

Acne Treatment Practices and Patient Preferences for Herbal Products: A Conjoint Analysis

Research Article

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Abstract

This study aims to understand the acne treatment practices and patient preferences, focusing on herbal products and identifying the most and least preferred attributes using conjoint analysis. Five key attributes were evaluated: product form (cream, lotion, gel), expected treatment time (1 week, 2 weeks, 4 weeks), packaging (tube, jar), type of medication (over the counter or prescription), and price (economy, mid-priced, premium). A survey was conducted with 408 respondents using purposive, snowball, and availability sampling methods. Data were analysed using SPSS software through conjoint analysis to determine the cardinal utility of each attribute. Results showed that 50% of respondents used medication for acne, while others relied on home remedies or lifestyle changes. Only 20% reported using herbal products. Among those using acne medication, 46.6% observed noticeable results within one week, and most reported no side effects. While 40% of participants were satisfied with their current treatments, 34.3% expressed dissatisfaction. About 34% of patients preferred herbal acne treatments, showing a liking for products that are applied once daily, white in colour, fragrant, and dispensed in fingertip quantity. The most significant attribute influencing patient preference was treatment time, followed by product form, price, packaging, and medication type. Patients preferred herbal gels that are over the counter, low cost, packaged in jars, and deliver results within a week. These findings provide valuable insights into consumer expectations and can aid in the development of effective, patient friendly herbal acne treatments that align with real world preferences.

Keywords: Acne, Herbal Products, Conjoint Analysis, Patient Preferences, Acne Treatment.

Introduction

Acne is a widespread dermatological skin condition that affects individuals globally, irrespective of age, gender, or ethnicity, and its impact extends beyond mere physical manifestations (1,2,3). It encompasses various inflammatory and non-inflammatory lesions such as comedones, papules, pustules, nodules, and cysts, significantly influencing an individual's psychological well-being and social interactions (4,5). Despite the availability of different treatments such as topical creams, oral antibiotics, and retinoids, managing acne effectively remains challenging for both patients and healthcare providers (6,7). This challenge has led to a growing interest in alternative or complementary approaches, particularly in recent years, where there has been a noticeable surge in the popularity of herbal treatment products (8,9).

As a result, many patients are turning to herbal remedies as they perceive them to be safe and effective

alternatives to conventional medications (10,11). Herbal treatments, which have been used for centuries in different cultures, are gaining popularity due to their supposed efficacy and fewer side effects compared to traditional medicines (12). However, despite their widespread use, there's a lack of research on acne patients' preferences and practices regarding herbal products (13,14). Understanding these preferences is crucial for tailoring interventions that meet patients' needs and improve treatment adherence and satisfaction (15).

In the world of acne treatments, it's really important to know what patients like and what they want. This helps doctors make sure patients stick to their treatment and are happy with how it works. Additionally, the appearance of antibiotic-resistant strains of *Propionibacterium acnes* highlights the urgent need for alternative treatment methods (16-19). In this context, herbal treatment products have emerged as potential alternatives due to their perceived efficacy and minimal contribution to antibiotic resistance (20,21, 22).

Conjoint analysis, a powerful research methodology, offers a systematic approach to unraveling patients' preferences for various attributes of healthcare products (23). By dissecting the relative importance of different product attributes such as

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efficacy, safety, cost, and formulation characteristics, conjoint analysis provides valuable insights into patient decision-making processes (24). This study aims to delve into the treatment practices and preferences of acne patients regarding herbal treatment products through the lens of conjoint analysis. By elucidating the most and least preferred attributes of herbal products, this study aims to provide actionable insights for healthcare practitioners and researchers (25,26).

The findings of this research will contribute to a comprehensive understanding of patients' perspectives on herbal acne treatment, informing healthcare providers and policymakers about the factors driving patient preferences in this domain (27,28). This study will also contribute to the existing literature on acne treatment. Ultimately, this knowledge can facilitate the development of patient-centered approaches to acne management, thereby enhancing treatment outcomes for individuals seeking alternative therapeutic options (29).

About the Present Study

The main objective of this study is to understand the acne treatment practices & experiences of patients with acne and their preferences for herbal products used to treat acne. This study makes an effort to determine the most preferred and least preferred attributes and various choices within each attribute of herbal products used by patients to treat acne by computing the cardinal utility of each attribute. This study endeavours to investigate empirically the preferences of the patients of acne towards five attributes of herbal products used to treat acne viz; product form (cream, lotion, and gel), expected treatment time to get noticeable results (1 week, 2 weeks, and 4 weeks), packaging (tube and jar), type of medication (over the counter i.e. without prescription and prescription required i.e. Rx medication) and price preference there are three levels (economy, mid-priced, and premium) by performing conjoint analysis. This study also aims to find out the relative importance of these attributes among the respondents. It endeavours to address the following research questions:

- RQ 1: What are the clinical characteristics of acne experienced by the patients?
- RQ 2: What are the acne treatment practices of acne patients?
- RQ 3: What is their experience of following an acne medication?
- RQ 4: What are their preferences for herbal products used to treat acne?

