

Original Article

Incidence and severity of stress among medical undergraduates and their coping abilities

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Abstract

Background and Aim: The undergraduate and postgraduate medical students withstand persistent pressure during their studies. This cross-sectional study is designed with the aim to find out the incidence of stress among undergraduate medical students of different academic years, and explore the effect of gender and difference in ethnicity, cultural, and social background on perceived stress and their coping strategies.

Methods: We used a questionnaire to assess the level of perceived stress among Saudi and Pakistani undergraduate students in medical schools.

Results: Around 46% Umm al Qura undergraduate medical students were found to be stressed with average stress score ranging between 15 and 15.43. On the other hand, Karachi Medical and Dental College students showed increased incidence of stress (63%), but their average scores are more or less similar to that of Saudi students. Academic overload is the major stressor and cognitive, emotional, and behavioral issues are common in both medical schools. Prayers and socializing with friends are the main coping strategies observed at both places.

Conclusion: Difference in ethnicity, cultural, and social background affects the incidence of stress but not the severity. Measures should be taken to reduce the academic stress. Developing a supportive environment, providing student counseling, and educating them about time management may play an important role in reducing the incidence of stress as well as its severity.

Key words: Perceived stress, stressors, undergraduate medical students

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INTRODUCTION

Acquiring admission in a medical school is a great achievement in the life of a science student but, both undergraduate^[1] and postgraduate^[2] medical studies are not only lengthy, but also hectic, requires devotion and stressful as well. According to various studies, 30–50% of medical students have perceived stress.^[3,4] In fact, both medical and nonmedical students^[5,6] showed academic stress particularly during the transitional stage from school to university.^[7] Ko *et al.* compared the stress level in Singaporean undergraduate medical and law students and reported it to be higher in medical

students.^[8] According to him, 57% medicine students showed emotional disorders compared to 47.3% law students. In another study, only 29.2% economics and physical education students are reported to have emotional disorders compared to 47.9% medicine students.^[9] The higher level of stress observed in medical students is because of multiple factors such as exposure to high psychological demands with low

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decision autonomy,^[10] higher expectations of parents and teachers that cannot be met within the given time.^[11] Moreover, there is insufficient recognition and feedback that a medical student receives in response to all the efforts. Sometimes, inadequate support from family, friends, and inadequate resources are the possible reasons of higher stress in medical students.^[12] Furthermore, majority of students who get admission in medical school are very sound academically, but their teachers or their parents pay little attention towards supporting them mentally and emotionally to cope up with the requirements of an extensive new curriculum of medical school. Under these circumstances, exposure to academic overload, long working hours, time limitation, frequent exams, competitive environment, rigid authoritative faculty, language, family, and financial difficulties make the environment complex.^[7,13] Although some level of stress is good for learning in a medical school training,^[14] but intense pressure and persistent demands of medical education not only decreases the academic performance but may also affect the physical and mental health.^[15] There are ranges of problems seen in the form of anxiety, depression, behavioral, eating and sleep disorders,^[16] which may lead to premature deaths,^[17] attempt of suicides,^[18] and low quality of life.^[19] An increased use of alcohol, cigarettes, and drugs among medical students is an attempt to reduce their stress.^[17] However, studies regarding stress in medical students observed the different level of stress among the students depending upon their academic year. In addition, a gender difference is common and female students are generally found to have more stress than the males. Study on Saudi medical students reported a decline in the stress level with an increase in the academic year of study.^[1] Furthermore, the highest level of stress was observed in 2nd year medical students with female preponderance. Earlier Dyrbye *et al.*^[20] and Khan *et al.*^[21] also indicated the higher prevalence of stress among females. In another study, no difference was seen in the perceived stress of male's versus females, but more stress was reported among 2nd and 3rd year students compared to the 1st year.^[13] It is to be noted that the level of stress experienced actually demonstrates the objective stressful events, coping processes, and personality factors of an individual.^[17] Despite the high prevalence, the level of stress is not identical for all medical students. Perhaps, an indication of individual diversity and different coping strategies are found effective in reducing different stressors. Regular exercise and prayers are reported to be effective in reducing the stress.^[22] Friends, fitness club, hobbies, and supportive teachers play an important role in reducing the stress and increasing the coping capability.^[13]

Considering that medical students have to sustain varying degrees of stress and different types of pressure during

the entire length of their education. The present study is designed to investigate the incidence of perceived stress among the students in various academic years of our medical school in Makkah, KSA, and to explore any relationship between the year of study, gender, and stress. Furthermore, we are keen to observe the influence of ethnicity, cultural, and social background, i.e., living and learning in an entirely different atmosphere that might affect the level of perceived stress among undergraduate medical students. In addition, we would examine different coping strategies used by the students.

