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EXPLORING SOCIO-DEMOGRAPHIC AND BEHAVIORAL INFLUENCES ON ACNE PREVALENCE: A SURVEY-BASED STUDY WITH PUBLIC HEALTH APPLICATIONS

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ABSTRACT

Objective: To investigate the factors associated with the occurrence and prevalence of *Acne Vulgaris* in a population study conducted in Karachi.
Methods: A cross-sectional field study was conducted from April to December 2023, involving 756 participants and assessments of various factors and their influence on acne prevalence. Questionnaires were developed to collect data on demographics, skin characteristics, acne incidence, season and dietary habits.
Results: This study identified significant associations between acne vulgaris and several factors, including family history, season, dietary habits, and gender. Specifically, the analysis revealed that:
Conclusion: This study provides valuable insights into the risk factors and impact of acne vulgaris in the studied population. These findings can inform future healthcare planning and interventions to address and prevent acne effectively.

Keywords: Acne, Sebum, Vulgaris, Adolescents, Comedones

INTRODUCTION

Acne is common among adolescents and the adults' age group. Acne is most prevalent at 16 to 18 years of age. Prevalence of acne is 75% to 98% it in young age group (Tan JK *et al.,* 2015). This skin disorder is common among both genders and all ethnicity (Karimkhani C *et al.,* 2016). Acne vulgaris (hereby acne) is an inflammatory skin condition that is well characterized clinically (Williams HC *et al.,* 2012). The pilosebaceous unit is well known as the site for acne development. It is comprised of the hair follicle and sebaceous gland, which produces and secretes sebum onto the skin surface via the pore of the hair follicle. Acne lesions develop when the pore of the pilosebaceous unit is blocked or inflamed (Heng AHS *et al.,* 2020). Acne lesions can be classified into a few types comedones, papules, pustules, nodules, and cysts based on their size and

appearance. Comedones are often referred to as "non-inflammatory lesions" while papules, pustules, nodules, and cysts are collectively termed as "inflammatory lesions" due to their red and swollen appearance. Based on the acne lesions that an individual present, their acne severity can be broadly classified into three categories – mild, moderate, and severe; milder acne presents with noninflammatory lesions while more severe acne presents with both inflammatory and non-inflammatory lesions mentioned in (Table#1)Vilar *et al*.,2015. During the healing process of acne lesions, damaged skin may develop scars (Lynn D *et al.,* 2016). It is predicted that diet is the important determinants of acne after hormones and genetics (Dlova NC *et al.,* 2018). The role of "Western style diet" (a diet rich in saturated fat, large quantity of processed carbohydrate including a high calorie amount) has been found major contribution in inflammatory skin diseases such as acne, atopic dermatitis, and psoriasis (Youssef EMK *et al.,* 2014). Gastrointestinal (GI) symptoms in patients of acne were also evaluated in some studies revealing convincing results. According to different studies, mechanisms underlying the pathogenesis of acne involve gastrointestinal dysfunction and this led to increases sebum production (Beheshti A *et al.,* 2015). Diets having high glycemic indices and dairy food like milk, especially skimmed milk have shown a prominent role in the severity of acne (Szántó M *et al.,* 2019). They are enhancing the signaling of insulin like growth factor-1 (IGF-1) (Zaenglein A *et al.,* 2015). Daily water intake has also been known to concern with skin's physiology and dermatological abnormalities. The role of dietary fiber intake has also been reported in reducing acne, but no study confirmed that fiber associated with acne. Acne not only presents with physical morbidity but also causes psychological harm to the patient. Different studies carried out among acne patients found that mental health disorder among acne patients (Syed M *et al.,* 2020).

