Research Article | **Open Access**

Assessment of Prevalence, Knowledge, Attitude, and Psychosocial Impact of Acne Vulgaris among Medical Students in Saudi Arabia

Ahmed Zahr Allayali[1]*, Bayan Nassir Asseri[2], Njoud Ibrahim AlNodali[3], Rawan Nasser M Alhunaki[4] and Shoug Fahad Goblan Algoblan[4]

[1]Department of Dermatology, Umm Al-Qura University, Makkah, Saudi Arabia
[2]King Khalid University, College of Medicine, Abha, Saudi Arabia
[3]University of Hail, College of Medicine, Hail, Saudi Arabia
[4]Almaarefa Colleges, Faculty of Medicine, Riyadh, Saudi Arabia

Abstract

Objective: To evaluate the prevalence of acne vulgaris among medical students in Saudi Arabia and to assess their knowledge and attitudes about it, as well as the psychosocial impact of acne.

Methods: Data was collected from 555 medical students, both males and females, in Saudi Arabia. A cross sectional design was used. Questionnaires were used to collect data.

Results: Of the participants 49.5% were male and 50.5% female. More than half of the participants (66.7%) were between 18 and 20 years old. The majority were single (91.4%). The geographical areas where they lived included the north (30.3%), south (13.3 %), central (9.4%), east (17.3%), and west (19.1). About two thirds were in the fourth year of medical school or less. Among the participating medical student, 55% had acne. The most common site affected was the face, and the least affected was the chest. More than half of medical students in the study sample used medical lotions to treat acne (57.0%), with only one third using medication (33.1%). Perceived adverse psychological effects were self-reported by 202 students, 72.1% of the 305 with acne. Most (91.4%) identified hormones as the most important aggravating factor. Other aggravating factors believed by students included change in stress (86.1%), dust and heat (84.9%), cosmetics (69.2%), and lack of care skin and diet (66.8%). Gender were significantly related to the level of knowledge score, with the majority of male students (62.5%) having poor knowledge about acne while 50.9% of the female students had good knowledge. Age, social status, living area, and study year were not significantly associated with knowledge level of participants.

Conclusion: Results of this study point out that lack of knowledge about acne is widespread among Saudi medical students, and patients with acne had poor practice and unfavorable attitude.

Keywords: Acne vulgaris; Depression; Anxiety; Psychological stress

Introduction

The term acne derives from the Greek word 'acme' from the writings of Aetius Amidenus. The word "acne" has the sense of "skin eruption," and "vulgaris" means "common." Acne is a chronic inflammatory disease of the pilosebaceous glands [1], characterized by comedones, papules, pustules, cysts, nodules, and occasionally scars. It includes follicular hyperkeratinization, sebaceous hypersecretion due to androgen stimulation, follicular colonization by *Propionibacterium acnes* and immune and inflammatory responses. It affects the face, anterior chest, and upper back [2].

Acne is a very common worldwide skin problem [3]. It is most commonly experienced by teenagers, suggesting a hormonal influence. The fact that approximately 80% of teenagers have acne supports the hormonal hypothesis [3,4,1]. However, the various studies report prevalence in adolescents ranging from 28.9% to 91.3% [5-7]. During adolescence, acne tends to be more common in boys than in girls. It reportedly occurs among 95% to 100% of boys 16 to 17 years old and 83% to 85% of girls in the same age group [3]. In the US, acne is the fourth most common reason for seeking medical consultation among patients aged 11 to 21 years, and it accounts for 4% of all visits from patients aged 15 to 19 [7,8]. Kilkenny et al. recorded a prevalence of acne in 27.7% of students aged 10 to 12 and in 93.3% of adolescents aged 16 to 18 among a cross-sectional cohort of 2491 students in Victoria, Australia [9].

Acne vulgaris involves important anatomic, physiologic, biochemical, genetic, and immunologic factors [3]. It is known to have social consequences and a psychological impact on patients. Acne can produce anxiety, depression, and other psychological problems that affect patients' lives in ways comparable to life-threatening or disabling diseases [9]. In addition, acne can affect teenagers' social, vocational, and academic performance [10]. Aktan et al. reported that severe acne may lead to scarring and disfigurement [11,12]. Thus, in a study by Picardi et al. suicidal ideation was reported in a group of patients with acne [13].

