Acne vulgaris represents the most prevalent skin disease of the world affecting about 9.4% of the world’s population during a specific period of their life, of which 80% present with Acne during 11 to 30 years of age suggesting a hormonal influence. [1] It is an epidemic inflammatory disease related to the human pilosebaceous glands with follicular hyper-keratinization and colonization by Propionibacterium acnes. [1] Clinically, Acne is characterized by the presence of open and closed comedones, papules, pustules, nodules, cysts, and occasionally scars. [2] Despite a high prevalence rate across the world, insufficient knowledge exists among medical students, especially before the commencement of their clinical learning years regarding effective control and the possible treatment options of acne vulgaris. Many attribute stress and hormonal changes as the only causes. [3]

Objectives: This study focuses on determining the prevalence of acne vulgaris among undergraduate medical students of a public sector institute of Pakistan. Besides, we aim to evaluate the level of knowledge and different lifestyle factors about Acne and correlate them to gender and academic years of study.

Methodology: For this purpose, a cross-sectional study design was selected, and the data was collected using a stratified random sampling technique. A paper-based self-made English questionnaire was distributed among the participants. A Chi-square test was used to compare differences of different categorical variables across gender and academic years.

Results: One hundred and seventy medical students from a public institute of Rawalpindi, Pakistan were recruited for the study. More than half of the students (64.7%) had acne vulgaris out of which 68% were females. Majority of the participants (61.8%) were between 18 and 21 years old, and most were single (99.4%). The most common site affected was the face (82.7%). Only 47.3% of the students with Acne had consulted the physician. Academic years were significantly related to the level of knowledge. Most of the students of clinical study years believed hormonal change, stress, and diet to cause Acne. Among treatment options, topical agents showed the highest number of responses (52.8%). Gender was significantly related to a lifestyle where females had acne lesions appearing more at the time of stress.

Conclusion: The results of this study indicate a high prevalence of Acne among Pakistani medical students, especially females. Lack of knowledge about Acne is widespread among medical students. Efforts should be made to improve knowledge about Acne in medical students to alleviate the burden of this common skin disease from the community.

Keywords: Acne vulgaris, medical students, hormones, lifestyle, stress, Pakistan

INTRODUCTION

Hereditary factors alone do not explain the high prevalence rates of Acne in many parts of the world. [4] Several risk factors for Acne have been proposed, including genetic, hormonal, and lifestyle factors such as diet and smoking. There is evidence of an association between a Western diet, in particular high glycemic index foods, and Acne that contribute to the clinical features of Acne in terms of appearance and severity of the various lesions associated with it. [4][5]

A study done in the Kingdom of Saudia Arabia in 2017 showed that Acne vulgaris prevalence was about 55.5% among medical students with no significant gender predilection. [3] Another study done in India in 2017, estimated an acne prevalence of 89% among medical
A paper-based self-made English questionnaire was distributed to the participants, which is shown in the Appendix. This questionnaire was divided into four sections: Demographic details (5 questions), Prevalence and Attitude details (5 questions), Knowledge (7 questions), and Lifestyle Association (9 questions). The participants who did not suffer from acne vulgaris at present as well as in the past five years were asked to fill Demographic details and Knowledge section only.

Data were analyzed using IBM Statistical Package for Social Sciences (SPSS), version 26 (IBM Corp., Armonk, NY, USA). Data were tabulated in the form of frequencies and percentages. Cronbach alpha value was calculated to check the reliability of the self-made questionnaire, which came out to be 0.7. Chi-square test was used to compare differences of different categorical variables across gender and academic year. It was observed that there was a statistically significant difference with p-value < 0.05 with a confidence level of 95%. The study was ethically approved from the institutional research forum by Rawalpindi Medical University.

RESULTS

A total of 170 medical students were recruited for the study according to the calculated sample size. Sociodemographic characteristics are shown in Table 1.

More than half of the students (n:110; 64.7%) had acne vulgaris out of which 75 (68%) were females. Common sites of acne lesions found are shown in Figure 1, with the face being the most common area affected by Acne (82.7%).

