REVISTIA

# EJMN

## EUROPEAN JOURNAL OF MEDICINE AND NATURAL SCIENCES

July - December 2019

Volume 2, Issue 2

ISSN 2601-6397 (Print)

ISSN 2601-6400 (Online)

REVISTIA
PUBLISHING AND RESEARCH

EUROPEAN JOURNAL OF
MEDICINE AND NATURAL SCIENCES

July - December 2019
Volume 2, Issue 2



Typeset by Revistia

ISSN 2601-6397 (Print)
ISSN 2601-6400 (Online)



Address: 11, Portland Road, London, SE25 4UF, United Kingdom
Tel: +44 2080680407
Web: https://ejmn.revistia.com
Email: office@revistia.com

Indexed in Elsevier's Mendeley, WorldCat, RePEc & Ideas, Google Scholar, Microsoft Academics, Crossref

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ANETA TOMESCU

# Research Concerning the Efficiency of *Aronia Melanocarpa* for Pharmaceutical Purpose

**Naliana Lupascu**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Emin Cadar**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Melat Cherim**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Cristina-Luiza Erimia**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Rodica Sîrbu**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Abstract**

The major impact of many types of disease on the human body have generated medical research orientation toward biotechnology identification and extraction of active principles from natural resources. The social problem to improve the health of the population, to maintain social balance of a healthy society oriented medical-pharmaceutical research for the use of other sources of pharmaceuticals from natural sources and not synthetic chemistry. On this line of work is also included the research wich orientates pharmaceutical medical studies by using new sources of bioactive compounds such as: anthocyanes, flavonoids, phenolic acids, chlorogenic acid, tannins, vitamin P,C, B2, B6 from the shrub Aronia Melanocarpa. Besides these compounds are also found in the fruits different cyanidin glycosides: 3-galactoside, 3-glucoside, 3-arabinoside and 3-xyloside. The rich content in bioactive forms makes possible the use in treating certain diseases by using internal use in household. For internal use are used by diabetics having hypoglycemic effect, astringent properties and very strong diuretics, they are cardiac tonic, regulates blood pressure and blood glucose, treatment of varicose veins and hemorrhoids, it has a good hepatoprotective effect due to its high iodine content , are effective in hyperthyroidism and can be consumed by sufferers of Alzheimer's disease and relieving symptoms slowig the aging processes.

**Keywords:** antioxidant activity, anthocyanes, flavonoids, phenolic acids, chlorogenic acid, tannins, vitamin P, C, B2, B6

## Introduction

Of all the least studied species in our country and with strong antioxidant effect our attention was drawn to Aronia melanocarpa, multiyear shrub, native of North America but brought into the country a few years ago. Calling itself also the "miracle fruit" in our country is cultivated mainly for ornamental reasons, but in other countries like America, Serbia, Russia, Bulgaria, Poland, Germany it is part of tree programs. In addition to decorative purposes, there are industrial plantations of Aronia because the fruits are edible, and the high content of antioxidants (15 times more than blueberries), resveratrol and vitamins may be a solid reason for establishing this culture in Romania, especially that the plant does not require heat, resistant to cold weather and frost , diseases or pests. There are shrubs with wonderful fruit crops in: Alexandria (Teleorman), Satu Mare, Craiova. The purpose of this paper is to study and characterize the species of Aronia Melanocarpa for use as feedstock for active principles of therapeutic interest.

## Medicinal Herbs

In Dobrogea the art of healing diseases was greatly expanded along monasteries, where monks were used to gathering and processing medicinal plants. In the same time in villages there were numerous healers to call on, if necessary, the

majority of the population. By communion with nature, native people always loved plants and have used the gifts offered by them with great skill and wisdom. In practice folk weeds were gleaned during the optimal harvest time, dried and prepared as concoctions aqueous extract by soaking in an acid environment (wine, vinegar), alcohol extraction (brandy, liqueur) in oil or by preparation of some based ointments, cream, butter or sheep fat.. [1]

**Aronia Melanocarpa**

Aronia Melanocarpa, Family Rosaceae is grouped in Subfamily Maloideae with Pyrus, Malus, Amelanchier, Sorbus and Photinia and is included by some authors in Pyrus or Photinia. There are reports with (Scorbus spp) [2, 3] The genus Aronia (Rosaceae family, Maloideae subfamily) includes two species of deciduous North American shrubs: A. melanocarpa (Michx.) Ell., known as black chokeberry, and Aronia arbutifolia (L.) Pers. (red chokeberry) plus a purple chokeberry whose origin is a natural hybrid of the two. [4, 5]

**Red chokeberry**, Aronia arbutifolia (*Photinia pyrifolia*), grows to 2–4 m tall, rarely up to 6 m and 1-2 m wide. Leaves are 5–8 cm wide and densely pubescent on the underside. The flowers are white or pale pink, 1 cm wide, with glandular sepals. The fruit is red, 4–10 mm wide, persisting into winter.

**Black chokeberry**, Aronia melanocarpa (*Photinia melanocarpa*) [5,6] tends to be smaller, rarely exceeding 1 m tall and 3 m wide, and spreads readily by root sprouts. The leaves are smaller, not more than 6 cm wide, with terminal glands on leaf teeth and a glabrous underside. The flowers are white, 1.5 cm wide, with glabrous sepals. The fruit is black, 6–9 mm wide, not persisting into winter.

**Purple chokeberry**, Aronia prunifolia (*Photinia floribunda*) [5,7] apparently originated as a hybrid of the black and red chokeberries but might be more accurately considered a distinct species than a hybrid [4,5] (see also nothospecies). Leaves are moderately pubescent on the underside. Few to no glands are present on the sepal surface. The fruit is dark purple to black, 7–10 mm in width, not persisting into winter. There are purple chokeberry populations which seem to be self-sustaining independent of the two parent species [4]. The range of the purple chokeberry is roughly that of the black chokeberry.

**Pharmacologically Constituients**

**Anthocyanins in aronia melanocarpa**

Much of the interest in Aronia Melanocarpa fruit is focused on its anthocyanin content. The juice from Aronia melanocarpa berries is a source of phenolic compounds with antioxidant properties: procyanidins, anthocyanins, (–)-epicatechin, chlorogenic acid, neochlorogenic acid. [8]

In chokeberry fruits, anthocyanins constitute the second largest group of phenolic compounds [4, 27]. The anthocyanins in A. melanocarpa are mainly a mixture of four cyanidin glycosides: 3-galactoside, 3-glucoside, 3-arabinoside and 3-xyloside, of which cyanidin 3-galactoside is the main one (Figure 1) [9, 10].

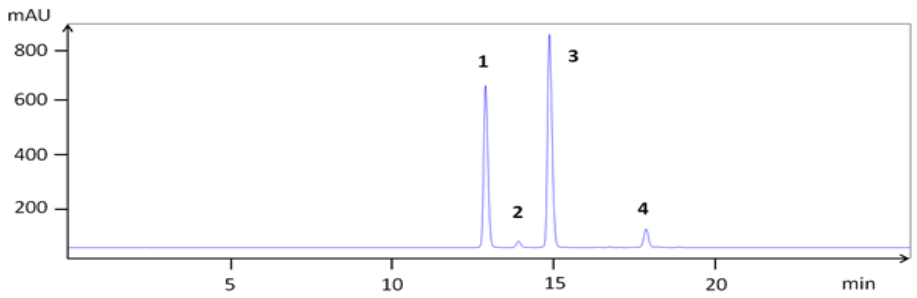
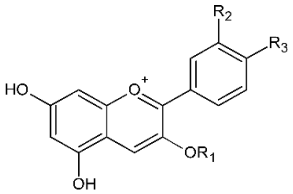



**Figure 1.** High-performance liquid chromatography (HPLC) chromatogram of the isolated anthocyanins: cyanidin 3-galactoside (1), cyanidin 3-glucoside (2), cyanidin 3-arabinoside (3) and cyanidin 3-xyloside (4). [9, 10].

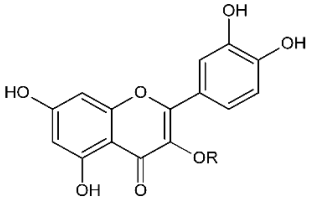
Other flavonoid compounds were also identified in both fruits and flowers of A. Melanocarpa.



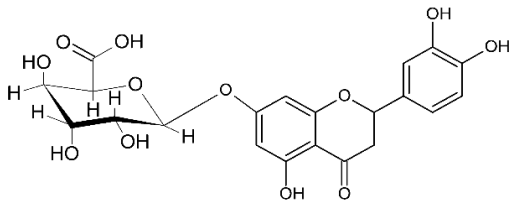

| | | | |
|---|---|---|---|
| cyanidin-3-O-galactoside | $R_1$ = gal | $R_2$ = OH | $R_3$ = OH |
| cyanidin-3-O-glucoside | $R_1$ = glc | $R_2$ = OH | $R_3$ = OH |
| cyanidin-3-O-xyloside | $R_1$ = xyl | $R_2$ = OH | $R_3$ = OH |
| cyanidin-3-O-arabinoside | $R_1$ = ara | $R_2$ = OH | $R_3$ = OH |
| pelargonidin-3-O-arabinoside | $R_1$ = ara | $R_2$ = H | $R_3$ = OH |
| pelargonidin-3-O-galactoside | $R_1$ = gal | $R_2$ = H | $R_3$ = OH |

**Fig. 2 Chemical structures of anthocyanins present in A. melanocarpa**. [11]

Five flavonol–quercetin derivatives - 3-vicianoside (6”-O-b- arabinosyl-b-glucoside), 3-robinobioside (6”-a-rhamnosyl- b-galactoside), 3-rutinoside (6”-a-rhamnosyl-b glucoside), 3-b-galactoside, and 3-b-glucoside - were also identified in flower umbels of A. melanocarpa (Fig.2) [10,11]




| | |
|---|---|
| R = 6"-O-β-arabinosyl-β-glucoside | = Quercetin 3-vicianoside |
| R = 6"-α-ramnosyl-β-galactoside | = Quercetin 3-robinobioside |
| R = 6"-α-ramnosyl-β-glucoside | = Quercetin 3-rutinoside |
| R = β-galactoside | = Quercetin 3-galactoside |
| R = β-glucoside | = Quercetin 3-glucoside |




Eriodictyol 7-glucuronide

**Fig.3. Chemical structures of quercetin glycosides and eriodictyol glucuronide present in A. melanocarpa**.

**Pharmacological Activity**

**a) Antidiabetic activity**

Aronia melanocarpa fruit juice (AMFJ) is rich in phenolic antioxidants, especially flavonoids from the anthocyanin subclass.

In a study was researched the influence of AMFJ on plasma glucose and lipids in diabetic rats. Diabetes was induced by an intraperitoneal injection of streptozotocin (50 mg/kg). AMFJ was applied by gavage at doses of 10 and 20 ml/kg for 6 weeks to normal and diabetic rats. Streptozotocin caused a significant elevation of plasma glucose by 141% and of plasma triglycerides (TG) by 64% in comparison with normal control rats and induced statistically insignificant elevations of total cholesterol and LDL-cholesterol and a reduction of HDL-cholesterol.

**Tabele 1 . Chemical composition in Aronia Melanocarpa [12]**

| CHEMICAL COMPOSITION<br>Aronia melanocarpa | | | |
|---|---|---|---|
| | FRUITS | FRESH JUICE | PASTEURIZED JUICE |
| Constituents | | | |

| | | | |
|---|---|---|---|
| pH | 3.3-3.7 | 3.6 | 3.3 |
| Glucose g/L | 41 | 41 | 40 |
| Fructozse g/L | 40 | 38 | 37 |
| Organic acids | | | |
| Malic Acid g/Kg | 13.1 | 9.0 | 11.1 |
| Citric Acid g/Kg | 2.1 | 0.500 | 0.247 |
| Minerals | | | |
| K mg/L | 2850 | 2180 | 1969 |
| Ca mg/L | 322 | 150 | 185 |
| Mg mg/L | 162 | 140 | 160 |
| Fe mg/L | 9.3 | 4 | 0.4 |
| Za | 1.47 | 1.3 | 0.6 |
| Vitamins | | | |
| B1 Vitamin | 180 mg/Kg | 500 mg/L | NOT DETECTED |
| B2 Vitamin | 200 mg/Kg | 600 mg/L | NOT DETECTED |
| B6 Vitamin | 280 mg/Kg | 550 mg/L | NOT DETECTED |
| Pantotenic Acid | 2790 mg/Kg | 2200 mg/L | NOT DETECTED |
| C Vitamin | 137 mg/kg | 200 mg/L | NOT DETECTED |

Applied to normal rats, AMFJ did not influence plasma glucose and lipid levels. Applied to diabetic rats, AMFJ (10 and 20 ml/kg) significantly reduced plasma glucose by 44% and 42% and TG by 35% and 39%, respectively, to levels that did not significantly differ from those of the normal control rats and counteracted the influence of streptozotocin on total cholesterol, LDL-cholesterol and HDL-cholesterol. In conclusion, AMFJ significantly decreased the streptozotocin-induced abnormalities in blood glucose and TG in diabetic rats and might be useful in prevention and control of diabetes mellitus and diabetes-associated complications.

The antidiabetic activity of A. melanocarpa juice was demonstrated in patients with dia- betes mellitus. It was shown that daily ingestion of 200 mL of sugar-free black chokeberry juice over a 3-month period resulted in substantially lower fasting blood glucose levels in patients with non–insulin-dependent diabetes compared to the control group. The observed results indicate that supplementation of the diet with Aronia juice may exert beneficial supporting effects in diabetic patients. [13]

**b) Anti-inflammatory effects, antibacterial and antiviral activity**

Valcheva (2006) studied intensively anti-inflammatory effects and bacteriostatic activity of Aronia juice. Her investigation has demonstrated a remarkable hepatoprotective, a very good gastro protective and a pronounced anti-inflammatory effect of Aronia melanocarpa fruit juice in rats as well as a bacteriostatic activity in vitro against Staphylococcus aureus and Escherichia coli and an antiviral activity against type A influenza virus. The properties of Aronia were attributed to two constituents, ellagic acid and myricetin. In an in vivo therapeutic mouse model, Aronia, ellagic acid, and myricetin protected mice against lethal challenge. Based on these results, we suggest that Aronia is a valuable source for antiviral agents and that ellagic acid and myricetin have potential as influenza therapeutics.[14]

Another research was made by Ohgami K, et all. (2005). This study shows the anti-inflammatory power of Aronia: “the anti-inflammatory effect of 100 mg Aronia extract was as strong as that of 10 mg prednisolone”, “The anti-inflammatory action of Aronia extract was stronger than that of either quercetin or anthocyanin administered alone.” [15]

The anti-inflammatory effects of the anthocyane flavonoids in the natural juice from Aronia melanocarpa and of rutin-magnesium complex, the water-soluble derivative of rutin were studied in comparison with rutin. Two experimental models of inflammation were used. Inflammation of rat hind paw was induced either by 0.5% solution of histamine or by 0.01% solution of serotonin. The results showed that the anthocyane flavonoids from the natural juice of Aronia melanocarpa exerted more pronounced effects as compared to rutin in both models of inflammation.

**c) Antioxidant activity**

Aronia melanocarpa contain particularly high amounts of procyanidins, anthocyanins, and phenolic acids but the highest total phenolics and anthocyanin contents were found in chokeberry pomace with the values of 63.1 g per kg expressed as gallic acid equivalents, and 4.5 g per kg expressed as cyanidin-3-glucoside equivalents. [16]

The extract from A. melanocarpa (5-50 µg/mL) significantly inhibited platelet protein carbonylation (measured by ELISA method) and thiol oxidation estimated with 5,5'-dithio-bis(2-nitro-benzoic acid) (DTNB) induced by peroxynitrite (0.1 mM) (IC50 – 35 µg/mL for protein carbonylation, and IC50 – 33 µg/mL for protein thiol oxidation). The extract from A. melanocarpa seems to be also useful as an antioxidant in patients with breast cancer.[17]

The extract from A. melanocarpa (5-50 µg/mL) can plau an important role as components of human diet in prevention of cardiovascular or inflammatory diseases, where blood platelets are involved. [15]

Also, A. melanocarpa berries exert significant anti-platelet effects ex vivo.[18]

**d) Anxiolytic activity**

**Anxiolytic activity has been demonstrated by Valcheva (2009). She investigated** the effects of AMFJ (5 and 10 mL/kg) on anxiety using the social interaction test, on locomotor activity in the open field test and on working memory in the object recognition test in rats. AMFJ showed an anxiolyticlike effect which was demonstrated by a dose-dependent increase in the time of active social contacts between the test partners. The effects of both AMFJ doses were comparable to the effect of diazepam (1 mg/kg). AMFJ neither changed significantly horizontal and vertical locomotor activity, nor did it adversely affect working memory [19]

**e) A**nticancer activity

In breast cancer patients (before and during anti-cancer therapy) oxidative/nitrative damage to various molecules is observed.

A. melanocarpa berries significantly reduced, in in vitro system, the oxidative/nitrative stress and hemostasis changes in plasma from breast cancerpatients, after surgery and different phases of chemotherapy.[20]

In another study in acute lymphoblastic leukemia Aronia melanocarpa juice (AMJ) containing 7.15 g/L of polyphenols inhibited cell proliferation, which was associated with cell cycle arrest in G2/M phase, and caused the induction of apoptosis. AMJ significantly increased the formation of reactive oxygen species (ROS), decreased the mitochondrial membrane potential and caused the release of cytochrome c into the cytoplasm. AMJ treatment also induced apoptosis of different human lymphoblastic leukemia cells (HSB-2, Molt-4 and CCRF-CEM). In addition, AMJ exerted a strong pro-apoptotic effect in human primary lymphoblastic leukemia cells but not in human normal primary T lymphocytes. AMJ has chemotherapeutic properties against acute lymphoblastic leukemia by selectively targeting lymphoblast derived tumor cells. [23]

A. melanocarpa juice was shown to strongly inhibit sulfoconjugation of 17b-estradiol in Caco-2 cells and also to exhibit an inhibitory effect on cytosolic sulfotransferase, the enzyme involved in estrogen deactivation, from human carcinoma cells in vitro. These results indicate that black chokeberry extracts might influence the growth of some breast and colon cancers through sulfotransferase inhibition, and therefore alter estrogen availability to their receptors. [20]

The effect of semipurified anthocyanin-rich was investigated extract from fruits of Aronia meloncarpa, on normal colon and colon cancer cell lines. A 24-h exposure to 50 µg monomeric anthocyanin/ml of Aronia extract resulted in 60% growth inhibition of human HT-29 colon cancer cells. The treated cells showed a blockage at G1/G0 and G2/M phases of the cell cy- cle. The cell cycle arrest coincided with an increased expression of the p21WAF1 and p27KIP1 genes and decreased expression of cyclin A and B genes.

Prolonged exposure to the extract resulted in no further change in the cell number, indicating a cytostatic inhibition of cell growth. NCM460 normal colon cells demonstrated <10% growth inhibition at the highest concentration of 50 µg/ml extract. A 35% decrease in the cyclooxygenase-2 gene expression was observed within 24 h of exposure of HT-29 cells but did not translate into de- creased protein levels or protein activity. [21]

**Conclusions**

- Modern pharmacological research presents A. melanocarpa as a plant with numerous Health – promoting activities. [11].
- Aronia melanocarpa contain particularly high amounts of procyanidins, anthocyanins, and phenolic acids. These antioxidants reduce the oxidative damage of human cells that can lead to cancer, heart disease, diabetes, hypertension, hypercholesterolemia. The black chokeberry may be used in the treatment and prevention of numerous civilization diseases. [22]
- The fruit of Aronia has proven to be one of nature's most powerful antioxidants , rich in nutrients and vitamins, offering extraordinary benefits to the ones that want to improve their health through healthy eating habits. Today Aronia fruit due to antioxidant phenols, are demanded on the world market as a quality dietary product, welcomed in daily food ration for strengthening the body and promote healthy lifestyles.

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# Collagen Sources and Areas of Use

**Melat Cherim**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Alef Mustafa**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Emin Cadar**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Naliana Lupașcu**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Stelian Paris**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Rodica Sirbu**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Abstract**

Fibrillar collagen type I undenatured represent the major structural component of all organs and connective tissues, which due to low antigenicity and outstanding biocompatibility the possibility of controlling the time of biodegradation by crosslinking, the ease of forming composites with other natural polymers and synthetic, represents one of the most used natural biomaterials . Collagen biomaterials are successfully used in gene therapy for artificial implants. They are used as medical devices, scaffolds for tissue regeneration, supports for drug release. Collagen can be extracted from various sources considering that it is one of the most abundant proteins on earth. It can be extracted from almost every living animal, even including alligators and kangaroos. Nonetheless, common sources of collagen for tissue engineering applications include bovine skin and tendons, porcine skin and rat tail among others. Marine life forms are also a considerable source of collagen, which can be extracted from sponges, fish and jellyfish. These collagens are widely used in the industry, but less for research and clinical usage. All these collagen sources are worth investigating considering that collagen properties differ from one animal to another. Collagen can also be used in biomedical applications as a decellularized ECM serving as a scaffolding material for tissue regeneration. Although extractible from many different sources, the diversity of acellular. Due to these features and the possibility to be isolated in pure collagen, they are essential in areas such as medicine, cosmetics, food and pharmaceutical applications.

**Keywords:** collagen type I, biomaterials, natural polymers, collagen sources.

## Introduction

The interest for collagen covers a historical long duration starting with leather processing, culinary uses and ending with pharmaceutical and biomedical applications. Behind the interest for collagen were the specific features and potential applications of collagen determining also the abundant data on this subject in scientific literature [1]. The benefits of using collagen in the biomedical and pharmacy area are coming from the fact that collagen is part of the architecture and functionality of the organism. On the human lifespan, collagen decreases quantitatively, with important consequences on the functioning of organs. It is estimated that after the age of 25, the decrease is 1.5% of the normal rate, which is not compensated by biosynthesis. Thus, collagen supplementation through diet or other ways is physiologically relevant for all organs and functions on whose regeneration to contribute [1].

About the diversity of data, selective approaches on issues have been adopted related to characterization, obtaining and exploitation of collagen in the biomedical-pharmaceutical field, which require conservation of certain biologically active features of native collagen. The presence of collagen in almost all organs and tissues, it's structural and biochemical peculiarities and role in human sanogenesis justify the effort of scientists in finding collagen implications in normal or pathological processes of the human body.

## 2. The Collagen Molecule

### 2.1. Distribution, biosynthesis and molecular structure

The presence of collagen in all connective tissue makes it one the most studied biomolecules of the extracellular matrix (ECM). This fibrous protein species is the major component of skin and bone and represents approximately 25% of the total dry weight of mammals [1]. To this day, 29 distinct collagen types have been characterized and all display a typical triple helix structure. Collagen types I, II, III, V and XI are known to form collagen fibers. Collagen molecules are comprised of three α chains that assemble together due to their molecular structure. Every α chain is composed of more than a thousand amino acids based on the sequence -Gly-X-Y-. The presence of glycine is essential at every third amino acid position in order to allow for a tight packaging of the three α chains in the tropocollagen molecule and the X and Y positions are mostly filled by proline and 4-hydroxyproline [2, 3]

**Composition of Fish Waste** The composition of the fish varies according to the type of species, sex, age, nutritional status, time of year and health. Most of the fish contains 15-30% protein, 0-25% fat and 50-80% moisture [4, 5]. Suvanich et al. [6] reported that the composition of catfish, cod, flounder, mackerel and salmon variedaccording to the species (Table 1, Fig. 1). Mackerel had the highest fat content (11.7%) and cod had the lowest (0.1%). Salmon had the highest protein content (23.5%) and flounder had the lowest (14%). The moisture content of the five fishes varied between 69 and 84.6% but the ash content of all species was similar. The fish proteins are found in all parts of the fish. There are three types of proteins in fish: structural proteins, sacroplasmic proteins and connective tissue proteins. The fish proteins can be extracted by chemical and enzymatic process.