According to Poli et al. people have a lot of wrong beliefs and misunderstandings about acne vulgaris [14]. His group recorded that 80.8% of 852 French people surveyed did not believe acne to be a disease but rather a normal phase of adolescence, although 69.3% agreed that it should be treated. Many of adolescents in the study thought that gender, excess weight, eating dairy products, and physical activity did not influence acne and that frequent washing could improve acne. In addition, people thought that eating chocolate and snacks, smoking cigarettes, sweating, not washing, touching or squeezing spots, eating fatty foods, using make-up, pollution, and menstruation could all worsen

Citation: Allayali AZ, Asseri BN, AlNodali NI, Alhunaki RNM, Algoblan SFG (2017) Assessment of Prevalence, Knowledge, Attitude, and Psychosocial Impact of Acne Vulgaris among Medical Students in Saudi Arabia. J Clin Exp Dermatol Res 8: 404. doi:10.4172/2155-9554.1000404

acne. Uslu et al. indicated that the high prevalence of acne vulgaris and peoples' deficient knowledge and wrong beliefs about demonstrate an urgent need for education about its complications and the importance of effective treatment for acne [15]. Al-Hoqail conducted a study in Riyadh, Saudi Arabia, also finding a lack of knowledge and incorrect beliefs regarding acne vulgaris [16]. A study conducted in Assir, Saudi Arabia found no major differences in the beliefs and perceptions of and psychological impact on patients with acne in a developing society compared with those from more developed societies [17]. Darwish and Al-Rubaya indicated that patients in Al-Khobar, a city in Saudi Arabia have insufficient knowledge about acne [18]. More recently, Al-Natour reported that misconceptions about acne are widespread among Saudi youth [19]. The study found that (58.9%) of the 329 male participants considered acne a transient condition not requiring therapy, and only 13.1% knew that the proper treatment of acne could take a long time, even several years.

Despite the high prevalence of this chronic inflammatory disease in the adolescent age group, there are many myths and misconceptions about it. This lack of awareness, knowledge, and good practices regarding acne vulgaris needs to be addressed, including among medical students, who may themselves have acne and some may, in later years, care for patients with the disease. We conducted this study among medical students in Saudi Arabia to evaluate the prevalence of acne vulgaris among them, their knowledge and attitudes, and the psychosocial impact the skin condition had on them.

Literature Review

This section will discuss research that has been conducted about the prevalence, knowledge about, attitudes toward, and psychosocial impact of acne vulgaris either locally or internationally. The following is summary of some recent studies in this regard.

Locally

Al-Natour evaluated the perceptions and beliefs of Saudi youth about acne [19]. Three hundred twenty nine male students (aged 13–22 years) from 6 secondary schools in the eastern Saudi Arabia completed a self-reported questionnaire on knowledge about causation and exacerbating and relieving factors of acne. Over half (58.9%) of the participants considered acne as a transient condition not requiring therapy. Only 13.1% knew that the proper treatment of could take a long time, even several years. Over half (52%) thought acne could be treated with only one or a few visits to the doctor. Popular sources of information were television or radio (47.7%), friends (45.6%), and the internet (38%). Only 23.4% indicated school as a source of knowledge. Factors that participants thought caused acne included scratching (88.5%) and squeezing (82.1%) of pimples, poor hygiene (83.9%), poor dietary habits (71.5%), and stress (54.1%). Ameliorating factors reported included frequent washing of the face (52.9%), exercise (41.1%), sunbathing (24.1%), and drinking of mineral water (21%). The author concluded that misconceptions about acne are widespread among Saudi youth and should be addressed by a health education program.

Al Mashat et al. conducted a cross-sectional, self-administered questionnaire study on a population in Jeddah, Saudi Arabia, of whom 64.5% suffered from acne and 85.6% thought that more information about acne would be helpful [4]. The most commonly stated causative factor was diet (28.4%), followed by bacteria (20.7%), and poor hygiene (15.4%), while 28.4% stated they did not know the cause. Stress (58.4%) and certain food (34.1%) were the most commonly cited factors believed to aggravate acne. Repeated, frequent facial washing was thought by 58.4% to improve acne, while 63.3% thought it was a curable disease. Acne was believed to be a serious health problem by 53.82%. Younger respondents were more likely to think acne would cause depression and increase suicide attempts than individuals above 25 years of age. Regarding the psychological impact of acne, depression was believed to be a psychological consequence by 79.7% of the respondents, 71.7% agreed it had detrimental effects social relationship, and 55.8% said it adversely affected marriage. The authors concluded that that there is a definite defect in general knowledge about acne regarding its causes and treatment.

Darwish and Al-Rubaya (2013) conducted a cross-sectional study to assess the understanding of acne vulgaris among 180 patients attending a referral dermatology clinic in Al-Khobar city [18]. The survey showed that 58.33% of the sample had poor knowledge about factors that affect acne vulgaris with a significant correlation with both age and gender (p=0.012 and p=0.031, respectively). There was significant association between reporting adverse effects on social activities with age and educational level (p=0.023 and p=0.013, respectively). The genders differed significantly regarding reporting feeling stressed due to acne (p=0.001). The majority of the sample sought medical advice after one year. The most commonly used treatment for acne vulgaris before seeking medical help was peeling products. The majority of the patients thought that acne needs no treatment by physicians. Doctors' treatment was considered guaranteed and safe by the vast majority of the patients. The study results reveal that poor knowledge, false beliefs, and many misconceptions are more prevalent among Saudi patients with acne compared to that among patients of previous studies in other populations and cultures.