Less than half of them (n:52; 47.3%) had consulted the physician for their problem. Fifty-four students (49.1%) had taken medications for Acne, and the medications worked only for 42 (38.2%) students. Responses regarding the most prone skin type are shown in Table 2.

Academic years of study were significantly related to knowledge and are shown in Table 3. Students of pre-clinical years gave a more negative response for genes, personal hygiene, unsanitary living conditions and chocolates, coffee as the causes of Acne as compared to the clinical years. Most of the students of clinical study years believed hormonal change, stress, and diet to cause Acne.

Regarding treatment options, responses of the students are shown in Figure 2, according to which topical agents show the highest number of responses (52.8%) and laser has a significant p-value.

More than half of the students (n:86; 50.6%) believed that acne vulgaris was curable. Most of the students...
The results of the study indicated a high prevalence of Acne in our setting which is per a Malaysian study that reported a prevalence of 68.1% and a study among Portuguese medical students reporting the prevalence of 62.2%.[13][14] However, studies were done in Saudia Arabia (Middle East), France, Belgium, Italy, and Spain (Europe), Egypt (Africa), and China (Asia) which reported much lower prevalence rates.[5,15-17] The difference in the results could be attributed to the disease being multifactorial and being affected by lifestyle, gender, age, genetics, and other environmental factors.[18] Of the students affected, more than half (68%) were females, which is similar to the female predominance found in studies done on students in Portugal (68%) by G Gonçalves and in Egypt (60%) by Al-Hamd MA.[14,16] In contrast, only 14.4% of female medical students were affected by Acne according to another study in Pakistan.[11] The Malaysian study revealed gender association to be statistically insignificant, while a study in Nigeria showed a more male population suffering from Acne.

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Nigeria showed a more male population suffering from Acne.[13,19] Concerning the help-seeking behaviours of the patients in our study group, only less than half (47.3%) had consulted a physician. Similar results came out in a community study conducted by Smithard A.[20] According to studies done in schools and hospital OPDs in the UK, reasons could include embarrassment, Acne not being severe enough, feeling that doctor was unapproachable or busy. In contrast, a Pakistani study showed that 80% of the students preferred medical advice from a dermatologist, which reflected an increase in medical students awareness in recent times about Acne is a treatable medical condition.[21-22]

Academic years of study were positively associated with knowledge and causative factors. Shiva Swamy KN et al. also reported a similar relationship with an increase in mean scores of up to 16.5% from pretest to posttest questionnaires possibly due to increased clinical exposure and learning during ward rotations as the academic year advances.[6] The most common causative factors were believed to be hormonal changes (82.4%) and stress (64.7%) with a p<0.001 and p=0.004, respectively. Al Robaee AA also noted in his study that 56% of students had adequate knowledge about Acne, and the majority of the students believed hormones and stress to be the commonly associated factors with Acne.[23] However, only 44% of students in another study were able to identify this link.[6] Farid-ur-Rehman et al. noted in his study that diet had a significant relationship as a causative factor of acne vulgaris.[24] Hereditary and genetics were perceived not to cause Acne (p=0.004). This was in support of a Pakistani study where the Acne was not believed to be a familial disease.[22] A British case-control study in 2005, however, found a greater risk of Acne in relatives of control proving genetic association.[25] More than half (52.8%) of the students used topical agents to be the treatment for Acne as compared to a medicated soap (66%) in Nigeria.[19] As is the case with another Pakistani research, our study also shows that misconceptions were pervasive among undergraduate medical students.[24] This is probably because the subject is not given adequate importance as a general community pathology and is taught only as a final year subject.[25] We advocate that medical universities give it relevance by teaching about it from pre-clinical years. Also, if these beliefs are not addressed, medical students could spread the misinformation to the general community.