MATERIALS AND METHODS

As such this cross-sectional study was designed to be conducted on the 1st year, 2nd year, and 3rd year male and 2nd year female undergraduate medical students in Umm al Qura University (UQU) Makkah, Saudi Arabia, whereas only 2nd year undergraduate medical students of Karachi Medical and Dental College (KMDC) Pakistan participated in the study. We used a modified questionnaire originally designed by Dr. Sue Firth a business psychologist and stress expert. Participants were ensured regarding the confidentiality of the information provided by them. This study was conducted after taking approval from the review board of both medical colleges; as per the ethical committee requirement, consent was taken from the participants. A total number of 419 students participated in this study. Participants were categorized in nonstressed and stressed groups on the basis of their stress score calculated according to the type of response for each question.

Statistical analysis of data

Percentages of nonstressed and stressed individuals were calculated using stress score. Descriptive statistics were calculated for the severity of stress level, nonparametric Kruskal–Wallis test was applied with Dunn's posttest for multiple comparisons between the groups. Whereas, nonparametric Mann–Whitney U-test (two-tailed) was used to compare two groups and a $P < 0.05$ was considered significant. All the statistical analyses were performed using GraphPad Prism Version 4 for Mac (GraphPad Software, La Jolla, CA, USA).

RESULTS

Response rate

All the participants of the faculty of medicine, UQU, in this study fall between the ages of 18 and 22 years from 1st, 2nd, and 3rd year. Out of 360 students who received the questionnaire, 289 (227 males and 62 females) responded by returning it after completion. Thus, the response rate

was 80%. In order to observe any difference between medical students of unlike ethnic, social, cultural and economic backgrounds. A same questionnaire was given to 2nd year medical students of similar age group (18–22 years) studying in KMDC Karachi, Pakistan. The response rate was better, i.e., 86% as 130 (8 males and 122 females) out of 152 returned completed questionnaire. Interestingly, admissions in the medical school in Karachi Pakistan are through open merit without any gender restriction. As a result of this merit-based system, gender dominance is observed in our study respondents from Pakistan; therefore, girls are more compared to boys.

Incidence and severity of stress among medical students

Stress scores for all the respondents were determined from their responses to the questionnaire. Participants were classified into nonstressed and stressed groups based on cut off 0–10 nonstressed and >10 stressed.

Percentage of incidence for both nonstressed and stressed groups and the average values of stress scores obtained from the participants of all the study years, i.e. 1st, 2nd, and 3rd year male and 2nd year female students are presented in [Figure 1]. According to the results, 46% of the total UQU respondents are stressed due to one or the other reason, ranging from 41% in 1st year to 52% among 2nd year males. However, an interesting observation is that inspite of differences in the incidence of stress among the participants from different academic years their average score of stress is almost similar in a narrow range from 15 to 15.43 [Figure 2]. Showing that most of the stressed students are in a moderate zone of stress may be because of an effective use of different coping strategies. Our results also indicate that the academic year affects the incidence of stress

but not the severity of perceived stress in UQU medical students [Figure 2]. Statistical analysis of the average values of stress scores obtained from nonstressed and stressed groups of all academic years represented significant differences as shown in the [Figure 2]. Moreover, we observed that majority of our stressed students, i.e., 38% have blood group O⁺ shown in Table 1, which may have a role in the etiology of stress. On the other hand, stress incidence among KMDC respondents is found to be 63%, which is 28% higher, compared to their 2nd year UQU colleagues. In addition, 20% of stressed KMDC students are severely stressed [Figure 3]. However, average values of the stress scores when compared statistically between UQU and KMDC 2nd year (14–16.7) stressed female students showed nonsignificant difference with higher scores among KMDC females [Table 1 and Figure 3]. As such, we can deduce that living and learning in different atmospheres might affect the incidence but not the severity of stress. Among the stressed KMDC students, 42% found to have blood group B⁺.

