Pharmacoeconomic Analysis of Cosmetic Treatments on Seborrheic Dermatitis Using the 80/20 Method

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Abstract

Seborrheic dermatitis poses a persistent challenge for both patients and dermatologists, necessitating effective treatment strategies that address symptoms and provide long-term relief. This abstract explores the application of the Pareto Principle, also known as the 80/20 rule, in the development and utilization of cosmetics for managing seborrheic dermatitis. The Pareto Principle suggests that roughly 80% of outcomes result from 20% of inputs. In the context of seborrheic dermatitis treatment with cosmetics, this principle underscores the importance of identifying and prioritizing key ingredients and formulations that deliver the most significant therapeutic benefits. By leveraging the Pareto Principle, pharmacy managers can highlight the products which bring the highest profits in order to maximize profits. Furthermore, the Pareto Principle informs strategic marketing and distribution efforts, directing resources towards promoting and disseminating products that offer optimal efficacy and patient satisfaction. In conclusion, the application of the Pareto Principle in the treatment of seborrheic dermatitis with cosmetics offers a systematic framework for optimizing therapeutic outcomes and enhancing patient care.

Keywords: *seborrheic dermatitis, Pareto principle, strategic marketing, cosmetics, patient satisfaction*

Introduction

Skin conditions represent one of the complex problems of our times, with seborrheic dermatitis emerging as one of the significant players affecting individuals across different ages and backgrounds [1]. In the realm of dermatology, the pursuit of effective treatments for seborrheic dermatitis not only encompasses clinical efficacy but also extends to considerations of economic feasibility and patient satisfaction. As the burden of this chronic skin condition continues to impact individuals worldwide,

the demand for cost-effective therapeutic interventions becomes increasingly imperative [2]. Characterized by red, itchy, and flaky patches, this chronic inflammatory disorder not only challenges one's physical comfort but also bears a considerable impact on their psychological well-being [3]. Seborrheic dermatitis usually appears in the form of small plaques or macules and sometimes as dry oily scales of white color [4]. The areas most affected are the ones with high concentration of sebaceous glands such as ears, face, or body folds [4]. Approximately 88% of the patients have seborrheic dermatitis on the face, 70% have it on the scalp, 27% have it on the chest, and 1, 2% have it on other parts of the body [4].

Seborrheic Dermatitis Manifestation and Pathogenesis

The scalp involvement of seborrheic dermatitis appears either as dandruff, manifesting as fine, white or yellowish scales on the scalp, often accompanied by pruritus, or as seborrheic plaques, presenting thick, adherent scales, leading to itching, inflammation, and occasionally, hair loss [5]. The facial involvement includes erythematous patches, predominantly affecting the nasolabial folds, eyebrows, eyelids, and retro auricular areas. It also includes greasy appearance characterized by oily skin and the presence of yellowish scales, especially in the nasolabial folds and eyebrows and it can also include pruritus which is a common symptom, varying in intensity and often exacerbating the inflammatory response [5].

The pathogenesis of seborrheic dermatitis is multifactorial, involving a complex interplay of genetic predisposition, immune dysregulation, microbial colonization, and environmental factors. Key contributors include:

Genetic susceptibility where certain genetic polymorphisms predispose individuals to an aberrant inflammatory response, contributing to the development of seborrheic dermatitis [6].

Malassezia Species: Fungal colonization, particularly by Malassezia species, is closely associated with seborrheic dermatitis. These lipophilic yeasts proliferate in sebum-rich areas, triggering an inflammatory cascade through various mechanisms, including antigenic stimulation and bioactive lipid metabolism [7].

Immune Dysregulation: Dysfunctional immune responses, such as Th2 predominance and altered cytokine profiles, play a pivotal role in the pathogenesis of seborrheic dermatitis, perpetuating chronic inflammation and tissue damage [6].