Internationally

Hulmani et al. implemented a study among 100 patients with acne attending the skin outpatient department of a private medical college in India [1]. The majority of the study subjects were aged 15 to 24 years, and 72% had good knowledge about acne. However, more than half of the study subjects had wrong beliefs that eating oily foods, chocolates, and spicy food caused acne, while more than 40% had good knowledge about the causes and aggravating factors, such as that it is made worse by squeezing, picking, or rubbing (83%); is commonly found on oily skin (67%); has a seasonal occurrence (54%); is associated with premenstrual flares (42%); and is aggravated by cosmetics (41%). They concluded that patients had poor practice and unfavorable attitudes in spite of good knowledge, and many myths remained. Despite being so common and very responsive to treatment, it was a major cause of depression among patients.

Pokharel and Harish conducted a study to assess knowledge and attitude regarding acne vulgaris among 100 school students in years 9 and 10 in Pokhara, Nepal [20]. Most of the students (82%) were aged 15 to 17 years. The majorities were boys (65%) and most were not vegetarian (91%). The level of knowledge about acne was considered good among 52% and average among 48%. The study also revealed that the majority (69%) had a favorable attitude and the rest a moderately favorable attitude (31%). All were aware that acne is also known as pimples and occurs most commonly in adolescents. Students had some misconceptions regarding treatment, thinking it unnecessary to continue medicine if the acne resolved with treatment (56%) and using extra medicine can make acne go away (33%). The authors concluded that the students were surrounded by myths and misconceptions about acne and recommended that this important adolescent health issue be addressed through the introduction of related educational programs at schools.

Noorbala and Mozaffary investigated the prevalence of acne and its impact on quality of life in high school aged adolescents in Yazd, Iran [21]. Acne severity was graded using the Global Acne Grading System. The students with acne were then given the self-reported Cardiff Acne Disability Index questionnaire. The prevalence of acne was 85.9% and was more common among females than males (90% *vs.* 81.4%). However, severe forms were significantly more common among boys.

Acne prevalence did not increase with age (p=0.089). There was a correlation between acne vulgaris severity and the Cardiff Acne Disability Index (p=0.001). The impact on quality of life increased with the severity of the acne. There was no association between the Cardiff Acne Disability Index score and gender (p=0.185).

All these previous studies, whether from Saudi Arabia or elsewhere, demonstrated that there are many myths and misconceptions among patients regarding the causes and treatment of acne. To our knowledge, however, there have been no such studies among medical students. We conducted this study to evaluate the prevalence of the disease and its psychosocial impact, as well as knowledge about and attitudes toward acne vulgaris among medical students in Saudi Arabia.

Methodology

Research design

This was a cross-sectional study conducted in Saudi Arabia among medical students in March and April 2017.

Sample size

Data was collected from 555 medical students, both males and females, in Saudi Arabia. Students were excluded if the data was incomplete. It is pertinent to note that the medical curriculum in the universities in which the study was conducted includes a short introductory course to common dermatological diseases in the sixth year.

Data collection

A standard multiple-choice questionnaire containing 45 questions about knowledge and awareness of causes, side effects, psychosocial impact, and treatment of acne was used in the study. A self-administered questionnaire was distributed to the participants by the researchers in direct contact with them. A research team consisting of the researcher and research assistants collected data from the questionnaire. Data was confirmed by hand, then coded and entered into a personal computer.

Statistical analysis

Data were processed using the statistical Package for Social Sciences (SPSS) software version 20.0. An independent samples t test used to compare variables. Chi-square tests of independence were used to analyze individual questions. A p value of <0.05 was considered the cut-off level for statistical significance.

Results

Description of the sample

As shown in Table 1, 555 students (49.5% male) participated to the study. More than half of the participants (66.7%) were between 18 and 20 years old. The majority of the participants were single (91.4%). Participants lived in north (30.3%), south (13.3%), central (9.4%), east (17.3%), and west (19.1). Regarding year in school, about two-thirds were in the fourth year or less.

Variable	N (%)
Gender	
Male	275 (49.5)
Female	280 (50.5)
Age (yr)	
18–20	84 (15.1)
20–24	370 (66.7)
>24	101 (18.2)
Social status	
Single	507 (91.4)
Married	48 (8.6)
Geographic location	
South	95 (17.1)
North	134 (24.1)
Central	86 (15.5)
East	94 (16.9)
West	146 (26.3)
Year in medical school	
1	20 (30.6)
2	74 (13.3)
3	52 (9.4)
4	96 (17.3)
5	106 (19.1)
6	131 (23.6)
7	64 (11.5)

Table 1: Socio-demographic characteristics of Saudi medical students surveyed (N=555).

