Objective: The objective was to report academic stress and prevalence of stress-related self-medication among undergraduate female students of health and non-health cluster colleges at a public sector university in Dammam, Saudi Arabia.

Materials and Methods: A 5-month cross-sectional survey was conducted in the university. The survey included the English version of 10-item Perceived Stress Scale (PSS) to report self-perceived stress. Student responses were analyzed by SPSS version 22 software.

Results: The majority of students (85%) perceived examinations as a stressor. Most of the students (64%) had perceived moderate stress that increased as students progressed from preparatory year to 4th year. It declined in students of 5th and 6th year. The prevalence of stress related was reported at 39.58%. Highest prevalence of stress-induced self-medication was reported from College of Nursing (59.09%) and lowest (29.69%) from clinical pharmacy. Most common drug used to self-medicate during stress was caffeine (49.5%). The PSS score was significantly associated with colleges and study levels.

Conclusion: Students studying in health cluster colleges reported high academic stress and self-medication practice. The major stressors identified were examination and course load. Student counseling sessions and counseling by pharmacists regarding self-care may help in the reduction of such stressors and may promote responsible self-medication. Self-evaluation and quality assurance process of curriculum may highlight areas for improvement in the courses. This may help in lowering academic stress among students.

Keywords: Academic stress, perceived stress scale, undergraduate students, Saudi Arabia, self-medication, social pharmacy

INTRODUCTION

Stress is a psychological disorder and one of the most common causes behind psychological problems in individuals belonging to all age groups.[1] It is an innate response of the body that may be either physical, mental, or emotional to an unforeseen event that occurs in the life of the individual. The event that aggravates this innate response is referred to as a stressor.[2] World Health Organization estimates that stress will become one of the major causes of death by the year 2020.

Stress is adaptive and manageable in acute conditions. However, experiencing chronic high levels of stress can lead to significant problems.[3] Academic life is one of the events in an individual’s life that may have different stressors. Contemporary literature suggests that university life is subjected to different stressors arising from academic pressure, social problems, and personal issues.[4] It demands a great deal of determination, dedication, and commitment from the individual. It may also involve living away from the family

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which brings social isolation and adds to personal vulnerability. The students may not be prepared to incorporate this change and may experience academic stress.\(^4,5\)

Proper management of stress is important as its mismanagement may lead to untoward outcomes regarding health, emotional well-being, and academic performance. Studies conducted in the USA among undergraduate pharmacy students reported an increased academic stress as students progressed to higher levels of pharmacy education. The study also established an inverse relationship between stress and quality of life. Other studies reported academic stress in Malaysia, Pakistan, and the UAE with similar findings.\(^2,6-11\)

Perceived stress can be determined using developed research instruments. One of the commonly used research instruments is Perceived Stress Scale (PSS). It contains ten items related to individual’s response to his/her recent social and personal events in life and grades the response quantitatively in the form of a score which is interpreted as low, moderate, and high perceived stress.\(^12\)

Evidence indicates that stress is quite prevalent in Saudi academia, particularly in female students studying health-related courses.\(^3-8\) A study conducted in the same university previously investigated stress among the males but did not include female students. To fill this gap, we conducted this study in females to document self-perceived stress and observe self-medication practice in this condition.

**Materials and Methods**

A cross-sectional survey was conducted among undergraduate female students of different colleges at Imam Abdulrahman Bin Faisal University (University of Dammam) located in the city of Dammam, Saudi Arabia. The study methodology adhered to STROBE guidelines. This study was of 5-month duration. It began in January 2017 and was completed in May 2017.

**Target population and exclusion criteria**

Female students studying in different colleges at study levels ranging from preparatory year to 6th year of professional bachelor education were identified as target segment. Only those female students who were currently enrolled and studying at the university were included in the study. Dropout students, those studying in other universities, male students as well as those who did not consent to participate were excluded from the study.