Materials and Methods

Sampling

This research study is based on descriptive and analytical research design. A sample survey of acne patients in Maharashtra State, India was conducted to gather primary data. The sample size was determined by using Cochran's (Cochran, 1977) formula for an infinite population with 95% confidence level and 5% sampling error (30). The minimum sample size computed by using Cochran's formula was 384. The researchers surveyed 408 respondents which is much more than the

minimum sample size required. The data for the study were gathered from those patients who had been experiencing acne at the time of conducting a survey and those patients who had experienced acne at some point in the past. Non-probability sampling techniques viz; availability, snowball, and purposive sampling techniques were adopted for the final selection of the respondents. Non-probability sampling techniques are typically used when the target population is infinite. The sample characteristics are presented in (Table 2).

Measure

This research study is based predominantly on the primary data. Primary data was gathered by administering a well-structured questionnaire. The survey instrument constitutes four sections viz; socio-demographic characteristics, clinical characteristics of acne, acne treatment practice & experience, and preferences of acne patients for herbal treatment products. A multiple-choice scale was used to measure socio-demographic characteristics viz; gender, age, education, monthly household income, and weight in kg. For assessing the clinical characteristics of acne viz; skin type of patients, age when they experienced first acne, appearance & feel of acne, concerns about acne, and places of acne spots on face on binary and multiple response scales. Two questions viz; concerns about acne, and places of acne spots on the face were adopted from Rendon et al., 2015. Acne treatment practice is measured by using three questions viz; whether any acne treatment, type of treatment, a form of medication and were adopted from Rendon et al., 2015. The question of whether to use any acne treatment was measured on a binary scale of 'yes' and 'no' type; and 'type of treatment' and 'form of medication' were measured by using checklist questions. The acne treatment experience of patients was measured by using four questions viz; 'time taken to get noticeable results in healing acne', 'time taken to heal acne completely', 'side effects experienced while using acne medication', and 'extent of satisfaction with acne treatment'. These questions were adopted from Rendon et al., 2015 (31). The first three questions are measured using multiple choice questions and for measuring the extent of satisfaction five-point Likert scale from 'highly dissatisfied' to 'highly satisfied' was used. Expectations of patients from herbal treatment products were measured by using five multiple-choice questions (Annexure 1). For determining the preferences of acne patients for herbal treatment products conjoint profiles are created. The procedure followed to create conjoint profiles is explained in the next section.

Conjoint Analysis: Attributes and Levels

In this study, conjoint analysis is performed to determine the relative importance of the attributes of herbal products used to treat acne. Conjoint analysis is a statistical method used to determine the value of the attributes of a product for its consumers. It is a method for analysing the preferences of customers. It is also a useful tool for predicting and determining the responses of customers to new product features and totally new

products (32). In this research study, choice-based conjoint analysis is used to evaluate the preferences of patients with acne for herbal products used to treat acne.

Based on extensive literature review and studying the present herbal products available in the market to treat acne, the researchers have selected five attributes of herbal products viz; product form, expected treatment time to get noticeable results, packaging, type of medication, and price preference. All the attributes consist of different levels. For 'product form' there are three levels (cream, lotion, and gel), for 'expected treatment time to get noticeable results' there are three levels (1 week, 2 weeks, and 4 weeks), for 'packaging' there are two levels (tube and jar), for 'type of medication' there are two levels (over the counter i.e. without prescription and prescription required i.e. Rx medication) and for 'price preference' there are three levels (economy, mid-priced, and premium). There are $3 \times 3 \times 2 \times 2 \times 3 = 108$ profiles after combining all the attributes and levels. In this research, 20 conjoint cards (profiles) have been created by using an orthogonal design and distributed to the participants. The various choices under each attribute are depicted in the conjoint lay-out (Table 1) prepared by the researchers. 20 profiles were generated by using SPSS software (Annexure 2). The respondents were asked to rate each profile on a 1 to 10 scale. '1' for the least preferred profile and '10' for the most preferred profile.

Table 1: Conjoint Lay-out

Attributes	Product Form	Expected treatment time to get	Packaging	Type of Medication	Price Preference
Choices	Cream	1 week	Tube	Without Prescription	Economy
	Lotion	2 weeks	Jar	Prescription Required (Rx)	Mid-Priced
	Gel	4 weeks			Premium

Data Collection

The data was gathered by administering a well-structured questionnaire on acne patients in Maharashtra, India from December 2023 to February 2024. The data was gathered by two methods viz; field survey and online survey. The researchers visited various colleges and institutions in Maharashtra. After seeking permission from the respective college authorities, the researchers visited the available students and faculties in the classrooms and college campus area. They have explained the nature of the research study. Survey forms were distributed to them. Subsequently, required instructions were rendered to them to fill up the form correctly. The questionnaire was also transformed into an electronic Google survey form Linge et al. 2023 (33). The link of the Google survey form was shared with the potential respondents in various WhatsApp groups and individual WhatsApp windows along with a cover letter requesting to participate in the survey. Additionally, telephone numbers of the potential respondents were gathered by using numerous known respondents in various cities and towns. A regular follow-up was taken by making

telephone calls to the potential respondents. After surveying the acne patients, they were asked to give the references of potential respondents in their contact. The respondents were also requested to forward the link to their known potential contacts. The potential respondents were motivated to participate in the survey throughout the data collection period.