**Figure 1:** Prevalence of acne among medical students.
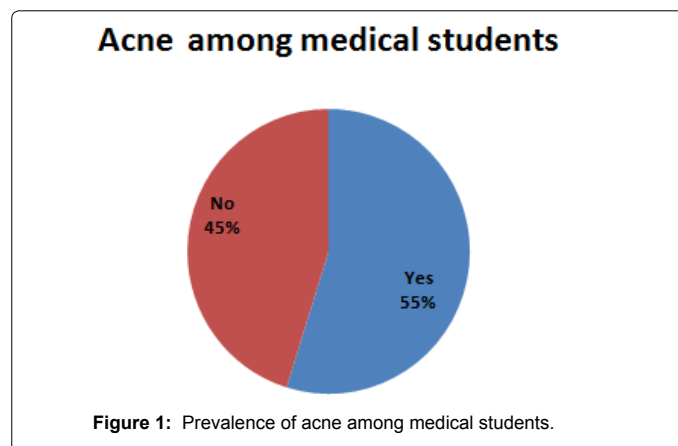
Acne-related characteristics acne of participants

Among the 555 participants, 305 (55%) reported having acne (Figure 1). The most common site affected was the face and the least affected was the chest (Figure 2).

Medical students' attitudes toward acne treatment

Table 2 presents the treatments used by the students who had acne. More than half of medical students in study sample used medical lotions to treat acne (57.0%) and only one-third used oral medications (33.1%).

In Figure 3, majority (66.3%) of students preferred to see a doctor for acne, while only 9.8% reported use of topical treatments as recommended on social media (Figure 3).

Figure 2: Common sites for acne among medical students.
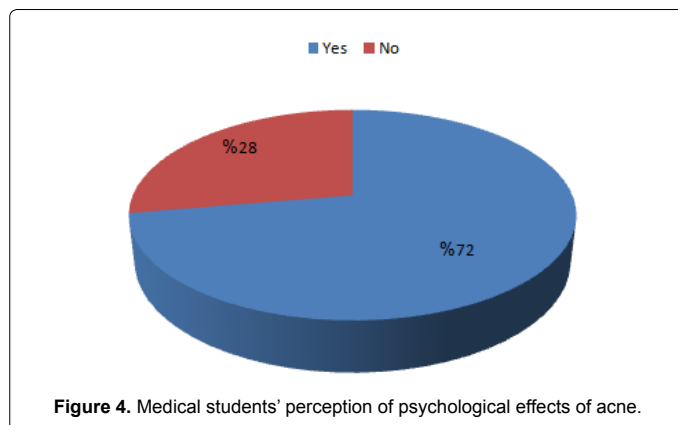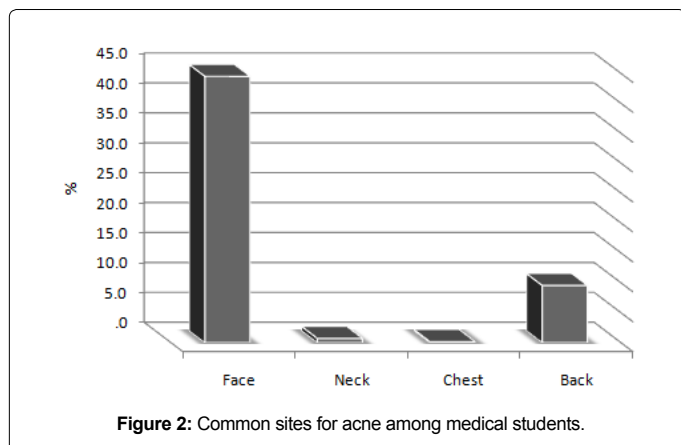
Treatment	Yes n (%)
Natural topical treatment (Tea tree oil, natural home masks)	147 (48.2)
Oral medications	101 (33.1)
Medical lotions	174 (57.0)

Table 2: Treatment used by medical students to treat acne (n=305).

Figure 3. Treatments and information source used by medical students with acne.
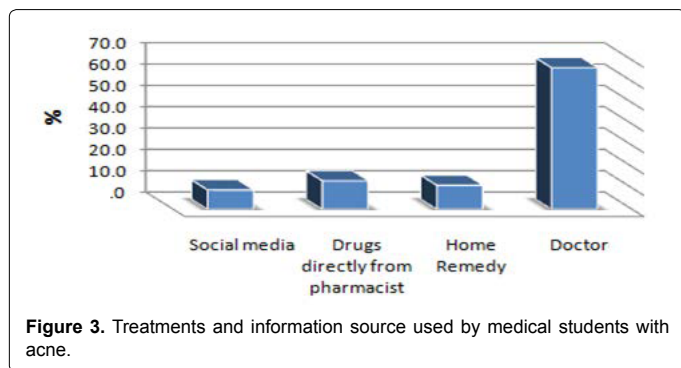
Psychosocial effects

Figure 4 shows the psychosocial effects of acne reported by the students. Among the 305 students with acne, 202 (72.1%) reported some degree of psychological impact from the condition (Table 3 and Figure 4). On the other hand, about half reported no profound social effects, and few thought acne had negative effects on their job performance.

