INTRODUCTION

Various superficial infectious agents are responsible for human skin problems. In this row, acne vulgaris is one of the most common chronic diseases of the pilosebaceous unit. It affects almost 85% of adolescents when they undergo maximum physical, psychological, and social changes [1]. This problem is neither life-threatening nor physically incapacitating, but generally procures the image of face. Moreover, it can affect the metabolic functioning and erode self-esteem of susceptible individuals [2]. Moving toward the factors influencing acne, female patients tend to develop acne earlier with high persistency than males whereas male suffers with the severe form of acne vulgaris [3-8]. Therefore, it is the demanding need of the present scenario to focus on the wide range of an epidemiological survey on acne vulgaris. Population-based data of epidemiologic survey are significant in framing the overall strategy for acne control. Various superficial infectious agents are responsible for human skin problems. In this row, acne vulgaris is one of the most common chronic diseases of the pilosebaceous unit. It affects almost 85% of adolescents when they undergo maximum physical, psychological, and social changes [1]. This problem is neither life-threatening nor physically incapacitating, but generally procures the image of face. Moreover, it can affect the metabolic functioning and erode self-esteem of susceptible individuals [2]. Moving toward the factors influencing acne, female patients tend to develop acne earlier with high persistency than males whereas male suffers with the severe form of acne vulgaris [3-8]. Therefore, it is the demanding need of the present scenario to focus on the wide range of an epidemiological survey on acne vulgaris. Population-based data of epidemiologic survey are significant in framing the overall strategy for acne control.

METHODS

This cross-sectional study was a population-based field study intending to discern the factors that influence the prevalence of acne in adolescents. The study carried out from April 2016 to October 2016 in the north central part of India. For this survey, questionnaires were 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 etc [10].

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.

Grading of questionnaire responses

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 of sanitation, dietary habit, candidates that approach different medical help and to share candidate’s personal household remedies experience that can help in further studies. The major 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 groups (6-12, 12-18, 18-24, 24-30, and 30-36) and their gender, i.e., male or female as well as to evaluate the severity of their acne infection.
Severity
Candidates were classified according to their infection in the three following categories: Mild, moderate, and severe. We pre-demonstrated the candidates how to examine their infection severity. They were asked to mention their severity infection frequency on an average has been of great concern in the epidemiologic analysis.

Seasonal variations
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 the most.

Complexion
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.

Skin type
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.

Breakout area
To mention their area of the breakout, the candidates were provided with four responses, i.e., face, back, chest, and forehead.

Dietary habits
To study the relationship between the dietary habit and frequency of acne disease. The dietary habit were 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. The quantity and quality of glycemic index (GI) defined by glycemic load (GL). The GL was calculated from the weekly food diaries by given formula.

GL = GI for food items × its carbohydrates in grams (g/100)

Moreover, the GI values were taken from the international table of GI [11] the GI was estimated using similar food of known GI.

GL = GI

Household remedies
For assembling individual’s personal experience or their knowledge of acne curatives, we had set a separate column for the household remedies.

Study areas
Areas were selected by simple random method taking into account to represent all the socioeconomic and age groups. These are schools, universities, and local residential areas including the slum area so as to include different ethnic groups and cultural practices and hygiene.

Subject selections
Totally, 1500 subjects were under assessment from the different areas out of which, 648 were male, and 852 were female within the age range of 6 year old to 36 years. Questionnaires were distributed to all the candidates and verbally interpreted in simple language or B&R language so as to avoid any kind of misunderstanding and to enable accurate response by the participants.

Statistical analysis
Further, data were collected based on the frequencies of occurrence and statistically analyzed with a Pearson’s Chi-square test to assign significant differences between the groups where the significance level was set at $P<0.05$. The odds ratio was calculated in adjusted logistic regression models.

RESULTS
The 1500 respondents were surveyed in between the age range of 6-36 years. Total 39% respondents were found affected, with 41.6% male candidates out of whom 29.6% were cases whereas 58.3% were female with 45.7% cases. The results clearly reflected that females were more affected than males (Table 1 and Fig. 1b).

Our observation reveals the prevalence of acne which is directly proportional to the age of 14-24/25 (Table 1 and Fig. 1a). However, acne occurrence is indirectly proportional to the age above than 25. There, we observed the rare cases of acne in the age of 6-12 years of female candidates although percentage is very low (0.13%). Although in each group of age, females have higher prevalence than males. The age variations are statistically significant ($P=0.00329$) (Table 1).

Coming to the next parameter, 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 42.9% in female and 17% in male out of total, i.e., 60.3% (Fig. 2). Dry skins are also prone to infection but comparatively lesser percentage is reported, i.e., 20.8% in female and 14.01% in male from 34.8% as a total (Fig. 1b). Whereas, normal and complex skin types have negligible sensitivity which is highly significant ($P=0.00039$) (Table 1 and Fig. 1c).

Further, the impact of complexion on acne prevalence is also noteworthy. Moderate is more at risk than the fair and dark complexion (68.3%, 24%, and 17%, respectively) which is also proved by p value, i.e., 0.00135 (Table 1 and Fig. 1d). However, seasonal variation is reported as one of the most valuable factors, in which summers (61.3%) are most infectious (Fig. 2). Whereas, spring and autumn are the seasons, in which the individual candidate has suffered the most.