Trend of stress across different academic years of medical schools

Earlier studies regarding stress among Saudi medical students showed a decrease stress incidence with the advancement of the academic year^[1] but, in this study, we observe more stress incidence in 2nd year males compared to 1st and 3rd year students [Figure 1]. In addition, we did not see a significant difference in the stress scores between stressed students of different academic years. However, we noticed 20% of 2nd year males falling in the severely stressed zone with stress score greater than 20 compared to students from other academic years. Our findings of greater stress in 2nd year UQU students compared to other academic levels is further strengthened by the results

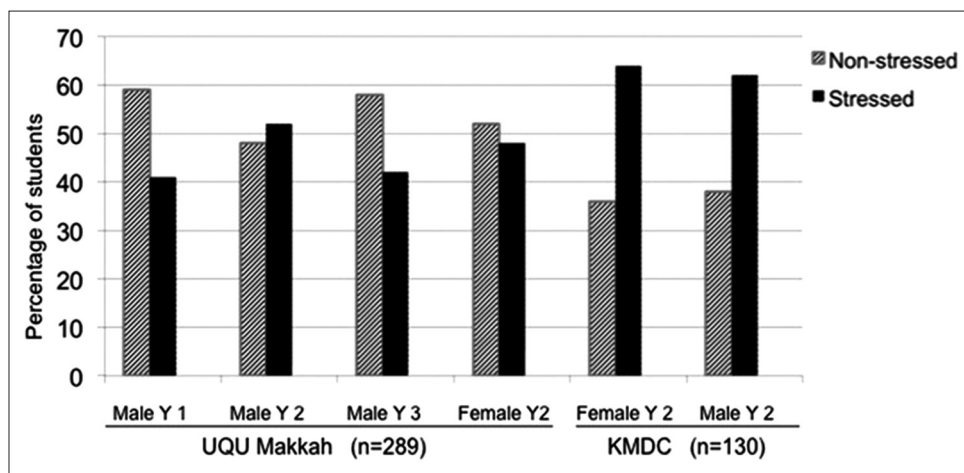


Figure 1: Incidence of stress in different medical schools. The percentage of nonstressed and stressed students in Umm al Qura University academic year 1 (59% and 40%), year 2 (48% and 52%), year 3 (59% and 41%), and year 2 females (52% and 48%), respectively. Whereas, in Karachi Medical and Dental College academic year 2 females (37% and 63%) and year 2 males (38% and 62%), respectively. UQU: Faculty of medicine Umm al Qura university, KMDC: Karachi Medical and Dental College

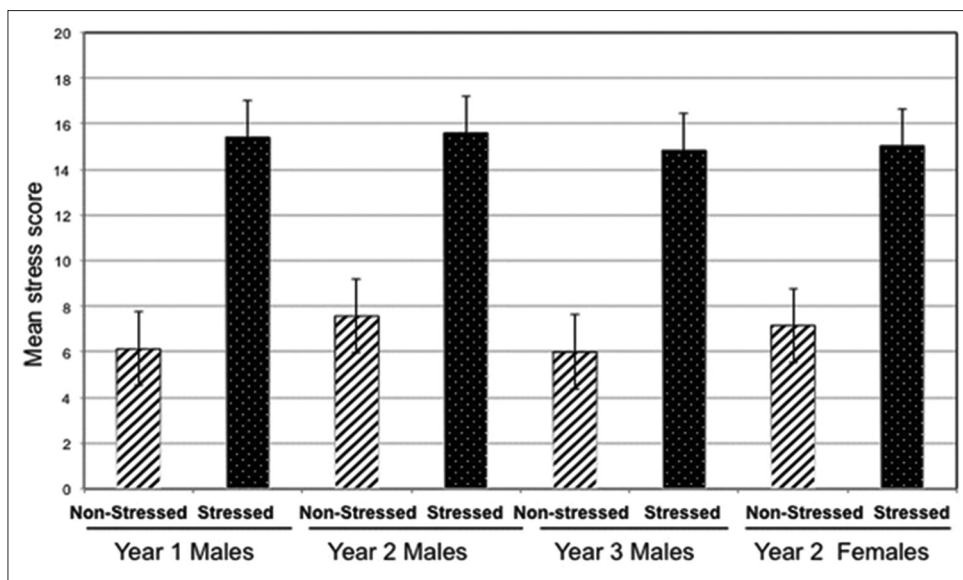


Figure 2: Severity of Stress in Umm Al Qura University. Comparisons of mean stress scores between stressed and nonstressed individuals within each academic year in the faculty of medicine Umm al Qura University