Knowledge about acne among medical students

Table 4 lists possible factors believed by medical students to cause acne. Students thought that the most common factors responsible for acne were hormones; stress; bad weather, such as moisture or dust; cosmetics; and lack of skin care and hygiene.

When the students were asked about factors that could cause acne, 91.4% identified hormones as the causative factor. Other factors believed to cause the condition included an increase in stress level (86.1%), dust and heat (84.9%), make up and cosmetics (69.2%), and lack of care skin and diet (66.8%). Only about a quarter of students thought that exposure to petroleum works and some types of medicines (rifampicin, lithium, B12, anti-epilepsy drugs) cause acne (25.4% and 26.3%, respectively).

When students were asked about groups most likely to be affected by acne, about one third reported teenagers as the age group

Figure 4. Medical students' perception of psychological effects of acne.

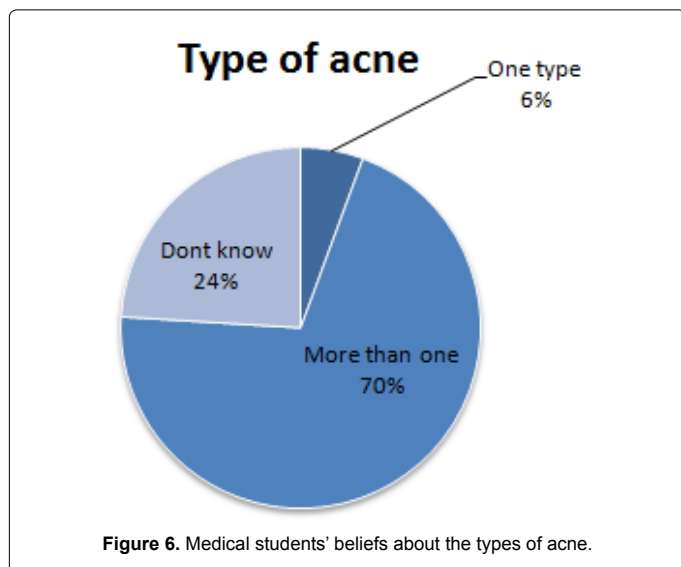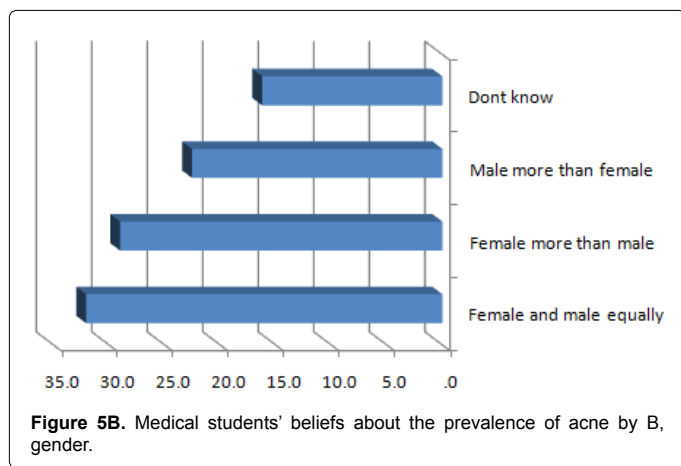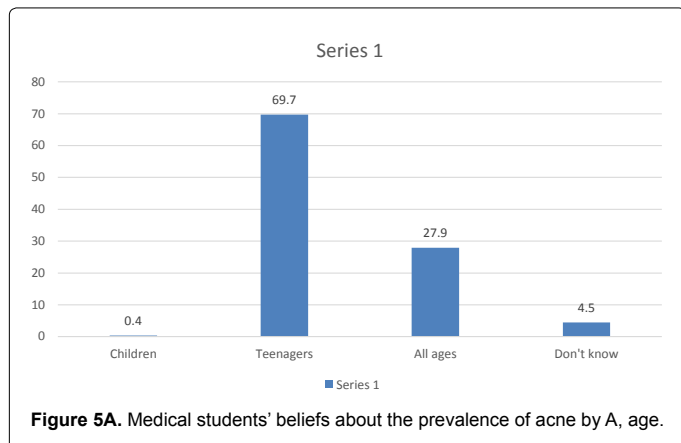| Negative effects	n (%)
Psychological effects	
Yes	202 (72.1)
No	85 (27.9)
Social effects	
Yes	57 (18.7)
No	153 (50.2)
Sometime	95 (31.1)
Job performance effects	
Yes	18 (5.9)
No	256 (84)
Sometimes	31 (10.2)

Table 3: Negative effects reported by medical students with acne (N=305).