Environmental Factors, exacerbating factors, such as humidity, temperature fluctuations, stress, and hormonal imbalances, can activate seborrheic dermatitis flare-ups, highlighting the influence of environmental triggers [8].

Several factors may predispose individuals to seborrheic dermatitis or exacerbate existing symptoms, see Figure 1.

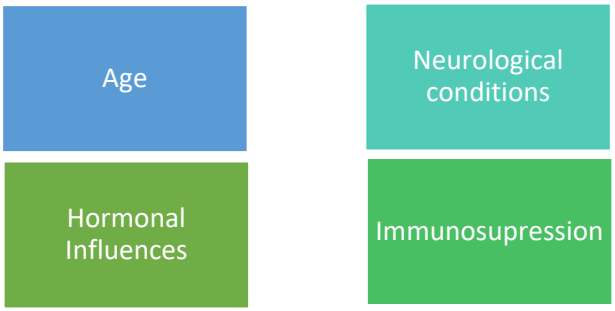

Figure 1 Predisposing factors for seborrheic dermatitis

Regarding age, although seborrheic dermatitis can occur at any age, it often peaks during infancy (cradle cap) and adolescence, with a second peak observed in adulthood, particularly among individuals aged 30 to 60 years [9].

Certain neurological disorders, such as Parkinson's disease and epilepsy, are associated with an increased risk of seborrheic dermatitis, possibly due to altered sebum composition and neurogenic inflammation [10].

Fluctuations in hormone levels, such as during puberty, menstruation, pregnancy, or menopause, can exacerbate seborrheic dermatitis symptoms, suggesting a hormonal component in its etiology [6].

Immunosuppressive conditions or medications may predispose individuals to seborrheic dermatitis, highlighting the role of immune dysregulation in its pathogenesis [6].

Seborrheic dermatitis encompasses a spectrum of clinical manifestations, driven by a complex interplay of genetic, immunological, microbial, and environmental factors. Understanding its clinical presentation and underlying pathophysiology is crucial for effective management, effective economic decisions and targeted therapeutic interventions.

Seborrheic Dermatitis Cosmetic Treatments

Seborrheic dermatitis poses a therapeutic challenge due to its chronic and recurrent nature, necessitating a multifaceted approach that addresses both acute flare-ups and long-term management [1].

Treatments for seborrheic dermatitis can be divided into three distinct types as in Figure 2

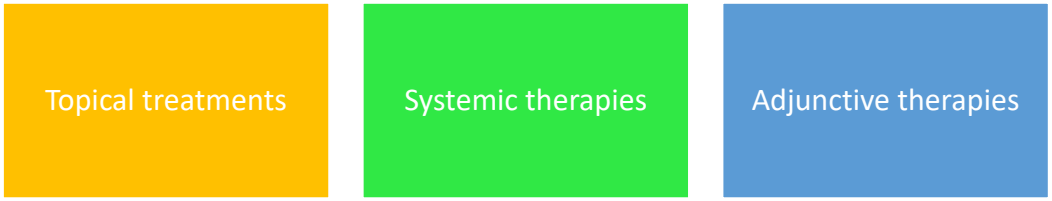

Figure 2 Classification of seborrheic dermatitis treatment options

In the management of seborrheic dermatitis, cosmetic topical treatments play a vital role, offering not only symptomatic relief but also aesthetic benefits that contribute to patient satisfaction and quality of life [11].

This part of the article explores a range of cosmetic interventions tailored to address the specific needs of individuals with seborrheic dermatitis, focusing on their efficacy, safety profile, and practical considerations. Now we will present 10 active ingredients with activity on seborrheic dermatitis. According to pharmacists from Constanta, Romania, we have selected the 10 most used ingredients for the treatment of seborrheic dermatitis.

Pyrithione Zinc: Shampoos containing pyrithione zinc exhibit antifungal and antibacterial activity, targeting Malassezia colonization and reducing flaking and itching associated with seborrheic dermatitis. Regular use helps maintain scalp hygiene and prevent relapses [12].

