Stress in Medical Students in a Problem-Based Learning Curriculum

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Abstract

Background

This study aims to assess stress level and its drivers among medical students using a PBL teaching system

Method

Higher Education Stress Inventory (HESI,) was used to assess stress among medical students. . All students in the College of Medicine were enrolled.

Results:

The response rate was 99%.The prevalence of stress was 54.7%. The overall mean stress score was higher in the 4th year students (2.64) than 1st year students (2.52) (p= 0.01).

Junior students were more likely to be stressed by lack of clarity of the aims of the study (p=0.014) and lack of feedback from the teachers (p=0.003). Senior students were more likely to be stressed by lack of time for other activities (p=0.036), financial worries (p=0.027)) and about preparedness for future profession (p=0.007)

Despite the high stress scores, only 8.3% regretted their choice of career and 9.3 % felt that they are not prepared well for their future profession

Conclusions

High level of stress was noted especially among senior students. Stress in junior students was more likely to be medical training-related and to be personal problems-related in senior students. The vast majority of students were happy with their choice of profession and optimistic about their future

Keywords: Stress, Medical students, PBL

1. Introduction

Medical school training requirements can be stressful to many medical students. There is a growing concern about stress and depression in medical students and its effect proper and optimal graduate output Depression is described as more common in medical students than in the general population (Compton, Conway, Stinson, Grant, 2006);Dahlin, Joneborg, & Runeson, 2005 ; Firth, 1986; Bacchi & Licinio, 2016; Tyssen, Vaglum, Grønvold, & Ekeberg, 2005) The prevalence of depression the USA general population is 10% in the age group 18 to 29 years and 7% in the age group 30 to 44 years. (Compton et al., 2006) The prevalence of depression in UK general population has been reported to be 5% (Kumar & Clark, 2002). In Saudi Arabia, the prevalence rate of depression in patients aged 15-29 years, is 23.2%, and in those age group 30 to 44 years, is 17.8%, whereas, in patients aged 45-65 years the prevalence is 7.1%.3 (Al-Khathami & Ogbeide, 2002).

On the other hand, the prevalence of stress and depression among medical students was found to be higher than in the general population. In three British universities, the prevalence of stress among medical students was found to be 31.2%. (Firth, 1986) In one study of medical students in Sweden, the prevalence of depression was 12.9%.(Dahlin et al., 2005) A study in Saudi Arabia has shown that the prevalence of stress was present in 57% of students with 19.6 % having severe stress(Abdulghani, AlKanhal, Mahmoud, Ponnamperuma, & Alfaris, 2011).

Students are often reluctant to seek help for stress and emotional problems (Tyssen et al., 2005) which can only be magnified leading to burnout occurring early in their careers (Guthrie et al., 1998)

Problem-based learning curriculum is a new experience in Saudi Arabia. The College of Medicine at the King Saud Bin Abdulaziz University for Health Science had adopted a problem based strategy as a method of teaching Medicine. The program consists of four year professional program for bachelor degree holders in Applied Medical fields. The

program is based on the curriculum developed by the University of Sydney, Australia. The College of Medicine is integrated within King Abdulaziz Medical City (KAMC) in Riyadh which is a 1000-bed tertiary-care hospital that serves as the primary teaching center for medical students in the clinical phase of the training.("King Saud bin Abdulaziz University For Health Sciences," n.d.)

Using a validated tool to measure stress level among medical students, this study was carried out with the objective of determining the prevalence of self-perceived stress among medical students in a problem based learning curriculum.

2. Methods

2.1 Instrument Used

To assess the stress levels, we used the instrument Higher Education Stress Inventory (HESI) developed by Dahlin et al specifically to assess stress among medical students. It is neutral to educational program. (Dahlin et al., 2005)

The instrument contains 33 statements (Appendix-1) designed to assess degree of stress and its generators. The responses are rated on a four-point

Likert scale (i.e. 1-4), "1=totally disagree", 2=somewhat disagree", 3=somewhat agree, 4=totally agree; with reversed order for items describing absence of stressors. High scores are always less favorable.

As we do not have female medical students at King Saud bin Abdulaziz University for Health Sciences and since our medical students are of the same ethnic stock we dropped two items from HESI namely the statements. "I feel that I am less well treated because of my sex" and "I feel that I am less well treated because of my ethnic group". We added two new statements namely "the requirement of doing research is a source of worry for me" and "the requirement of doing frequent presentations is a source of worry for me" respectively. The instruments was initially tested in a pilot study in 20 students and reliability and validity assured.