**Research instrument, piloting, and validation**

The research instrument was designed in the form of a survey questionnaire in English language. It was given to the respondents after obtaining their consent. The questionnaire consisted of two open-ended questions regarding demographic variables, i.e., age and illness, as well as five close-ended questions, i.e., gender, college, study level, residence, and marital status. The questionnaire employed 5-item Likert scale (1= strongly agree, 2= agree, 3= neutral, 4= disagree, and 5= strongly disagree) to assess predictors of academic stress, i.e., course load, assignments, examination, academic competition, career prospects, cumulative grade point, family issues, and health. A 10-item self-reported PSS was used to report stress among students.\(^13\) Other items included prevalence, stressors, and stress-induced self-medication practice.

The questionnaire was subjected to physical validation including face and content validity as well as reliability analysis that reported a Cronbach’s alpha value of 0.772 for N = 10 items. PSS was not included in statistical validation as it has already been validated by Almadi et al.\(^13\) Only the items related to stressors were statistically validated using exploratory factor analysis (EFA) with principal component analysis method and varimax rotation. The resulting solution highlighted a 4-factor structure with eigenvalues above 1.0. The values for Kaiser-Mayer-Olkin measure of sampling adequacy was reported at 0.752 which was considered satisfactory. The Bartlett’s test of sphericity was significant with P < 0.0001. The questionnaire was piloted in 23 students and was validated with some minor corrections in spelling. The Likert Scale category (df) of “strongly agree,” was merged with “agree,” and similarly the category, “disagree,” with “strongly disagree,” to increase data reliability. The 4-component structure obtained from EFA was then confirmed using partial confirmatory factor analysis with maximum likelihood analysis and direct oblimin rotation. The values for fit indices were obtained to assess a 4-factor structure model fit. The values for normed fit index, Tucker-Lewis index, and comparative fit index were reported at 0.981, 0.987, and 0.997, respectively, i.e., >0.95. The value for root mean square of error approximation was reported at 0.02, i.e., <0.06. All these values indicated a good model fit and were therefore acceptable.

**Sampling procedure and sample size calculation**

The study employed convenient sampling and collected data from students in their free time. According to the official figures, the total number of female pharmacy students was 2810.\(^14\) This figure was considered as study population. Sample size was calculated by Raosoft, Inc., sample size calculator.\(^15\) The confidence level was set at 95% with a 5% margin of error and recommended sample size obtained was 339. The study gathered a total of 386 responses.
Data analysis
The responses of the students were analyzed by IBM SPSS Statistics for Windows, Version 22.0, Armonk, NY: IBM Corp. The results were presented in the form of sample counts (N), percentages (%), and P values. The prevalence data were reported in 95% confidence interval. The association between variables was analyzed using cross tabulation and Chi-square (χ²) test for association and was interpreted in terms of significant P < 0.05.

Ethical approval and consent
The students were briefed about the purpose of the study and their consent was obtained before handing them the questionnaire. The study was approved by the Department of Pharmacy Practice, College of Clinical Pharmacy of Imam Abdulrahman Bin Faisal University (previously University of Dammam) (Ref# 2130020050).

Results
Response rate
The cumulative response rate obtained was 84.65%. The response rates obtained from various colleges were clinical pharmacy (96.9%), nursing (55%), medicine (74.2%), dentistry (95%), medical engineering (94%), information technology (IT) (54%), applied sciences (92%), design (100%), and science college (100%).

Demographic information
The mean age of respondents was between 20 and 21 years, i.e. (X = 20.7 years). The youngest respondent was 18 years old and oldest was 26 years old. An overwhelming majority (N = 343, 88.9%) belonged to age group between 18 and 22 years. This study included only female students (N = 386, 100%) and most of them were single (N = 299, 77.5%). The study incorporated responses from nine colleges of the university, i.e., clinical pharmacy (N = 64, 16.6%), nursing (N = 22, 5.7%), medicine (N = 77, 19.9%), dentistry (N = 38, 9.8%), medical engineering (N = 47, 12.2%), IT (N = 27, 7%), applied sciences (N = 46, 11.9%), college of design (N = 15, 3.9%), and college of science (N = 50, 13%).