Table 1: Sociodemographic details of all medical students involved in this study (N=170)

| Variable       | N%  |
|----------------|-----|
| Gender         |     |
| Male           | 50  (29.4) |
| Female         | 120 (70.6) |
| Age (year)     |     |
| 18-21          | 105 (61.8) |
| 22-25          | 65  (38.2) |
| Social Status  |     |
| Single         | 169 (99.4) |
| Married        | 1   (0.6)  |
| Residence      |     |
| Urban          | 141 (82.9) |
| Rural          | 29  (17.1) |
| Year of Study  |     |
| 1st-year MBBS  | 34  (20)  |
| 2nd Year MBBS  | 34  (20)  |
| 3rd-year MBBS  | 34  (20)  |
| 4th-year MBBS  | 34  (20)  |
| Final year MBBS| 34  (20)  |

Table 2: Knowledge about skin type most prone to Acne among medical students (N=170)

| Prone skin | N% |
|------------|----|
| dry        | 12 (7.1) |
| normal     | 7  (4.1) |
| oily       | 134 (78.8) |
| any skin   | 17 (10)  |

compounding the problem.[26] This is because Acne is not just a skin problem but has a far-reaching psychological impact on its patients.[15,18,27] Lifestyle was significantly related to gender where females suffered exacerbations of Acne in periods of stress (p=0.02). Chiu A also found a positive correlation between acne severity grade and mean perceived stress scores during examinations in university students (p<0.01).[28] This was explained in a 2017 study where the basis of the association was due to an interaction of cutaneous neurogenic factors such as corticotropin-releasing hormone, melanocortins, and substance P, with a pathogenic cascade involving cutaneous microbial residents and
the immune system in Acne.[29] Authorities should arrange stress management seminars and counselling sessions to address and improve the psychological health of medical students, especially females.[30] No significance was found between hormones (p=0.9) or a diet including chocolates and coffee (p=0.6), dairy products (p=0.4), and fried, processed food items (p=0.4) as lifestyle factors causing Acne. This proved that although the hormonal change was believed to be an important causative factor, many patients in our study did not experience this link.

CONCLUSION

The results of this study indicate a high prevalence of Acne among Pakistani medical students, especially females. Lack of knowledge about Acne is widespread among medical students. Efforts should be made to improve knowledge about Acne in medical students to alleviate the burden of this common skin disease from the community.

RECOMMENDATIONS

The results of this study indicate a high prevalence of Acne among Pakistani medical students, especially females. Lack of knowledge about Acne is widespread among medical students. Efforts should be made to improve knowledge about Acne in medical students to alleviate the burden of this common skin disease from the community.

REFERENCES

1. 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:10.4172/2155-9554.10.
2. Zohra FT, Sultana T, Islam S, Nasreen T.
Evaluation of severity in patients of acne vulgaris by global acne grading system in Bangladesh.
Clini Pathol. 2017;1(1):1-3. Available from: DOI: https://doi.org/10.23880/cprj-16000105
3. Alajlan A, Al Turki YA, AlHazzani Y, Alhowaish N, AlEid N, Alhozaimi Z, Al Saleh W, Yahya AB, Alkriadees Y, Alsuwaidan S. Prevalence, level of knowledge and lifestyle association with acne vulgaris among medical students. J Dermatol Dermatol Surg. 2017;21(2):58-61.
4. Juhl CR, Bergholdt HKM, Miller IM, Jemec GBE, Kanters JK, Ellervik C. Dairy Intake and Acne Vulgaris: A Systematic Review and Meta-Analysis of 78,529 Children, Adolescents, and Young Adults. Nutrients. 2018;10(8):1049. Available from: DOI: 10.3390/nu10081049. PMC6115795.
5. Wolkenstein P, Machovcová A, Szpeitkowska A, Szpeitkowski JC, Tennstedt D, Veraldi S, Delarue A. Acne prevalence and associations with lifestyle: a cross-sectional online survey of adolescents/young adults.