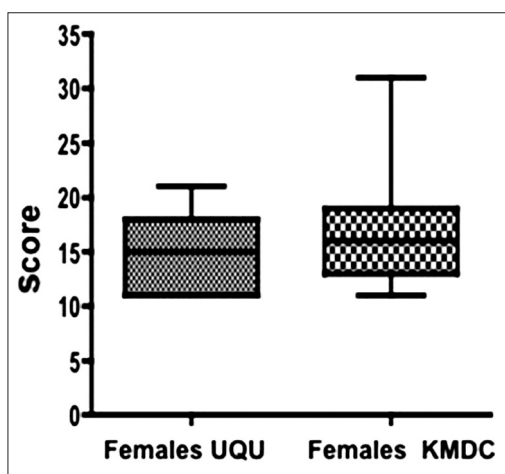


Figure 3: Comparison of stress among female medical students. The stress score of female students were compared between Umm al Qura University ($n = 30$) versus Karachi Medical and Dental College ($n = 61$). Nonparametric Mann–Whitney U-test (two-tailed) used and $P = 0.124$

Table 1: Characteristics of subjects

Parameters	UQU, Saudi Arabia	KMDC, Pakistan
Participants (n)	289	130
Male	227	08
Female	62	122
Age	18-22	18-22
Blood group (%)	O positive (38)	B positive (42)
Average stress score	15-15.43	14.4-16.65
Response rate (%)	80	86
Incidence of stress (%)	46	63

UQU: Umm al Qura University, KMDC: Karachi Medical and Dental College

from 2nd year KMDC respondents that showed 28% higher incidence than their UQU colleagues with 20% of them being severely stressed.

Stressors their effects and coping strategies

A stressor is defined as a personal or environmental event that causes stress. Medical students have to face different types of stress in their career. Moreover, the type of stressor involved varies from person to person and may vary with a change in the academic level. Our participants from all academic years and both countries showed agreement that academic overload is the most important reason for their stress followed by traveling between home and university, uncertainty about the future and family problems [Table 2]. Females in particular are found to be more concerned about their future. Irrespective of the cause majority of our stressed individuals from different academic years reported defective cognitive function, emotional, physical and behavioral disturbances to be the major outcomes of their stress [Table 2]. An encouraging aspect of our results is that the participants are not only well aware of, but they are practicing different coping methods to reduce their stress. This is evident from our results that showed only a small percentage of students in the severely stressed category [Figure 4]. Prayers, socializing with friends, sleeping, listening music, watching television, and sports are found to be common coping methods used by the participants [Table 2].

DISCUSSION

Results of our study demonstrated an overall 46% incidence of stress, which is similar to a study in Egypt (43.7%)^[23] and a Malaysian study (41.9%),^[3] higher than a British study (31.2%)^[24] but lesser than the % incidence reported by some of the Saudi workers such as, 63%,^[25] 71.7%,^[26] and 71.9%^[1] respectively, and by many other workers in their studies conducted on medical students in other

Table 2: Common stressors their effects and coping strategies identified by the participants

Common stressor	1 st year males (%)	2 nd year males (%)	2 nd year females (%)	3 rd year males (%)	2 nd year males KMDC (%)	2 nd year females KMDC (%)
Academic overload	79	44	58	67	20	58
Travelling between home and university	34	32	27	12	40	37
Uncertainty about future	21	22	43	50	40	38
Family issues	21	20	33	33	20	37
Type of effect						
Cognitive	61	75	43	77	40	37
Emotional	76	66	48	76	35	50
Physical	54	53	37	47	40	41
Behavioral	38	30	43	44	40	65
Coping strategies prayers	54	31	50	72	60	96
Socializing with friends	45	66	63	66	20	63
Sports, TV and music	42	59	64	61	40	78
Sleep	42	69	70	61	60	65