Possible cause	Yes	No	Don't know	Sometimes
Genetic	251 (45.2)	161 (29.0)	142 (25.6)	
Hormones	507 (91.4)	7 (1.3)	-	40 (7.2)
Pregnancy	206 (37.1)	116 (20.9)	-	232 (41.8)
Contraceptive pills	182 (32.8)	103 (18.6)	-	269 (48.5)
Menses	305 (55.0)	65 (11.7)	-	184 (33.2)
Smoking	167 (30.1)	129 (23.2)	258 (46.5)	-
Diet	371 (66.8)	67 (12.1)	116 (20.9)	-
Stress, wakefulness	478 (86.1)	28 (5.0)	48 (8.6)	-
Infection	311 (56.0)	140 (25.2)	103 (18.6)	-
Poor skin hygiene	326 (58.7)	139 (25.0)	89 (16.0)	-
Cosmetics	384 (69.2)	50 (9.0)	120 (21.6)	-
Weather (Moisture heat and dust	471 (84.9)	29 (5.2)	54 (9.7)	-
Lack of skin care	371 (66.8)	183 (33.0)		-
Some types of Medicines (rifampicin, lithium, B12, anti-epilepsy drugs)	146 (26.3)	408 (73.5)	-	-
Exposure to sunlight	248 (44.7)	145 (26.1)	161 (29.0)	-
Exposure to petroleum works	141 (25.4)	73 (13.2)	340 (61.3)	-

Table 4: Factors believed by medical students to cause acne (n=555).

most commonly affected by acne (Figure 5A). Most believed there was no difference between males and females in the prevalence of acne (Figure 5B), and over two-thirds (70.0%) believed that there is more than one type of acne (Figure 6).

Only gender was significantly related to the knowledge score (Table 5),

Figure 5A. Medical students' beliefs about the prevalence of acne by A, age.

Figure 5B. Medical students' beliefs about the prevalence of acne by B, gender.

Figure 6. Medical students' beliefs about the types of acne.

Variable	Poor	Good	p value
Gender			0.001
Male	172 (62.5)	103 (37.5)	
Female	137 (49.1)	142 (50.9)	
Age			0.287
18–20	51 (60.7)	33 (39.3)	
20–24	208 (56.4)	161 (43.6)	
>24	50 (49.5)	51 (50.5)	
Social status			0.945
Single	282 (55.7)	224 (44.3)	
Married	27 (56.3)	21 (43.8)	
Living area			0.185
South	54 (56.8)	41 (43.2)	
North	84 (62.7)	50 (37.3)	
Central	39 (45.9)	46 (54.1)	
East	53 (56.4)	41 (43.6)	
West	79 (54.1)	67 (45.9)	
Year in medical school			0.074
1	13 (65.0)	7 (35.0)	
2	41 (55.4)	33 (44.6)	
3	31 (59.6)	21 (40.4)	
4	66 (68.8)	30 (31.3)	
5	57 (53.8)	49 (46.2)	
6	67 (51.5)	63 (48.5)	
7	29 (45.3)	35 (54.7)	

Table 5: Knowledge scores of medical students according to their socio-demographic characteristics (N=555).

all over the world. A lot of misconceptions surround acne, with many lacking knowledge about it, and using wrong practices. Patient's knowledge about their condition plays an important part in management and compliance, so this knowledge gap should be addressed.

Our results showed that 55% of the medical students surveyed had acne themselves, and the most commonly on the face and few having it on the chest. The face, chest and back all have a high sebaceous gland activity with excessive growth of *P. acnes* within sebaceous gland ducts, makes these sites prone to acne [22]. In a study by Hulmani et al. 87% of patients reported that the face was most commonly affected, whereas Tan found only 26% who knew that acne usually affects the face, neck and chest [1,23]. Pokhare and Harish reported that only 26% knew that acne usually affects face, neck & chest [20].

With regard to acne treatment, more than half of the medical students in our study sample used medical lotions to treat acne, with only one third using oral medications. The majority of medical students preferred to see a Dermatologist for treatment (66.3%). Hulmani et al. reported that 74% of patients with acne used medications, while Brajac et al. found that most patients used medical creams to treat acne [1,24]. Pokhare and Harish found that slightly over half thought that ongoing treatment was unnecessary once the acne improved [20].