Table 1: Acne prevalence among the genders, based on various factors

| Factor          | Range   | Male | Female |
|-----------------|---------|------|--------|
| Age             | 6-12    | 0    | 2      | 0.00329 |
|                 | 12-18   | 43   | 79     |
|                 | 18-24   | 72   | 124    |
|                 | 24-30   | 60   | 130    |
|                 | 30-36   | 10   | 65     |
| Skin type       | Oily    | 102  | 251    | 0.00039 |
|                 | Dry     | 82   | 122    |
|                 | Normal  | 0    | 5      |
|                 | Complex | 1    | 22     |
| Face complexion | Fair    | 33   | 50     | 0.00135 |
|                 | Moderate| 120  | 280    |
|                 | Dark    | 30   | 70     |
| Season          | Summer  | 100  | 259    | 0.03531 |
|                 | Winter  | 6    | 10     |
|                 | Monsoon | 15   | 20     |
|                 | Autumn  | 17   | 18     |
|                 | All     | 47   | 93     |
condition in summer) while other seasons, i.e., monsoon, autumn, and winter are less susceptible, respectively. The seasonal variation has significance of $P=0.035$ (Table 1). The face considers a having highest breakout area (Figs. 1f and 2a-i).

The marital status has found to be insignificant in acne perseverance. Regarding dietary habit, it was established from the data that consumption of high glycemic index diet and high glycemic load (GL) exacerbates risk of acne occurrence. Respondents with high GL daily dietary habits (i.e., consumption of 100 g of carbohydrates daily), make up 56.8% of total infected respondent, while consumptions with 2-3 times a week (i.e., consumption of 100 g of carbohydrates only 2-3 times/days/week) show 43.2%, and there are no reports on rare consumption of carbohydrates. It is clear from the data that high GI diet computing high GL reflects its influence on promotion of acne. However, the consumption of dairy products and milk shows the risk of acne prevalence significantly higher among the respondent with daily consumption (52.6%) than 2-3 times a week (29.3%) and weekly (18.1%). Data reveal a direct correlation between the dairy product consumption and risk of occurrence of acne [12] although the examinees consuming fatty and spicy foods show comparatively low-risk competent than dairy products. Apart from this, consumption of chocolate reveals contrary effects (Fig. 3) [13,14].

Further interrogations during the survey, the personal experience of household remedies from respondent were assembled. Among the infected examinees, 64.8% seek household treatments, and 27.1% seek medical care, which may include allopathic, homeopathic, Ayurvedic, and Unani disciplinary. Moreover, 8.1% respondents seek no treatments. All the information regarding household natural remedies were assessed and considered for the future prospects that may prove assistive for our study. Some of the information is listed in Table 2.

**DISCUSSION**

An individual can suffer from acne more easily and frequently than any other disease [4]. Our community-based study reveals that acne is commonly occurring problem in the age of puberty and shows extensive emotional impact and ultimately declines one’s self-esteem. The present investigation shows the prevalence of acne in population, i.e., 39%. There are many similar studies which have been reported globally till date such as in Turkey [25], Syria [26], Ankerbøl Ethiopia [27], Northern Ethiopia [28], Taiwan [29], Australia [8], South India [3,30], Saudi Arab [31], Iran [1], Portugal [32], Malaysia [4], Greece [33], Brazil [34], Glasgow [35], Mexico [36], France [11] etc., (Table 3 and Fig. 4).

The present findings demonstrate similarities with the reports of Bogino et al. (2014) in Northern Ethiopia (19.4%) [28], Perkins et al. (2012) in Taiwan (4.7%) [29], Stathakis et al. (1997) [46] and Kilkenny et al. (1998) [8] in Australia (1.0%) and 36.1%, respectively. Moreover, other global findings like that of Al-Ameer and Al-Akloby (2002) in Saudi Arabia 19.6% [31], France 7.2% (1996) [11], Mexico 2.5% (1972) [36], Brazil 2.7% (2014) [34], and Singapore 3% (2007) [41] of community-based survey shows 11.2% and 19.6% of prevalence. The present findings show 39% of prevalence in north central India [46,47].

However, our investigation shows lower number of cases than various other studies 91.3% [33], 86% [2], 64% [43] of occurrence suggest that...
the selected region is lesser prone to acne. Although, it is reflected by community-based studies that Australia has the least prevalence of acne than Asians [48].

This study clearly reveals in the form of graphs, and tables which depicts prevalence frequency of acne is directly proportional to the age, from 20-36 (Fig. 1a), supported by the findings of Aktan et al. [25], Hanish et al. [4] and Rademaker et al. [35] Moreover, females are more infected (45.7%) than the males (29.6%) (Fig. 1b and Table 1) which was also reported by Tallab [49] and Al-Ameer [31]. It might be due to hormonal changes, which are supposed to facilitate the initiation of premenstrual acne [50]. It is interesting that the season has an inordinate role in the initiation of acne (Fig. 1c). Summer and monsoon are found highly prevalent in acne (23.1%) and the winter season is lesser prone to acne. Although, it is reflected by community-based studies that Australia has the least prevalence of acne than Asians [48].

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The knowledge we gain from the participants were given the equal evaluating worth as they can prove assistive for our research work. These informations are summarized in Table 2.

CONCLUSION

Our study has profiled out various possible factors accountable for acne prevalence. This population-based study in North central zone of India shows lower occurrence than other Asian countries and Africa. The prevalence is higher in females of this zone. Our survey intensifies the fact that season and dietary habit does effects acne. Facial acne is common among patients that cause foremost impression on their quality of life. Assessment of quality of life in patients with acne is needed as it helps in the pharmacological as well as psychological treatment of the patients in a more active and assimilated way.

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