## Research Methods

### Sources of Raw Materials - Treatments to Obtain Extracts of Natural Collagen

The main sorce of fibrillar collagen type I is animal skin. Traditionally, collagen was isolated from the skin of animals such as cattle and swine. To these sources were added lately marine organisms, generally fish, witch results in marine collagen. Even if it doesn't differe significantly from land collagen, it has certain commercial and technological advantages.

It is a known fact that in some countries, swine and cattle products are prohibited or difficult to access, so marine collagen represents an important sorce. Collagen is a typical animal derived. We mention this becouse in the commercialization of natural products a new collagen is used, and that is the vegetable collagen. Such products are actually mixtures, blends of collagen with different ingredients of vegetable origin or products based on soybean oil, which does not stand for the name of collagen.

Table I Collagen types, forms and distribution.

| Type | Molecular Formula | Tissue |
|---|---|---|
| I | $[\alpha_1(I)]_2[\alpha_2(I)]$ | Skin, Bones, Tendon |
| II | $[\alpha_1(II)]_3$ | Tendons, cartilages |
| III | $[\alpha_1(III)]_3$ | Skin, liver |
| IV | $[\alpha_1(IV)]_2[\alpha_2(IV)]$ | Base membranes |
| V | $[\alpha_1(V)]_2[\alpha_2(V]$ | Amniotic membrane |
| VI | $[\alpha_1(VI)][\alpha_2(VI)][\alpha_3(VI)]$ | Cornea |
| VII | $[\alpha_2(VII)]_3$ | Sustaining fibres |
| VIII | $[\alpha_1(VIII)]_2[\alpha_2(VIII)]$ | Endothelial cells |
| IX | $[\alpha_1(IX)][\alpha_2(IX)][\alpha_3(IX)]$ | Cartilages |
| X | $[\alpha_1(X)]_3$ | Bone-cartilages transition tissue |
| XI | $[\alpha_1(XI)][\alpha_2(XI)][\alpha_3(XI)]$ | Cartilages |
| XII | $[\alpha_1(XII)]_3$ | Skin bones |
| XIII | $[\alpha_1(XIII)]$ | Muscles, cartilages |
| XIV | $[\alpha_1(XIV)]$ | Skin, cartilages |
| XV | $[\alpha_1(XV)]$ | Uterus, kidney |

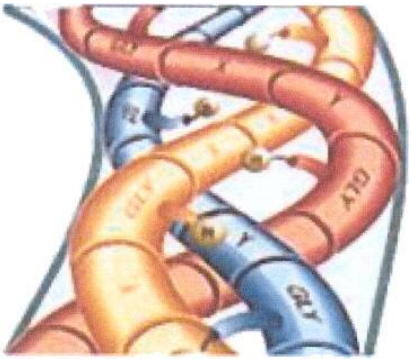


Figure 1. Schematization of a collagen α chain triple helix segment.

**The fish proteins can be extracted by chemical and enzymatic process.**

In the chemical method, salts (NaCl and LiCl) and solvents (isopropanol and aezotropic isopropanol) are used, whereas during the enzymatic extraction, enzymes (alcalase, neutrase, protex, protemax and flavorzyme) are used to extract proteins from fish. These fish proteins can be used as a functional ingredient in many food items because of their properties (water holding capacity, oil absorption, gelling activity, foaming capacity and emulsifying properties). They can also be used as milk replacers, bakery substitutes, soups and infant formulas. The amino acids are the building blocks of protein. There are 16-18 amino acids present in fish proteins.

The amino acids can be produced from fish protein by enzymatic or chemical processes. The enzymatic hydrolysis involves the use of direct protein substrates and enzymes such as alcalase, neutrase, carboxypeptidase, chymotrypsin, pepsin and trypsin.

In the chemical hydrolysis process, acid or alkali is used for the breakdown of protein to extract amino acids. The main disadvantage of this method is the complete destruction of tryptophan and cysteine and partial destruction of tyrosine, serine and threonine. The amino acids present in the fish can be utilized in animal feed in the form of fishmeal and sauce or can be used in the production of various pharmaceuticals.

**Collagen and gelatin**

The fish skin waste is a good source for collagen and gelatin which are currently used in food, cosmetic and biomedical industries. Collagen and gelatin are two different forms of same macromolecule in which gelatin is a partially hydrolysed form of collagen. The collagen and gelatin are two unique and more significant forms of proteins in comparison to that of fish muscle proteins. The significance lies upon the amino acid content; more than 80% are non-polar amino acids such as glycine, alanine, valine and proline [7]. Heat denaturation of collagen easily converts it into gelatin. The collagen and gelatin extracted from bovine sources pose the risk of mad cow disease or bovine spongiform encephalopathy (BSE), whereas the collagen and gelatin extracted from fish skin eliminates these risks of BSE. The gelatin extracted enzymatically from fish skin has better biological activities as antioxidants and antihypertensive agents. The gelatin has a unique repeating sequence of glycine-proline-alanine in their structure compared to the peptides derived from fish muscle protein and it is the main reason behind the antioxidative propertyof gelatin [8, 9].

**Chemical extraction of fish protein**

The most common extraction method used for the fish proteins is the solvent extraction method. The standard protocol for the solvent extraction of proteins reported by Sikorski and Naczk [10]. The whole fish is first ground and the protein is extracted using isopropanol. After grinding, the supernatant is collected and extracted three times. The first extraction is carried out at 20-30°C for 50 min in isopropanol. The second extraction is carried out at 75°C for 90 min with isopropanol. The third extraction is carried out at 75°C for 70 min with azeotropic isopropanol. The final supernatant fraction is collected, dried, milled and screened to separate out bone particles. Hermansson et al. [11] reported that the fish protein concentrate can also be produced at a temperature of 50°C but it will have lower emulsifying properties and poor solubility. The disadvantages of this method are poor functionality, off-flavours, high cost of production and traces of the solvent in the final product, making it commercially unsuccessful. Another chemical method for the production of fish protein concentrate and gelatin was reported by Arnesen and Gildberg [12].

2000 g of the Atlantic cod are added to 2000 mL of water and the pH is adjusted to 11 with 62 mL of 3 M NaOH. The first extraction is carried out for 15 min and the sample is centrifuge is then suspended in 2000 mL and the pH is adjusted to 11 with 3 M NaOH (15 mL). The second extraction is carried out for 60 min and the sample is then centrifuged. The pellet is again suspended in 2000 mL of water and the pH is adjusted to 2 with 3M HCl (145 mL). The third extraction is carried out for 15 min and centrifuged. The supernatants from the three extracts are pooled together and the pH was adjusted to 7 with 3 M NaOH.

**Results of Collagen Applications in Biomedical and Pharmaceutical Industries**

The collagen itself is considered a drug/active ingredient, being used – in various forms – as a hemostatic and dressing treatment of various types of injuries. Regenerative-inductive qualities determine the use of collagen as a substitute of skin of bone.The positive effects of collagen on tissue regeneration and its iteraction with the cells are the main cause of interest of the local treatmant of the affecte tissue or the formation of new tissue, e.g., bone skin or nerves, using the scaffolds based of collagen. However the, natural protein, collagen alone can not cure an infected tissue alone, becouse the more there is the more bacteria can use it as a substrate.[13]

Due to the excellent biocompatibility and biodergradability, well-defined structure, biological characteristics and how it interacts with tissues, collagen is one of the most used biomaterials. Extracted as a aqueous solution or gel, collagen fibrillar type I, can be molded into various forms such as medical devices, artificial implants, supports for the disposal of drugs and skeletons(scaffolds) for regenaration of the tissue, with an important role in present medical practice.

In severe infections of the wound, systemic administration of drugs can lead to insufficient drug concentrations or drug side effects and/or systemic toxicity. This deficiency was solved successfully in local applications of drugs, thus developing delivery systems that have underlying collagen and as an antibiotic drug/antiseptic for infection control.[5]

Although intensely investigated worldwide, only a few controlled drug delivery systems (DDS) based on collagen were clinically tested and placed on the medical market. Their development is focusing on the so-called „smart systems" that are able to keep or dispose of controlled amount of medication. Moreover, with these developments there will be a better understanding of the great benefits derived from the local disposal of medicines, some of the new systems, collagen-drug, can replace standard systemic treament with antibiotics.[3]

Recent research have as subject the development of drugs delivery systems, growth factor, proteins, hormones, enzymes etc.. Collagen, used as an adequate support for drugs, offers the advantage of being a natural biomaterial with astrigent properties and wound healing. [14].

**Utilization of amino acids**

Amino acids are the building blocks of proteins. They have wide nutritional value, taste, medicinal action and chemical properties. All amino acids are sold in different quantities each year. They are used as food additives, in pharmaceutical applications, feed and food supplements. The amino acids such as arginine, glycine ,glutamate and histidine are used in protein pharmaceuticals as an excipient for drug development is shown. The largest consumer of amino acids is the food flavoring industry which uses monosodium glutamate, alanine, aspartate and arginine to improve the flavour of food. The second largest consumer of amino acids is the animal feed industry which uses lysine, methionine, threonine, tryptophan and others to improve the nutritional quality of animal feed. The amino acids can also used in various pharmaceutical applications such as protein purification and formulations and production of antibiotics such as jadomycin [15]. The total amino acid market in 1996 was estimated to be $4.5 billion. The market value of amino acids has drastically increased since 1996 [16]. Fermentation products in 2004 were estimated to be $14.1 billion and $17.8 billion and amino acids were the second most important category after antibiotics in 2009 [17].

Current applications worth mentioning:

In medical field: treatment for hypertension, urinary incontinence and pain associated with osteoarthritis, inhibition of agiogenic diseases, such as complications of diabetes, obesity and arthritis.[4]. Fish collagen is a product with a real potential to become a key element in the development of artificial bones and therapies made for this purpose [ 18]. In ophthalmology, researchers are trying to implant biodegradable collagen in gaucoma surgerys [19].

Pharmaceutical: they are used as excipients for various forms of drugs administration, vector systems for the controlled release of active substances emulsions, pastes, eye washes and various containers [13].

In the cosmetic field: base for emulsions and cosmetic creams, complex systems of chemical peels, used as a gel, cream, serum or injections, collagen improves the suppleness and elasticity of the skin, repairing the damage caused by age and exposure to UV radiation.

Marine collagen cannot be injected at this time, so its effect is limited to the creams and masks in which is used. It may be also administered orally. [20]. In its hydrolyzed form, collagen is used as a nutritional adjunct in beverages, pasta and bakery products. [13]

**Conclusions**

- This scientific work achieves its informative purpose in providing inside the narrated documents with useful data for researches in the field.
- The presented information, open the possibility of valorizations of black sea domestic resources associated with technological options and drug delivery systems with particular originality potential applications based on a specific area.
- Towards this diversity of data, we adopted a carefull and selective approach on issues related to characterization, abtaining and exploitation of collagen in the biomedical-pharmaceutical fields, that require the use of certain feutures and attributes preserving biologically native active collagen.

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# The Reflection of Human Rights in the Health System from the Angle of Patients' Rights

**Cristina-Luiza Erimia**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Rodica Sîrbu**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Emin Cadar**

Umf Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Aneta Tomescu**

Ovidius University of Constanta, Faculty of Medicine, Constanta, Romania

**Stelian Paris**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Abstract**

Ever since the drafting of the principles for the promotion and implementation of patients' rights in European states member of the W.H.O., human values expressed in several intergovernmental instruments were reflected in health care systems. Given that patient rights are part of human rights and are intended to promote long-term patient autonomy, this article examines how human rights are respected from the angle of patient interaction with the health system. In the contemporary era, when the right to health is a human right and is based on its natural rights, European countries and the European Community have addressed the question of the rights of people who use health services. This article aims to present the reconsideration of the position of the patient in its interaction with the health system, which involves the statement and application of new rights and obligations. However, when exceptional limits are imposed on patients' rights, they must be consistent with human rights instruments and have a legal basis in national laws. The limitations that may be imposed on patients' rights, seen as individuals, may be subject to limitations or restrictions only when they are justified by a major interest, such as, for example, public health.

**Keywords:** fundamental rights, the right to health, patients' rights, European legislation, public health, public policies, the European Union

## 1. Introduction

Throughout historical evolution, the patient has had many obligations, but no rights in the modern sense. For authorities, much more important than individual wellbeing was epidemic control, which is the underlying reason for public health care.

The findings of political democracy, along with economic and scientific progress, have changed the game of power.

In the decades that followed World War I, the progress of citizens' rights became the foundation for modern patients' rights. The introduction of the popular vote and the clear definition of citizens' rights created the foundation for articulating a desire for various social services, including healthcare. In our opinion, scientific progress between the two world wars has highlighted the potential to treat a growing number of diseases, not only increasing the number of patients but also their expectations.

The idea of modern citizenship should not be limited to voting rights and participation in formal political decisions. In our view it must also offer rights in other spheres such as the right to work, to life, education, housing and healthcare.

In the contemporary era, when the right to health is a human right and is based on its natural rights, European countries and the European Community have addressed the question of the rights of people who use health services.

Patients' rights are part of human rights and are intended to promote long-term patient autonomy. These rights are often intertwined.

Although political statements, for example on human rights, are too general and imprecise to serve as a manual of patients' rights, their value as a source of ideological inspiration and ethics was significant.

**2. Theory**

Before the explicit advent of patients' rights, several generations were needed. The 1945 Charter of the United Nations and the Universal Declaration of Human Rights of 1948, followed in 1950 by the European Convention on Human Rights [1] have not addressed the problems of the patient, but several universal human rights.

These documents, together with the International Covenant on Civil and Political Rights (1966), International Covenant on Economic, Social and Cultural Rights (1966) [2] and the European Social Charter (1961) [3] offered together a framework and a set of basic concepts that have been applied to patients' rights.

The legal regulation of patients' rights started with the European Consultation on the Rights of Patients of the W.H.O. (Amsterdam, 28 to 30 March 1994), which authorized the document "Principles of patients' rights in Europe: a common framework", which consists in a set of principles for the promotion and implementation of patients' rights in European states members of the World Health Organization. Subsequently, the Oviedo Convention [4] gave the patient a catalogue of rights and proclaimed his fundamental rights.

A result of these signals has been an increase in the national regulations on patients' rights in almost every European country, even though in some countries patients' rights had formal laws, applied relative to the political culture, such as the right of an individual to take legal action if a right is denied to a certain function or in cases of discrimination based on ethnic criteria or sexual behaviour.

In some systems, patients' rights are brought together in a general framework, in others there are numerous specialized legal documents.

In the context of the European Union, the affirmation of patients' rights had to take into account in particular the right to mobility of the citizens between EU states and the principle of equal opportunities, in the sense of the patient benefitting from quality services in both the countries of origin and the receiving countries and, particularly, to promote the implementation of these rights in all Member States.

**3. Results and Discussions**

One of the most important rights of patients is that of being informed. Patients' right to information is proclaimed in both international (the WHO Declaration, the Helsinki Declaration of the World Medical Association [5], the European Charter of Patients' Rights [6]) and in national documents, which represent the implementation of international legislation and in the field and of the European acquis.

The doctor can take the best therapeutic measures for the patient, but they must explain them to the understanding of the patient. Information about healthcare services and about the best way to use them should be publicly available, for the benefit of all those concerned.

It may be noted that at present, citizens, especially those from vulnerable groups, do not have basic information on their rights and obligations as patients. The lack of this information is due, on the one hand, to the lack of activity in the healthcare system in terms of communicating the minimum information on these rights and obligations, but also to a certain social inertia which has not hitherto led the interest of the Romanian patient in this matter [7]. Basically, citizens find out his rights and obligations in relation to the health system only when they have a problem in this area and get to use one or several services of the health system.

According to this principle, patients have the right to be fully informed about their health, including on the medical factors of their condition, about the proposed medical procedures, the potential risks and the benefits of each procedure, about alternatives to the proposed procedures, including the effect of non-treatment. Patients have the right to be fully informed about the diagnosis, prognosis and the progress of treatment.

Governments are obliged to provide information on health issues, information from both the state and private health service providers [8].

Transparency is an essential feature of an effective healthcare system, access to information also empowering citizens to participate effectively in political decisions taken at European, national and international levels.

For civil society it is necessary to monitor whether the state develops appropriate policies to promote access to health, so that individuals have access to information about the development and implementation of public health policies [9], without their fundamental rights being violated.

Information may be refused to patients, exceptionally, when there is good reason to believe that this information would cause them great harm, without any exception of possible positive effects. Such situation may be, for example, when a diagnosis with very grim prognosis must be communicated. Several issues ensue, both legal and ethical.

If the patient has the right to be informed about his health and has not explicitly requested not to be informed, can the doctor conceal the diagnosis on the grounds that it would cause greater harm? Medical practice in the field has shown that it is essential, both for the patient and for the health system, to have psychological support [10] for those patients who will be communicated unpleasant news regarding the diagnosis or treatment. Thus, a 2001 study [11] conducted on a group of 89 Canadian women with cancer, showed a 24% reduction in direct healthcare costs for those who received cognitive behavioural therapy. During the study the estimated savings amount to $ 6,199. This saving would have been significantly greater if treatment had been provided by social psychologists rather than psychiatrists.

The main responsibility in the healthcare field lies with the states, in the obligation to ensure a proper promotion and protection of public health, for the improvement of the quality of life.

Pursuant to that principle, everyone is entitled to respect for his person as a human being, to self-determination, to physical and mental integrity and to the security of his/her own person.

Thus, a person cannot be treated medically without consent. Informed consent arose from the need for vulnerable people not to be exploited [12].

By free and informed consent is understood the patients' right to participate in decisions affecting them [13]. Before signing, patients must receive information, to understand and to remember them, to analyse the situation and make decisions. The patient will have to be able to explain to others, in simple terms, the procedure which he/she is subject to.

In terms of self-determination, we consider relevant to broach the patient's right to decide whether it wishes to be kept alive artificially.

This can be expressed earlier occurrence of such situations in the patient's medical condition or when this occurs and the patient is still conscious.

In terms of self-determination, we consider relevant to bring into question the patients' right to decide whether they wish to be kept alive artificially.

This option can be expressed prior to the occurrence of such situations in the patient's medical condition or when this occurs and the patient is still conscious.

If the patient is braindead, the decision rests with carers who have to decide taking into account the previously expressed wishes of the patient.

Eloquent in this respect is the case of Terri Schiavo, a legal battle in the United States relating to artificially maintaining vital functions, which lasted from 1990 to 2005 [14]. In this case the issue was whether to apply the decision of Maria Theresa "Terri" Schiavo's husband and legal representative to remove the feeding tube that maintained Terri's vital functions. Terri was diagnosed as being in a persistent vegetative state, although this diagnosis was disputed by her parents and the doctors employed by them. The highly publicized and prolonged series of legal challenges raised by her parents and the state and the lack of federal legislative intervention caused a delay of seven years before her supply tube was finally removed [15].

As another consequence of this principle, everyone is entitled to respect for their own confidentiality, to the respect of their private life.

There are certain areas in the health sector in which privacy acquires other dimensions, such as, for example, the medical services related to the sexual and reproductive health [16], particularly that of sexually active adolescents or of homosexuals [17]. These vulnerable groups often avoid to ask for professional help, on the one hand for fear their secret being disclosed and, on the other hand, for fear of being seen in a certain institution providing health services [18].

Although the obligation of medical confidentiality is guaranteed by all normative acts (international, European, national), there are situations where it can be surpassed by another obligation of public or general interest. This is the case of patients that could pose a danger to themselves, to the family and to others, where the legislation allows the information of "third parties" about certain aspects of the medical act. In the event that a patient would be a threat in terms of spreading sexually transmitted infections or HIV / AIDS due to unprotected intercourse, the doctors have the duty to ensure they protect third parties through adequate information or counselling [19]. Most of the times it is enough for the doctor to ensure that the patient has the real representation of the risk he/she poses and would take the right steps to protect their sexual partners or family from possible infection.

On the other hand, patients cannot claim the right to privacy in order not to alert medical staff on a number of risks that they themselves would have been required to prevent, such as, for example, if an HIV-positive patient who does not inform his/her dentist about his/her health. [20]

The patients' right for their privacy to be respected has great applicability in healthcare especially when it comes to terminating a pregnancy, sexual and gynaecological diseases etc. In this respect are relevant the decisions of the European Court of Human Rights - ECHR.

Thus in the case R.R. v. Poland [21] the Court was again asked to rule on the highly sensitive issue of abortion, only a few months after a resounding rulings in the field [22].

Poland was convicted of breach of *Articles 3 (prohibition of inhuman and degrading treatment) and 8 (right to respect the private and family life)*, the Court expressing a paradoxical jurisprudence position. Although the Court expressed its position on granting the freedom of Member States to recognize or not the right to abortion, it also showed its growing will to ensure this right when it is protected internally. The laudable desire to protect pregnant women who want an abortion, resulting from the solution ruled in 2011, contrasts sharply with the refusal crystallized at the end of 2010 to grant a conventional autonomous right to abortion.

On art. 3 of the Convention, the Court held that it cannot be excluded that the acts and omissions of the authorities in the field of healthcare policy may engage, in certain circumstances, their liability under art. 3 because of their failure to provide appropriate medical treatment [23].

In this case, the Court found that, although the applicant should have had access to the genetic testing recommended by doctors, the whole period was marked by procrastination, confusion and lack of counselling, the applicant not being properly informed. She was admitted to a hospital by a subterfuge, as emergency.

National law imposed a duty on the State to ensure free access to prenatal information and tests, especially in cases of suspected genetic disease or developmental problems. However, there is no indication that the legal obligations of the state and medical staff about the patient's rights were taken into account.

The Court noted that the applicant was in a state of great vulnerability. Like any pregnant woman in such a situation, she was deeply disturbed by the information that the foetus could be affected by some malformation. It was therefore natural for her to want to get as much information as possible to determine if the initial diagnosis was correct, and if so, what the nature of the disease was. Due to the delay on the part of health professionals, she had to endure weeks of painful uncertainty regarding the health of the foetus, her health and the future of her family in the perspective of raising a child suffering from an incurable disease, suffering which reached the minimum threshold in accordance with art. 3 of the Convention, on which the violation was found.

Regarding art. 8 of the Convention, firstly, the European Court confirmed the applicability of that article to the facts of the case, recalling that "*the decision of a pregnant woman to continue the pregnancy or not falls within the scope of private life and personal autonomy*".