Results

Sample Characteristics

This study is conducted to understand the acne treatment practices & experiences of acne patients and their preferences for herbal products used to treat acne. The socio-demographic characteristics of the acne patients are presented below:

Table 2: Sample Characteristics

Characteristic	Choices	No. of Respondents	%
Gender	Male	134	32.8
	Female	274	67.2
Age	15 to 20	150	36.76
	21 to 30	214	52.45
	Above 30	44	10.78
Education	Up to HSSC	39	9.6
	Above HSSC	369	90.4
Monthly Household Income	Below Rs 25000	152	37.3
	Rs 25,000 to Rs 50000	146	35.8
	Above Rs 50000	110	27.0
Weight (in Kg)	25 to 45	94	23.04
	46 to 65	227	55.64
	Above 65	87	21.32

N = 408

A survey of 408 acne patients was conducted. The sample constitutes 134 (32.8%) male and 274 (67.2%) female patients. There were 150 (36.76%) patients in the age group of 15 to 20 years, 214 (52.45%) in the age group of 21 to 30 years and 44 (10.78%) were above the age of 30 years. 39 (9.6%) respondents studied up to HSSC and the majority of them i.e. 369 (90.4%) were above HSSC educational qualification. The monthly household income of 152 (37.3%) respondents was below Rs 25000, 16 (35.8%) respondents' monthly household income was between Rs 25000 to Rs 50000, and 110 (27%) respondents' monthly household income was above Rs 50000. As far as BMI is concerned, 94 (23.04%) respondents weigh 25 to 45 kg, 227 (55.64%) have between 46 to 65 kg, and 87 (21.32%) weigh 65kg.

Clinical Characteristics of Acne

The clinical characteristics of facial acne are presented in Table 3.

Table 3: Clinical Characteristics of Acne (N= 408)

Characteristic	Choices	No. of Respondents	%
Acne Experience	Presently Experiencing	295	72.3
	Experienced in the past	113	27.7
Skin Type	Dry	54	13.2
	Oily	124	30.4
	Sensitive	44	10.8
	Normal	79	19.4
	Combination	107	26.2
Age When Experienced First Acne	13 to 15 years	96	23.5
	16 to 18 years	173	42.4
	19 to 20 years	89	21.8
	Above 20 years	50	12.3
Appearance of Acne	Small Red Spots	276	67.6
	Yellow Spots	71	17.4
	Large painful Red Spots	61	15.0
Feeling of Acne	Itchy	130	31.9
	Painful	100	24.5
	Stingy	28	6.9
	Inflammation	59	14.5
	No Feeling	91	22.3
Concerns about Acne	Actual Pimples	91	22.3
	Pimples with Inflammation	58	14.2
	Dark marks (discoloured skin) left by pimples	107	26.2
	Both pimples and dark marks (discoloured skin)	152	37.3
Places of Acne Spots on Face	Chin	23	5.6
	Chik	241	59.1
	Forehead	100	24.5
	Hairline	3	0.7
	Jawline	6	1.5
	Nose	35	8.6

There were 295 (72.3%) patients experiencing acne at the time of conducting a survey and 113 (27.7%) experienced acne at some point in their lifetime. 54 (13.2%) patients had dry skin, 124 (30.4%) had oily skin, 44 (10.85%) had sensitive skin, 79 (19.4%) had normal skin and 107 (26.2%) had a combination skin type. 96 (23.5%) acne patients experienced acne for the first time between the age of 13 to 15 years, 173 (42.4%) experienced it at the age of 16 to 18 years, 89 (21.8%) experienced it at the age of 19 to 20 years and only 50 (12.3%) experienced acne for the first time when they were above the age of 20 years. As far as the appearance of acne is concerned, a maximum i.e. 276 (67.6%) patients reported that their acne looked like small red spots, 71 (17.4%) said it looked like yellow spots, and 61 (15%) said that their acne was large painful red spots. In terms of the feeling of acne, 130 (31.9%) said that their acne was itchy, 100 (24.5%) said

it was painful, 28 (6.9%) felt it painful, 59 (14.5%) experienced inflammation and 91 (22.3%) patients said there was no noticeable feeling of acne. 91 (22.3%) patients were concerned about their actual pimples, 58 (14.2%) were concerned about pimples with inflammation, 107 (26.2%) were concerned about dark marks left by pimples and 152 (37.3%) were concerned about both pimples and dark marks. Moreover, 23 (5.6%) patients experienced acne on the chin, 241 (59.1%) on the chik, 100 (24.5%) on the forehead, 3 (0.7%) on the hairline, 6 (1.5%) on the jawline, and 35 (8.6%) patients experienced acne on nose.