Our study indicated that three quarters of the medical students with acne reported some psychological problems. According to Al Mashat et al. younger people surveyed were more likely than those over 25 years old to think that acne would cause depression and increase suicidal attempts [4]. This view was attributed to the fact that it was the younger people who were suffering more from acne. Depression was thought to be a possible consequence of acne (79.7%), followed by adverse reflects on social relationships (71.7%). Al-Hoqail, reported that more than half

with nearly two-thirds of male students (62.5%) having poor knowledge, while just over half of female students (50.9%) had good knowledge about acne. Age, social status, living area, and year in medical school were not significantly associated with the participants' knowledge.

Discussion

Acne is a multi-factorial condition, commonly seen in adolescents

of the group studied indicated that acne leads to loss of self-confidence and marriage avoidance (58.8% and 56.3%) [16].

The majority of our sample (86.1%) believed that psychological stress is an aggravating factor for acne. Clarke et al. suggested that chronic stress might cause increased androgen secretion in some of the women, contributing to the pathogenesis of acne in such patients [25]. Similar to our results, Pokharel and Harish found that 82% of people surveyed believed that stress aggravates acne and that acne makes the person feel depressed [20]. Hulmani et al. reported that 51% knew that acne can be aggravated by stress [1]. Similar findings were reported by Tahir and Ansari and Al Mashat et al. where more than half of the study subjects knew this [26,4].

Among our study group, two-thirds believed that diet is an aggravating factor. Al-Hoqail recorded that 72% of those surveyed believed that diet is an etiologic factor of acne [16]. Al Mashatet al. reported that, among possible causes of acne, diet was most commonly (28.4%) listed [4]. Su et al. found that the most common foods people thought were associated with acne were spicy or fried foods, whereas not many thought chocolate was a cause [27].

Poor skin care was cited as a risk factor for acne by two-thirds of our students. Beliefs varied among groups studied, with Ganga and Harish finding that only 37% knew that acne was worsened by irritation, while Hulmani et al. reported that 83% knew that acne lesions were worsened by squeezing, picking or rubbing [28,1]. Poli et al. also reported that 75% knew that acne lesions worsen by squeezing, and 58.7% knew that poor skin hygiene plays a role in increasing the appearance of acne [14]. Other surveys on beliefs about acne have had varied results, with reports of 42.4% (Rigopoulos and Gregoriou), 74% (Pokharel1 and Harish), and 15.4% (Al Mashat et al.) of respondents in different groups believing that poor hygiene and infection can cause acne [29,20,4]. Among the medical students we surveyed, 91.4% believed that hormones play a significant role in the development of acne, compared with 55.1% according to Rigopoulos and Gregoriou [29].

Genetic factors play an important role in the pathogenesis of acne. In the present study 45.2% knew that genetics play such a role, similar to results found by Tan (38%) and Hulmani et al. (35%) [23,1].

The majority of male students (62.5%) had poor knowledge about acne. Age, social status, living area and year in medical school were not significantly associated with the participants' level of knowledge. Pokhare and Harish found similar results among the Nepali secondary school students, with just over half having good knowledge (52%) and the rest average knowledge about acne vulgaris [20]. In contrast, a study conducted in Tricity School in Poland concluded that almost 90% of the participants considered their knowledge sufficient [30]. Likewise in another study conducted in Nigeria, over 80% respondents had knowledge of acne [31].

In conclusion, the present study reveals that the medical students with acne had poor practice and unfavorable attitude in spite of good knowledge. Educational programs should be directed at this age group in schools and in the mass media. Young people should be made aware that acne is a disease that can be managed and controlled effectively.

References

1. Hulmani M, Bullappa A, Kakar S, Kengnal P (2017) Knowledge, attitude and practice towards acne vulgaris among acne patients. Int J Res Dermatol 3: 107-112.

2. Shen Y, Wang T, Zhou C, Wang X, Ding X, et al. (2012) Prevalence of acne vulgaris in Chinese adolescents and adults: a community-based study of 17,345 subjects in six cities. Acta Derm Venereol 92: 40-44.

3. Markus M (2010) Acne & Prevalence.

4. Al Mashat S, A Sharif N, Zimmo S (2013) Acne awareness and perception among population in Jeddah, Saudi Arabia. J Saudi Society of Dermatology & Dermatologic Surgery 17: 47-49.

5. Stathakis V, Kilkenny M, Marks R (1997) Descriptive epidemiology of acne vulgaris in the community. Australas J Dermatol 38: 115-123.

6. Smithard A, Glazebrook C, Williams HC (2001) Acne prevalence, knowledge about acne and psychological morbidity in mid-adolescence: a community-based study. Br J Dermatol 145: 274-279.

7. Law MP, Chuh AA, Lee A, Molinari N (2010) Acne prevalence and beyond: acne disability and its predictive factors among Chinese late adolescents in Hong Kong. Clin Exp Dermatol 35: 16-21.