Piroctone olamine: Piroctone olamine is an antifungal agent that has garnered attention for its potential effectiveness in the management of seborrheic dermatitis [13]. Piroctone olamine offers a gentle yet effective option for individuals seeking relief from the symptoms of seborrheic dermatitis. Its antifungal and anti-inflammatory properties, combined with its favorable tolerability profile [13].

Salicylic Acid: Salicylic acid-based cleansers and shampoos exfoliate the stratum corneum, promoting desquamation and reducing scale accumulation. They are particularly beneficial for scalp involvement and can help enhance the penetration of other topical agents [14].

Coal Tar: Coal tar preparations possess antipruritic and keratolytic properties, exerting their therapeutic effects through inhibition of epidermal hyperproliferation and modulation of inflammatory pathways. Coal tar shampoos are effective in controlling scalp symptoms and are often used in combination with other topical treatments [15].

Tea Tree Oil: Tea tree oil-based cleansers and shampoos possess antifungal and anti-inflammatory properties, offering a natural alternative for individuals seeking gentler yet effective treatment options. However, caution is warranted due to the potential for contact sensitization and irritation [1].

Ceramides: Ceramide-containing moisturizers replenish lipid components of the stratum corneum, reinforcing the skin barrier and reducing transepidermal water loss. They are particularly beneficial for individuals with compromised barrier function and sensitive skin [1].

Hyaluronic Acid: Hyaluronic acid-based moisturizers provide intense hydration by attracting and retaining water molecules within the skin, improving skin texture and suppleness. They are well-tolerated and suitable for all skin types, including oily and acne-prone skin [11].

Occlusive Agents: Occlusive agents, such as petrolatum and dimethicone, form a protective barrier over the skin, preventing moisture loss and enhancing the efficacy of concomitant topical treatments. They are especially beneficial when applied to areas prone to dryness and irritation [11].

Niacinamide: Niacinamide, a form of vitamin B3, possesses anti-inflammatory and seboregulatory properties, making it an attractive option for individuals with seborrheic dermatitis. Topical niacinamide formulations help alleviate erythema, reduce sebum production, and enhance skin barrier function [1].

Green Tea Extract: Green tea extract contains polyphenolic compounds with antioxidant and anti-inflammatory properties, exerting protective effects against UV-induced damage and inflammatory mediators implicated in seborrheic dermatitis. Topical formulations may help reduce inflammation and improve overall skin health [16].

Research Regarding the Value of Different Cosmetic Treatments for Seborrheic Dermatitis in Community Pharmacies

The Pareto Principle

Before delving into strategies, it's essential to understand the market dynamics surrounding seborrheic dermatitis treatments. The prevalence of this condition, coupled with increasing awareness and demand for cosmetic solutions, creates a ripe opportunity for businesses to capitalize on providing effective and aesthetically pleasing treatments.

Moreover, with advancements in dermatological research and technology, innovative products and procedures continue to emerge, catering to diverse consumer preferences and needs. This diversity opens avenues for businesses to offer a range of solutions, from over-the-counter skincare products to specialized dermatological treatments, thereby catering to a broad spectrum of customers.

This research is conducted based on the Pareto principle, also known as the 80/20 rule, considered an efficient analysis method. According to the Pareto Principle, or 80/20 rule, approximately 80% of effects are caused by 20% of causes [17]. Economic, business, and time management are all fields that use this concept. There is a theory that suggests that a small number of inputs are often responsible for the

majority of the results. The Pareto method has been used in the healthcare system with good results in the past [18-20].

The Pareto method is used to make various economic processes more efficient. There are many difficulties faced by company management that must be resolved in a short period of time and at an affordable price. Choosing the right approach is an integral part of management, which is influenced by a variety of factors. Modern methods are usually used when the problems encountered are complex, they are novel, they require a lot of time to solve, etc.