Undoubtedly, the legislation regulating abortion affects private life [24], and the state has a wide discretion to define the circumstances under which permits abortion, but once this decision is made, the legal framework designed for this purpose

must be coherent and able to take account of the various legitimate interests at stake at an adequate level and in line with obligations under the Convention.

Analysing the procedural dimension of this Article, the Court held that prenatal genetic testing targets different purposes and cannot be regarded as an incentive for pregnant women to seek abortions, and that States are required to organize the health system to ensure the effective exercise of freedom of conscience of doctors, without being able to deny patients access to health services, in accordance with the applicable law, and the courts must provide an effective appeal to remedy situations such as that in which was the applicant.

From the human rights perspective, the patient has the right to have its own moral and cultural values and the right to be respected their philosophical and religious beliefs. Regarding the patient's refusal to give their consent to a medical intervention on religious grounds [25], we can take the example of Jehovah's Witnesses cult members. Witnesses are very categorical in this regard. They would rather die than receive a transfusion in case of an accident or an operation. This refusal also applies, of course, to underage children. Most witnesses carry a document signed both by themselves and by two witnesses establishing the refusal of transfusion and prohibiting medical personnel to perform it if unconscious. Jehovah's Witnesses organization shows that blood transfusion is the equivalent of eating blood because it resembles an intravenous feeding. A witness who accepts transfusion will be called before the committee of judges, behind closed doors, and will be excluded from cult [26].

In our view, we consider it necessary to make some remarks concerning the protection of religious freedom. As a universal human right, the right to freedom of thought, conscience, religion or belief, guarantees the respect for diversity. Its free exercise directly contributes to democracy, the rule of law and stability. The violation of this universal right may exacerbate intolerance and often is an early indicator of potential violence and conflict.

Everyone has the right to manifest religion or belief (individually or together with others, in public and in private), in worship, observance, practice and teaching, without fear of intimidation, discrimination, violence or attacks. People who change their religion, those who renounce religion and those adherents of non-theistic or atheistic beliefs must be protected equally. Violations or abuses against the freedom of religion or belief, committed both by state and non-state actors, are widespread and complex and affect people from all over the world, including in Europe.

In line with global and European standards on human rights, the EU and its Member States undertook to respect, protect and promote the freedom of religion within their borders. In Europe, the freedom of religion or belief is protected in particular by Article 9 of the European Convention on Human Rights [27] and Article 10 of the EU Charter of Fundamental Rights [20].

In contrast with the freedom to have a religion, to have a belief or disbelief, the freedom to manifest one's religion or belief may be subject to strictly regulated limitations, necessary to protect public safety, order, health or the morals or the fundamental rights and freedoms of others. These limitations shall be in accordance with international standards and must be interpreted strictly. Limitations on other grounds, such as national security, are not allowed. Any limitations on the freedom to manifest religion or belief must meet the following criteria: must be stipulated by law, are not applied in a manner which vitiate the rights guaranteed in Article 18, to be applied only for purposes for which they were intended, to be directly related and proportionate to the specific need for which they were created and may not be imposed for discriminatory purposes or applied in a discriminatory manner.

Reaffirming its determination to promote, in its foreign policy on human rights, the freedom of religion or belief as a right that is exercised by any person anywhere, based on principles of equality, non-discrimination and universality, the European Union adopted the EU Guidelines on the promotion and protection of freedom of religion or belief [29]. By this document and in its foreign policy instruments, the EU intends to contribute to preventing and addressing in a timely, systematic and consistent manner, the violation of this right.

**Conclusions**

Ever since 1948, various international bodies have presented various declarations and agreements on patient rights, of which some refer exclusively to health, such as Article 35 of the Charter of Nice, which guarantees a high standard for the protection of health, the right to security preventive health, or the right to benefit from medical treatment under conditions established by national laws and practices.

As regards the Council of Europe should be recalled, in particular, Recommendation Rec (2000) 5 on the development of structures for citizen and patient participation in the decision-making process affecting health care [30]. The recommendation reaffirms the universality, indivisibility and interdependence of all human rights and fundamental freedoms and the need for people with disabilities to enjoy fully without any discrimination, these rights and freedoms.

The document took note of the failure to promote the rights of disabled citizens, for which inequality of opportunity is a violation of human dignity.

The Council of Europe, convinced that human rights must be addressed to ensure the integrative participation of persons with disabilities in society, recommends their incorporation into all relevant policy areas at international, national, regional and local level as ensuring equal opportunities for members of all groups in society contributes to strengthening democracy and social cohesion.

Patients' rights are part of human rights and are intended to promote long-term patient autonomy. These rights are often intertwined. From the same principle on human rights and values in healthcare, each citizen has the right to health protection, to the extent available, through adequate disease prevention and healthcare, and to the opportunity to pursue reaching the highest possible level of health.

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# The Patient – The Most Important Point of Medical System

**Stelian PARIS**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Rodica SÎRBU**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Emin CADAR**

UMF Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Aneta TOMESCU**

Ovidius University of Constanta, Faculty of Medicine, Constanta, Romania

**Melat CHERIM**

UMF Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Cristina-Luiza ERIMIA**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Abstract**

The patient status is the main concern of doctors and the entire health system. The present paper shows more issues starting from the quality of a healthcare consumer and reaching patient behavior induced by the disease.

**Keywords:** the patient, health system, healthcare consumer

## Introduction

### What is a patient?

Usually, when dealing with a health problem, has taken a decision, answering the questions: should assess my health? Does the pain that I will or should go to a doctor? Do good product is presented on TV and for my pain?

A first step would be deciding to opt for a medical service and to observe the evolution of the state.

Consumer of medicines and medical services, the patient, can choose your doctor, pharmacist and finally, although the influence could be considered indirect, it causes all components of healthcare company. If self, consumer decision is significant at the pharmacy, but this trend should not be encouraged by the pharmacist, regardless of the economic implications thereof.

**Alternatives patient in case of disturbing symptoms**, which must decide are: call a medical service or self.

### Patient Motivation

Psychological studies, whose results are used by the marketing in consumer knowledge, show that human activity including human behavior, are targeted to satisfy certain basic needs, for which there are common views between clinicians and psychologists, on the nature of those needs.

**Maslow** presents them in order of importance to most people as a scale, a normal guy trying to satisfy the needs of first base, after which, only, is free to focus their attention to other steps of the ladder.

**Ladder rungs of Maslow**:

1. *Physiological needs* - are based, and they are hungry, thirsty, sleep, until they are satisfied, other needs are without significance for the individual.
2. *The need for safety (security)* - in modern society, these needs are not often reflected in the needs for economic security and social needs rather than physical safety.
3. *The need for belonging and love*. The need for relationships and individuals with the disease need to take a place in society, groups, clubs, associations etc.. is so important that its absence is a common cause of noncompliance.
4. *The need for discretion*. People need self appreciation (assessment of their own) and the estimation of others in the social. Full filment of this need creates a sense of utility and self confidence before the world;
5. *The need is self-actualization desire* to achieve the maximum possible and, although it is present in each individual performance depends on its previous performance of other basic needs and economic and social conditions concrete.
6. *The need for knowledge* refers to the search of the meaning of things around us, in the literature are references to a certain instinct of curiosity present in humans.
7. In an effort knowledge of patient, consumer medicines, it is important to know that the disease is an altered state of health, which require a decision, a process that has several stages.

**Stages of decision-making related to the disease:**

- was a change in health status - the amendment is significant
- need help
- preferably is a type of aid
- is a suitable remedy or treatment
- a degree of cooperation with the doctor is necessary.

**Factors influencing the decision on the severity of patient symptoms** are:

- measures of interference with normal activities or characteristics,
- clarity of symptoms,
- the threshold of tolerance of the person presenting symptoms,
- severity of symptoms and familiarity;
- hypotheses on the cause;
- assumptions about forecasted;
- interpersonal influences;
- other moments of crisis in the life of the person presenting symptoms;
- assumptions on treatability;
- physical manifestations;
- impression management (organization, the order of impressions).

The patient is one who takes the decision to ask for help from those dealing with health care, unlike the cases of self-treatment or surrender to the disease.

In these studies led to the hierarchy of criteria involved in choosing the pharmacy:

- high professional competence,
- lower prices,
- personal attention shown by the pharmacy staff,
- a pharmacist who knows the doctor who prescribed;
- source of information about medicine, pharmacy well supplied with many types

**Patient compliance**

Compliant (agreement, consent, approval) is a patient support of therapeutic success.

What factors influence compliance?

- Receive recipe from the first doctor is not related to compliance. Price limitation may be another factor, especially for those who have insufficient income. This may be the health insurance system;

- Price may be a factor in favor of complianţei: if a drug is more expensive, patients will be treated with respect and will follow the scheme in May conscientious treatment.

Influence on medication cost complianţei been studied in detail for the purpose of determining all factors that have a role in this. Were the following:

- prescription cost,
- cost of medication for one day of treatment,
- the reported cost of the entire prescription,
- the full cost of treatment,
- perceived cost, expected cost,
- the cost of past experiences,
- the cost based on ability to pay,
- opportunity cost (subsidy on purchase medicine

**Significance of medical prescription for sick**

It is possible that the prescription to be become a common thing so that we may have lost sight of some of its functions, being the focus of the interaction between pharmacy and medicine, while being the subject of conflict. In pharmaceutical practice, the prescription has a central place.

Prescription is to give more definition:

- limitation may relate to a product, issued pursuant to written order, so the patient enters the pharmacy with a prescription in hand and leaves the pharmacy with other prescription;
- as a form of verb "to prescribe" the term may refer also to the issue of orders by a licensed practitioner;
- as defined in the dictionary, the prescription may relate to the orders of drug administration, thus "taking a tablet three times daily" is also a prescription.

Prescription serves as a way to communicate with your patient and pharmacist, transmitting its recommendations related to medical therapy. According to author Smith, this is a legal authorization to spread myth of medicine, and after it was completed, serving as a therapeutic.

Obvious limitation of the functions are:

- means of communication,
- legal document,
- source documentation,
- therapeutic method,
- by means of medical therapy;
- mechanism for use of samples, means of clinical tests.

**Characteristics of marketing consumer products and medical services and pharmaceuticals**

Consumer of medical services is the consumer of pharmaceutical services, because most processes include therapeutic medication given the patient. Those who provide medical services or pharmaceutical required to measure the market and its segments, with their characteristics, in order to understand individual consumers, how they see things, such as thinking and reacting. This concept of reality-oriented consumer.

**Sources of information about health services:**

In terms of marketing, the sources of information consumers are divided into 4 groups:

(1) Uncontrolled marketers personal (family, friends, personal physician of someone),

(2) personal control marketers (representatives, sales agents)

(3) non Uncontrolled marketeri (media, ambient),

(4 ) non-marketer controlled (catalogs, brochures, spreadsheets).

The marketer task is to interview the consumer and to ask what sources of information accessed during the process of buying. On these data it can make a map that includes the most popular sources. A consumer may be exposed to all these sources. Certainly it can be a complex process. The buyer not only receives information from various sources, but he placed different values on each source of information.

**Psychological characteristics of the patient**

Choice Decision medical service or product has a significant subjective component, and response to disease depends largely on the temperament and character.

**Personalities and enhanced disease**

There are 4 types of personalities related to accentuate certain traits of character.

*Live demonstration of nature* in this more immediately, take hasty decisions, is recalcitrant about treatments. Demo rattled up medical leave, is advantageous to adapt to the weaknesses they listen. It is prone to breakdown and nervous exhaustion.

*Hiperexact nature suffers*, conversely, gaps in the ability of repression: the decision indecision, doubt, oscillations between interminable opinions, inhibitions and self excessively. It is very meticulous man with a jealous care for himself, developing a strong sense of fear. You can get to nervous, to obsessive neurosis. Fear of germs is often encountered, sometimes ablutomanie (obsessive tendency to wash), also nosofobia (fear of illness).

*Nature hiperperseverent substrate* has the abnormal persistence of disease. It resulted in susceptible people (easily offended, that he always injured), yellow, stubborn, ambitious and blame it on others hostile attitude. Certainly, anxiety and fear psychological colour painting. Ideas at the meeting, even fixed obsession with passages for paranoid psychopathy and neurosis to hypochondria.

The hiperseverent has its own ideas about his illness, which seeks to impose them.

*Nature fit is dominated by momentary impulses*, which contrasts with the apparent slow thinking, high-strung detailed to pedantry. Impulsive acts can be violent. Nature fit is commonly encountered in childhood, is worse at puberty. The patient is irritable, exploration and even questions the doctor is a damper, on the other hand, it is difficult to follow a lifestyle or diet.

**Individual reactions to the phenomenon of disease are:**

- Recognition of disease
- An emotionally balanced individual, with a satisfactory level of medical and health culture in the face of disorder of a somatic or psychic or arising without apparent wear adjusts its behavior through hygienic dietary provisional pending presentation to the doctor, as required.
- Ignore the state of disease is the absence of symptoms, neglect their cultural ignorance.
- State of denial by the underestimation of disease or, even if they recognize the disease, will not accept the disease, risking a worsening of symptoms. Denying a state of sickness, when the subject receives a series of symptoms show him that “something is not right ”with the body or even his psyche may be based on two fundamental attitudes:
- delaying the decision vague hope in its transient nature, or lack of seriousness
- unconscious mechanisms of water

**Patient attitude towards the disease can be:**

- Combative attitude is own a significant number of patients in a state of relative equilibrium in mental illnesses and when equipped with a type of personality that allows an adequate adaptation to reality;
- attitude of resignation, of disregard to the fate of its own, usually a show with a sick feeling depressed more or less expressed, but other patients whose religious or concepts psihofizic with fatalistic iz predispose them to such reactions, the neighboring state of indifferentism (own particular Mystics);
- attitude refuge in sickness, caused by the secondary benefit that we have some patients with serious existential issues;

- attitude of recovery than the disease, the attitude that include all the side out of this impasse is a disease.
- attitude of "bad use" of the disease is reasonably required for very serious diseases and, inexcusably, the slight overestimate of disease. It consists of immersion in suffering, in the agitation and anxiety.

**Psychic and somatic discomfort imposed by illness**

- *Specific somatic disorders*. Besides the excruciating symptoms capable of exasperating patient (pain, dyspnea, fever, cough, vomiting, diarrhea, vertigo, etc.).
- Asthenia, dizziness standing increase due to the dietary and or side effects of medication are unnecessarily concerned about what symptoms the sick, which is related to "halo" psihofizic of the sick.
- *Somato-psychiatric disorders nonspecific*. Common are: insomnia, anxiety, mental asthenia, etc.

**Behavioral changes induced by disease**

- *egocentrism* as a result of the restriction concerns outside of the disease, becoming the spotlight diet, digestion, excretion, and its related sensations or Sickness;
- *dependence*
- *emotional processes* of the type - outbursts of crying, anger or even jollification are frequently encountered in sick people
- *aggression*
- *anxiety*
- *depression*
- *magical way of thinking, illogical*- The patient believes passionately in the power of the doctor, drugs and even disease.

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# Breech Presentation: Vaginal Delivery or Caesarean Section?

**Tomescu Cezar-Laurentiu**

Ovidius University of Constanta, Faculty of Medicine, Constanta, Romania

**Sirbu Rodica**

Ovidius University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Emin Cadar**

UMF Carol Davila Bucharest, Faculty of Pharmacy, Bucharest, Romania

**Brezeanu Dragos**

Resident physician, OB-GYN Department,

County Emergency Clinical Hospital "Sf Apostol Andrei", Constanta, Romania

**Aneta Tomescu**

Ovidius University of Constanta, Faculty of Medicine, Constanta, Romania

**Abstract**

The incidence of breech presentation is approximately 3,97%. Breech presentation is considered as being "borderline eutocic" and it requires carefully monitoring both the foetus and the mother. The aim of the current paper is to evaluate the preffered method of delivery in case of breech presentation. The paper presents a retrospective study performed in the Obstetrics and Gynaecology Departments of the County Emergency Clinical Hospital "Sf. Apostol Andrei" in Constanta, during a period of 5 years (2010-2014). The methods of birth were analyzed for a lot of 1104 patients with breech presentation with ages ranging between 16 and 44 years old. The total number of patients who gave birth through vaginal delivery was of 139 patients, amounting to 12.59% of the total population sample. The number of patients that gave birth through C-section was 965, which amounts to 87.4% of the total population sample. Birth through C-section is preferred by both obstetricians and patients alike, due to the fact that vaginal delivery is associated with a higher foetal risk in breech presentation.

**Keywords:** Breech Presentation, Sacrum, Foetus

## Introduction

Breech presentation is the variety of presentation in which the foetus exits the upper strait of the maternal pelvis with its inferior pole (the pelvis), its landmark point being the foetal sacrum bone. The incidence of breech presentation is approximately 3.7% [1].

## Classification

Breech presentation can be:

- complete: with knees and hips flexed; the foetal feet can be palpated in the area of the upper opening.
- incomplete: the foetal inferior members are elongated along the foetal abdomen.

## Aetiology

The normal development of pregnancy is characterized by a breech presentation of the foetus in the 7$^{th}$ month of gestation, after which the foetus rotates reaching a cephalic presentation. A body of mass immersed into liquid must subject itself to the laws of equilibrium, meaning that the centre of mass must be situated above the centre of gravity; from the 7$^{th}$ month onwards, the centre of gravity is situated above the centre of mass, leading to the rotation of the foetus. Even though the pelvis of the foetus is larger, it is also reducible, meaning that it can better adapt to the uterine fundus, which is wider [2].

**Aetiological factors accounting for breech presentation (which impede rotation)** [3]:

1. Maternal factors:
- Modified pelvic bone
- Praevia tumors
- Uterine malformations
- Uterine fibroids
- Hypoplastic uterus.
2. Foetal appendage factors:
- Placenta praevia
- Oligohydramnios
- Primitive short umbilical cord or nuchal cord
3. Foetal factors:
- Large foetuses (larger than 3800 g)
- Foetal malformation characterized by abnormalities of the cephalo-pelvic disproportions: hydrocephalus, anencephaly, cerebral meningocele
- Multiple pregnancies

**Research Methods**

The current research is a retrospective study conducted in the County Emergency Clinical Hospital "Sf. Apostol Andrei" in Constanta, over a period of 5 years between the first of January 2010 and the 31st of December 2014. Patient observation charts from 1104 patients admitted to the Obstetrics and Gynaecology Department were studied. The main point of interest was represented by the method of delivery – either through caesarean section or vaginal delivery. During the 5 years, the total number of births in the County Emergency Clinical Hospital "Sf. Apostol Andrei" was 14,763.

**Results and Discutions**
**Statistical Data**

2010: The total number of births was 2894, out of which 208 (7.18%) were breech presentation births. Out of these, 173 patients delivered through C-section (83.7%) and 35 through vaginal delivery (16.83%)

2011: The total number of births was 2918, out of which 219 (6.61%) were breech presentation births. Out of these, 162 patients delivered through C-section (83.93%) and 31 through vaginal delivery (16.07%).

2012: The total number of births was 3186, out of which 246 (7.72%) were breech presentation births. Out of these, 225 patients delivered through C-section (91.46%) and 21 through vaginal delivery (8.54%).

2013: The total number of births was 2972, out of which 223 (7.5%) were breech presentation births. Out of these, 200 patients delivered through C-section (89.68%) and 23 through vaginal delivery (10.32%).

2014 : The total number of births was 2793, out of which 234 (8.37%) were breech presentation births. Out of these, 205 patients delivered through C-section (87.6%) and 29 through vaginal delivery (12.4%).

**Total study lot, fig. 1:**Throughout the 5 years of study, the total number of births was 14,763, out of which a total of 1,104 were breech presentation births (7.47%). Out of these, a total of 965 were C-sections (87.4%), while the remainder of 139 were vaginal deliveries (12.59%).

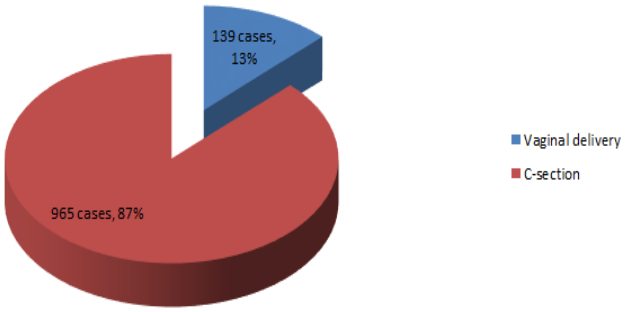


Fig. 1 Breech presentation births

It is worth noting that patients that delivered vaginally (139 – 12.59%) originate from a rural environment (77 patients – 55.4%) and that the remainder originate from an urban environment (62 patients – 44.6%) Fig. 2.

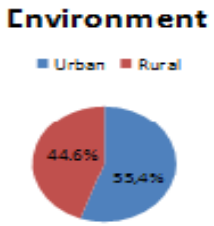


Fig. 2 The distribution of the patients after the environment

**Ages of patients who underwent a C-section:**

Patients younger than 20-years old: 57 (5.9%);
Patients between 20-30 years old: 569 (58.96%);
Patients between 31-40 years old: 315 (32,64%);
Over 41-years old: 24 (2,48%).

**Ages of patients who delivered vaginally:**

Patients younger than 20-years old: 12 (8.63%);
Patients between 20-30 years old: 71 (51.07%);
Patients between 31-40 years old: 46 (33,09%);

It can be observed that the maximum incidence is over 50% for the 20-30 years old age group, both for patients who delivered vaginally and for those who delivered through C-section.

Birth in breech presentation can follow the natural course of vaginal delivery in optimal conditions. Birth can either occur spontaneously (Vermelin [1) or through manual assistance (Bracht-Tovianov [1]). Others recommend a systematic C-section (Wright) [2].

The Romanian Obstetrics-Gynaecology Guidelines recommend a C-section in the following situations:

- Primitive extension of the foetal skull;
- Foetal macrosomia (estimated foetal weight over 3,800g);
- Prolapse of the umbilical cord;

- Prematurity according to: foetal viability, number of pregnancies, age of the mother and other obstetrical factors;
- Intrauterine growth restriction (estimated foetal weight under the 10th percentile or lower than 2,000g);
- Any other co-morbidity associated with breech presentation;
- Uterine scarring;
- Premature rupture of membranes (The Romanian Obstretics and Gynaecology Society Guidelines, 2012 [4]).

**Vaginal delivery**

In the absence of clear indications for C-section, the operating physician must inform the patient regarding delivery methods for breech presentation pregnancies. After informed consent, the patient is allowed to opt for vaginal delivery [4] .

Researches that have studies the ulterior development of children originating from breech presentation pregnancies show that there is no difference in the type of delivery regarding morbidity, mortality or psycho-functional development. There is however, a small difference in what regards early morbidity, with lower rates in the case of children born through C-section (The Romanian Obstretics and Gynaecology Society Guidelines, 2012 [4]).

Foetal accidents during vaginal delivery:

- Humerus or collarbone fracture;
- Femur fracture;
- Neonatal perinea lesions;
- Haematomas of the sternocleidomastoid muscle;
- Disjunction of the scapula, humerus, or femur epiphysis;
- Brachial plexus paralysis;
- Severe testicular lesions that can lead up to anorchia [5].

**Perinatal morbidity and mortality:**

Maternal mortality is around 2-3%, while foetal mortality is around 10-15% [2]

Perinatal mortality is higher in breech presentation compared to cephalic presentation [6].