Further to this, the study incorporated students from all study levels, i.e., preparatory year to 5th year. Most of the students indicated that they lived with families (N = 326, 84.5%) and did not suffer from any disease (N = 325, 84.2%). However, few students indicated migraine (N = 11, 2.8%) and anxiety and depression (N = 20, 5.2%). More than a third segment of the females (N = 122, 31.6%) never indulged in self-medication during stress. The students also mentioned the drugs they have been using during stress. Almost half of target segment (N = 191, 49.5%) used caffeine and one student reported using amphetamines.

More than half of the students (N = 245, 63.5%) provided various reasons for practicing self-medication. Some students resorted to self-medication with the purpose of treat insomnia (N = 12, 3.1%), improve concentration (N = 18, 4.7%), and address health issues (N = 12, 3.1%). The summary of demographic information and reasons to indulge in self-medication during stress is presented in Table 1.

Information about stressors
Most of the students identified examinations (N = 328, 85%) and course load (N = 286, 74.1%) as stressors. Similar figures were obtained for assignment load (N = 257, 66.6%) and cumulative grade point average (N = 273, 70.8%). Thoughts about career and future prospects were highlighted as stressors by a half proportion of students (N = 200, 52%). Lack of free time was also reported to cause stress among students (N = 241, 62.5%). The summary of various stressors is presented in Table 2.

Perceived stress among students
The study reported perceived stress among students using PSS. The mean score reported was 19.99; minimum score (3) and maximum score (35) (standard deviation: 6.53). The majority of students (N = 247, 64%) were found to be in moderate stress according to PSS scoring criterion. The results of the perceived stress score are interpreted in Table 3.

Prevalence of self-medication in stress
The cumulative prevalence of self-medication during stress was reported at 39.58% (34.27% to 45.07% for 95% confidence interval). The lowest prevalence was reported from College of Clinical Pharmacy (29.69%) and the highest from College of Nursing (59.09%). The detail is tabulated in Table 4.

Cross tabulation of demographic variables with stress and self-medication variables
The cross tabulation between colleges and perceived stress score revealed significant association with χ² value of 54.95 and P = 0.0001 (<0.05) with moderate strength, i.e., phi reported at 0.377. Only four cells had minimum expected count <5; therefore, results were reliable. Similarly, Chi square reported from College of Clinical Pharmacy value reported for association between level of study and stress score was 83.301 and P = 0.0001 (<0.05) with significant strength, i.e., phi reported at 0.465. Only one cell had minimum expected count <5; therefore, results were reliable. The cross tabulation of age groups and residence status with perceived stress score was not significant with P value reported larger than 0.05. However, the association of marital status with stress score was significant as χ² value reported
The correlation between prevalence of self-medication and the percentage of students in stress was not significant (\( P > 0.05 \)). Hence, a relationship of self-medication practice with academic stress could not be established.

**Discussion**

This study was conducted among the female students of Imam Abdulrahman Bin Faisal University formerly known as University of Dammam. The overall response rate of the survey was 84.65%. The mean age of students was 20.7 years and most of them (77.5%) were single. Studies conducted in the region reported similar age, residential, and marital status of the students.[3,4]

The majority of students (64%) had moderate perceived stress. A similar proportion of moderately stressed students (61%) was also reported by a study conducted in a Thai medical college.[16,17] The proportion of students with moderate perceived stress in a UK university was slightly higher than our findings, i.e., 77.6%. However, the percentage of students with high perceived stress in our study was more (17.4%) than the figure obtained in the UK (10.4%).[18] This implies that universities in Saudi Arabia have more students who perceive high stress as compared to others.