Acne Treatment Practice

The researchers also investigated the acne treatment practices of patients viz; whether they use any acne treatment medication, if yes, then, the type of treatment used by them to heal acne, and the form of medication they used. The responses of acne patients show that 203 (49.8%) patients use some sort of medication to heal acne and 205 (50.2%) acne patients don't use any typical medication to heal acne. They rely more on home remedies and lifestyle changes to heal their acne naturally. It has been observed that acne patients use more than one type of treatment to heal acne. The related data gathered using checklist questions show that maximum patients i.e. 189 (35.93%) had been using home remedies, 107 (20.34%) using herbal products, 100 (19.01%) preferred to make changes in their lifestyles, 76 (14.45%) use prescription-based medication and only 54 (10.27%) patients are using over the counter medications. Similarly, it is observed that acne patients use more than one form of medication for acne treatment. The related data gathered using checklist questions show that maximum acne patients i.e. 243 (30.92%) use facewash, 154 (19.59%) use cream, 148 (18.83%) use gel, 99 (12.6%) use soap, 67 (8.52%) take tablets, and only 59 (7.51%) acne patients use an ointment to heal acne. The data is exhibited in Table 4.

Table 4: Acne Treatment Practices of Patients

Characteristic	Choices	No. of Respondents	%
Whether used any acne treatment	Yes	203	49.8
	No	205	50.2
Type of Treatment*	Home Remedies	189	35.93
	Herbal Products	107	20.34
	Lifestyle Changes	100	19.01
	Prescription based (Rx medication)	76	14.45
	Over the Counter (OTC)	54	10.27
Form of Medication*	Facewash	243	30.92
	Cream	154	19.59
	Gel	148	18.83
	Soap	99	12.60
	Tablet	67	8.52
	Ointment	59	7.51
	Patches	16	2.04

Note: * indicates checklist questions

Acne Treatment Experience

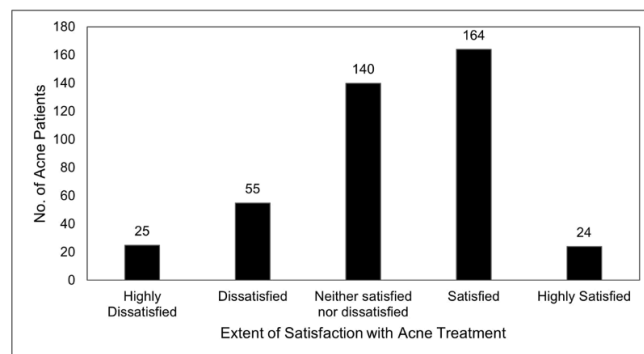
One of the objectives of this research study is to know the acne treatment experiences viz; time taken to get noticeable results while using a particular type of treatment, time taken to heal acne completely, side effects experienced while using acne medication, and the extent of satisfaction of the patients with acne treatment. The relevant data is presented in Table 5.

Table 5: Acne Treatment Experience

	Choices	No. of Respondents	%
Time Taken to Get Noticeable Results in Healing Acne	1 Day	31	7.6
	1 Week	190	46.6
	2 Weeks	103	25.2
	More than 2 Weeks	84	20.6
Time Taken to Heal Acne 100%	1 Week	109	26.7
	2 Weeks	102	25.0
	3 Weeks	76	18.6
	More than a Month	121	29.7
Side Effects Experienced while using Acne Medication	No Side Effects	235	57.6
	Dry Skin	85	20.8
	Allergic Reaction	19	4.7
	Skin Flakiness	20	4.9
	Other	49	12.0
Extent of Satisfaction with Acne Treatment	Highly Dissatisfied	25	6.1
	Dissatisfied	55	13.5
	Neither satisfied nor dissatisfied	140	34.3
	Satisfied	164	40.2
	Highly Satisfied	24	5.9

As shown in Table 5, only 31 (7.6%) patients got noticeable results in just one day of using acne treatment. 190 (46.6%) patients got noticeable results in one week, 103 (25.2%) in 2 weeks and 84 (20.6%) patients got noticeable results in more than two weeks. Moreover, 109 (26.7%) patients experienced that it takes only a week to heal acne completely. 102 (25%), 76 (18.6%), and 121 (29.7%) patients experienced two weeks, three weeks, and more than a month time to completely heal acne. Maximum acne patients i.e. 235 (57.6%) had no side effects of acne treatment, 85 (20.8%) experienced dry skin, 19 (4.7%) experienced an allergic reaction, 20 (4.9%) experienced skin flakiness and 49 (12%) acne patients experienced other side effects of acne treatment. As far as the extent of satisfaction of acne patients with their acne treatment is concerned, 25 (6.1%) patients were found to be highly dissatisfied, 55 (13.5%) were dissatisfied, 140 (34.3%) were neither dissatisfied nor satisfied, 164 (40.2%) satisfied and 24 (5.9%) found to be highly satisfied. The results are presented in Figure 1.