**Conclusions**

A number of 1104 breech presentation births were evaluated. Out of these, a total of 965 were solved through C-section (87.4%), with the remainder of 139 through vaginal deliver y (12.59%). It can be observed that 87.4% out of all breech presentation pregnancies were ended via C-section.

The incidence of breech presentation in our study was of 7.47%, which represents almost double compared to the data available in literature on the matter. The high percentage of C-sections can be explained to the level of safety such an intervention awards to the foetus (taking into account the foetal accidents that can occur during vaginal delivery).

Mothers aged between 20-30-years old exhibit the highest incidence in what regards births (58.96% for C-sections and 51.07% for vaginal deliveries); vaginal delivery births are more frequently observed for mothers originating from a rural environment (55.4%), compared to those from an urban environment (44.6%).

In what regards future prospects, it is expected that the number of C-sections will increase, partly due to the fact that Romanian guidelines permit mothers to choose the method of delivery and partly because this type of delivery is associated with a lower level of risk, an important aspect to take into account for obstetricians, as the number of malpractice complaints is on the rise.

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# Qualitative Data Regarding the Macrophytic Communities Structure in the Wave Breaking Zone at the Romanian Black Sea Littoral

**Bogdan-Stefan Negreanu-Pirjol**

"Ovidius" University of Constanta, Faculty of Pharmacy Constanta, Romania

**Ticuta Negreanu-Pirjol**

"Ovidius" University of Constanta, Faculty of Pharmacy, Constanta, Romania

**Emin Cadar**

U.M.F. "Carol Davila", Faculty of Pharmacy, Bucharest, Romania

**Gabriela–Mihaela Paraschiv**

3"Ovidius" University of Constanta, Natural and Agriculture Sciences Faculty,

Constanta Romania

**Abstract**

At the Romanian seaside the development of macro-algae mass is reported mainly in summer and is registered especially by the group green macro-algae; thus the largest deposits occur ashore after periods of storm especially, but especially after bottom movement, when a large area of shallow coastline is "shaved" of vegetal carpet. Most macrophyte algae from the Romanian littoral are seasonal species; typical for low temperatures are species of red algae: Bangia, Porphyra and Ectocarpus; species Dasya, Chondria are typical for the summer temperatures and others are frequently met especially in spring – fall; in addition to these, a number of species belonging to the group of green algae. Enteromorpha, Cladophora, are present in all associations succeeding in the year.

**Keywords**: Black Sea Romanian littoral, macroalgal species, hard substratum

## Introduction

The Romanian littoral of the Black Sea has a length of 245 km (6 % of the total length of the Black Sea shore, Fig. 1), between the flowing mouth of the Chilia Branch, to the border with Ukraine in the north and with Bulgaria in the south.

The Romanian coastal area is divided into two geographical and geomorphic units [3], [13].

The northern unit (N) occupies 2/3 of the total littoral length and stretches between Musura Bay, at the flowing mouth of the Chilia Branch and Cape Singol, including the shore of the Danube Delta Biosphere Reservation (Fig. 1). The area is characterized by sandy beaches with low altitudes and reduced submarine slopes. The beaches are generally wide and made up of sediments which include a large variety of fine sand, silt and sludge fractions, 75% of this area displaying a relatively high degree of sediment compaction.

It is characterized by the presence of narrow beaches interrupted by limestone platforms that extend into water, and high seawalls (Fig. 1). The superficial sediments include a large variety of mollusk shells and gravel, these beaches being made up of coarse sand with medium granulometry.

Between the two big geomorphic units of the Romanian littoral, the continental platform extends more to the north (Danube Delta). The terrigenous runoff transported by the Danube causes the sedimentary substrate to be dominated by clay and silt, not favorable for the attachment of macrophytobenthos [2], [3], [7], [8], [9]. Despite this fact, the protection jetties for the harbor and beaches, but most especially the presence of the deep mussel infralittoral biocoenosis (*Mytilus galloprovincialis* Lamarck, 1819) and its extension (relatively large, from St. George Branch to Vadu and Constanta) determine the development of a harder substrate (shell layer) which permits the installation and development of macrophytobenthos [20], [21], [22], [23], [24], [25 - 28]. This explains the occasional presence of algal deposits at the shore, especially after storms.

The frequency of episodes with macroalgal deposits is higher in the southern sector (and over longer periods of time), a fact explained by the very presence of submerse limestone platforms (Fig. 1).

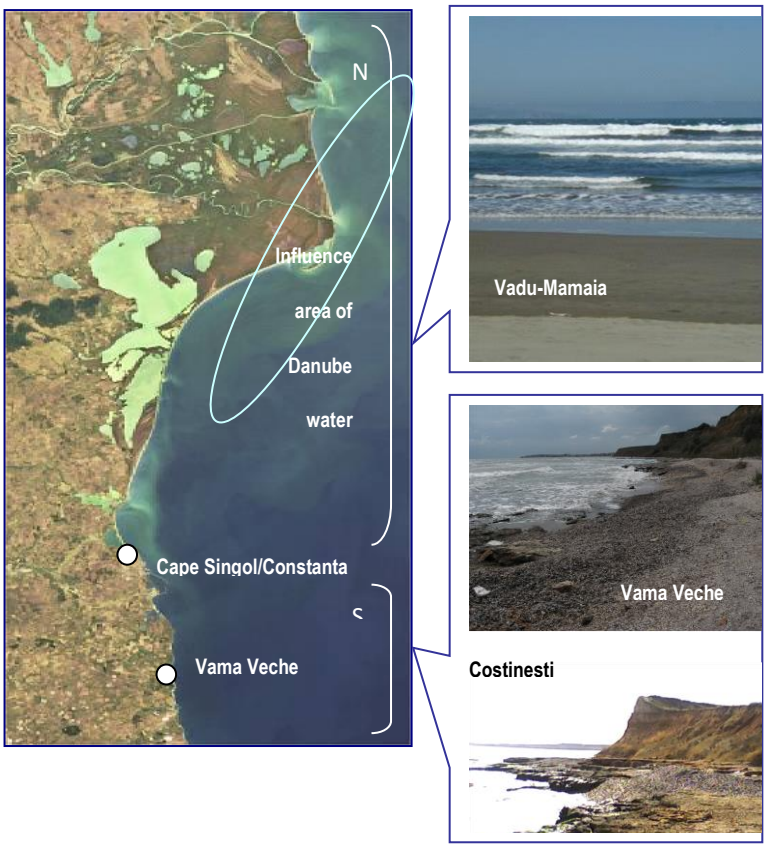



**Fig. 1. The South Romanian littoral of the B Sea**

The macrophytobenthos is made up of macroscopic algae (green, brown and red) and phanerogams. It is spread over the north-western continental platform of the Black Sea basin (in littoral zones of low depth) and it can sometimes form important deposits at the shore, especially in the pre-vernal or vernal season or after storms.

The 1980s represent a period of increased eutrophication and pollution, which generated important modifications in the qualitative structure of macrophytobenthos. The effects of these modifications are still felt today [4], [19], 86 macroalgal species were cited in the 1970s-1980s [1], 69 species were cited in the 1980s-1990s and only 55 species after 1990 [20], [21]. This decrease in the number of species (apart from the pollution phenomenon) was attributed to climate changes –

frost at the Romanian littoral (for unprecedented long periods of time) on the one hand and to the deposits of clay sediments on limestone platforms (fraction mobilized and brought to the sea mass as a result of hydrotechnical constructions in the Harbors of Cape Midia and Agigea South) on the other hand. The sedimentation of clay fractions on the limestone substrate did not permit the attachment of plantules to the substrate [18], [19].

**The taxonomic structure of macroalgal communities at the Romanian littoral**

The qualitative analysis of the marine macroalgal communities consists of the elaboration of lists of species, as well as a comparative analysis of communities from different littoral sectors. A previous documentation must be done because there are species with development phase in the prevernal – cold season (February-March), this being the period when they can be encountered at the shore [1], [3], [4], [5], [17], [18].

**Green algae – *CHLOROPHYTA***

Distributed over the entire length of the Romanian sector, from south of the Danube flowing mouths to the southern extremity of the littoral (Vama Veche). They are more developed in the Cape Singol-Constanta to Vama Veche sector. The mass development of the macroalgal carpet in this sector is explained by the very presence of limestone platforms which cover almost entirely the shallow waters and which represent the ideal substrate for their attachment.

The group includes representatives of *Clorophyceae*, three orders: *Ulvales*, *Cladophorales* and *Bryopsidales* (Table1); the vegetative apparatus is diverse: lamellate, filamentous, tubular or cladomial [1], [6], [18], [19], [20], [21] (Table.2).

**Brown algae – *PHEOPHYTA***

Brown algae prefer cold marine waters, developing exuberantly at greater depths than green algae. Representatives from three classes are found at the Romanian littoral: Isogeneratae (with two species of *Ectocarpus* and one species of *Scytosiphon*), Heterogenerateae (*Punctaria*) and Cyclosporeae (with the most representative species at the Romanian littoral from this group, *Cystosera barbata* (Good *et* Wood Ag.)

The representatives of the first two classes register reduced biomasses compared to the representatives of green algae, especially in spring and autumn. In the Black Sea, *Cystoseira barbata* forms a perennial association fixed to the hard substrate, especially in the southern sector of the Romanian littoral. If in the past in was one of the most important associations, covering the infralittoral zone between Agigea-Vama Veche, it is currently much reduced (due to the frost periods in 1975 but also to pollution, increased water turbidity and substrate clogging). The biomass of this alga in deposits at the seashore is relatively reduced, but its importance is given by the fact that its relatively rigid thallus constitutes a substrate for a rich fauna and for epiphytic algae.

**Red algae - *RHODOPHYTA***

The representatives of this group make up the phytobenthos in the deep zone of the infralittoral. The

algal deposits register an increased biomass compared to brown algae, but reduced in comparison to green algae. Two classes have representatives in the Black Sea:

- Bangiophyceae (with *Porphyra leucosticta* Thur and *Bangia fuscopurpurea* Lyngb. Both are cold water species and grow at the end of winter till March without developing significant biomasses, compared to green algae);

- Florideophyceae – with the perennial species, *Hildenbrandtia rubra* Menegh., (distributed in the shallow zone, attached to rocks or to mollusk shells). The species *Corallina officinalis* L. (pharmaceutical importance – vermifuge) develops in the shallow infralittoral - permanently covered by water - and shelters a characteristic fauna. It rarely occurs in shore algal deposits. Four species of the genus *Phyllophora* form "Zernov's field" in the north-western basin of the Black Sea. It registers maximum development at depths of 20-25 m and attaches to sandy substrate with sludgedy matrix. This field suffered a significant reduction but clusters that form associations specific to the invertebrate fauna can still be encountered. The biomass is reduced in the shore deposits. There are four representatives of Ceramiaceae: *Callithamnion corymbosum* Lyngb. and three species of the genus *Ceramium* (these develop significant biomasses in the shallow zone – depths

between 1.5 to 4-5 m, (Fig. 2), in the prevernal and vernal season. One species from Rhodomelaceae – *Polysiphonia denudata* Grev. encountered in the warm season but without significant biomasses [4], [5], [17], [18].

**Table 1. Representatives of *Clorophyceae* encountered at the Romanian littoral of the Black Sea** (according to Sava, 2006 [18], [25 - 28], photo: Sava, Paraschiv)

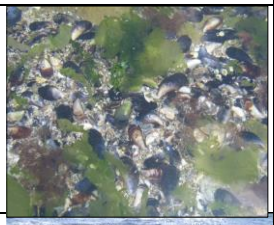
| Species of *Ulvales* that develop appreciable biomass especially in the prevernal, vernal ant autumnal season | | | | | |
|---|---|---|---|---|---|
| Order | Family | Species | Photo | Observations | |
| Ulvales | Ulvaceae | *Ulva rigida* Ag. |  | Maximum development in winter-spring, attached to rocks, at low depths; frequent in areas with high concentrations of nutrients, together with sp. Entromorpha. They are the first species of macroalgae that colonize the substrate. | |
| | | *Enteromorpha intestinalis* (L) Link. |  | All the species of the genus *Enteromorpha* display wide ecological valences being cosmopolite. Develops appreciable biomasses especially in prevernal and vernal seasons, forming a compact vegetal carpet on the surface of rock platforms. It dominates in a proportion of 80% the algal deposits at the sea shore. | eurybiont |
| | | *E. compressa* (L) Grev. | | | It develops well in waters rich in organic compounds of sulfur and nitrogen. |
| | | *E. linza* (L) Ag. |  | | eurybiont |
| | | *E. flexuosa* (Wulf) Ag. |  | | Important for the antibacterial activity *Mycobacterium tuberculosis* and possible bio-indicator for waters contaminated with heavy metals |
| | | *E prolifera* (O.Müll) J. Ag. | | | eurybiont |
| | Ulotrichaceae | *Ulothrix implexa* (Kütz.) Kütz. |  | Develops especially in the cold period of the year, in spring and autumn on hard substrate and epiphyte on the thallus of other macroalgae. | |

**Table 2. Species of *Cladophorales* that develop appreciable biomass in the prevernal, vernal and autumnal season** [25 - 28]

| Order | Family | Species | Observations | |
|---|---|---|---|---|
| Cladophorales | Acrosiphonaceae | *Urospora penicilliformis* (Roth.) Aresh. | Cold water species considered arctic relic. It grows in midlittoral waters, attached to rocks but can also reach greater depths. It lacks in the Mediterranean. | Filamentous thallus, non-ramified that can reach 30 cm in length |
| | Cladophoraceae | *Cladophora vagabunda* (L) Hoek. | Very abundant at our littoral; a good indicator for highly eutrophicated waters; wide ecological valences | |
| | | *C. sericea* (Huds) Kütz. | | |
| | | *C. laetevirens* (Dillw.) Kütz. | | |
| | | *C. albida* (Huds) Kütz. | | |
| | | *C. dalmatica* Kütz. | | |
| | | *Chaetomorpha aerea* (Dillw.) Kütz. | Abundant in the warm season, in shallow waters; it is considered valuable as food in the extreme east. | |
| Bryopsidales | Bryopsidaceae | *Bryopsis plumosa* (Huds.) Ag. | It develops well in the warm period of the year, in eutrophicated waters – even polluted | |
| | | *B. hypnoides* Lamor | | |

**Fig. 2. Algal deposit at the sea shore made up of species from the genus *Ceramium* and depigmented green algae in advanced decomposition state** (Eforie Sud, Photo: Paraschiv)

**Materials and Methods**

**Collection and processing of samples of macrophytic algae**

**1. Qualitative analysis**

It involves the collection of samples from different places along the transect line without applying the sampling method (Fig. 3). The result of this type of analysis is represented by the list of species.

**Sample collection for qualitative determinations**

Observations and collection of algae for qualitative determination was made monthly, especially after storm periods, to identify the dominant perennial and seasonal species, and to capture the different stages of the development cycle. Fresh algal samples were taken in the laboratory, washed of the associated fauna and sorted in the main groups; the sampling is done so that the estimation of the abundance can be done (after density and biomass); for this purpose, a classical procedure was pursued, but unanimously supported by specialists in the world community, that of sampling the "square sample".

Samples are obtained by integral collecting of plant biomass by scraping the substrate corresponding to a square sample; for each sample at least one replicate was taken; samples are stored in the chest freezer and will be processed in the laboratory. Photographs in the field, before taking samples, will complete the picture of the structure of macro-algal associations from the southern part of the Romanian coast.

In this case, the study objective was to establish a list of species in a given region. The study of biodiversity is complex and long, its purpose being more than just the publication of lists of species valid at one moment, but also the appreciation of the way in which these lists change in time and space, as well as the reasons for these changes, which can be due to natural variability or the impact of biotic and abiotic factors.

In order to obtain this kind of long-term results and for their comparison in time and space, it is necessary to standardize them and maintain them at the same level of precision in sample collection, as well as their processing and analysis. These objectives are difficult to reach for practical reasons, especially in the case of macrophytes.

Algae collection for qualitative determinations takes place monthly or at least once every other month in order to detect not only the perennial but also the seasonal species, as well as for the determination of stages in the development cycle. Also, it is recommended to collect whole samples, both with the fixing portions (rhizoids, disks or cramps) and the apical parts of the thallus, all structures being necessary for the correct identification of species.

Algal samples are brought fresh to the laboratory, washed from the associated fauna and sorted on main groups. The fresh material is determined macroscopically and microscopically, using field guides or specialized papers: *Ulvales (Chlorophyta*) from URSS Seas (Vinogradova, 1974); A critical survey of European Taxa in Ulvales (Bliding, 1963); Revision of European species of *Cladophora* (van Hoek, 1963); Sur le *Ceramium* de la Mer Noire (Celan şi Şerbănescu, 1959); Algology Book vol II, vol III (1977, 1979); Wold Life Diversity–Ilustrated Book of Romanian Flora and Fauna, vol I –Marine Environmental (1995); Guides des algues des mers d'Europe (Bouduresque, 1992).

**2. Quantitative analysis**

This type of analysis involves the collection of biological samples usable for an estimation of abundance (according to density and biomass) [8]. For this purpose, a classical method is used as it is unanimously accepted by specialists and known as the sampling by means of the "sample square."

**Establishing transects** (Fig. 3.a).

Transects that conform to certain conditions must be chosen in order to collect samples of macrophytic algae:

- To be accessible in different climatic conditions,
- To be easy to locate but to maintain the collection conditions,
- To tolerate repeated collections (samples), at different distances from the shoreline.

**Substrate**

In the distribution of flora and algal vegetation, the nature and aspect of the substrate are very important. Apart from the rocky substrate (Fig. 3.b), limestone platforms, protection jetties), two other factors are also important: the substrate represented by mollusk shells and the thallus of certain algae, for fauna.

**Materials and equipment**

Simple and accessible equipment is needed for the collection of samples: knife, plastic bags, cloth sacks, plastic dishes, tracing paper, pencil, refrigerating box. The samples are obtained by the total collection/scraping from the substrate of a vegetal biomass corresponding to a sample. At least one replicate will be taken for each collection. The samples are kept in the refrigerating box and processed in the laboratory.

**Sample collection for quantitative determinations**

The quantitative estimations are important for the understanding of the structure and functioning of a population, for the analysis of the biochemical compounds, as well as for the estimation of current deposits, especially in the case of species valuable from the economical point of view.

The quantitative collection of macrophytic algae is realized using the square method, by means of frames of proper sizes, which are established according to the characteristics of the respective population, as well as to the type of substrate.

In concrete conditions regarding the type of macrophytic algal vegetation at our littoral, as well as the substrate it prefers, wooden frames (10/10 cm) are used for quantitative collection (Fig. 3).

All the algae from this surface are collected, each sample being introduced into a plastic bag and labeled with the date, place and depth of collection. Three replicates are usually collected from each depth.

The fresh samples brought to the laboratory are washed from the associated fauna, sorted on main groups (green, red and brown algae). Then, the species are separated in each group after their prior identification.

In order to obtain the dry biomass values, the samples are dried at $105^0$C in the drying oven for 24 hours. The biomass is calculated for each species and the final value is represented by the average of each species collected in the three samples from each depth, then multiplied by 100 and expressed in $g*m^{-2}$.

The value of abundance according to the dry biomass (e.g. for *Cladophora vagabunda*), collected from a depth of 1 m: $A_1$ – value of dry biomass from the first replicate; $A_2$ – value of dry biomass from the second replicate; $A_3$ – value of dry biomass from the third replicate; B $g/m^2$ (*Cladophora* biomass at 1 m) = $(A_1 + A_2 + A_3) \times 100$

At the end of sample processing and identification of species, the individuals in each species are counted and thus we obtain the abundance on sample surface. The arithmetic mean is realized depending on replicates and its value is extrapolated to square meter (surface unit) and represents abundance according to density (expressed in number of individuals per species$*m^{-2}$).

**Results and Discussions**

Macrophytes recorded mass development during periods of optimal thermal and nutrients regime, as follows: species of clorophyte group (Table 3): *Urospora penicilliformis*, red algae species, *Bangia fuscopurpurea, Porphyra leucosticta, Ectocarpus siliculosus* are frequently met in February and May, while species *Dasya, Chondria* appear during summer; cosmopolite species belonging to genus *Enteromorpha* (*E. intestinalis, E. compressa, E. linza, E. flexuosa, E. prolifera*) *Ulva rigida, Ceramium (C. elegans, C. diaphanum)* are present in all the associations follow one another during the year. Perennial algae: *Cystoseira barbata* and *Cy. bosphorica* from the shallow rocky littoral areas and *Phyllophora nervosa*, *Ph. brodiaei* from greater depths of circa littoral, but until 50 m (almost 50 years ago a wide field of about 11000 $km^2$, in the NW

part of the sea was described as a true red "plain" formed by species of genus *Phyllophora* – with a biomass over 5,6 million tone; this representing one of the basic biological characteristics of the Black Sea [17].

Observations and studies that we have done over several years enabled us to identify the two summer periods in which large amounts of macro-algae are detached from the substrate and bonded to the shore (especially in the group of green algae-*Chlorophyta*), in June – August .

In addition to natural factors such as prolonged periods of freezing from the Romanian seaside in the years `70 -`80, the emergence of high intensity storms, the anthropogenic factors have had an important contribution; studies in recent years have shown a significant decrease in the number of species of algae covering the shallow littoral south of Constanta (Table 4, [18]), and this was made on behalf of human impact stemming mainly from the work of the Port of Constanta South Agigea (large amounts of fine clay sediments reached the water through port works and hydro technical works, determining decrease of transparency and change of shallow bottom waters because the sediments that were deposited on hard substrate created a mobile substrate and prevented macro-algae deposition).

a. b. c.

**Fig. 3. Sample**

**collection: the sample square" for qualitative and quantitative determinations of the macroalgal flora: a. the choice of transects perpendicular to the shore line; b. the "sample square" method; c. sampling by corer for quantitative determinations in the depth of the column with algal substrate and fauna associated to this substrate** (Photo: a. Vama Veche - 2 Mai; b. Vama Veche and Mangalia; Paraschiv, Sava, Negreanu), [25 – 28]

All shoreline protection works (against beaches erosion and for tourist activities) caused changes in the movement of littoral currents, being created areas with low dynamic of water bodies and thus eliminated rheophile/oxygenophile species in these areas.

Today only about one third of the total number of macro-algae species is encountered, compared to species cited 50 years ago; this has allowed the mass development of cosmopolitan, opportunistic, short life cycle species, especially belonging to the group *Chlorophyta* (green macro-algae); the most significant decrease is recorded for red (31 species in this group no longer being found on the Romanian seaside in the past 50 years) and brown macro-algae species (9 species). An important ecological niche for the development of marine benthos on hard substrate of the littoral part from the south of Constanta was represented by the "field of *Cystoseira barbata*"; currently in this field have left only small "oasis" with a much reduced surface [Sava et. al., (2007)].