METHOD

In this study we designed to cover all the required information regarding the occurrence of acne that includes factors such as gender, age, skin type, complexion, season of the occurrence, dietary habit and lifestyle. The schools, colleges, universities as well as local residential colonies including slum areas were taken under consideration. We seek permission for the survey from principals of all the selected institutions. The assortments of the area were made in such a way so as to represent all the socioeconomic groups. We demonstrated the candidates in school, colleges, and in communities the required information about acne and about the survey by lectures and presentations and administer the questionnaires. This study was approved by the hospital research. (Qidwai *et al*.,2017)

Participant's selections

Totally, 756 subjects were under assessment from the different areas out of which, 375 were male, and 375 were female within the age range of 11-year-old to 40 years. Questionnaires were distributed to all the candidates and verbally interpreted in Urdu language to enable accurate response by the participants

Grading of questionnaire

The grading of questionnaire was designed as such so that all the possible factors influencing the acne prevalence were considered. The different socioeconomic groups were included to conclude the effect on acne. The major risk factors were as follows:

Gender and age

The gender-based analyses were done by grouping male and female individuals. This is an important factor as there are considerable variations in the prevalence due to variations in hormones. On the basis of gender, most of the other factors were evaluated. To address both the gender equality, we seek coeducation and segregated institutes. Candidates were asked to assess their age, divided into three groups 11-20, 21-30 and 31-40 and their gender, i.e., male or female as well as to evaluate the severity of their acne infection.

Table 1: Classification of acne vulgaris		
Degree I	Predomiance of comedones, papules and pustules (small and < 10)	Mild
Degree II	10-40 papules and pustules (comedones)	Moderate
Degree III	40-100 papules and pustules, >40 comedones, presence of nodules	Moderate/ Severe
Degree IV	Nodulocystic and conglobata AV with severe, painful l esions, papules, pustules and comedones	Severe

Vilar *et al*.,2015

Seasonal effects

Seasonal variations in disease frequency have been of great interest in the epidemiologic investigation, the seasonality of disease and mortality has been observed for centuries. Therefore, the effects of climatic changes (humidity, sunlight, cold, and temperature) on the skin were also aimed to be assessed in the questionnaires with the heads of summer, winter, autumn, spring, and all seasons. Since the candidates have variable sensitivity to the varying seasons; we seek to investigate the seasons, in which the individual candidate has suffered most.

Skin colure

The complexions were assessed as fair, moderate, and dark. Although the effects of complexion are hardly reported yet, we have taken it under consideration, which proves worthy.

Types of Skin

It was mentioned under following heads, i.e., oily, dry, normal, and complex. The skin types play a noteworthy role to influence acne frequency and severity. As the oily content (sebum) promotes anaerobic bacteria growth.

Marital status

We have taken this factor as married or unmarried, but it is found to have no association with acne severity.

Dietary habits and Lifestyle

To study the relationship between the dietary habit and frequency of acne disease. The dietary habit was assessed using weekly food diary, including high glycemic diet, dairy products, fatty, spicy diet, and chocolate consumption. The frequency of consumption of dairy products was taken as regulated (organized) factors, and the grade of severity of acne disease or its absence was taken as efficacious characteristic. The dietary habit was assessed under the heads of high glycemic diet, dairy products, spicy food (junk food) fatty food, and chocolate.

Stress

Stress levels correlated with acne incidence and severity . In a study in Saudi Arabia with 144 female medical students, increased levels of stress (quantified with the Perceived Stress Scale) were positively correlated with acne severity (graded with the Global Acne Grading System) ($P < 0.01$).16 Another study on Indian medical students found 33% (165/500) of their students reported their acne worsening during stressful exam periods.23 Moreover, those under prolonged stress according to the Perceived Stress Scale were four times more likely to develop acne.

Table #2 Acne Prevalence among the gender based on various factor

Factors	**Range**	**Male 170**	**Female 210**	**P value**
Age	11-20 21-30 31-40	35 86 54	32 105 70	0.0029
Marital Status	Married Not Married	71 99	90 120	0.0061
BMI	Less than 18.5 18.5 to 24.9 25.0 to 29.9	49 96 25	35 110 65	0.0035
Positive family history of acne	Yes No	60 110	95 115	0.05
Smoking	Yes No	50 120	0 210	0.0021
Excess sun exposure	Yes No	100 70	50 160	0.061
Skin type	Oily Dry Normal Complex	70 35 45 20	60 55 54 30	0.0041
Face Complexation	Fair Moderate Dark	37 84 49	70 110 30	0.0021
High fat diet	Yes No	102 68	111 99	0.05
Stress	Yes No	90 80	115 95	0.0031
Season	Summer Winter Monsoon Autumn	80 26 35 29	98 37 43 32	0.0045

Statistical analysis

Further, data were collected based on the frequencies of occurrence and statically analyzed with a Pearson's Chi-square test to assign significant differences between the groups where the significance level was set at $P<0.05$ (Qidwai *et al*.,2017).