Figure 1: Extent of Satisfaction with acne treatment



Expectations of Acne Patients from Herbal Treatment Products

Table 6: Expectations of Acne Patients from Herbal Treatment Products

Questions	Choices	No. of Respondents	%
Whether patients prefer to use herbal acne treatment product?	Do not Prefer to use it	73	17.89
	May consider using it	196	48.04
	Would certainly prefer it	139	34.07
Preference for frequency of application of herbal product	Twice a week	118	28.92
	Once in a Day	195	47.79
	Twice a Day	95	23.28
Preference for the Colour of Herbal Acne Treatment Product	White	326	79.90
	Brown	82	20.10
Preference for the fragrance of herbal acne treatment product	With Fragrance	237	58.09
	Without Fragrance	171	41.91
Preference for herbal acne treatment product application method	Finger Tip	300	73.53
	Roller Ball	108	26.47

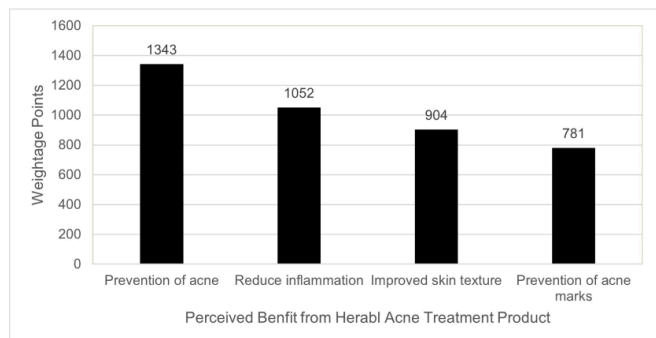
As mentioned earlier, the main aim of this study is to understand acne patients' expectations from herbal products used to treat acne. As shown in Table 6, 17.89% of acne patients do not prefer to use herbal products to heal their acne, 48.04% of patients may consider using it and 34.07% of patients would certainly prefer it. The majority i.e. 47.79% of patients prefer to apply the herbal product once a day, 28.92% twice a week, and only 23.28% of patients prefer to apply it twice a day. As far as the colour of the herbal treatment product is concerned, the maximum i.e. 79.9% of patients prefer to have it in white colour and only 20.1% of patients wish to have it in brown colour. Moreover, 58.9% of customers prefer to have herbal acne treatment products with fragrance and 41.91% want it without fragrance. In terms of application of the herbal product, the majority i.e. 73.53% of patients prefer it in

‘fingertip’ form and only 26.47% of customers prefer it in ‘rollerball’ form.

Table 7: Benefits perceived by acne patients from an Herbal Acne Treatment Product

Benefits perceived	Weightage	Rank
Prevention of acne	1343	1
Reduce inflammation	1052	2
Improved skin texture	904	3
Prevention of acne marks	781	4

Figure 2: Benefits perceived by acne patients from an Herbal Acne Treatment Product



As shown in Table 7 and Figure 2, acne prevention is the most preferred benefit expected by acne patients from a herbal treatment product followed by reduced inflammation, improved skin texture, and prevention of acne marks.

Preferences for Herbal Acne Treatment Products: A Conjoint Analysis

As mentioned earlier, conjoint analysis is performed to investigate the acne patients’ preferences for attributes and various choices within each attribute of herbal products for acne treatment. The hypothesis is that all the attributes of herbal acne treatment products are not significantly different. This hypothesis is tested by performing conjoint analysis at a .05 significance level using the SPSS computer program. The results show that the attributes of herbal acne treatment products are significantly different from each other ($p < .05$, $F = 20.352$) (Table 8).

Table 8: Test of Significance - Conjoint Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	6.267	8	0.783	20.352	0.000
Residual	0.423	11	0.038		
Total	6.690	19			

The R^2 for the model shows that the preferences for the attributes of herbal acne treatment products independently account for 93.7% of the variance in different choices (Table 9). It indicates that the patients with acne are very clear about the attributes of each herbal acne treatment product.

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	SE of the Estimate
1	.968 ^a	0.937	0.891	0.196

The partworth utility table (Table 10) is useful for comparing the partworth utility of the choices in each attribute. After comparing the utilities of ‘product form’, it is found that gel form is the most preferred herbal acne treatment product followed by lotion form. However, the herbal treatment product in cream form is found to be the least preferred form. As far as the expected time of herbal acne treatment products to get noticeable results is concerned, the patients associated the maximum utility with ‘1 week’ followed by ‘2 weeks’ and ‘4 weeks.’ This means, the patients prefer to purchase those herbal acne treatment products which could give noticeable results in just one week. The herbal acne treatment products packaged in jars are preferred by the patients than tube packaging. The partworth utility of ‘over-the-counter (OTC)’ herbal acne treatment products is found to be more than prescription-based medication. In terms of price preferences, acne patients are found to prefer economy i.e. low-priced herbal acne treatment products over mid-priced and premium products.