**Table 3. The most abundant algae species identified in algae agglomerations on the shore**

(after Sava, [18], [25 - 28])

| Nr. crt. | Taxonomic group | Species |
|---|---|---|
| CHLOROPHYCEAE | | |
| 1 | Ulvales | *Ulva rigida* (*lactuca*) (L.) |
| 2 | | *Enteromorpha intestinalis* (L.) Link. |
| 3 | | *E. compresa* (L.) Grev. |
| 4 | | *E. linza* (L.) Ag. |
| 5 | | *E. flexuosa* (Wulf.) Ag. |
| 6 | | *E. prolifera* (O.Múll) J. Ag |
| 7 | Cladophorales | *Urospora penicilliformis* (Roth.) Aresh |
| 8 | | *Cladophora vagabunda* (L.) Hoek. |
| 9 | | *C. sericea* (Huds.) Kütz. |
| 10 | | *C. albida* (Huds.) Kütz. |
| 11. | Bryopsidales | *Bryopsis plumosa* (Huds.) Ag. |
| 12 | | *B. hypnoides* Lamour |
| ISOGENERATAE - PHAEOPHYTA | | |
| 13 | Ectocarpales | *Ectocarpus siliculosus* (Dillw.) Lyngb. |
| CYCLOSPOREAE - PHAEOPHYTA | | |
| 14 | Fucales | *Cystoseira barbata* (Good et Wood) Ag. |
| FLORIDEOPHYCEAE-RHODOPHYTA | | |
| 15 | Ceramiales | *Callithamnion corymbosum* (Smith.) Lyngb. |
| 16 | | *Ceramium rubrum* (Huds) Ag. |
| 17 | | *Ceramium elegans* (Roth.) Ducl. |

**Table 4. The decrease of the number of macrophyte algae species during 1977-2007**

(data after Sava [19], [18], [25 - 28])

| Phyllum | After data: | | |
|---|---|---|---|
| | Bavaru 1977 | Vasiliu 1980-1995 | Sava 2007 |
| *Chlorophyta* | 31 | 22 | 16 |
| *Phaeophyta* | 14 | 9 | 5 |
| *Rhodophyta* | 41 | 24 | 10 |
| Total | 86 | 55 | 30 |

**Conclusion**

The most important features of macro-algal communities in the southern Romanian Black Sea Coast are:

- reduced number of species in groups of red and brown macro-algae;
- proliferation of opportunistic species of green macro-algae group, with short life cycle and which can develop impressive biomass in a relatively short time; these few species occupies 80% area of shallow sea bottom;
- reduce the area occupied by perennial macro-algae, *Cystoseira* and *Phyllophora*.
- To improve the existing situation is necessary to popularize the importance of species (rare species and especially of perennial ones) on one hand, and to recover large amounts of macro-algae biomass produced during summer on the other hand.

**Acknowledgments**

Scientific investigations were funded by Norway Grants Program – Innovation Norway, "Norwegian Cooperation Programmes for Economic Growth and Sustainable Development in Bulgaria and Romania", Project no. KNRIN 2008/115241.

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# An Empirical Analysis on the Relationship between Health Care Expenditures and Economic Growth in the European Union Countries

**Çiğdem Börke Tunalı**

Associate Professor, Department of Economics,
Faculty of Economics, Istanbul University, Istanbul, Turkey

**Naci Tolga Saruç**

Professor, Department of Public Finance,
Faculty of Economics, Istanbul University, Istanbul, Turkey

**Abstract**

This paper empirically investigates the relationship between health expenditure and economic growth in the European Union countries over the period 1995-2014. By using the Dumitrescu-Hurlin Test (Dumitrescu and Hurlin, 2012) which is developed to test Granger causality in panel datasets (Lopez and Weber, 2017), it is found that there is a unidirectional relationship between these variables and gross domestic product (GDP) per capita Granger causes health expenditure per capita. After determining the direction of the relationship between health expenditure per capita and GDP per capita we estimate the short run and the long run effects of GDP per capita on health expenditure per capita by using Mean Group (MG) and Pooled Mean Group (PMG) estimators which are developed by Pesaran and Smith (1995) and Pesaran, Shin and Smith (1999) respectively. According to the estimation results, GDP per capita has a positive effect on health expenditure per capita both in the short run and the long run.

**Keywords:** Health care expenditures, Economic growth, Panel Granger causality analysis, European Union

## 1. Introduction

Health is one of the significant factors which can have dramatic effects on economic performance of a country. Increasing health care expenditure leads to higher social security, safety and welfare and hence, it improves labour efficiency (Mladenovic et al., 2016).

There are quite a few studies which investigate the impact of health/health care expenditure on economic growth in the existing literature. These studies generally find that health/health care expenditure has a positive influence on economic growth (see for instance; Rivera and Currais, 2003; Bloom et al., 2004 and LI and Huang, 2009). However, the number of studies which analyse the causality between health care expenditure and economic growth is very low. Unlike previous analyses, in this study we examine the causality between health care expenditure and economic growth in the European Union countries over the period 1995-2014. Moreover, after determining the direction of causality between these variables we estimate the short run and the long run effects of GDP per capita on health expenditure per capita.

The remainder of the paper is structured as follows: in section 2 we present a brief literature review, in section 3 we explain our methodology and data, in section 4 we discuss the results of our empirical analysis and finally in section 5 we conclude.

## 2. Literature Review

Although there is a vast literature which investigates the effect of health on economic growth the number of studies that focus on the direction of the relationship between health expenditure and economic growth is very low. Here, we briefly summarize the results of recent literature which examine the relationship between health and economic growth.

Rivera and Currais (2003) investigate the influence of health investment on productivity in OECD countries over the period 1960-2000. The authors estimate an Augmented Solow Model by using ordinary least squares and two stages least squares estimators and find that health expenditure has a positive effect on economic growth (Rivera and Currais, 2003).

Bloom et al. (2004) analyse the impact of work experience and health on economic growth for a panel of countries by estimating a production function over the period 1960-1990. According to the estimation results, Bloom et al. (2004) conclude that good health has a positive impact on economic growth.

LI and Huang (2009) examine the effect of health and education on economic growth for Chinese provinces between 1978 and 2005 by estimating Mankiw, Romer and Weil (1992)'s model. The results of this analysis show that both health and education positively affect economic growth (LI and Huang, 2009).

Narayan et al. (2010) analyse the relationship between health and economic growth for 5 Asian countries by drawing on panel unit root, panel cointegration with structural breaks and panel long run estimation over the period 1974-2007. According to the empirical results, Narayan et al. (2010) suggest that there is a long run relationship between health and economic growth and health positively influences economic growth.

Hartwig (2010) examines the impact of health capital formation on GDP growth by drawing on panel Granger causality analysis. Hartwig (2010) uses a data set covering the period between 1970 and 2005 for 21 OECD countries and finds that health care expenditure does not Granger cause GDP per capita growth.

Wang (2011) investigates the causality between health care expenditure rise and economic growth for 31 countries by using both panel regression and quantile regression techniques over the period 1986-2007. According to the panel estimation results, Wang (2011) argues that while health care expenditure growth has a positive impact on economic growth economic growth decreases health care expenditure growth. However, the results of quantile regression indicate that the effect of health care expenditure growth on economic growth is positive in countries which have medium and high levels of economic growth (Wang, 2011).

Amiri and Ventelou (2012) examine the relationship between health care expenditure and economic growth in OECD countries by using a new version of Granger causality test suggested by Toda and Yamamoto (1995). In the empirical estimations, a data set for 20 OECD countries which covers the period between 1970 and 2009 is used. According to the estimation results, Amiri and Ventelou (2012) suggest that there is bidirectional causality between health care expenditure and economic growth.

Lago-Penas et al. (2013) analyse the relationship between health care expenditure and income for 31 OECD countries over the period 1970-2009. By estimating the short run and the long run elasticities Lago-Penas et al. (2013) investigate the adjustment process of health care expenditures to changes in GDP per capita and find that health care expenditures are more responsive to cyclical components of GDP per capita than to trend components.

To summarize, we can state that most of the empirical analyses in the existing literature focus on the effect of health/health care expenditures on economic growth and find a positive impact of health on income. However, the number of studies that examine the causality between health expenditure and economic growth is very low. The main contribution of our analysis is to investigate the direction of causality between health expenditure and economic growth empirically. Moreover, after determining the direction of causality we also estimate the short run and the long run effects of GDP per capita on health expenditure per capita.

**3. Methodology and Data**

In this paper we investigate the relationship between health expenditure and economic growth in the European Union countries. At first, we examine the direction of the causality between health expenditure and economic growth. In order to do this, we use the Dumitrescu-Hurlin Test (Dumitrescu and Hurlin, 2012) which is developed to test Granger causality in panel datasets (Lopez and Weber, 2017). The Dumitrescu-Hurlin Test can be explained by the following linear model (Dumitrescu and Hurlin, 2012):

$$y_{i,t} = \alpha_i + \sum_{k=1}^{K} \theta_i^{(k)} y_{i,t-k} + \sum_{k=1}^{K} \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \quad (1)$$

In equation 1, x and y are two stationary variables observed for N individuals on T periods (Dumitrescu and Hurlin, 2012). Dumitrescu and Hurlin (2012) suggest testing Homogenous Non Causality hypothesis by considering both the heterogeneity of the regression model and the casual relation. The alternative hypothesis of the Dumitrescu-Hurlin Test allows a subgroup of individuals for which there is no causality and a subgroup of individuals for which there is Granger causality (Dumitrescu and Hurlin, 2012). The null hypothesis of the Dumitrescu-Hurlin Test can be stated as follows (Dumitrescu and Hurlin, 2012):

$$H_0: \beta_i = 0 \qquad \forall i = 1, \dots N \tag{2}$$

In order to test the null hypothesis Dumitrescu and Hurlin suggest using the average of individual Wald statistics (Dumitrescu and Hurlin, 2012).

After determining the direction of causality between health expenditure and economic growth, we draw on Mean Group (MG) and Pooled Mean Group (PMG) estimators which are developed by Pesaran and Smith (1995) and Pesaran, Shin and Smith (1999) to estimate the short-run and the long-run effects of the variable which Granger causes the other variable. The PMG presumes that long run coefficients are equal across groups but, allows the constants, short run coefficients and error variances to be different (Pesaran, Shin and Smith (1999). When MG estimator is used regressions are estimated for each group separately and then the means of coefficients over groups are calculated Pesaran and Smith (1995).

The MG and PMG estimators can be explained by the following autoregressive distributive lag (ARDL) (p, $q_1$, …, $q_k$) panel model (Blackburne and Frank, 2007):

$$y_{i,t} = \sum_{j=1}^{p} \varphi_{i,j} y_{i,t-j} + \sum_{j=0}^{q} \sigma'_{i,j} X_{i,t-j} + \mu_i + \varepsilon_{i,t} \tag{3}$$

In this equation, i= 1, 2, …, N is the number of groups, t= 1, 2, …, T is the number of periods, $X_{i,t}$ is a k x 1 vector of explanatory variables, $\sigma_{i,t}$ are the k x 1 coefficient vectors, $\varphi_{i,j}$ are scalars and $\mu_i$ is the group-specific effect (Blackburne and Frank, 2007). By using equation 3 the error correction model can be stated as follows:

$$\Delta y_{i,t} = \theta_i \left( y_{i,t-1} - \vartheta'_i X_{i,t} \right) + \sum_{j=1}^{p-1} \varphi^*_{i,j} \Delta y_{i,t-1} + \sum_{j=0}^{q-1} \sigma'^*_{i,j} \Delta X_{i,t-j} + \mu_i + \varepsilon_{i,t} \tag{4}$$

In equation 4, $\theta_i = -(1 - \sum_{j=1}^{p} \varphi_{i,j})$, $\vartheta_i = \sum_{j=0}^{q} \sigma_{i,j} / (1 - \sum_k \varphi_{i,k})$, $\varphi_{i,j} = -\sum_{m=j+1}^{p} \varphi_{i,m}$ j= 1, 2, …, p-1, and $\sigma^*_{i,j} = -\sum_{m=j+1}^{q} \sigma_{i,m}$ j= 1, 2, …, q-1 (Blackburne and Frank, 2007).

In this equation, $\theta_i$ is the speed of adjustment term (error correction term) and it is expected to be statistically significant and negative (Blackburne and Frank, 2007). The vector of $\vartheta'_i$ includes long-run relationships among the variables (Blackburne and Frank, 2007).

In our empirical analysis, we use gross domestic product per capita and health expenditure per capita in order to estimate the relationship between health expenditure and economic growth. Both of these variables are in current US Dollars and we draw on GDP deflator of the respective country to calculate the real values of the data. In the estimations, the logarithmic forms of the variables are used. The data set is annual and covers the period between 1995 and 2014 for 28 European Union countries. All of the data is obtained from the World Bank World Development Indicators (World Bank, 2018).

## 4. Results

Although the order of integration of the variables is not important for the MG (Pesaran and Smith, 1995) and PMG models (Pesaran, Shin and Smith, 1999) so long as the variables are integrated either in I(0) or I(1) the Dumitrescu-Hurlin Test assumes that the variables are stationary (Dumitrescu and Hurlin, 2012). So, we first estimate Im-Pesaran-Shin (Im, Pesaran and Shin, 2003) and Fisher type (Fisher-Augmented Dickey-Fuller (ADF)) (Choi, 2001) unit root tests in order to establish the order of integration of the variables. Table 1 shows the results of these unit root tests.

**Table 1: Unit Root Test Results**

| Variables | Im-Pesaran-Shin | Fisher-ADF Inverse Normal | Fisher-ADF Inverse Logit |
|---|---|---|---|
| GDP per capita | -17.2327*** | -9.6563*** | -14.6831*** |
| Health Expenditure per capita | -7.4784*** | -6.3808*** | -9.4002*** |

**Note:** *** indicates 1% significance level. The null hypothesis of Im-Pesaran-Shin Test and Fisher-ADF Test states that all panels contain unit roots. An intercept and a trend term are added to the models while estimating the statistics. For Im-Pesaran-Shin Test lag length is determined according to the Akaike Information Criterion.

**Source:** Authors' estimations.

According to table 1, both GDP per capita and health care expenditure per capita are stationary. So, we can estimate the MG (Pesaran and Smith, 1995) and PMG models (Pesaran, Shin and Smith, 1999) and the Dumitrescu-Hurlin Test (Dumitrescu and Hurlin, 2012).

Table 2 shows the results of the Dumitrescu-Hurlin Test (Dumitrescu and Hurlin, 2012). The results of the Dumitrescu-Hurlin Test indicate that while GDP per capita Granger causes health expenditure per capita there is no Granger causality from health expenditure per capita to GDP per capita. Therefore, it is argued that there is a unidirectional relationship between GDP per capita and health expenditure per capita and the direction of this relationship is from GDP per capita to health expenditure per capita.

**Table 2: The Dumitrescu-Hurlin Test Results**

| Hypothesis | Test Statistic (Z-bar ~) |
|---|---|
| $H_0$: GDP per capita does not Granger-cause health expenditure per capita. | 3.8082*** |
| $H_0$: Health expenditure per capita does not Granger-cause GDP per capita. | 0.4992 |

**Note:** *** indicates 1% significance level. Lag length is determined according to the Akaike Information Criterion.

**Source:** Author's estimations.

After determining the direction of causality between GDP per capita and health expenditure per capita we estimate the short run and the long run effects of GDP per capita on health expenditure per capita by using the MG (Pesaran and Smith, 1995) and PMG models (Pesaran, Shin and Smith, 1999). Table 3 shows these estimations. Before interpreting coefficient estimates we should determine which estimator is more efficient than the other one. According to the Hausman specification test (Hausman, 1978) result, PMG (Pesaran, Shin and Smith, 1999) is more consistent and efficient estimator than MG (Pesaran and Smith, 1995). So, we will evaluate the coefficient estimates which are obtained by using PMG estimator (Pesaran, Shin and Smith, 1999). The last two columns of table 3 show the coefficient estimates of PMG (Pesaran, Shin and Smith, 1999) model. When we look at these results we find that speed of adjustment term (ec) is statistically significant and negative as expected. Moreover, both the short run and the long run coefficient estimates of GDP per capita are statistically significant and have a positive sign. So, it is stated that GDP per capita has a positive effect on health expenditure per capita both in the short run and the long run. While a 1% percent increase in GDP per capita increases health expenditure per capita by 0.72% in the short-run this increase is 1.10% in the long run.

**Table 3: MG and PMG Estimations**

| *Variables* | *MG Model* | | *PMG Model* | |
|---|---|---|---|---|
| | *Long Run* | *Short Run* | *Long Run* | *Short Run* |
| *GDP per capita* | *1.1526*** (0.1504)* | | *1.1001*** (0.0177)* | |
| *ec* | | *-0.3198*** (0.0422)* | | *-0.2209*** (0.0402)* |
| *ΔGDP per capita* | | *0.5676*** (0.0636)* | | *0.7274*** (0.0647)* |

| | | | | |
|---|---|---|---|---|
| *constant* | | *-1.7145**** *(0.3438)* | | *-0.7860**** *(0.1484)* |
| *Hausman Test Probablity* | | *0.12 0.7294* | | |

**Note:** *** indicates 1% significance level. Standard errors are in parenthesis. The chosen lag structure is ARDL(1, 1). Ec is the speed of adjustment term. The models are estimated by using xtpmg routine in Stata. Hausman test indicates that PMG estimator is more consistent and efficient than MG estimator.

**Source:** Authors' estimations.

In summary, our empirical results indicate that there is a unidirectional relationship between health expenditure per capita and GDP per capita and the direction of this relationship is from GDP per capita to health expenditure per capita. Moreover, when we investigate the short run and the long run effects of GDP per capita on health expenditure per capita we find that GDP per capita has a positive effect on health expenditure per capita both in the short run and the long run.

**Conclusion**

Without doubt, health care expenditure can have dramatic effects on economic performance of a country. In the existing literature, although there are numerous studies which analyse the impact of health/health care expenditure on economic growth the number of studies which focus on the causality between these variables is very few.

In this study, we empirically investigate the relationship between health expenditure and economic growth in the European Union countries over the period 1995-2014. Unlike previous studies, we first analyse the direction of causality between these variables and then, we estimate the short run and the long run effects of GDP per capita on health expenditure per capita.

The results of our empirical analysis indicate that there is a unidirectional relationship between health expenditure per capita and GDP per capita and the direction of this relationship is from GDP per capita to health expenditure per capita. Moreover, we find that GDP per capita has a positive impact on health expenditure per capita both in the short run and the long run. So, we argue that economic growth is a significant determinant of health expenditure in the European Union countries over the period under investigation.

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# Why is the Coverage of Pneumonia Case Detection on Children under Five Years-Old Still Considered as Low in Sleman?

**Ade Kartikasari Sebba**

Magister Student of Field Epidemiology Training Program, Universitas Gadjah Mada

**Baning Rahayujati**

Field Epidemiology Training Program, Universitas Gadjah Mada

**Isa Dharmawidjaja**

Prambanan Hospital, Yogyakarta

**Abstract**

Pneumonia is one of the deadliest diseases for children under five years-old throughout the world. In Indonesia, pneumonia is the second deadliest disease after diarrhea. In 2015-2016, the Coverage of pneumonia case detection on children under five years-old increased from 22.33% to 36.06% but it had not achieved the detection target (>85%). A program evaluation needs to conduct, consequently. The evaluation aims to observe the implementation of pneumonia investigation program on children under five years-old in Sleman in 2016. The evaluation used a descriptive design performed in June-July 2017. The research subject was the program of Upper Respiratory Infection (ISPA, Infeksi Saluran Pernapasan Akut) implemented in community health centers (puskesmas, pusat kesehatan masyarakat). Twenty respondents as the sample were chosen by using the purposive sampling technique. The surveillance evaluation employed the input, activities, and output. The instruments were structural questionnaires and checklist sheets. The analysis result was presented in forms of tabulation and narration. From the input facet, 100% respondents have not had any special trainings related to pneumonia. 55% respondents have interlocking jobs with the longest service time of three years or more (75%). 70% respondents are able to show ARI Soundtimer. There are only 10% respondents holding the media of communication, information, and education (KIE, Komunikasi, Informasi, dan Edukasi) in forms of flipchart and leaflet; while 100% respondents admit that they have no stamp seal of URI. The proses facet displays that 100% respondents do not arrange any plan. The case investigation is only passive (100%). 80% respondents do socialization of case management and only 15% respondents perform a home visit. 100% respondents have not held trainings for responsible people, alert villages, and private midwives. From the output facet, the scope of case investigation is still low (36.06%).The implementation of pneumonia case investigation program on children under five years-old has been well executed but there are still weaknesses. Hence, public health offices (dinas kesehatan) should improve their human resources by arran ging a training program, equalize the use of breath counting tool and make MoU with all health services to report pneumonia cases. Community health centers are recommended to arrange plans, actively attempt to discover pneumonia cases, and train the responsible people, centers for pre-and postnatal health care (posyandu, pos pelayanan terpadu), or midwives related to the subject of pneumonia.

**Keywords:** program evaluation, pneumonia, descriptive

## Introduction

URI (ISPA, *Infeksi Saluran Pernapasan Akut*) is one of diseases frequently suffered by children. Of all cases occurring, 7-13% cases were categorized as serious and demanded further actions of treatment. URI is one of major diseases with a high patient visit in community health centers (40-60%) and hospitals (15-30%). One of concerned URI diseases is

pneumonia suffered by children under five years old. Pneumonia is an acute infection attacking the alveoli caused by various microorganisms; such as fungi, viruses, and bacteria (Ministry of Health, 2016).

Pneumonia is the deadliest disease for children under five years-old in all over the world (WHO & UNICEF, 2013). In Indonesia, pneumonia is the second highest disease causing death after diarrhea and there are 83 children under five dead every day (Ministry of Health, 2010). Pneumonia contributed 16% deaths of children under five in 2015 (Ministry of Health, 2016). The data from UNICEF reveal that among six deaths of children under five, one death was caused by pneumonia with the detail number of deaths was 920,000 each year, 2,500 each day, 100 each hour, and one each 35 seconds (UNICEF, 2017).

Indonesia reaches a higher number of death caused by pneumonia as much as 0.16 if compared to the death of children under five as much as 0.08% in 2014. Data by the Fundamental Health Research (Riskesdas, *Riset Kesehatan Dasar*) in 2007 indicate that pneumonia is the second deadliest disease for children under five (13.2%) after diarrhea (17.2%). One attempt conducted by the government to control this disease is by increasing the number of pneumonia case investigation on children under five (Health Profile of Indonesia, 2016)

By appliying a target of pneumonia sufferer investigation, in 2013-2014 10% children under five assumed for suffering pneumonia in Sleman did not show any significant increase that meant it was still only 4-5%. However, in 2015-recent, by employing the assumption of case incident as much as 4.32%, the result of Fundamental Health Disease in 2013 displays an improvement (Health Profile of Sleman, 2016). Although the target of sufferer investigation in 2015 is less than previous years, up to these days the target has not been achieved. The scope of pneumonia investigation on children under five indicated an improvement from 22.33% to 36.06% in 2015-2016, yet the percentage had not reached the target of investigation (>85%). Such background unfolds the importance of having a program of pneumonia investigation evaluation in 2016 in Sleman.

**Objectives**

**General Objectives**

To observe the implementation of URI controlling program especially the pneumonia investigation on children under five in 2016 in Sleman.

**Specific Objectives**

To figure out the input, activities, and output of the implementation of pneumonia investigation in Sleman.