RESULTS

The 756 respondents were surveyed in between the age range of 11-40 years. Total 55% respondents were found affected, with 50% male candidates out of whom 45% were cases whereas 50% were female with 54% cases. The results clearly reflected that female were more affected than males (Table 2). Our study results reveal the prevalence of acne which is directly affect with the age however, a. Although in each group of age, females have higher prevalence than males. The age variations are statistically significant (P=0.0029) indicated in table 2. Our study second variable is marital status and it not significant(P=0.006).

Third variable of our study is BMI and study results is statistically significant (0.0035) and higher BMI may impart to gain acne. Fourth variable of our study is Positive family history of acne and survey indicated significant results (0.05). Fifth variable of our study was smoking and results was only positive for male candidate i.e (0.0021).Sixth parameter of our study is excess sun exposure and study result not found significant (0.061). Seventh parameter is skin type and oily skin mainly involve for development of acne as the oily content sebum promotes anaerobic bacteria growth. The skin type was proved to be another effective factor. It was under the heads of oily, dry, normal, and complex skin type. Oily skin showed higher sensitivity toward the infection 70% in female and 60% in male. Dry skins are also prone to infection but comparatively lesser percentage is reported, i.e., 55% in female and 35% in male. Whereas, normal and complex skin types have negligible sensitivity and study results was significant (P=0.0041). Eighth parameter of the study is the impact of complexion on acne prevalence is also notable. Moderate was more at risk than the fair and dark complexions (37% in male and 70% in female and p value is 0.0021. Nineth factor was high fat diet and high fat diet is effective for the acne formation process and p value is highly significant (0.05). Tenth variable of our study was stress and results are significant i.e (0.0031).However last variable, seasonal variation is reported as one of the most valuable factors, in which summers is most susceptible (80% in male 98% in female) while other seasons, i.e., monsoon, autumn, and winter are less susceptible, respectively. The seasonal variation has significance of P=0.0045 mentioned in Table 1.

DISCUSSION

The prevalence of acne vulgaris has been reported in different countries, while their prevalence rate according to factor and conditions vary from one country to another. A large study with 4,191 subjects was conducted in which prevalence rate of acne was reported (68.5%) in boys and (59.6%) in girls. Prevalence rate from another study was (20.8%) in girls and (27.9%) in boys. The average rate of prevalence was reported 70 to 87% from all over the world neglecting the significant difference between countries (Ali *et al*.,2019). The appearance of acne on face could lead to psychological problems which affect females more than that of males. The modified grading of lesion is observed as described by come done, papule, pustule, nodule and cyst. (Ali *et al*.,2019). Acne vulgaris significantly impairs quality of life (QoL), particularly in patients of a higher grade of acne, female gender, obesity, illiteracy, and poverty. These patients may benefit from counseling and psychological intervention in parallel with medical management. Also, acne relapses were significantly associated with impaired quality of life and productivity loss/absenteeism. (Alshammari *et al*.,2020). Similar proportions have been reported in related studies. Another study shows young adults were the most affected age group. Acne among same age distribution has been shown in previous literature (Kanwal *et al*.,2018). Acne related to age at onset of puberty were high in this study. Puberty has been strongly associated with onset of acne since sebum production is greatly enhanced along with hormonal changes. This creates a pro-acne environment and hence the higher prevalence rate rates among this age group. Majority of females affected by acne in our study had a positive family history for parents or siblings. A similar observation was made in a related study (Heng *et al*.,2020).

CONCLUSION

This population-based study in Karachi, Pakistan, identified several factors associated with acne prevalence, including family history, season, dietary habits, and gender. Notably, acne prevalence was lower in this population compared to other countries. Importantly, our findings highlight the significant impact of facial acne on patients' quality of life. This underscores the need for comprehensive treatment approaches that address both pharmacological and psychological aspects, considering the specific needs and experiences of individual patients.

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