Our study found that most students studying in clinical pharmacy had moderate perceived stress whereas students of medicine and dentistry reported high perceived stress. The students of College of Medical Engineering reported moderate to high perceived stress. Students of College of Applied Sciences perceived moderate stress. A low perceived stress was reported from the students of College of IT. All findings were subjected to cross tabulation and \( \chi^2 \) test and were statistically significant, i.e., \( P = 0.0001 \).

A noteworthy observation in our study was about the figures for stress among students studying in different academic years. Students of preparatory year had low perceived stress, whereas those of 2nd and 4th year mainly...
had moderate to high perceived stress. Students of 3rd year had moderate perceived stress, whereas students of 5th and 6th year reported low perceived stress. The findings were statistically significant, i.e., \( P = 0.0001 \). This fluctuating level of stress as perceived by students during academic years can be attributed to the fact that students are subjected to rigorous and exhaustive course load and examinations during studies. However, as they gradually progress to higher levels of education, they familiarize themselves with the academic environment and exhaustive curriculum. Hence, there is a drop in self-perceived stress.[19]

The overall prevalence of self-medication in stress was reported at 39.58%. The lowest prevalence was reported from clinical pharmacy students, i.e., 29.69%, whereas the highest was reported from nursing students, i.e., 59.09% [Figure 1]. Studies report a figure of 67% for self-medication prevalence among students in Pakistani universities. However, prevalence of self-medication to cope up with stress and depression resulting from study burden was reported at 8.34% in Pakistani academia.[20,21] In comparison with figures obtained from Pakistani students, our results highlight that self-medication practice during stress is quite high among Saudi students. However, this phenomenon needs to be further investigated in other universities before these findings could be generalized in Saudi academia at large.

Furthermore, our study reported that as many as 49.5% students consumed caffeine as a drug for self-medication during stress. Caffeine is consumed mainly in the form of coffee or tea and energy drinks. Our study considered caffeine as a drug for self-medication only when the students indicated that they consumed it in more quantity than usual. Previous study reported high consumption of energy drinks containing caffeine by students during examinations in Saudi universities.[22] Hence, our findings are in line with results of Al Malak et al. Only a single student reported using amphetamine which is an encouraging sign keeping in view previous studies that reported the growing use of such drugs among this population.[23,24] This observation also confirmed the finding of Albusalih et al. in the same population.[25]
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The majority of students perceived examinations (85%) and course load (74.1%) as stressors. This is reported worldwide as studies conducted in universities of the UK, India, Malaysia, and Thailand also highlighted that examinations and amount of taught content throughout the academic session were perceived as stressors by students.[16-18,24-27]
CONCLUSION

Academic stress and stress-related self-medication practice is quite high among students of health cluster colleges at Imam Abdulrahman Bin Faisal University (IAU). Conducting student counseling sessions may help in lowering stress. Moreover, counseling by pharmacists regarding self-care may help in promoting responsible self-medication among students.[26, 28]

Further investigation is needed to identify the reasons for relatively higher stress level among students studying in health cluster colleges as compared to non-health cluster college students. A self-evaluation and quality assurance process may be initiated to have an insight into the curriculum design that might help in restructuring the courses so as to decrease academic load and subsequently academic stress.[29]

Supporting information

This research paper is based on undergraduate thesis submitted by Fatima Al Rasheed (ID 2130020050) student of Pharm.D 5th year for partial fulfillment of the degree of Doctor of Pharmacy (Pharm.D) at College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University (previous University of Dammam), Dammam 31441, Eastern Province, Saudi Arabia. This article was a continuation effort under the Evidence-Based Improvement Initiative undertaken at a Pakistani pharmacy teaching institution.[30–32]

Limitations

The study only incorporated the students from a single public sector university in Dammam, Saudi Arabia using convenient sampling. Therefore, the results of the study cannot be generalized. However, the findings of our study can be used as a primary source to further investigate the phenomenon.

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Conflicts of interest

There are no conflicts of interest.

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