To figure out weaknesses of the implementation of URI program, especially the pneumonia investigation in Sleman.

To improve the implementation of URI program, especially the pneumonia investigation in Sleman.

**Stakeholder Involvement**

This program evaluation involves stakeholders of Sleman that are:

The head of control and eradication (P2, *Pengendalian dan Pemberantasan*) and the head of control and eradication section as the policy maker in the regency level.

URI programmers of Public Health Office of Sleman

The head of community health center of Sleman

URI programmers of community health center of Sleman

Officers involved in the pneumonia case investigation on children under five.

**Methodology**

The evaluation was conducted by implementing a descriptive design in June-July 2017. The research subjects were the managers of URI program in community health centers. The sample consisting of twenty respondents was taken by using the purposive sampling technique. The surveillance evaluation was executed by utilizing inputs (force, fund, partnership, infrastructure, and support), activities (planning, implementation, monitoring, and evaluation), and outputs (Silverman, B.,

2009). The data were primary and secondary data. The instruments were in forms of structural questionnaires and checklist sheets. The research result was presented in forms of tabulation and narration.

**Findings**

**Respondents' Characteristics**

The data analysis conducted in this program evaluation system was by analyzing each variable descriptively and the result was presented in forms of tabulation and narration. The data were gathered by conducting interviews by utilizing structural questionnaires given to pneumonia programmers in community health centers. The community health centers that became the analysis units were the Community Health Center of Prambanan, Kalasan, Mlati 1, Mlati 2, Tempel 2, Depok 3, Gamping 2, Minggir, Tempel 1, Turi, Cangkringan, Pakem, Ngemplak 2, Gamping 1, Godean 2, Depok 1, Moyudan, Godean 1, Seyegan, and Berbah. The distribution based on respondents' characteristics is shown in Table 1:

**Table 1. The Distribution of Respondents' Characteristics of Age, Sex, and Education of in Sleman**

| *Respondents' Characteristic* | *Number* | *Percentage (%)* |
|---|---|---|
| *Age* | | |
| *21-30 years-old* | *3* | *15.0* |
| *31-40 years-old* | *4* | *20.0* |
| *41-50 years-old* | *6* | *30.0* |
| *51-60 years-old* | *7* | *35.0* |
| *Sex* | | |
| *Male* | *5* | *25.0* |
| *Female* | *15* | *75.0* |
| *Current Education* | | |
| *Senior high school/collaborative education unit/equivalent graduate* | *3* | *15.0* |
| *Diploma III of Nursery/Midwifery* | *15* | *75.0* |
| *Bachelor of Nursery/Midwifery* | *2* | *10.0* |

Table 1 shows that the age group with the most URI programs is the age group of 51-60 years-old, occupied by seven respondents (35.0%) and dominated by fifteen female respondents (75.0%). Education at the level of Diploma III of Nursery/Midwifery achieved by fifteen respondents possesses the largest portion (75.0%).

**Input Aspect**

Inputs involving force, funding, infrastructure, partnership, and supports in forms of logistic aspects are needed to support the improvement of pneumonia investigation. The result of input evaluation is as follows:

**Force**

**Table 2. The Distribution of Respondents' Force Availability, Training Participation, Interlocking Position, Number of Interlocking Assignments, and Service Time in Sleman**

| *Force* | *Number* | *Percentage (%)* |
|---|---|---|
| *Force availability* | | |
| *Yes* | *20* | *100* |
| *No* | *0* | *0* |
| *Training Related to Pneumonia* | | |
| *Yes* | *0* | *0* |
| *No* | *20* | *100* |
| *Interlocking Position* | | |
| *Yes* | *20* | *100* |
| *No* | *0* | *0* |
| *Number of Interlocking Assignments* | | |
| *≤3 interlocking assignments* | *9* | *45.0* |
| *>3 interlocking assignments* | *11* | *55.0* |

| | | |
|---|---|---|
| *Service Time* | | |
| *≤ 3 years* | *15* | *75.0* |
| *> 3 years* | *5* | *25.0* |

Table 2 displays that every community health center hires responsible officers as program holders. The interviews reveal the fact that all officers (100%) did not participated in any special training related to pneumonia in 2016. All program holders have an interlocking position with the highest number of interlocking assignments is more than three, had by eleven people (55.0%) and the most service time is three years or more, had by fifteen people (75.0%).

**Funding**

The result of interviews indicate that there is no specific funding available for pneumonia controlling activities. The funding is taken from the funding for another program.

**Partnership**

The result of interviews also reveal that for activities of pneumonia controlling on children under five, they have established a partnership/cooperation yet still limited to a cross-program partnership/cooperation. The partnership/cooperation is in forms of investigation and reporting of pneumonia cases on children under five.

**Infrastructure**

An ill child under five is generally treated in polyclinic (BPU, *Balai Pengobatan Umum*), the unit of Maternal and Neonatal Health (KIA, *Kesehatan Ibu dan Anak*) and special units for children under five. The distribution of departments responsible in performing checkups for ill children under five in community health centers is shown by Table 3.

**Table 3. The Distribution of Departments Responsible to Perform Checkups for Children under Five-Years Old in Community Health Centers of Sleman**

| *Community Health Center* | *Department for Checkups* | | | *Doctor Availability* | |
|---|---|---|---|---|---|
| | *Polyclinic* | *Unit of Maternal and Neonatal Health* | *Units for Children under Five Years-Old* | *Yes* | *No* |
| *Prambanan* | √ | | | √ | |
| *Kalasan* | | √ | | √ | |
| *Mlati 1* | | √ | | | √ |
| *Mlati 2* | √ | | | √ | |
| *Tempel 2* | √ | | | √ | |
| *Depok 3* | √ | | | √ | |
| *Gamping 2* | √ | | | √ | |
| *Minggir* | √ | | | √ | |
| *Tempel 1* | √ | | | √ | |
| *Turi* | | √ | | | √ |
| *Cangkringan* | √ | | | √ | |
| *Pakem* | √ | | | √ | |
| *Ngemplak 2* | √ | | √ | √ | |
| *Gamping 1* | √ | | | √ | |
| *Godean 2* | | √ | | | √ |
| *Depok 1* | √ | | | √ | |
| *Moyudan* | | √ | | | √ |
| *Godean 1* | | √ | | | √ |
| *Seyegan* | √ | | | √ | |
| *Berbah* | | √ | | √ | |

Table 3 displays that there are twelve community health centers performing checkups for children under five in the general examination office (BP, *Badan Pemeriksaan*), seven community health centers performing checkups in the department of maternal and neonatal health, and one community health center facilitated by a special chamber for performing the checkups.

**Logistic Availability**

The result of checking the logistic (ARI Soundtimer) availability found in the field is presented in Table 4.

**Table 4. The Distribution of Availability and Eligibility of ARI Soundtimer in Sleman**

| *Community Health Center* | *Availability ARI Soundtimer* | | *Eligibility of ARI Soundtimer* | |
|---|---|---|---|---|
| | *Yes* | *No* | *Yes* | *No* |
| *Prambanan* | √ | | √ | |
| *Kalasan* | √ | | | √ |
| *Mlati 1* | √ | | √ | |
| *Mlati 2* | | √ | | |
| *Tempel 2* | | √ | | |
| *Depok 3* | √ | | √ | |
| *Gamping 2* | √ | | √ | |
| *Minggir* | √ | | √ | |
| *Tempel 1* | √ | | √ | |
| *Turi* | | √ | | |
| *Cangkringan* | √ | | | √ |
| *Pakem* | | √ | | |
| *Ngemplak 2* | √ | | √ | √ |
| *Gamping 1* | √ | | | √ |
| *Godean 2* | √ | | √ | |
| *Depok 1* | √ | | √ | |
| *Moyudan* | √ | | | √ |
| *Godean 1* | √ | | | √ |
| *Seyegan* | | √ | | |
| *Berbah* | | √ | | |

Table 4 shows that of twenty community health centers where interviews and observations were conducted, there are fourteen community health centers (70%) facilitated with ARI Soundtimer. Of those fourteen community health centers, there are nine community health centers equipped with ARI Soundtimers (64.3%) that can still be operated.

**Table 5. The Distribution of Medicine Availability; Guide Book; Media of Communication, Information, and Education; and Media of Recording and Reporting**

| *Logistics* | *Number* | *Percentage (%)* |
|---|---|---|
| *Medicine* | | |
| *Availability of pneumonia medicine* | *20* | *100* |
| *Guide Book* | | |
| *URI controlling* | *20* | *100* |
| *URI management* | *20* | *100* |
| *Media of Communication, Information, and Education* | | |
| *DVD video* | *0* | *0* |
| *Poster, leaflet, flipchart, etc.* | *2* | *10.0* |
| *Media of Recording and Reporting* | | |
| *URI stamp seal* | *0* | *0* |
| *Daily registration book* | *20* | *100* |
| *Monthly reporting form* | *20* | *100* |

| *Logistics* | *Number* | *Percentage (%)* |
|---|---|---|
| *IMCI (Integrated Management of Childhood Illness) (MTBS, Manajemen Terpadu Balita Sakit) form* | *20* | *100* |

Table 5 displays that all community health centers facilitate their clients with guide books of URI controlling and management. Nevertheless, logistic tools for the media of maternal and neonatal health have not been provided by all community health centers. Only Community Health Center of Tempel 2 and Pakem provide the media of maternal and neonatal health in forms of leaflet and flipchart. All community health centers are reported for not holding the URI stamp seal. The register book is still combined with the registration book of maternal and neonatal health since those community health centers have not attempted to make a separated registration book for pneumonia cases. Furthermore, all community health centers have made monthly IMCI forms.

**Activity Aspect**

The result of activity process evaluation related to pneumonia on children under five in Sleman is as follows:

**Activity Planning**

After being interviewed, all programmers stated that they had not made any planning for pneumonia programs; such as conducting problem analyses, identifying and determining planning objectives, arranging PoA (Planning of Action), and planning logistics and budgets for the pneumonia controlling activities themselves.

**Activity Execution**

**Table 6. The Distribution of Respondents Based on the Execution of Pneumonia Controlling Activities on Children under Five Years-Old in Sleman**

| *Activity Execution* | *Number* | *Percentage (%)* |
|---|---|---|
| *Planning* | *0* | *0* |
| *Case investigation* | | |
| *Active* | *0* | *0* |
| *Passive* | *20* | *0* |
| *Socialization of standard management* | *16* | *80.0* |
| *Early detection of pneumonia cases and clusters* | *20* | *100* |
| *Immediate case management in accordance with the standards* | *20* | *100* |
| *Management of severe pneumonia case in accordance with the standards* | *11* | *55.0* |
| *Home visit for cases with impossibilities in revisiting* | *3* | *15.0* |
| *Referring severe pneumonia cases to hospital* | *5* | *25.0* |
| *Gradual reporting within 24 hours after detecting pneumonia cluster cases* | *0* | *0* |
| *Performing monthly recording and reporting* | *20* | *100* |
| *Presenting and analyzing data in forms of table, chart, map, etc.* | *0* | *0* |
| *Collecting, analyzing, interpreting data, and taking controlling actions* | *0* | *0* |
| *Broadcasting information through workshop coordination* | *20* | *100* |
| *Counselling the risks of communication, information, and education* | *20* | *100* |
| *Arranging a regular, cross-program meeting* | | |
| *Arranging a regular, cross-program meeting to monitor the program progress and problem solving* | *20* | *100* |
| *Coordination with the heads of sub-district, neighborhood, hamlet, or related instance to investigate and control any risk factors* | *0* | *0* |
| *Train the responsible people, alert villages, pre- and postnatal health cares, and private midwives in order to familiarize them with pneumonia and conduct preventive attempts* | *0* | *0* |
| *Monitoring and evaluation* | *20* | *100* |

Table 6 shows that the investigation of pneumonia case on children under five is still passively conducted. The case investigation is only performed when the patient goes to community health center. There are four community health centers (20%) whose program holders do not perform socializations of standard management that are Community Health Center of Kalasan, Mlati 1, Pakem, and Depok 1. Relevant information has been distributed by all community health centers yet still limited on a cross-program distribution. The early detection of pneumonia and cluster as well as the early case management have been conducted by all community health centers.

There are three community health centers (15%) whose officers performed home visits that are Community Health Center of Depok 3, Tempel 1, and Tempel 2; whereas there are five community health centers (25%) that have suggested severe pneumonia cases being referred to hospitals that are Community Health Center of Prambanan, Depok 3, Gamping 2, Tempel 1, and Godean 2. All community health centers have made monthly recording and reporting but gradual reporting within 24 hours after the detection of pneumonia case has not been made by all community health centers. Besides, data analysis and interpretation have not been conducted as well.

Specific counselling related to communication, information, and education/risky communication of pneumonia has not been executed indeed but simple counselling during activities of pre- and postnatal health care has been arranged. A cross-sector cooperation to investigate the controlling of risk factors and trainings for the responsible people, alert villages, private midwives, and pre- and postnatal health cares to recognize symptoms of pneumonia and preventive attempts of pneumonia suffered by children under five have not been built and arranged due to unavailable fund.

**Output Aspect**

The coverage pneumonia case detection under five years-old in 2016 in Sleman was only 36.06%. The percentage has not reached the target determined for Sleman.

**Discussion**

The target of pneumonia case investigation on children under five in Sleman is still considered as low. To figure out the causes, the research analyzed the aspects of input, activity, and output.

**Input Aspect**

The Ministry of Health argues that training is the most crucial aspect to improve the quality of human resources, especially in case and program managements.[7] During interviews, the URI program managers conveyed that they did not join any special training related to managements of pneumonia case and other relevant programs in 2016. They also revealed that they only took participation in socializations of pneumonia. There are still also many program holders with $\leq$3-years service time and desperately need training to improve the quality of human resources.

Fund availability is one of considerably determining factors to perform pneumonia controlling activities since those activities can only be conducted if supported by sufficient fund. Decree of the Ministry of Health highlights that the funding of URI control and eradication program largely depends on the State Budget (APBN, *Anggaran Pendapatan Belanja Daerah*) (Decree of the Ministry of Health, 2002). During interviews, programmers revealed the fact that there is no funding earned by community health services to control pneumonia and that funding for another program has to be used.

Checkups for children under five can be executed in polyclinics, units of maternal and neonatal health, and special units for children. However, the researchers found out that the checkups were mostly conducted in polyclinics. The obstacle exists when human resources of those polyclinics are not adequate to overcome the number of patients coming so that IMCI cannot be completely applied.

Partnership is one of important factors to succeed the program. Partnership establishment related to the pneumonia investigation aims to improve the society's participation and roles of cross-sector and cross-program distributions. In approaches of implementation of disease eradication program especially for pneumonia, partnership is expected to be able to be executed in an integrated and comprehensive way. The pneumonia eradication with the help of competent, active sectors is not only targeted to the sufferers and risk factors but also other influential factors (Ministry of Health, 2012).

The interview results unfold the fact that cooperation of pneumonia case investigation on children under five has not been optimally established. It is still only internal or inside building. Cases occurring outside building that might be handled by private midwives, polyclinics, or private hospitals have not been reported to community health centers so that those

community health centers only deliver reports containing the number of pneumonia patients inside building to the Public Health Office of Sleman.

Decree of the Ministry of Health states that the investigation should be conducted through activities supporting the desire of society to get the right medicine, assisted by health officers. Hence, reports of pneumonia sufferer investigation of various health facilities, including government and private health facilities have to be delivered to the public health office or community health centers nearby (Decree of the Ministry of Health, 2002).

Logistics are crucial to succeed the investigation of pneumonia case. Necessities of investigation and case management involve breathing apparatuses (ARI Soundtimer) and medicine; while the media of communication, information, and education are requested for the activities of communication, education, and information. Other necessities to support the investigation of pneumonia on children under five are guide books and recording and reporting media (Decree of the Ministry of Health, 2012).

Logistic availability in Sleman can be categorized as good. However, there are community health centers possessing inabilities to use ARI Soundtimer properly. There are even community health centers that still put the timer in the warehouse and do not operate it. All community health centers have provided guide books. Nevertheless, the media of communication, information, and education is still inadequate and thus it impediments counselling activities related to pneumonia.

**Activity Aspects**

**Planning**

Planning is an activity supposed to be done before arranging a certain activity or event to achieve goals within a certain period. Planning is performed to improve efficiency and provide guidance to implement a certain program in order to be able to be utilized as an evaluation base (Asropi, 2013). In interviews with the program holders, it is conveyed that there has been no planning done, causing a minimum investigation implementation.

**Execution**

Investigation of pneumonia on children under five should be actively conducted to expand the scope of case investigation and hence the target can be achieved. In line with the result of research by Marlinawati, the result of this research also points out that community health centers achieving their national target perform the case investigation actively and passively; while unsuccessful community health centers perform the case investigation passively only (Lina Sri Marlinawati, 2015).

Investigation of pneumonia case by all health facilities (hospital, community health center, community health sub-center (Pustu, Puskesmas *Pembantu*), pre- and postnatal health care, and private health facility) should be actively and passively reported by using standard instruments stipulated by community health centers, public health offices of regency as well as Public Health Office of Sleman.

The research by Marlinawati in Tangerang proves that the failure of community health centers to achieve the target of pneumonia investigation is affected by the difficulty in finding pneumonia cases on children under five and no reporting of private clinics. This research also supports the finding resulting that pneumonia cases are still passively investigated and conducted inside building; while pneumonia cases outside building remains unknown (Lina Sri Marlinawati, 2015).

The majority of community health centers have conducted socialization of standard case management yet still intern (cross-program) only. The distribution of information through workshop coordination has also been executed during mini workshops or the monthly Reflection Case Discussion (RCD) meeting. Nevertheless, the topic discussed is still the number of pneumonia cases; whereas the attempts to investigate cases and overcome and monitor the program of unsuccessful problem solving are still out of range.

Decree of the Ministry of Health states that to improve the investigation of pneumonia and its management quality, the IMCI approach should be implemented in health facility units. This is necessary to improve the quality of health services for children, to improve the scope of pneumonia investigation, and to decrease the number of suffering and death due to pneumonia on children under five (Decree of the Ministry of Health, 2002).

Approaching ill children under five can be conducted by applying IMCI. IMCI should be executed in polyclinics by nurses. However, the research results indicate that IMCI is not applied to all ill children. There are even health facilities that do not

apply it so that the checkups are performed by midwives. Case detection in units of maternal and neonatal health is also assisted by IMCI. For the units existing without doctors, referral to polyclinic will be given.

To improve the quality of IMCI implementation, a separated chamber should be provided and conveniently and appropriately designed for children.[3] This research figures out that checkups for ill children under five are still performed in the general poly and unit of maternal and neonatal health. Investigation of pneumonia cases by using IMCI in the unit of maternal and neonatal health should have achieved a complete success with the percentage of 100% but the interview results reveal the contrary.

The barriers are that there are many patients that have to be treated; while officers take a long time to complete one IMCI form for one patient. It means that the existing workforce is insufficient to treat the ill children. Troublesome children worsen the situation since making the officer miss TDDK by losing their concentration.

This research also discovers the fact that almost all community health centers never had any home visit for children under five that did not revisit the centers two days after treatment due to the funding absence for performing such visit. Cooperation with supportive public health offices, the heads of sub-district, neighborhood, hamlet, or related instances to investigate the risk factor controlling has not been conducted either due to the limited fund and time.

A successful pneumonia controlling is also considerably determined by roles of society. The society has to aspire others to participate in the program implementation and utilize health infrastructures and facilities. To improve the participation of society in pneumonia controlling, training of pneumonia controlling is arranged. The research figures out the fact that program holders have not arranged any socialization or training for people responsible in health facilities, alert villages, private midwives, or private polyclinics.

**Conclusions and Recommendations**

**Conclusions**

The implementation of pneumonia case investigation in Sleman has been well conducted but there are still weaknesses requiring fixation that are:

From the input aspect: inadequate breath counting tools with usage irregularities, absence of cross-sector cooperation, absence of specific funding to support pneumonia controlling activities on children under five, and $\leq$3 years service time experiences as a program holder.

From the activity aspect: absence of program planning, passive case investigation, investigation of pneumonia cases with IMCI less than 100%, incomplete home visit for pneumonia sufferers that do not revisit after treatment, absence of trainings for responsible people, private midwives, pre-and postnatal health care, private polyclinic to recognize pneumonia symptoms and preventive attempts for pneumonia.

From the output aspects: low coverage of pneumonia case detection on children under five in 2016 in Sleman (only 36.06%) while the percentage of achievement target is >85%.

**Recommendations**

**Public Health Office**

Monitoring, evaluating ARI Soundtimer availability, and providing three soundtimers for one community health service are required to be conducted. Uniformity in utilizing breath counting tools are also required to be performed in all community health centers.

Agreement between public health offices and community health services to examine children under five in the chamber of maternal and neonatal health or in a special chamber for ill children thus enables all children to be treated by nurses is required to be made.

Improvement of human resource quality by giving trainings to the program holders and health workforces responsible to be an executor in detecting the ill children by providing training to refreshing relevant knowledge should be conducted.

A cooperation commitment to report pneumonia case investigation to community health services in the form of MoU should also be established by public health offices, community health services, hospitals, polyclinics, and other private health services in Sleman.

**Community Health Service**

Planning of funding, logistics, and activities to support the improvement of pneumonia investigation scope needs to be arranged.

A commitment of community health services to implement IMCI for improing the pneumonia case investigation on all ill children under five is required.

An active case investigation and home visit for sufferers who do not revisit after treatment should be performed.

Trainings or socializations of symptoms and preventive attempts for private midwives, responsible people, alert village, and pre- and postnatal health cares to improve the investigation of pneumonia cases should also be arranged.

**Acknowledgments**

I would like to thank to Indonesia Endowment Fund for Education (LPDP) Ministry of Finance Republic Indonesia for always giving supporting authors by scholarship. I also wanna thank to my lecturers in Magister Field Epidemiology Training Program, Faculty of Medicine Universitas Gadjah Mada. Best regard for my big family and my friends for giving me supporting and motivation.

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# Learning from the Patient - The Cooperative Endeavor of Analytic Psychotherapy

**Donna L. Roberts**

Embry-Riddle Aeronuatical University

**Abstract**

Communication involves intimate human interaction that creates shared realities and forges connections. Nowhere is this more apparent and more necessary than in the therapeutic relationship, where the communication is, essentially, the curative agent. By following the patient's lead, the many nuances of the various levels of communication are harnessed to promote insight and understanding. In this way, that analytic space becomes grounds for new restorative experiences and healing.

**Keywords:** Learning, Patient, Cooperative, Endeavor, Analytic, Psychotherapy

## Introduction

*"Psychotherapy is the systematic use of a human relationship for therapeutic purposes"*

*Hans Strupp, Vanderbilt University Psychologist*

Psychoanalysis and its related therapeutic process can be conceptualized as both a science and an art. As a science, it seeks to forge an understanding of the human mind. As an art, it may be considered the endeavor by which an individual, in close relationship with an analyst, may become acquainted with his/her unconscious feelings and release imprisoned emotions, giving up illusions that were once useful, but have become exaggerated, redundant or outmoded and thus cause pain and dysfunction. Methods of psychoanalytic therapy, "provide for a situation in which a systematic exploration is undertaken of the patient's automatic, unconscious, defensive solutions to conflict, based on the fact that since childhood he or she has perceived certain wishes, fantasies, emotions and impulses as too dangerous to manage at a conscious level" (Moore & Fine, 1990, p.16). The major aim of such exploration is to help the patient achieve increasingly mature, conscious or preconscious solutions to his or her conflicts.