| Lifestyle Factors                                      | Response | Male (n=35) | Female (n=75) | Total (N=110) | p-value* |
|--------------------------------------------------------|----------|-------------|---------------|---------------|---------|
| Is Acne related to hormonal changes in the body?       | yes      | 31          | 67            | 98 (89.1)     | 0.9     |
|                                                        | no       | 4           | 8             | 12 (10.9)     |         |
| Experience acne breakouts during stress               | yes      | 21          | 60            | 81 (73.6)     | 0.02    |
|                                                        | no       | 14          | 15            | 29 (26.4)     |         |
| Suffer Acne and disturbed sleep at the same time       | yes      | 9           | 34            | 43 (39.1)     | 0.05    |
|                                                        | no       | 26          | 41            | 67 (60.9)     |         |
| Frequently eat chocolates and drink coffee             | yes      | 18          | 34            | 52 (47.3)     | 0.6     |
|                                                        | no       | 17          | 41            | 58 (52.7)     |         |
| Are you obese?                                         | yes      | 4           | 16            | 20 (18.2)     | 0.2     |
|                                                        | no       | 31          | 59            | 90 (81.8)     |         |
| Consume dairy products excessively                     | yes      | 14          | 24            | 38 (34.5)     | 0.4     |
|                                                        | no       | 21          | 51            | 72 (65.5)     |         |
| Eat fried, junk and processed food items               | yes      | 24          | 57            | 81 (73.6)     | 0.4     |
|                                                        | no       | 11          | 18            | 29 (26.4)     |         |
| Use antibacterial soaps, body washes, face washes and creams to reduce Acne | yes | 22 | 42 | 64 (58.2) | 0.5 |
|                                                        | no       | 13          | 33            | 46 (41.8)     |         |
| wash skin properly                                     | yes      | 29          | 68            | 97 (88.2)     | 0.2     |
|                                                        | no       | 6           | 7             | 13 (11.8)     |         |