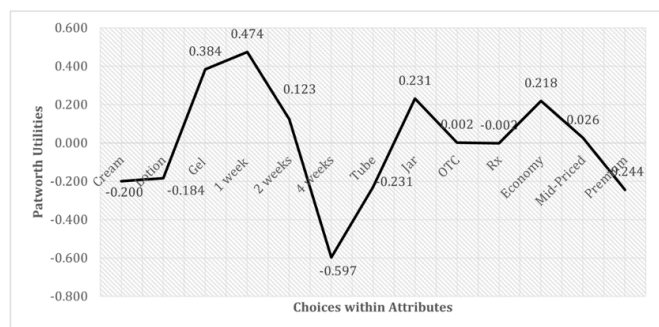
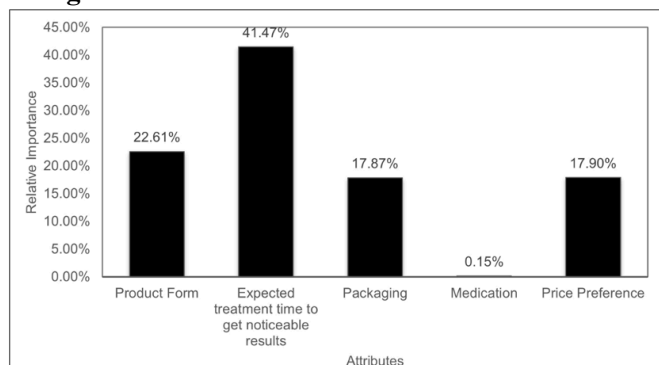
A conjoint calculator was used to calculate the part-worth utilities of different attributes. Table 11 shows the relative importance of each attribute of herbal acne treatment products specified in this research. The results show that ‘expected treatment time’ has the maximum relative importance. ‘Product form’ is the second most preferred attribute of herbal acne treatment products followed by ‘price’ and ‘packaging’. ‘Type of medication’ is found to be the least considered attribute while purchasing herbal acne treatment products. The relative importance of ‘product form’ ‘expected treatment time to get noticeable results’, ‘packaging’, ‘type of medication’, and ‘price’ are 22.61%, 41.47%, 17.87%, 0.15%, and 17.9% respectively. The higher percentage of relative importance indicates a higher contribution of the attribute in deciding to purchase herbal acne treatment products.

Table 10: Part-worth Utility Table

Attribute	Choices	Utility	Preferences
Product Form	Cream	-0.200	Gel > Lotion > Cream
	Lotion	-0.184	
	Gel	0.384	
Expected treatment time to get noticeable results	1 week	0.474	1 Week > 2 Weeks > 4 Weeks
	2 weeks	0.123	
	4 weeks	-0.597	
Packaging	Tube	-0.231	Jar > Tube
	Jar	0.231	
Type of Medication	OTC	0.002	OTC > Rx
	Rx	-0.002	
Price Preference	Economy	0.218	Economy > Mid-Priced > Premium
	Mid-Priced	0.026	
	Premium	-0.244	

Table 11: Relative importance of different attributes

Attributes	Relative Importance	Preference
Product Form	22.61%	Expected treatment time > Form > Price > Packaging > Type of Medication
Expected treatment time to get noticeable results	41.47%	
Packaging	17.87%	
Type of Medication	0.15%	
Price Preference	17.90%	

Figure 3: Part-worth Utilities of all the Choices with each attribute

Figure 4: Part-worth Utilities of Each Attribute


Discussion

Implications of the Study

The findings of this research study hold significant implications for various stakeholders within the acne treatment industry. Primarily, manufacturers producing herbal-based products for acne treatment can utilize the understanding obtained from this study to refine existing products or develop new ones that align more closely with the preferences of acne patients (34,35).

By identifying the most desired attributes and features of herbal acne treatment products, manufacturers can better meet the needs and expectations of their target demographic (36,37).

Furthermore, the study sheds light on the clinical characteristics of acne, providing valuable insights into the appearance and sensory experiences of acne as reported by patients. This information can aid industry professionals in developing treatments that more precisely target the symptoms and concerns of acne patients.

Additionally, understanding the current acne treatment practices adopted by patients can inform managerial decisions within the industry, allowing for more strategic product positioning and marketing strategies (38).

From a theoretical perspective, this study contributes to the existing literature on acne treatment by providing empirical evidence regarding patient preferences and treatment practices. It offers valuable insights for research scholars and academia, serving as a basis for further investigation into the efficacy and acceptability of herbal acne treatment products (39).