Practical study

The paper compares the values from 10 different active principles presented above for the treatment of seborrheic dermatitis. As mentioned above, the various active ingredients included in the study were selected on the basis of suggestions from local pharmacists and a thorough search of literature data. The ingredients come from different classes and have different effects, but what they all have in common is that they are used in cosmetic products for the treatment of seborrheic dermatitis.

The study has taken into account sales on products containing the active principles from 10 different community pharmacies in the city of Constanta, Romania. The pharmacies have been selected from different areas of the city in order to cover different types of people. Four pharmacies were selected from the center of the city, near shopping malls, three pharmacies were selected from small residential areas, and three pharmacies were selected from the city outskirts. The study has been conducted from 01.06.2023 – 01.02.2024. Table 1 highlights the sales value of the 10 different ingredients in the different pharmacies taken into the study.

Table 1 Product sales in the community pharmacies

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Total
Pyrithione Zinc	3280	1560	1230	1850	520	890	12200	5567	1556	2226	30879
Piroctone olamine	655	355	290	288	52	26	550	220	266	226	2928
Salicylic Acid	5523	2200	1879	3089	766	567	8800	4250	1230	1890	30194
Coal Tar	378	220	55	166	128	-	596	280	28	55	1906
Tea Tree Oil	188	76	150	79	-	88	655	127	89	188	1640
Ceramides	277	180	220	55	-	176	388	226	166	612	2023

Hyaluronic Acid	2089	2855	1355	800	680	550	7588	3850	688	997	21452
Occlusive Agents	300	88	66	115	155	210	455	298	167	288	2142
Niacinamide	278	166	88	38	255	44	660	488	122	455	2594
Green Tea Extract	178	155	-	96	29	-	315	-	55	28	856
Total	13146	7855	5333	6576	2585	2551	32207	15306	4367	6965	96614

Using Table 1, we can see that pyrithione zinc had the highest amount of sales in the 10 community pharmacies, followed by acid salicylic and hyaluronic acid. Although the sales volumes clearly vary in the different pharmacies, the top 3 products remain the same. If we look and compare the total sales obtained from the 10 different substances we can clearly see the effectiveness of the Pareto method as showcased in Table 2 and Figure 3.

Also it can be observed that F1, F7 and F8 pharmacies have the highest sales, and they were all pharmacies placed in busy areas near shopping centers, from which we can conclude that people living near those areas are more inclined to buying cosmetic products for the treatment of seborrheic dermatitis. F3, F4 and F5 are the selected pharmacies on the outskirts of the city. We can clearly observe that the sales for cosmetic products used to treat seborrheic dermatitis are lower, which can be attributed to the lower household income of families in this part of the city.

Table 2 The total sales and the percentage of each ingredient

Ingredients	Total sales	Percentage of total sales
Pyrithione Zinc	30879	31.96%
Piroctone olamine	2928	3.03%
Salicylic Acid	30194	31.25%
Coal Tar	1906	1.97%
Tea Tree Oil	1640	1.70%
Ceramides	2023	2.09%
Hyaluronic Acid	21452	22.20%
Occlusive Agents	2142	2.22%
Niacinamide	2594	2.68%
Green Tea Extract	856	0.89%
Total	96614	100%