UQU: Umm al Qura University, KMDC: Karachi Medical and Dental College

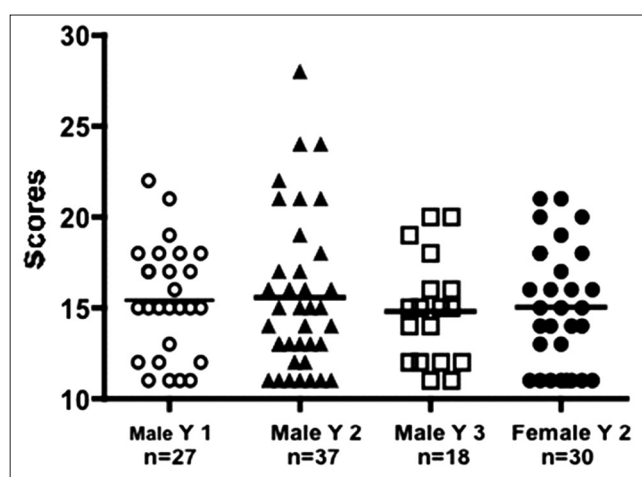


Figure 4: Severity of stress among different academic years. Comparison of stress scores between the academic years. A nonparametric Kruskal–Wallis test used and $P = 0.062$

countries such as 61.4% in Thai,^[27] 52.4%, in Ethiopians,^[28] 73% in Indians,^[13] and 90% in Pakistani^[4] medical students. Even in this study, the reported incidence of stress obtained from Pakistani medical students is higher than the Saudi students being 63%. This lesser percentage of stress that we observed in Saudi medical students can be explained on the basis of many factors like it may be the result of different type of questionnaire that we use in this study compared to the other studies. Difference in curriculum and/or evaluation system is another possible reason for the lesser % incidence in our study. Feeling of loneliness, quality of food in mess, and staying away from family and friends associated with hostellers are psychosocial factors producing stress,^[29] but fortunately, 98% of our respondents live with their families so, in our opinion this is also a possible reason of low-stress incidence in our study. In earlier studies, Reio *et al.*^[30] and Steele and Fullagar^[31] emphasized that good relations with the teachers, supportive environment, and assisted learning encourages the autonomy, clarify the role

expectations, and helps in students self-determination, so they will work hard and have a positive effect on their wellbeing. We have an experienced and devoted faculty well aware of their role in reducing the student's stress. As such they are very cooperative and play a supportive role and an authoritative noncooperative atmosphere which is the cause of stress for students practically does not exist. Faculty members are instructed to notify their office hours and supportive hours on their office doors so that students can contact them to solve their academic or other problems by their help and support. In addition, senior faculty members have to act as a mentor for 5–6 students taking care of their academic performance as well as other sort of problems. Under the structure of university, we have a student support club as well to solve financial, family, and other issues of the students. The Dean and Vice Dean also remain in touch with the students to get the academic feedback for the sake of continuous improvement as well as to find out and solve their other problems.

All these measures are helpful and seem very effective in reducing the percentage of students perceiving stress as well as in reducing the perceived stress score by our students as evident from the results. As far as the effect of year of study on the incidence of stress is concerned, our results showed first an increase in the % stress level from 1st year to 2nd year and then a fall toward 3rd year being maximum in 2nd year students. However, we cannot say that the decreasing trend that we observed from 2nd to 3rd year in the stress percentage will continue with the increasing year of study as observed by^[1,25] and^[28] in their studies because our study is limited to preclinical students of first three years only. However, our finding of 2nd year being most affected is supported by^[1] and^[32] who also reported the maximum incidence of stress in 2nd year students. Supe also observed significantly higher stress prevalence in 2nd and 3rd year students compared to 1st year.^[13] In our opinion, it is the 2nd year of medicine when