Understanding Patient Preferences for Herbal Acne Treatment

This study offers valuable insights into the treatment practices and preferences of patients suffering from acne, particularly regarding their preferences for herbal products. Utilizing conjoint analysis, the research delves into the subtle differences in preferences among acne patients regarding the attributes of herbal acne treatment products (40).

Significance of the Study

Acne remains a prevalent dermatological concern affecting millions worldwide, and patient preferences play a crucial role in determining treatment adherence and efficacy. Herbal products have emerged as popular alternatives for individuals seeking complementary treatments for acne (41). Understanding patient preferences for these products is paramount for healthcare providers and policymakers in delivering patient-centered care and improving treatment outcomes (42).

Conclusion

The study was to understand the acne treatment practices & experiences of patients with acne and their preferences for herbal products used to treat acne. The results of the survey conducted of 408 acne patients show that about 50% of patients use medication for acne treatment and the rest rely on home remedies and lifestyle changes. It is also found that only 20% of patients use herbal products to heal acne. The results also show that a maximum i.e. 46.6% of patients got noticeable results in one week time of treatment. Maximum patients reported that they didn't have any side effects of using acne treatment medication. About 40% of patients are satisfied and 34.3% of patients are dissatisfied with their acne treatment.

The results of expectations of patients from herbal treatment products indicate that 34% of patients certainly prefer to use herbal acne treatment products. Majority of the acne patients prefer to apply it once in a day. They prefer to have it in fingertip form, available in white colour that too with some fragrance. Conjoint analysis was performed to understand the preferences of acne patients for herbal products. This research study has used five attributes of herbal acne treatment products viz; 'product form', 'expected treatment time to get noticeable results', 'packaging', 'type of medication', and 'price preference' to understand which

of these attributes are the most and least preferred by the patients with acne while purchasing herbal acne treatment products. The results of conjoint analysis show that 'expected treatment time' has the maximum relative importance. 'Product form' is the second most preferred attribute of herbal acne treatment products followed by 'price' and 'packaging'. 'Type of medication' is found to be the least considered attribute while purchasing herbal acne treatment products. Further, the part-worth utilities of the choices within each of these five attributes were computed. It was also found that the acne patients are very clear about the choices within various attributes. The results show that patients with acne prefer to purchase herbal acne treatment products that are available over the counter in gel form, packaged in a low-priced jar, and which could give noticeable results in just one week.

Limitations & Future Research

The main focus of this study is to understand the practice & experience of acne treatment and to determine the preferences of acne patients for herbal products used to heal acne. Future studies may consider other medications in various forms. The present study focuses on Maharashtra, India, which may limit global applicability. The future studies could be conducted in other geographic locations covering multi-regional data so as to gain more insights on the topic. This study is confined to the evaluation of preferences of only five attributes of herbal products used to heal acne. Future studies could involve some other attributes and other specific herbal ingredients so that further information on this topic can be explored in depth. This study is conducted by applying conjoint analysis technique. Future studies may also involve a deeper comparison between herbal and conventional acne treatments. One of the limitations of this study is that it has used non-sampling techniques for selecting the samples. The study also does not focus on post-treatment analysis. The future studies may involve post-treatment analysis. Future studies may also be conducted on several other target populations.

Conflicts of Interest

The authors declare no conflict of interest.

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Annexures

Annexure 1: Questionnaire on Acne Treatment Preferences

Section 1: Socio-Demographic Characteristics of Acne Patients

Name

Gender

- a) Male
- b) Female

Age:

Education

- a) SSC
- b) HSSC
- c) Above HSSC

Total Monthly Household Income

- a) Below Rs 25,000
- b) Rs 26,000 to Rs 50,000
- c) Above Rs 50,000

Weight (in Kg):

Section 2: Clinical Characteristics of Acne

Q: 1. Are you suffering from acne?

- a) Yes. Presently Suffering
- b) Experienced acne in the past

Q: 2. How would you describe your skin type?

- a) Dry
- b) Oily
- c) Sensitive
- d) Normal

Q: 3. How old were you when you get first acne?

- a) 13-15
- b) 16-18
- c) 19-20

Q: 4. How does your acne look like?

- a) Small red spot
- b) Yellow spot
- c) Large painful red spot

Q: 5. How does your acne feel?

- a) Itchy
- b) Painful
- c) Stingy
- d) Inflammation

Q: 6. What bothers or concerns you most about your acne?

- a) Actual pimples
- b) Dark marks (discoloured skin) left by pimples
- c) Both pimples and dark marks (discoloured skin)

Q: 7. Where on your face do you most often experience acne?

- a) Chin
- b) Cheeks
- c) Forehead
- d) Hairline
- e) Jawline
- f) Nose

Section 3: Acne Treatment Practice & Experience

Q: 8. Have you used some type of acne treatment or procedure?