Often referred to as the "talking cure", psychotherapy relies heavily on the interaction and relationship between therapist and patient, which develops through extensive communications. However, communication in a therapeutic environment, occurs on many levels and is not limited to the direct and explicit verbalizations that ensue in a session. On the contrary, the very nature of analysis determines that the majority of communication which addresses the underlying issues relevant to therapy is not of a direct and obvious nature. It is the derivative communication, "the indirect communication of thoughts or feelings unconsciously associated to or derived from whatever has primarily provoked them" (Casement, 1992, p. 14), and the subsequent response of the therapist to this communication, that often serves to direct therapy in a forward motion toward the exploration of the patient's unconscious conflicts. It can be argued that in the context of therapy everything that occurs is a communication of some type. Greater attention to the content and process of interactive communication in the therapy session, while suspending premature theory-based interpretations, can facilitate the development of the trusting relationship and the progress toward more effective insight and subsequent change.

## Elements of the Psychoanalytic Process - How One Learns from the Patient

### Symptom Formation

Sigmund Freud hypothesized that symptoms of psychopathology arise when conflicting emotions produce unmanageable psychic distress. Mirroring scientific notions regarding the conservation of energy, he theorized that psychic conflict creates an energy imbalance in the psychiatric apparatus that manifests itself in the subjective experience of anxiety, which, in turn, induces the psyche to relieve the distress by transferring awareness of the conflict into the unconscious. This process of

psychic repression, however, is typically incomplete and elements of awareness leak into consciousness, again causing anxiety. In response, the psychic apparatus further attempts to relieve the anxiety by transforming it into a neurotic symptom. In essence, Freud posited psychic defenses against intrapsychic conflict and anxiety and considered symptom formation largely as a consequence of the failure of the psychic defense mechanisms (Goldman, 2011).

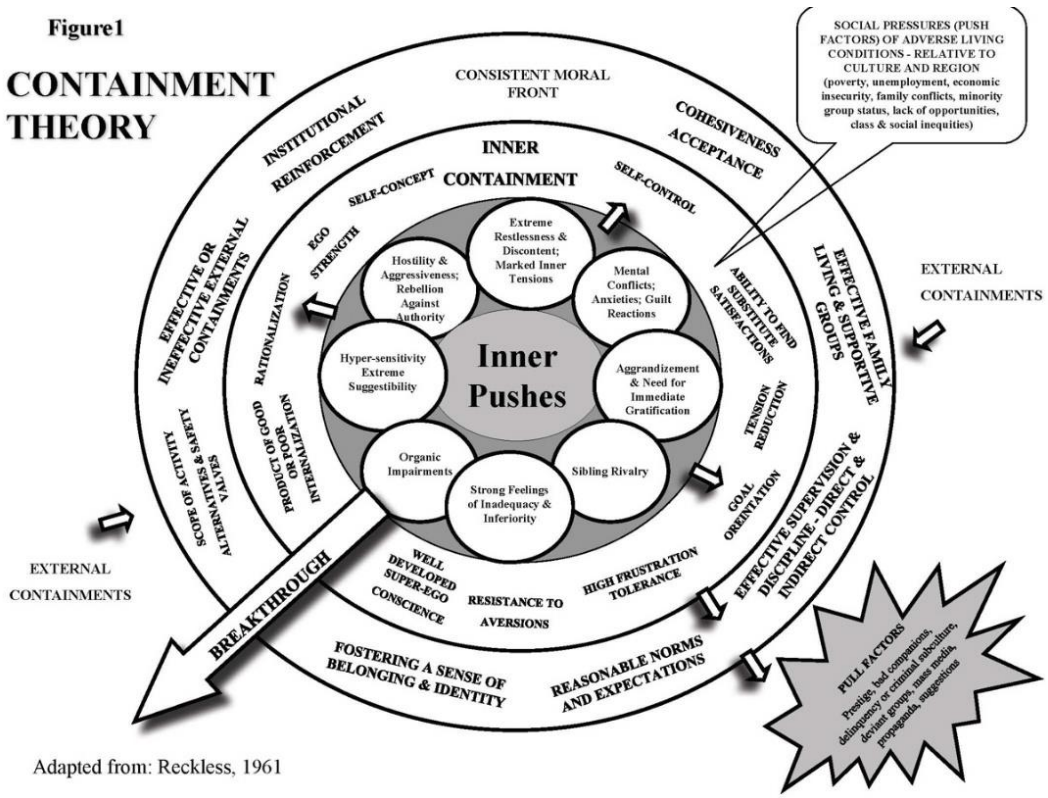
(See Table 1)

*Table 1: Psychic Defense Mechanisms*
*Goldman, H. H. (2011). Review of general psychiatry, 10e. New York, NY: McGraw-Hill.*

| | |
|---|---|
| *Denial* | *The unconscious literally deletes from awareness an unpleasant or anxiety-provoking reality.* |
| *Sublimation* | *The redirection of an unacceptable impulse into an acceptable form of behavior.* |
| *Reaction Formation* | *The redirection of an unacceptable impulse into its opposite.* |
| *Displacement* | *An impulse toward a given person or situation is redirected toward a "safer" less distressing object.* |
| *Projection* | *An unacceptable or anxiety-provoking impulse or affect is transplanted to another individual or situation.* |
| *Rationalization* | *An acceptable explanation for a feeling or behavior is used to camouflage the unacceptable underlying motive or impulse.* |
| *Intellectualization* | *The avoidance of "feeling" by taking refuge in "thinking".* |
| *Repression* | *Disturbing psychological material is secondarily removed from consciousness or primarily prevented from becoming conscious.* |
| *Isolation of Affect* | *The removal of disturbing affect from an idea or event, with the dispassionate details or description remaining.* |
| *Suppression* | *Intentional repression of unpleasant conscious material.* |
| *Humor* | *A conscious and unconscious defense that allows material that stirs unpleasant affects to be better tolerated in consciousness.* |

Correspondingly, Walter C. Reckless proposed the Containment Theory which posited dysfunctional behavior (or alternatively functional behavior) as the product of interplay between various forms of stressors, known as pushes or pulls, and internal and external controls, known as containments. While originally formulated as a sociological premise, Containment Theory is extrapolated to a representation of intrapsychic functioning and conflict, encompassing the unconscious structure of both adaptive and maladaptive responses. It assumes that for every individual there exists, in varying levels of strength and functionality, containing external structures as well as protective internal structures. The relative integrity and stability of these entities determines one's predisposition toward either health or dysfunction (Reckless et al., 1956; Reckless, 1961, 1967). Therapy then, would seek to make conscious and fortify these psychic structures.

(See Figure 1)




**Transference and Countertransference**

The psychoanalytic orientation to psychotherapy specifically emphasizes the processes of transference and counter-transference in the progression of the therapeutic relationship. Transference refers to "the largely unconscious displacement of patterns of feelings, thoughts and behavior, originally experienced in relation to significant figures during childhood, onto the therapist or other significant figure" (Moore & Fine, 1990, p. 196). As therapy progresses transference concentrates more pointedly on the analyst and increases in intensity as it serves to replicate the childhood neurosis. Patients strive to elicit in an analyst a duplication of their basic life struggles, and analysts must interpret that transference while regressively experiencing and containing their own countertransference. In this way the analyst's personal anonymity and neutrality creates a frame within which the transference issues can be worked through and resolved.

According to Freud, (1910; 1963) the concept of transference constitutes a one-person, intrapsychic construct reflecting the patient's psyche. From this perspective, pathology is viewed as a manifestation of the manner and processes in which the individual's instinctual drives are developed and defended against. Subsequently, healing occurs when these drives are made conscious in a therapeutic environment through the development of a transference neurosis whereby a patient experiences regression and the drives are displaced from their original objects onto the analyst. In this context, the analyst represents a neutral "blank screen" and therefore does not contribute to the nature of the transference, but rather merely receives the patient's projections. The analyst "is presented as a vessel for transference, a potential space within which the patient can live infantile life anew" and furthermore, " . . . is assumed to approach becoming a perfect observing instrument, transcending his or her idiosyncracy through submission to the powerful analytic process" (Bollas, 2017, p.200). This strategy is designed to maximize conscious scrutiny of a patient's previously unconscious mental life. Furthermore, this orientation contends that for an analyst to explicitly state his or her own view of reality constitutes a personal disclosure on the part of the analyst that tends to foreclose a patient's exploration of his or her own view.

Conversely, Moreno (1937) espouses an interpersonal alternative to the intrapsychic perspective, stating that, "Transference does not take place toward a generalized person or a vague Gestalt, but toward a role which the therapist represents to the patient. The therapist, in turn, can be caught in experiencing the patient in complimentary roles" (p.8). Thus, Moreno implies that transference is the product of the engagement of two persons in commendatory roles, which, in terms of the therapeutic context, occurs as the reciprocal influence of therapist and patient represented by the processes of transference and countertransference. From this interactional viewpoint, the therapist is not viewed as a blank screen but rather as an active participant and the therapeutic transference is the product of both the patient's inner world and the therapist's behavior. Moreover, Yalom (2005) asserts that increasing therapist transparency would actually decrease transference because the process evolves not through projection but rather through engagement and complementarity.

From either orientation transference can be characterized as "a form of memory in which repetition in action replaces recollection of events" (Corsini & Wedding, 2013, p. 39). It represents the patient's unconscious communication regarding the inner conflicts and motivations for defenses which constitute the integral issues of therapy. Through analysis and interpretation of the transference neurosis, insights can be gained, repressed memories recalled, issues re-worked in the safe therapeutic environment, and ultimately, substitute sublimated interests developed for effective functioning in the world at large.

Correspondingly, the analyst develops countertransferential reactions to the patient that may encompasses a form of negative feelings and/or disproportionately positive, idealizing or even eroticized reactions. Countertransference refers to "the displacement onto the patient of attitudes and feelings derived from earlier situations in the analyst's own life in response to the patient's behavior toward the analyst or a more specific reaction to the patient's transference" (Blum & Goodman, 1999, p.121). Countertransference may exist in relation to a particular individual, to a type of patient, to an aspect of psychopathology, to significant objects and figures in the patient's life, to tangential and adventitious aspects of the patient's current life situation or to his/her history or personality attributes. Additionally, countertransferences are generally a blend of the therapists' own displacements from the past and their reactions to the issues of the patient's transferences. Through this process of interpersonal collaboration therapists often adopt roles in reaction to subtle tranferential interactional pressures from their patients. Such induced roles indicate to therapists how the patient experiences the therapeutic relationship and provide a glimpse into the kinds of relatedness in the patient's earlier life.

While unanalyzed countertransference reactions are considered negative and even an impedance to effective therapy, conscientious scrutiny of this phenomena can facilitate discernment of the meaning of the patient's feelings, thoughts and behaviors as well as the dynamics of their interpersonal interactions. In many cases, when used appropriately, the process of countertransference makes transference a more efficient and effective agent for change. If, even more than being a blank screen, an analyst can be a detached, safe acknowledgment of the typical way a patient is experienced by others, then this representation can assist in the process of moving the patient beyond the underlying conflict fueling those repetitive reaction patterns. According to Freud, who first noted the existence of this interplay in the therapeutic context, "Countertransference is a major source of the trials and tribulations of the analytic encounter, with the potential for both destructive regression and constructive progress in understanding" (Freud, 1910, p. 151).

This powerful energy flow of transference and countertransference between analyst and patient constitutes the driving force of psychoanalytic work. Commenting on this complex interaction, Bollas (2017) writes, ". . .for differing reasons and in various ways, analysands re-create their infantile life in the transference in such a determined and unconsciously accomplished way that the analyst is compelled to re-live elements of this infantile history through his countertransference, his internal responses to the analysand" (p.200).

Effective management of the processes of transference and countertransference is essential in understanding the unconscious communication of the patient and ultimately in facilitating progressive insight and change. It is the therapist's role to step back from the subjective experience of these processes as they occur in the therapeutic session and to consider the various cognitive and affective aspects in the context of the patient's life history and problems. In this way, these issues, which characteristically represent recurring patterns of maladaptive and dysfunctional behavior, can be viewed in a new light and used to encourage new, more adaptive and functional responses. Casement (1992, p. ix) refers to this aspect of the therapist's role as the development of internal supervision whereby "analysts monitor the interaction between themselves and their patients, and their impact upon the analytic process."

**Interpretation and Containment**

Within the context of the evolving therapeutic relationship and the dynamic interplay of transference and countertransference previously described, the analyst offers both progressively insightful explanations and emotional support as the patient explores unconscious material. Interpretation refers to the central activity of the analyst during treatment whereby, "the analyst expresses an understanding of the patient's mental life, based on the patient's description of memories, fantasies, wishes, fears and other elements of psychic conflict that were formerly unconscious or known to the patient only in incomplete, inaccurate or otherwise distorted form, as well as on the way a patient distorts the relationship with the analyst to meet unconscious needs and to relive old experiences" (Moore & Fine, 1990, p.103). This process of interpretation requires the contribution of both therapist and patient and involves modification as new material emerges. Interpretation allows patients to understand their past and present inner life in a new, less distorted and more complete way, and thus lays the groundwork for the possibility of changes in feelings, attitudes and behavior. In a sense, interpretation represents the overt communication by the analyst based on the cumulative conscious and unconscious communications of the patient and is intended to offer patients explanation and extended knowledge about themselves and the previously unacknowledged aspects of their suppressed unconscious conflicts.

Containment occurs when an individual "projects a part of his or her psyche, especially the uncontrolled emotions, to be held or incorporated by another in a supportive relationship, who absorbs them and translates them into specific meanings, and acts upon them thoughtfully, the whole transaction resulting in a transformation of the projective identifications into meaningful and unthreatening thought" (Moore & Fine, 1990, p.32). Using the vehicle of the transference-countertransference experience patients purposefully communicate their need for the therapist to experience, understand and successfully manage those feelings which the patient has heretofore experienced as unmanageable. Typically, patients bring with them a history of past experiences whereby previous attempts at finding containment in the context of other relationships has failed. In this way, the patients' desperate need to further suppress the emotions has been reinforced and strengthened. Therefore, unconsciously and/or consciously they expect and seek to induce the same reaction from the therapist. Through the process of analytic holding, the therapist's ability to endure these emotions and interpret them in such a way that the patient feels truly understood allows patients to develop their own capacity to manage difficult feelings without resorting to the standard defenses of suppression, repression and avoidance (Casement, 1992, 2013).

In order to move the analysis forward toward useful insight, the therapist must, within the context of the ongoing therapeutic processes of transference and countertransference, provide an adequate balance of interpretation and containment. Interpretation without containment establishes a protective and defensive distance from the emotions a patient is communicating, reinforcing the notion that they are dangerously unmanageable and must remain repressed. Containment alone keeps a patient stuck in a dependency state with the therapist in relation to the quagmire of emotions which the patient experiences as unmanageable and bewildering. Through a balance of interpretation and containment the therapist communicates both a willingness and an ability to comprehend, connect with and tolerate those feelings which the patient experiences as overwhelming.

**Analytic Space and Analytic Process**

The analytic space, unlike the mental and emotional space in any other interpersonal interaction, exists for the purpose of allowing a unique type of relating, involving transference and subsequent working through the patient's resistance which will bring about significant and lasting change. While there is an exchange of ideas, the space exists for, and is focused on, the needs of the patient and is protected from internal and external influences which distract from the primary purpose. In order to be therapeutic, the analytic space must be free from the intrusive pressures of influence, expectation and judgment which exist in the space of most relationships. The therapeutic space allows the patients to spontaneously be, think, feel and express whatever is reflective of their experience of an autonomous self in that moment. It is from these natural projective expressions that the patient will consciously and unconsciously communicate their issues and lead the therapist toward accurate interpretation of their unresolved conflicts. Within the analytic space the analyst provides a reflective viewpoint and monitors his/her countertransference interactions in order to maintain a level of security that allows the patients to risk examination of heretofore repressed internal conflict and feeling states. It is the maintenance of the analytic space and a willingness to respond to the direction indicated by the unconscious communication of the patient which allows for progress in the analytic process.

As part of the analytic process some individuals may benefit greatly from a period of dependency on or idealization of the therapist (Kohut, 2009; Winnicott, 2014). Ultimately, however, for the patient to grow, this mode of relatedness must be worked through. As Kellerman (1985) states, "Learning to see who the therapist really is is one of the unavoidable steps in acquiring a greater capacity for reality testing and for achieving autonomy. The distortion of reality inherent in idealization leaves the patient a child, unable to grow up. And sooner or later patients will realize that they were cheated by a leader who did not challenge their flattering idealizations" (pp. 91-92).

**Not-Knowing - the Uncomfortable Realm of the Unknown**

Casement asserts that in "any unfamiliar situation elements that can be regarded as familiar are responded to as signs" (1992, p. 9). In this way, therapists as well as patients can sacrifice a true understanding of the uniqueness of a situation for the sake of the comfortable security of moving beyond the not-knowing and into the knowing. For therapists, theory-based expectations of typical behavior or a typical course of therapy can hamper progress by too quickly veering the analyst off course and not leaving room for discovery. Casement further asserts, "If too much weight is given to what is already known, then the unknown remains elusive and our attempts at understanding introduce their own distortions to what is being studied" (p. 190).

**Conclusion**

Communication has been referred to as "the process of constructing shared realities through human interaction" (Shockley-Zalabak, 2014, p.23). It can be argued that nowhere is it more imperative to establish a genuine understanding of a shared reality than within the context of a therapeutic relationship where the ideal, as first expressed by Freud, is "to replace the unconscious repression of impulses, wishes and attitudes with rational judgment, to give the patient the opportunity to make conscious decisions about his conflicts, to redirect the psychic energy into higher and more valuable social and cultural activities; in essence, to become the kind of individual he would have become had not the neurosis interrupted his development toward maturity" (Freud, 1963, p.68). From the first expressions of symptomatic behavior patients communicate their unconscious search for help and wholeness. Following their lead, the analyst must "be instrumental in generating a new experience of a different order and disconfirming the patient's pathogenic beliefs" (Ehrenberg, 1984, p.23)

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# Mental Images and Postpartum Depression: Case Study

**Dorina Bedhia**

Clinical Psychologyst at University hospital
for obstetrics and Gynecology "Koco Gliozheni" Tirana, Albania

**Abstract**

Imagination and images refer jointly ability to imagine. Imaginative therapies operate all within an almost real context. In therapeutical experience, the individual goes through almost real experiences before going through the events in reality, acts before acting in reality and this provokes changes in somatic level. The almost real dimension, namely the imaginative dimension, influences the individual, or rather the individual, starting from the imagination changes himself, his beliefs and perceptions. Imagination as therapeutic intervention is sometimes more efficient and more valuable than other therapies. It is also effective in treating a range of psychological symptoms such as insomnia, depression, obesity, cronich pain, various phobias, anxiety and panic , somatic problems. Given the fact that the images are effective in treating a range of psychological symptoms, including depression we want to see if imaginative techniques help improve symptoms of postpartum depression. This case was treated at University Hospital for Obstetric and Gynecology "Koco Gliozheni" Tirane (Albania). A 35 years young mother showed depressive symptoms associated with post-partum condition, as determined by semi-structured interviews and relevant test EDPS, also by psychiatric consultations. Besides the daily psychological support I proposed some imaginative techniques like self-watching, flooding, guided imagery. Imaginative activity in general, in the case in question, was a valid instrument of the difficulties in everyday life. The patient learned to visualize problematic elements of each situation and this resulted an efficient approach. Imagination helped identify schematic components that have contributed to the formation of inappropriate thoughts and exaggerated ideas. It helped in recognition of the patient's emotional reality and modifying this emotional reality. The patient uses images to manage situations different daily life even by telephone follow up. This case study shows that imagery techniques, elaborated through images, facilitate recovery and provide us with a functional interpretation of the event and its consequences. Working with images intended to make the patient able to withstand and manage the pain that bring different situations and to integrate it in the history of personal life.

**Keywords:** imaginative techniques, post-partum depression.

## Introduction

### 1. Background

The imagination, images and imaginative techniques have always raised great interest. Imagination and images refer jointly the ability to imagine. Imagination is action (Widman 2004). It is the ability to shape mental images, to transform them, to develop them and to deform them. In Psychological terminology it is a form of thinking that does not follow fixed rules, nor logical relationships but is presented as a reproduction and elaboration of current or past sensory data associated with a certain affective stage. The imagination allows the combination of memories, perceptions, aspirations and real context by creating in mind something new, transformed and re-elaborated thanks to the fantasy. Images are the basis of psychic life. The approach that is used by some orientations and imaginative psychotherapies lies on the fact that some imaginative experiences take on the colors of reality and it is precisely this almost real dimension that acts in changing the individual. The ability to imagine allows the experimentation in this almost real dimension. The almost real dimension, namely the imaginative dimension, succeeds in influencing the individual, or to be more precise, the individual starting from the imagination changes himself, his own beliefs and perceptions. The process that is followed by most of the therapies is from the fantasy to reality.

The imagination as an intervention technique has yielded results in various fields. Most clinicians use imaginative techniques to promote relaxation, to reduce stress, to regain control of unwanted behaviors and to improve health.

They are effective in treating a variety of psychological symptoms such as depression, different phobias, anxiety and panic, sleeplessness, somatic problems.

Imaginative techniques are incorporated into psychoanalytic, psychodynamic and cognitive behavioral theories as supplementary therapeutic methods.

**2. Case Study**

Our patient is transferred to the obstetric-gynecological university hospital 'Koco Gliozheni' Tirana (Albania) from Berat maternity. It is 30-31 week pregnancy and the patient is diagnosed with preeclamsia. She is 35 years old, married and in her first pregnancy. She gives birth to a girl with a weight of 1100 grams, who starts a treatment at the intensive therapy unit at the “Koco Gliozheni” maternity hospital.

The first psychological counseling is requested by the gynecologist and then by the pediatrician who is curing the patient's daughter. The latter asks for the consultation because of the lack of interest shown by the mother to the child.

The patient complains of persistent headaches, chest pain and breathing difficulties. After examinations with the specialized doctors, the room physician requests a psychological counseling. The first consultation is done about one month after the baby's birth. The patient complains of headaches, breathing difficulties and persistent anxiety that does not allow her to sleep but is trying to suffocate her. She goes very rarely to see the girl because she does not feel good, according the declaration of the patient. She is always accompanied by her mother-in-law and husband who are present at almost all meetings with the patient and they refuse to leave her alone through consultations.

In the upcoming hours and days the situation appears alternately, there are days when she is quiet and other days when she only cries because she does not feel physically fit.

**3. Methodology**

The patient started to follow the consultation regularly every day. During the consultations, there were constantly present either the husband or the mother-in-law of the patient who with all the insistence of the psychologist refused to leave, moreover by taking the approval of the patient. This aspect was counterproductive because it did not allow us to obtain additional information on the patient's family problems. In the presence of the family, the patient complained continuously of physical problems but not for psychological problems. The psychologist noted sleep disorders, fatigue and lack of energy, anxiety, guilt feelings, thoughts of death and suicide.