Table 4: Cross-tabulation of lifestyle factors associated among medical students with Acne according to gender (N=110)
in 7 European countries. J Eur Acad Dermatol Venereol. 2018;32(2):298-306. Available from: DOI: 10.1111/jdv.14475. Epub 2017 Sep 6.
6. Shivashwamy KN, Shyamprasad AL, Sumathy TK, Ranganathan C, Kumar SP. Knowledge of Acne among medical students: Pretest and posttest assessment. ISRN Dermatol. 2014;2014:727981. Available from: DOI: 10.1155/2014/727981.
7. Tameez Ud Din A, Sadiq A, Khan MT, Chaudhary NA, Arshad D. Assessment of knowledge, attitude, and practices regarding self-medication for Acne among medical students. Cureus. 2019 Aug 28;11(8):e5510. Available from: DOI: 10.7759/cureus.5510. PMC6818732.
8. Ulvestad UM, Bjertness E, Dalgard F, Halvorsen J. Acne and dairy products in adolescence: results from a Norwegian longitudinal study. J Eur Acad Dermatol Venereol. 2017;31(3):530-535. Available from: DOI: 10.1111/jdv.13835. Epub 2016 Jul 16.
9. Romarańska-Gocka K, Woźniak M, Kaczmarek-Skamira E, Zegarska B. The possible role of diet in the pathogenesis of Acne vulgaris. Postepy Dermatol Alergol. 2016;33(6):416-420. doi: 10.5114/ada.2016.63880. Epub 2016 Dec 2.
10. Al-Natour SH. Acne vulgaris: Perceptions and beliefs of Saudi adolescent males. J Family Community Med. 2017;24(1):34-43. Available from: DOI: 10.1080/22138489.2017.197180. PMID: 28163574; PMCID: PMC5254843.
11. Babar O, Mobeen A (September 22, 2019) Prevalence and Psychological Impact of Acne Vulgaris in Female Undergraduate Medical Students of Rawalpindi and Islamabad, Pakistan. Cureus 11(9): e5722.
12. Meyes K, Alipasha & Taee, Farough & Mohammadi-Vajari, Mohammad-Mohammad Ali & Yoosefi-Khangah, Siamak & Emamzadeh-Fard, Sahra & Abbasi, Mehrshad. (2014). Sample size calculation on web, can we rely on the results?. Journal of Medical Statistics and Informatics. 2. 3. 10.7243/2053-7662-2-3.
13. Muthupalaniappen L, Tan HC, Puah JW,-ipi M, Sohahri MAH, NF, Rafeef NM. Acne prevalence, severity and risk factors among medical students in Malaysia. Clin Ter. 2014;165(4):187-92. Available from: DOI: 10.7417/CT.2014.1731.
14. Gonçalves G, Amado JM, Matos ME, Massa A. The prevalence of Acne among a group of Portuguese medical students. J Eur Acad Dermatol Venereol. 2012;26(4):514-7. Available from: DOI: 10.1111/j.1468-3083.2011.04080.x. Epub 2011 Apr 22.
15. Alanazi MS, Hammad SM, Mohamed AE. Prevalence and psychological impact of Acne vulgaris among female secondary school students in Ar-Riyadh, Saudi Arabia. Asian Physceian. 2018;10(8):7224-7229. Available from: DOI: 10.19082/7224.
16. El-Hamd MA, Nada EE-DA-A, Moustafa MA-K, Mahboo-Allah RA. Prevalence of acne vulgaris and its impact of the quality of life among secondary school-aged adolescents in Sohag Province, Upper Egypt. J Cosmet Dermatol. 2017;16(3):370-3.
17. Shen Y, Wang T, Zhou C, Wang X, Ding X, Tian S, et al. Prevalence of acne vulgaris in Chinese adolescents and adults: a community-based study of 17,345 subjects in six cities. Acta Derm Venereol. 2012;92(1):40-4.
18. Khan Qt, Lawson S, Dawson AL, Dunnick CA, Delvalle RP. Acne vulgaris: pathogenesis, treatment, and needs assessment. Dermatol Clin. 2012;30(1):99-ix. Available from: DOI:10.1016/j.det.2011.09.001.
19. Yahya H. Acne vulgaris in Nigerian adolescents–prevalence, severity, beliefs, perceptions, and practices. Int J Dermatol. 2009 May;48(5):498-505.
20. Smithard A, Glazebrook C, Williams HC. Acne prevalence, knowledge about Acne and psychological morbidity in mid-adolescence: a community-based study. Br J Dermatol. 2010;164(2):274-279. Available from: DOI:10.1016/j.bjder.2011.04.04346.x.
21. Desai KP, Martyn-Simmons C, Viner R, Segal T. Help-seeking behaviours, opportunistic treatment and psychological implications of adolescent Acne: Cross-sectional studies in schools and hospital outpatient departments in the UK. BMJ Open. 2017;7(9):1-6.
22. Ali G, Mehtab K, Sheikh ZA, Ali HG, Kader SA, Mансoor H, et al. Beliefs and perceptions of Acne among a sample of students from Sindh Medical College, Karachi. J Pak Med Assoc. 2010;60(1):51-4.
23. Al Robaee AA. Prevalence, knowledge, beliefs and psychosocial impact of Acne in University students in the city of Najran, central Saudi Arabia. Saudi Med J. 2005;26(12):1958-1961.
24. Fardur-Rehman, Niazi NAK. Beliefs and perceptions about Acne among undergraduate medical students. J Pakistan Assoc Dermatologists. 2007;17(4):231-4.
25. Magin P, Pond D, Smith W, Watson A. A systematic review of the evidence for ‘ myths and misconceptions ’ in acne management: diet, face-washing and sunlight. 2005;(January):23–8.
26. Green J, Sinclair RD. Perceptions of acne vulgaris in final year medical student written examination answers. Australas J Dermatol. 2001;42(2):98-100.
27. Lynn DD, Umar T, Dunnick CA, Dellalvalle RP. The epidemiology of acne vulgaris in late adolescence. Adolesc Health Med Ther. 2016;7:13-25.
28. Chiu A, Chon SY, Kimball AB. The response of skin disease to stress: changes in the severity of acne vulgaris as affected by examination stress. Arch Dermatol. 2007;143(7):897-900.
29. Jović A, Marinović B, Kostović K, Ćeović R, Basta-Juzbašić A, Bukvić Mokos Z. The Impact of Psychosocial Stress on Acne. Acta Dermatovenereol Croat. 2017;25(2):1133-1141.
30. Tariq S, Tariq S, Tariq S, Jawed S. Perceived stress, severity and sources of stress among female medical students in a private medical college in Pakistan. J Pak Med Assoc. 2020 Jan 1;70(1):162-7.

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ETHICAL CONSIDERATION
This study was approved by the Institutional Review Board of Rawalpindi Medical University, Rawalpindi, Pakistan on 22-05-2019 via letter no 2019-M-36.

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