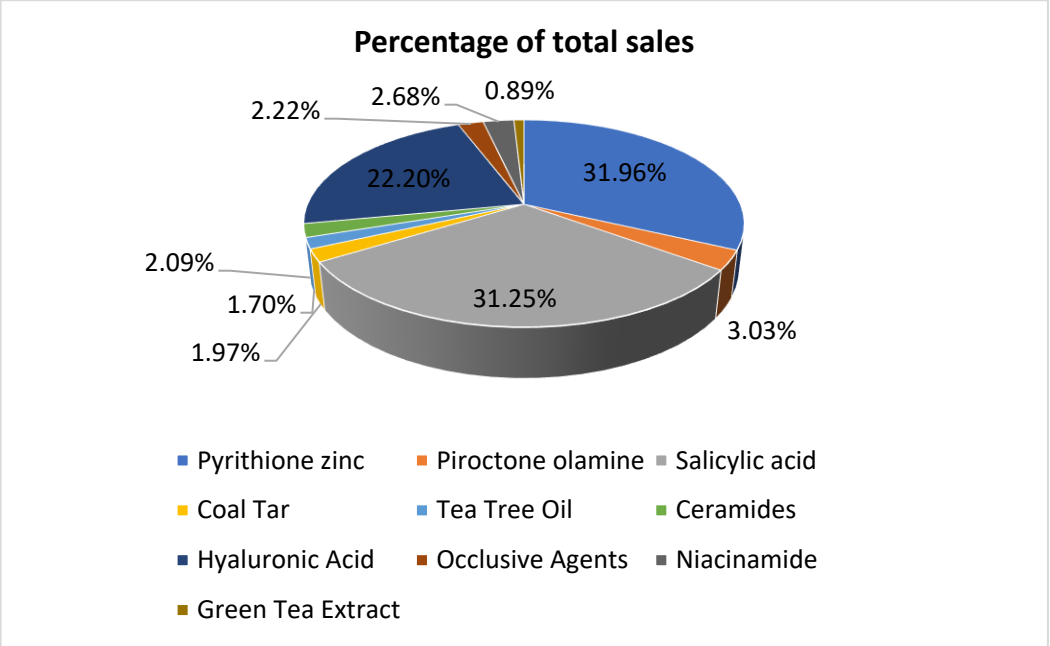

Figure 3 Percentage of total sales for each substance

We can see from Table 2 and Figure 3 that 85.41% of total sales go to the three top products, pyrithione zinc, salicylic acid, and hyaluronic acid, which corresponds to the Pareto principle which states that approximately 80% of effects are caused by 20% of causes. Sales for the top 3 products account for approximately 80% of the total amount in this case. This is an effective tool to maximize sales efficiency and profit in certain businesses.

Through this study, we can also see trends, at least locally, for treating seborrheic dermatitis in the location where the study was conducted.

Conclusions

Seborrheic dermatitis is a very common skin condition that affects patients of all ages. There is a wide range of clinical manifestations of seborrheic dermatitis, caused by a complex interaction of genetic, immunological, microbial, and environmental factors.

For effective management and targeted therapeutic interventions, it is crucial to understand the clinical presentation and underlying pathophysiology of this disease. The treatment of seborrheic dermatitis encompasses a comprehensive approach that integrates topical therapies, systemic medications, and adjunctive measures tailored to individual patient needs and disease severity.

The management of seborrheic dermatitis through cosmetic products presents a multifaceted approach that encompasses both therapeutic efficacy and patient-centered care. From cleansers and shampoos targeting Malassezia colonization to

moisturizers and barrier repair formulations restoring skin integrity, cosmetic products offer a spectrum of solutions aimed at alleviating symptoms and improving quality of life.

However, amidst the plethora of cosmetic products available, navigating the nuances of efficacy, safety, and patient preferences remains paramount.

We can identify different products that are more effective or less expensive using different economic methods, such as the Pareto method, which was used in this study.

This study highlights the most commonly used active ingredients used by the local population in Constanta, Romania, for the treatment of seborrheic dermatitis. From this study, pharmacy managers can draw various decisions and conclusions to increase the efficiency of their business. In the future, this study can be continued with further economic studies such as cost-effectiveness analysis, cost-minimization analysis, cost-benefit analysis, longitudinal studies to monitor long-term effectiveness and patient satisfaction.

Future studies using the Pareto method can enhance a variety of processes in the pharmaceutical industry, such as improving the efficiency of medicines stocks, focusing on products that sell better, and maybe have a higher level of efficiency, deciding which preparations community pharmacies should concentrate on, etc.

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