our students have their first proper and detailed exposure to medical subjects such as anatomy, physiology, and biochemistry because in 1st year they have to study mostly nonmedical subjects. This exposure of extensive course, to be completed in a short time with repeated exams, seminars presentations, and tutorials along with a desire to get good grade point average and fear of getting failed induces a high level of anxiety and stress in the students. With the passage of time, however, they gradually adjust in the learning environment and with the faculty support develop skills to manage their studies and are in a better position to handle the stress using different coping methods. It is also observed that the failure rate is less in advance years of medicine. This leads to a reduction in the percent incidence of stress that we observed in our 3rd year students. Our results although demonstrated less percent incidence in 1st and 3rd year students compared to 2nd year but the average stress score of the stressed students of all the 3 years is more or less same indicating that the different coping strategies affects mainly the percent incidence but not the severity of stress. Earlier workers have reported conflicting results regarding the association between gender and stress. Sani *et al.*^[11] and Abdulghani *et al.*^[25] observed females to be more stressed than males but Al Sunni and Latif^[26] found no significant difference in the stress scores of male and female. Cohen and Williamson,^[33] Niemi and Vainiomäki,^[34] and Leta *et al.*^[28] also reported nonsignificant association between gender and stress. We are also unable to find any significant effect of gender on stress incidence as well as average stress score. This represents that our female students are also well aware of using different coping techniques, have equal academic and nonacademic opportunities like males and have a good idea of managing their studies within the available time. Pakistani respondents, on the other hand, showed 28% higher incidence of stress as compared to their Saudi counterparts. Although 20% of Pakistani female respondents are noticed to have severe stress compared to the Saudi females [Figure 3], the difference in the average stress scores of pakistani and saudi females were not found to be statistically significant. There are many reasons for the higher incidence of stress in Pakistani students like less academic facilities, tough competition, more authoritative faculty, financial restrains, uncertainty about future and other hurdles like transport, electricity and security issues. Moreover, in addition to higher incidence, 20% among Pakistani girls are found to be severely stressed, i.e., stress scores >20. It may be because of more social and cultural restrains, less independence, less chances of recreation, logistic problems, and uncertainty about future and because they have to share some responsibilities at home as well. Dunn *et al.*^[35] attributed female distress to be because of wastage of time and energy required for learning and rest, as they have to perform at many places outside the faculty.

However, higher incidence of stress in 2nd year Saudi as well as Pakistani students that we noticed in our study strengthens our opinion that for a medical student preclinical part in general and 2nd year in particular is more distressing than the other years. It has already been reported that high levels of stress among medical students not only affect their academic performance but also affect their physical and mental health,^[15] health behavior^[36] and will have a negative effect on their cognitive and learning capabilities.^[25] Our students also showed cognitive, emotional, physical, and behavioral changes due to stress. Emotional disturbance is found to be the major effect of stress in 1st year males and 2nd year females, whereas disturbed cognitive ability is noticed mainly in 2nd and 3rd year male students. Other effects and their percentages are shown in Table 2. Pakistani male students demonstrated all sort of disturbances almost equally, but females mostly have behavioral effects. Almost all students who participated in the study thought academic overload to be the main reason for their stress. However, there are other stressors as well like, traveling between home and university, family problems, uncertainty about future and family problems. Most of the students get relieved of their stress through prayers, going out with friends, sleeping, sports, and listening music. Hence, we can say that medical education is stressful in every society and everywhere in the world, and serious efforts from medical educators are required to minimize the intense pressure and persistent demands faced by the medical students which otherwise, will not only deteriorate their academic performance but their physical and mental health^[15] as well.

Limitations of the study

This study was designed to record the stress level of undergraduate medical students from different academic years of UQU but due to the cultural restrains, it was not possible to include girls from all academic years which in our opinion is a limiting factor in the study. Similarly, number of Pakistani male participants from 2nd year medicine are very low. Majority of respondents pinpoint academic overload as the main stressor; however, its effect on academic performance is not examined in the study, which is another limitation of this work. Inability to address the comparison made among the medical students with two different socioeconomic circumstances is also a limitation of the present study.

CONCLUSION

Medical students are under stress throughout the period of their education/training. The available academic and nonacademic facilities, ethnicity, cultural, and social

background can alter the incidence of stress but not the severity. It is encouraging to know that the students are using different methods to cope up their stress. However, to minimize the incidence as well as the severity of stress serious measures are taken particularly in relation to academic overload, traveling problems and regarding the future uncertainty of students. Changes in curriculum contents, teaching methodologies and students counseling programs, time management programs, teamwork, and recreational opportunities should be extended particularly for those identified as stress prone and with low coping capabilities.

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Conflicts of interest

There are no conflicts of interest.

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