8. Stern RS (1996) Acne therapy. Medication use and sources of care in office-based practice. Arch Dermatol 132: 776-780.

9. Kilkenny M, Merlin K, Plunkett A, Marks R (1998) The prevalence of common skin conditions in Australian school students: 3. acne vulgaris. Br J Dermatol 139: 840-845.

10. Niemeier V, Kupfer J, Gieler U (2006) Acne vulgaris--psychosomatic aspects. J Dtsch Dermatol Ges 4: 1027-1036.

11. Do JE, Cho SM, In SI, Lim KY, Lee S, et al. (2009) Psychosocial Aspects of Acne Vulgaris: A Community-based Study with Korean Adolescents. Ann Dermatol 21: 125-129.

12. Aktan S, Ozmen E, Sanli B (2000) Anxiety, depression, and nature of acne vulgaris in adolescents. Int J Dermatol 39: 354-357.

13. Picardi A, Mazzotti E, Pasquini P (2006) Prevalence and correlates of suicidal ideation among patients with skin disease. J Am Acad Dermatol 54: 420-426.

14. Poli F, Auffret N, Beylot C, Chivot M, Faure M, et al. (2011) Acne as seen by adolescents: results of questionnaire study in 852 French individuals. Acta Derm Venereol 91: 531-536.

15. Uslu G, Sendur N, Uslu M, Savk E, Karaman G, et al. (2008) Acne: prevalence, perceptions and effects on psychological health among adolescents in Aydin, Turkey. J Eur Acad Dermatol Venereol 22: 462-469.

16. Al-Hoqail IA (2003) Knowledge, beliefs and perception of youth toward acne vulgaris. Saudi Med J 24: 765-768.

17. Tallab TM (2004) Beliefs, perceptions and psychological impact of acne vulgaris among patients in the Assir region of Saudi Arabia. West Afr J Med 23: 85-87.

18. Darwish MA, Al-Rubaya AA (2013) Knowledge, Beliefs, and Psychosocial Effect of Acne Vulgaris among Saudi Acne Patients. ISRN Dermatol 2013: 929340.

19. Al-Natour SH (2017) Acne vulgaris: Perceptions and beliefs of Saudi adolescent males. J Family Community Med 24: 34-43.

20. Pokhare G, Harish B (2014) Acne Vulgaris: knowledge and attitude among Nepali school students. Int J Nurs Res Pract 1: 2350-1324.

21. Noorbala M, Mozaffary B (2013) Prevalence of acne and its impact on the quality of life in high school-aged adolescents in Yazd, Iran. Journal of Pakistan Association of Dermatologists 23: 168-172.

22. Kubba R, Bajaj AK, Thappa DM, Sharma R, Vedamurthy M, et al. (2009) Factors precipitating or aggravating acne. Indian J Dermatol Venereol Leprol 75: 1-62.

23. Tan JK (2004) Psychosocial impact of acne vulgaris: evaluating the evidence. Skin Therapy Lett 9: 1-9.

24. Brajac I, Bilic-Zulle L, Tkalcic M, Loncarek K, Gruber F, et al. (2004) Acne vulgaris: myths and misconceptions among patients and family physicians. Patient Educ Couns 54: 21-25.

25. Clarke SB, Nelson AM, George RE, Thiboutot DM (2007) Pharmacologic modulation of sebaceous gland activity: Mechanisms and clinical applications. Dermatol Clin 25: 137-146.

26. Tahir CM, Ansari R (2012) Beliefs, Perceptions and expectations among acne patients. Journal of Pakistan Association of Dermatologists 22: 98-104.

27. Su P, Chen D, Lee SH, Han MP (2015) Beliefs, perceptions and psychosocial impact of acne amongst Singaporean students in tertiary institutions. J Dtsch Dermatol Ges 13: 227-233.

28. Ganga P, Harish B (2014) Acne Vulgaris: knowledge and attitude among Nepali school students. Int J Nurs Res Pract 1: 29-33.

29. Rigopoulos D, Gregoriou S, Ifandi A, Efstathiou G, Georgala S, et al. (2007) Coping with acne: beliefs and perceptions in a sample of secondary school Greek pupils. J Eur Acad Dermatol Venereol 21: 806-810.

30. Talasiewicz K, Oldakowska A, Szczerkowska-Dobosz A (2012) Evaluation of knowledge about acne vulgaris among a selected population of adolescents of Tricity schools. J Postep Derm Alergol 29: 417-420.

31. Onayemi O, Aghanwa HS, Soyinka F, Morakinyo O (2005) Prevalence, knowledge and perceptions of acne vulgaris among secondary school student is in Nigeria. Niger Med Pract 48: 73-76.