With the cooperation of the maternity staff we tried to find time when the patient could be consulted alone in order to explore her thoughts and emotions.

Initially I conducted semi-structured interviews that consisted of cognitive questions. These questions are proposed by the National Institute for Health and Clinical Excellence (United Kingdom) (Nice 2007), and are important in screening postpartum.

- Did you feel very sad and hopeless during the last month?

- Did you have little interest or little pleasure in daily activities during the last month?

If the above questions result positive then the third question is raised

- Taking in consideration this situation, do you feel the need for help?

After the answers to the questions were all positive we applied the Edinburgh test for postnatal depression.

The Edinburgh Postnatal Depression Scale (EDPS) is a valuable and effective way of identifying patients at risk for perinatal depression. The EDPS is easy to administer and has proven to be an effective screening tool. Mothers who score above 13 are likely to be suffering from a depressive disease of varying severity. The scale indicates how the mother has felt during the previous week.

From the interviews we made and from the respective tests we identified depressive symptoms.

We sought a psychiatric consultant, who based on the assessments made, confirmed the diagnosis of postpartum depression and proceeded with the respective pharmacological therapy.

In addition to pharmacological therapy, the patient continued to have constant psychological support.

But since the communication with the patient was difficult and we reached a point without way out, we thought to use the imagination, starting from the fact that the patient's imagination was quite alive (at least from the description of the scenes of death and suicide which she imagined and outlined).

Self-Watching Technique: This technique uses self-observation to change compulsive behaviors. It is taught to the patient to identify the factors that support and associate compulsive behavior, also are taught the techniques that modify this situation. The patient should keep a behavioral diary in which he should note any compulsive behavior and the circumstances in which this behavior occurs. This helps in identifying events, ideas and feelings that influence the behavior. The patient is assisted in creating the strategies to face and not avoid them. Important in this technique is the identification of alternative satisfaction based on the fact that it is easier to resist to compulsive behaviors when they are anticipated from alternative positive behaviors.

Flooding Tech: Polin (1959) has named it as a shocking therapy. It consists in the imagination of an anxiety situation that is experienced with the maximum intensity including all the emotional dyeing that it causes. This image pushes the patient to the limit of patience and aims to avoid strategies that the patient usually uses in similar situations such as avoiding or leaving.

The directive images were used to build a future-oriented identity. To re-imagine or re-live changes the patient's point of view regarding the reality of the pain.

**4. Discussions And Conclusions**

The period of pregnancy and birth are important events that contribute not only to the birth of a human being such as a child but also to the birth of a new identity of the next mother, particularly from the psychological point of view. Pregnancy is configured as a fundamental process in shaping of the female identity. Like all phases of identity crisis, this stage also has its own conflicts because the mother's personality is tested and faces constant changes and adjustments. The woman can withstand with difficulty this process, and the birth of the baby may worsen the situation, causing humorous disorders from the easiest to the worst.

The post-partum depression phenomenon in Albania is highly underestimated. There are no good statistics for this phenomenon. Medical staff are not trained to identify these cases and refer them to relevant institutions. The psychological service in maternity is regularly implemented since 5 years.

Patients are still not happy about the psychological support. There is still the mentality that asking for psychological help means being crazy. And these prejudices become even more distinct among the people living in the city and those living in the village.

On top of these limitations, adds the fact that a child's birth is a joyful event and should not bring any kind of problem, and therefore new mothers have difficulty in expressing and showing their problems.

Even when maternity personnel faced such problems, is the mother herself or her family members who try to minimize the problem, not pay attention, even to refuse psychological support or even when they accept it they are not at all cooperative.

Such problems are also encountered in our case. The husband of the patient and her family wanted to be in consultation, and this limited the confession of the woman.

Since verbal communication was blocked at a point without a way out, I decided to use the imagination and the imaginative techniques to understand the problems, motivations and behaviors of the patient, starting from the fact that the imagination helps to face daily difficulties and improve the lifestyle

Images are always associated with emotion. It is a bidirectional relationship. If images produce emotions the latter together with feelings and affections produce imaginative activity, which is used to recognize the individual's cognitive-emotional reality and to modify it if necessary.

Imaginative exposure is used as an alternative to the real-life difficulties. These images are capable of provoking a positive or negative emotional state, transforming some aspects of the external and internal reality, facilitating the identification and analysis of emotional states, cognitive processes, to identify and modify the distorted and irrational beliefs of patients through a change in the degree of anxiety stimulus risk or through a change in the way of assessing the ability to confront.

The directive images used with our patient helped us discover new areas of exploration, such as a depressive episode that occurred six years ago and treated with medicines. Or the conflicting relationship with her husband and her family, or fear of having a child who would have a life full of suffering like her, so she preferred to die together with the baby.

The images helped us to modify the irrational beliefs that led to the appearance of inappropriate emotions.

The directive images helped us to start the creation of a future-projected identity, a future that includes her child.

The patient began to approach and stay more with her child, and one month later, after daily psychological consultations and psychiatric support, came out of the hospital in a better state.

In a telephone follow-up with the patient, the patient referred us to be better, changed some things in her life. She had been divorced from her husband and had gone to live with her daughter at her parents, she had started a new job. She was happy with the new life she had created, and she continued to consult periodically with mental health institute.

This clinical case is a positive example, which indicates that work with imagery and imaginative techniques is more effective where words are lacking, and where barriers and protective mechanisms are very obvious.

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# New Formulation with Marine Algae from Black Sea

**Emin Cadar**

Umf "Carol Davila" Bucharest, Faculty of Pharmacy,
Traian Vuia, Bucharest, Romania

**Emilia Mihaela Cadar**

The School No.30 "Gheorghe Titeica", Constanta, Romania

**Cristina-Luiza Erimia**

"Ovidius" University of Constanta, Faculty of Pharmacy,
Constanta, Romania

**Aneta Tomescu**

"Ovidius" University of Constanta, Faculty of Medicine,
Constanta, Romania

**Abstract**

Seaweed is a natural treasure that can be intensely evaluated for therapeutic purposes. During the past years, it became obvious that the ecosystem presents **a marine algae excedent**, which should be utilized in one way or another. Marine algae have been intensely studied. The superior exploitation of the marine biomass represents a highly important resource for the pharmaceutical industry, supplying raw material for the extraction of bioactive substances (vitamins, sterols, and aminoacids) and various other substances, the purity of which is strongly connected to the state of the marine ecosystem. In present work the extracts from marine algae are incorporated in type I non-denatured fibrillar collagen matrixes for obtain new pharmaceutical product. In order to obtain therapeutic effects at nanostructure level, it is important to know the rheological characteristics of the relevant mixtures of collagen gels and extracts from marine algae selected for use. In this survey we have studied mixtures made of non-denatured fibrillar collagen hydro-gels where different concentrations of marine algae have been incorporated.

**Keywords:** marine biomass, fibrillar collagen, marine algae, seaweed, bioactive substances

## 1. Introduction

The first data regarding the use of algae dates back to the year 2500 B.C, while in China they are recorded in literature as early as the 8-6$^{th}$ centuries B.C. In Japan, the product Kombu, which is prepared from *Laminaria (angusta, japonica, religiosa)* and *Alaria* species, is consumed. However, only beginning with the 1670s have they been grown a large-scale. Antique Greeks used algae as a remedy against intestinal worms [1]. In Western countries, algae are not yet accepted as normal daily nutrient, maybe due to their less than appealing aspect and insufficient digestion ability. Nonetheless, in various parts of Europe, algae were used as a food product.

Alongside the Romanian coast, from a qualitative point of view, in the year 1935, the number of macrophytes was 77. Between 1970 and1980, only 68 species were recorded. According to other estimates, at the end of the 1990s, only 38 species of *Clorophytes* were recorded. These observations outline the significant qualitative decline of the Romanian shore macrophytobenthos. During the last seven decades, the progressive diminishing of the macroalgae flora has intensified, with severe consequences on the entire coastal ecosystem. In 199, only the southern part of the Romanian shore exhibited a more specific diversity. Vegetation impoverishment, especially after 1970, is due to natural and anthropologic causes which have deteriorated the marine system (severe frosting, argyle sedimentation on bottom rocks, a decrease in light penetration in the water column due to suspensions, increase in eutrophication) [1][2].

Along with the increase in eutrophication, significant qualitative changes were noted in the structure and function of the macrophytobenthos, starting with the oldest records up to the end of the year 2000. Due to important amounts of suspended particles and plankton, the transparency of the sea water registered significant changes, with a considerable decrease. The position of the compensation point changed in such a way that bottom plants that were growing at depths over 7-8 metres became shadowed. This has contributed to the decline of macrophytes, despite large quantities of nutrients. Consequently, due to a large variability of ecologic factors, these changes of the ecosystem and community structure has lead to certain phytocenses being replaced by others. The consequene has been a change in seasonal and multiannual dynamics of the algae communities. The interaction between various anthropologic factors on vegetation has lead to various results, from a structural simplification to complete disappearance. Following hydrotechnics construction work, the algae bed was covered with mud and/or sand. Under these circumstances, *Cystoseira Ag.* species were replaced by *Cladophora* and *Ceramium,* these macrophytes being usually seen in shore areas, at depths lower than 3 metres, were eutrophication tolerant species have emerged such as *Enteromorpha intestinalis* and *Cladophora vagabunda* [1], [3].

The most frequent species belong to the *Enteromorpha* and *Ceramium* genus, but also *Cladophora, Porphyra Ag.* and *Callithamnion Lyngb.* Usually, *Enteromorpha* species are mixed in this green algae belt with *Cladophora* species, and, in particular, *Cl. sericea (Huds), Kutz* and, sometimes, *Cl. albida (Huds) Kutz.* and *Cl. laetevirens (Dillw.) Kutz* [4]. Although in a reduced number (qualitatively), the remaining species have developed considerable productivities on the available rocky substrates; the common algae populations, represented primarily by *Enteromorpha* and *Ceramium* species cover 80% of this substrate.

During the past years, it became obvious that the ecosystem presents **a marine algae excedent.** The phytochemical studies on the algae (inferior marine plants belonging to the Thallophyta systemic category) presents the possibility of their usage as raw material, due to the high context in poli-sugars, such as [5], [6]:

- alginates (the alginic acid and its metallic salts, organic bases or their derivates), characteristic for the brown algae,
- the agar-agar (co-polymer of D-galactoze with 3,6-anhydro-L-galactoze, partially esterified with sulphuric acid characteristic for the red algae,
- various L-type monozes-galactoze, 3,6-anhydro-D-galactoze, L-frucoze, D-maluronic and L-guluronic acids, cellulose, chracacteristic for the green algae.
- In addition, aminoacids (especially in green alage, such as *Ulva lactuca*) – among which the 8 that are essential for the human organism, and that impossible to be synthesized: izoleucine, leucine, lizine, metionine, fenil-alanine, treonine, triptofan, valine – are present in the algae.

Furthermore, the extraction of agar-agar from red algae Phyllophora nervosa, Ceramium rubrum, C. elegans, Callithamnion corymbosum, Polysiphonia violaceea) can provide vegetal geloze [3]. For the Romanian littoral area, the marine materials are easily accessible [4]. In literature on the matter, attempts of obtaining pharmaceutical products from the Romanian shore marine algae as alcoholic extracts incorporated in collagen hydrogels have been recorded [2]. The active principles identified in the Black Sea algae have drawn researchers' attention for their use in obtaining new pharmaceutical products [5][7][8].

The present study outlines the obtaining of new pharmaceutical formulations using marine algae, collagen, and hyaluronic acid. Each of these components has their own individual properties. The main goal is obtaining time-stable products with beneficial effects on various skin disorders.

## 2. Materials and Methods

The materials used are represented by green marine algae from the *Enteromorpha intestinalis* and *Cladophora vagabunda* species. Enteromorpha (Enteromorpha intestinalis),one of the mmost common green seaweeds to be found in shallow rockpools which copes with high temperatures and changes in salinity [3], [4]. From macroscopic and microscopic observations, the following descriptions can be made [3]:

**Table 1**. The macroscopic examination of the analysed marine algae [3], [5]

| *Cladophora Vagabunda* | *Enteromorpha intestinalis* |
|---|---|
| *Multiannual alga, 10–15 cm tall;* | *green multimulticellular alga, with a* |

| | |
|---|---|
| *Strong discoidal rhizoid;*<br>*Filamental tale with ramifications,*<br>*Bushy aspect;*<br>*Filaments formed of long continuous cells;*<br>*Terminal ramifications in groups of 4–6,*<br>*bent as a sickle.* | *single-cell layer tale*<br>*height – from a few cm to 1m, width – from*<br>*1 mm to 10 cm;*<br>*disk-like rhizoid;*<br>*short, cylindric cauloid;*<br>*intestine-like filoide.* |

**Table 2**. The microscopic examination of the analyzed algae [3]

| *Cladophora Vagabunda* | *Enteromorpha intestinalis* |
|---|---|
| *Multiannual alga, 10–15 cm tall;*<br>*Strong discoidal rhizoid;*<br>*Filamental tale with ramifications,*<br>*Bushy aspect;*<br>*Filaments formed of long continuous cells;*<br>*Terminal ramifications in groups of 4–6,*<br>*bent as a sickle.* | *green multimulticellular alga, with a single-cell layer tale*<br>*height – from a few cm to 1m, width – from 1 mm to 10 cm;*<br>*disk-like rhizoid;*<br>*short, cylindric cauloid;*<br>*intestine-like filoide.* |

The algae used were in powder form.

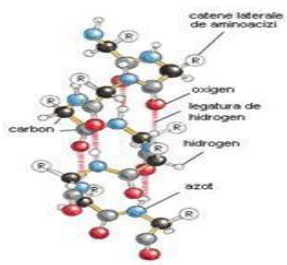
Type I fibrillar collagen

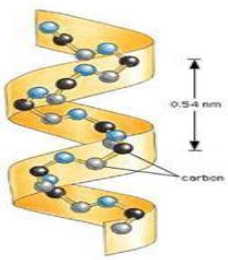
Collagen hydrolysate is obtained from bovine skin. Collagen, under all its characteristic forms, presents as a polymer with triple helix structure, which individualizes through intense hydrophilia, variable ionic characters and diverse functionality (Fig. 3).

Fig. 1 *Cladophora Vagabunda*

*Fig. 2 Enteromorpha intestinalis*

It can be involved in a wide number of interaction systems with other micro- or macromolecular components. Currently, in vertebrates, at least 27 different types of collagen are known, which exhibit a remarkable diversity in what regards molecular and supramolecular organisation, tissue distribution and function.



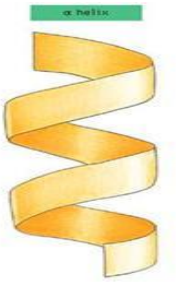



Fig 3 Collagen triple helix function

From this material, mixtures with varying collagen and Black Sea green algae composition were made (Fig. 4).


Fig 4 Products obtained from a collagen and different percentages of green algae

In order to select the product with the best stability, rheological studies were performed. In stability tests, the rotational viscometer Reovscostar R was used. Viscosity was measured at various rotation speed for the collagen products containing different percentages of green algae. Reading times were identical every 10 seconds, for 10 minutes.

**Results and Discussions**

The formulations were obtained from collagen gels and green algae. Rheological studies were performed through viscosity measurements at varying rotation speeds. Thus, we established the D ($s^{-1}$) shear rate gradient, for which the η (cPoise) viscosity was obtained. From experimental data analyses, rheological parameters were obtained for each formulation:

- For the P1 formulation with 4.76% green algae in collagen hydrolysate, the values from Table 1 were obtained.

Table 1. Rheological parameters for P1

| *Viscosity η (cP)* | *Shear rate D (sec $^{-1}$)* | *Shear stress τ (Pa)* |
|---|---|---|
| *Interval between 19700 cP and 3800 cP,* | *Interval between 4,8 (sec $^{-1}$) and 68 (sec $^{-1}$)* | *Interval between 80,37 Pa and 258,4 Pa.* |

- For the P2 formulation with 7% green algae in collagen hydrolysate, the values from Table 2 were obtained.

Tabelul 2 parametrii reologici pentru P2

| *Viscosity η (cP)* | *Shear rate D (sec $^{-1}$)* | *Shear stress τ (Pa)* |
|---|---|---|
| *Interval between 21323 cP and 8000 cP,* | *Interval between 6,8 (sec $^{-1}$) and 34 (sec $^{-1}$)* | *Interval between 145 Pa and 268,6 Pa.* |

Measurements were made both at rotation speed increase and decrease. Rotation speed was between 12 rpm and 200 rpm for formulation P1 and between 12 rpm and 100 rpm for formulation P2. For rheological analyses, graphics were used so as to follow rheograms (Fig. 5 and Fig. 6), variation of sheer stress with speed gradient (Fig. 7 and Fig. 9) and flow curves (Fig. 8 and Fig. 10).

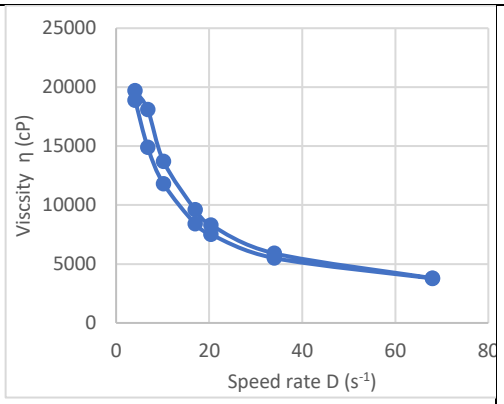



Fig. 5 Rheogram for formulation P1 (collagen and 4.76% green algae)

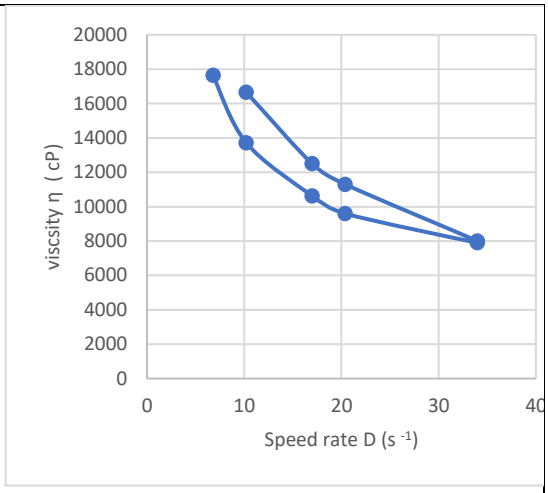



Fig. 6 Rheogram for formulation P2 (collagen + 7% green algae)

As it can be seen in figures 5 and 6, viscosity variation with speed gradient, the formulations have a pseudoplastic behaviour. Viscosity decreases as rotation speed increases. It can be noted that, at percentage of algae increases, the viscosity of the product increases. In figures 7 and 9, a more rapid increase of shear stress is noted at the same shear rates, with an increase in algae percentage. Hysterzis loops are wider for formulation P2, which has a higher percentage of green algae.

From analysing flow curves (figures 8 and 10), a linearization of curves for both formulations can be observed at increases of shear rates of over 20 $sec^{-1}$. This means they exhibit a tendency for ideal plastic behaviour at high shear rates, over 20 $sec^{-1}$, which practically means that the gel no longer changes its structure at shearing rates over the mentioned value.

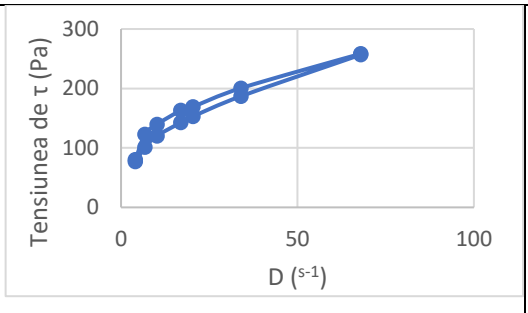



Fig. 7 Shear stress variation with speed gradient for P1 – collagen + 4.76% green algae

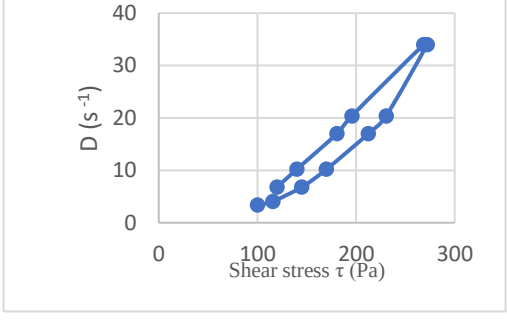



Fig. 8 Flow curve P1 collagen+ green algae 4.76%

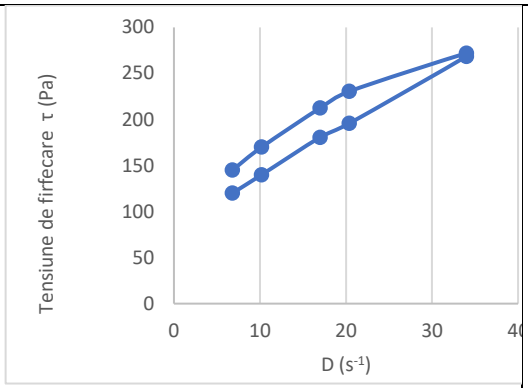



Fig.9 Variation in shear stress τ (Pa) with speed gradient for P 2 collagen + 7% green algae

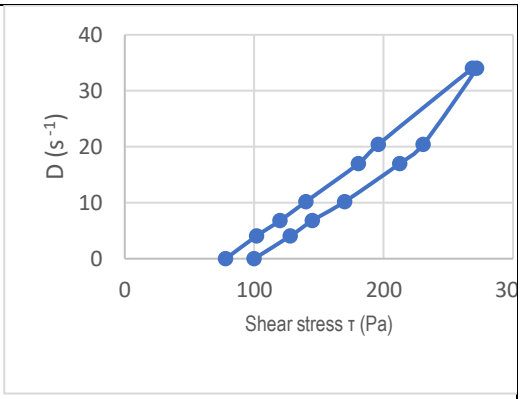



Fig.10 Flow curve for P2 collagen + 7% green algae

For a comparative study of the new pharmaceutical formulations and an appraisal of the interaction between algae and collagen components, which are represented by collagen gels containing marine algae powders from the *Enteromorpha intestinalis* and *Cladophora vagabunda* species, from the rheological data, the following were taken into account:

- Shear rate domains on which viscosity can be measured;
- Rheogram shape;
- Viscosity values at reduced sheer rates;
- Destructuration resistance (value of shear rate at which sudden destructuration is produced).

To the points mentioned above, the aspect of the gel - opalescent – was added – which can represent a proof of the compatibility of the components.

**Conclusions**

Formulations with different green algae content in collagen hydrolysate were obtained.

From the present study, the following conclusions can be drawn:

- Formulations with marine algae in the same type of collagen hydrolysate have a pseudoplastic rheological behaviour, with a decrease in apparent viscosity as shear rates increase.
- Formulations are stable and have an opalescent aspect.
- After the linearization of flow curves over a certain shear rate, formulations are stable and no longer modify structure.
- Based on the values of rheological parameters, it can be noted that formulation P2, with a higher percentage of algae in the same collagen hydrolysate, has a superior stability.

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