- a) Yes
- b) No

Q: 9. What treatment you have been using for last 4 weeks? (You may tick mark more than one choice)

- a) Over-the-counter (OTC)
- b) Prescription based (Rx medication)
- c) Home-remedies
- d) Lifestyle changes

Q: 10. What form of medication you have been taking? (You may tick mark more than one choice)

- a) Gel
- b) Ointment
- c) Tablet
- d) Patches
- e) Cream
- f) Soap
- g) Facewash

Q: 11. According to your experience, how long does it take to get noticeable results in healing acne with the medication you are using?

- a) 1 day
- b) 1 week
- c) 2 weeks
- d) More than 2 weeks

Q: 12. According to your experience, how long does it take to heal your acne 100% with the medication you are using?

- a) 1 Week
- b) 2 weeks
- c) 3 weeks
- d) More than a month

Q: 13. Did you experience any side effects while using acne medication?

- a) No side effects
b) Dry skin
c) Allergic reaction
d) Skin flakiness
e) Other (please specify)
- Q: 14. What is your extent of satisfaction with your present acne treatment?
a) Highly dissatisfied
b) Dissatisfied
c) Neither satisfied nor dissatisfied
d) Satisfied
e) Highly satisfied
- Q: 15. What is the extent of acne clearing achieved by you with your present treatment?
a) No clearing
b) Minimal clearing
c) Moderate clearing
d) Good clearing
e) Full clearing
- Q: 16 What is the composition of your medication?
a) Aloe vera
b) Salicylic Acid
c) Other Herbal Products
d) Niacinamide
e) Tea Tree Oil
f) Benzoyl Peroxide
g) Clindamycin & Benzoyl Peroxide
h) Alpha Hydroxy Acids (AHAs)
i) Sulphur
j) Licorice Extract
k) Topical Retinoids
- Q: 17 What was the composition of Rx medications?
a) Oral antibiotics
b) Topical antibiotics
c) Both a and b
d) Topical retinoids
e) Do not know

Section 4: Herbal Treatment Expectations

Q: 18 Have you ever used herbal product for your acne treatment?

- a) Yes
b) No
- Q: 19 Would you prefer to use herbal acne treatment?
a) No, not at all
b) I may consider
c) Yes, I would certainly prefer
- Q: 20 How much of your lifetime would you be willing to give to get your face completely (100%) clear after using herbal product?
a) Overnight
b) 1 week
c) 1 Month
d) 6 Months
e) More than six months
- Q: 21 What would be your preference for frequency of application of herbal acne treatment product?
a) Twice a week
b) Once in a day
c) Twice a day
- Q: 22 What is your preference for acne treatment product colour?
a) White
b) Brown
- Q: 23 What is your preference for acne treatment product fragrance?
a) With fragrance
b) Fragrance-free
- Q: 24 What is your preference for acne treatment product application method?
a) Finger tip
b) Roller ball
- Q: 25 What benefit in addition to acne clearing you are expecting from a herbal product?

Kindly rank the following benefits from 1 = most preferred benefit to 4 = least preferred benefit

Benefit in addition to acne clearing	Rank
· Prevention of Acne Scarring	
· Reduction in Break out frequency	
· Improved skin texture	
· Prevention of acne marks	

Annexure 2: Conjoint Profiles

Q: Kindly rate the following profiles in the scale of '1=Least Preferred' to '10=Most Preferred'

	Product Form	Expected Time to Get Noticeable	Packaging	Type of Medication	Price Preference	Rating
1	Cream	Two Weeks	Jar	Over the Counter	Economy	
2	Gel	Four Weeks	Tube	Over the Counter	Premium	
3	Lotion	Two Weeks	Tube	Over the Counter	Economy	
4	Gel	One Week	Jar	Over the Counter	Economy	
5	Cream	Two Weeks	Jar	Over the Counter	Mid-Priced	
6	Gel	Two Weeks	Tube	Prescription Based	Premium	
7	Lotion	One Week	Tube	Over the Counter	Economy	
8	Lotion	Two Weeks	Tube	Prescription Based	Premium	
9	Gel	One Week	Jar	Prescription Based	Mid-Priced	
10	Gel	Two Weeks	Tube	Over the Counter	Economy	
11	Lotion	One Week	Tube	Over the Counter	Premium	
12	Gel	One Week	Jar	Over the Counter	Premium	
13	Lotion	Two Weeks	Tube	Over the Counter	Mid-Priced	
14	Gel	Two Weeks	Tube	Over the Counter	Mid-Priced	

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15	Gel	Four Weeks	Tube	Over the Counter	Mid-Priced	
16	Cream	Four Weeks	Tube	Over the Counter	Mid-Priced	
17	Cream	Two Weeks	Jar	Prescription Based	Premium	
18	Gel	Four Weeks	Tube	Prescription Based	Economy	
19	Cream	One Week	Tube	Over the Counter	Economy	
20	Lotion	One Week	Tube	Prescription Based	Mid-Priced	