2.2 Study Sample

All the four-year undergraduate students in the College of Medicine were enrolled in the study. The students were asked to complete the Higher Education Stress Inventory self-administered English version questionnaires during the academic year 2008-2009. Questionnaire were completed at least 2 weeks before or after an examination in order to minimize the extra examination-related stress. All students who participated in the study were informed about the purpose of the study and information regarding the instrument was explained. The participation was entirely on voluntary basis. All students were guaranteed complete confidentiality.

2.3 Analysis

Responses for each of the 33 statements were meant and compared to each other and according to the year of training. In addition the responses were analyzed after being dichotomized into "agree" (score 3 & 4) and "disagree" (scores 1 and 2). The 3 statements were further grouped into 7 stress generator areas. These are :*worries about future endurance\capacity(3 statements), Non-supportive climate(4 statements), Faculty shortcoming(7 statements), Workload(4 statements), Insufficient feedback(2 statements), Low commitment(2 statements),* and *Financial concerns(2 statements)* (Table-1).. (Appendix 2)

Statistical Analysis: Data were entered in and analyzed using SPSS version 17.0 . Student's t-test for independent samples was used to compare the mean values of study variables in relation to stress. The means of categorical data was compared using chi square A p-value of < 0.05 was considered statistically significant.

2.4 Results

There were 108 responses from a total student population of 109 (a response rate of 99%). The overall prevalence rate of stress was found to be 54.7%.(p=0.05). One out of the seven factors, namely workload, was statistically significantly different when comparing 2nd year to the other years (p=0.01).

The overall mean stress level was higher in the 4th year students (2.64) compared to 1st year students (2.52) (p= 0.01). One out of the 7 "stressors" namely "workload," was statistically significantly more stressing for senior students than for junior students different when comparing junior and senior years (p=0.01). There was also a tendency– not reaching significant level-towards worsening stress scores in 3 stress factors as the year of study progresses. These are "*worries about future endurance capacity (*from 2.88 to 3.15), "*non-supportive climate"* (from 2.63 to 2.85)., and "*financial concerns"* (from 3.02 to 3.46). (Table 1)

Nevertheless junior students showed higher stress scores than senior students n 5 of the 33 statements tested namely including *"the teachers often fail to clarify the aims of the studies"* and "*the teachers do not often give feedback on the students' knowledge and skills"* (p=0.003).

When analyzing the data in a dichotomous fashion (agree versus disagree) we find significant differences in the responses by 1st and 4th year students in seven out of the total 33 statements tested Higher percentage of junior students agreed that stress was seen in the areas of "the teachers often fail to clarify the aims of the studies" (78.6 % Vs. 56.1%, p=0.0.014) and "the teachers do not often give feedback on the students' knowledge and skills" (64.3% Vs. 34.8%, p=0.003), One the other hand, more senior medical students expressed stress in 4 statements namely ""studies control my life and I have little time for other activities" (90.9% Vs. 76.20 % , p=0.036) and "I feel that the training is not preparing me well for my future profession" (97% Vs. 81 %, p=0.007), "the requirement for frequent presentations is a source of worry for me (66.7% Vs. 42.9% p-0.013) and "I am worried about my future financial status" (78.8% Vs. 59.9% p-0.027) (Table-2)

Despite the high scores indicating stress that still only a very small minority of the students felt that "the studies do not stimulate their personal development" (13.9%), that "they are not satisfied with their choice of career".(8.3%), that "they are not proud of their future profession" (5.6 %) or that "they feel that the training is not preparing them well for their future profession (9.3%) (Table 3)

Table 1. Means of stress-generating factors according to educational year

	1st year	2d year	3rd year	4th year	p-value
Worries about future endurance capacity	2.88	2.92	2.94	3.15	0.35
Non-supportive Climate	2.63	2.65	2.69	2.84	0.29
Faculty Shortcomings	2.15	2.34	2.20	2.20	0.31
Workload	3.27	2.83	3.05	3.20	0.01
Insufficient feedback	2.39	2.58	2.23	2.34	0.29
Low Commitments	1.30	1.38	1.59	1.32	0.29
Financial Concerns	3.02	3.06	3.20	3.46	0.10

Table 2. Percent of junior and senior students agreeing with the statements shown (only scores with significant differences are shown

	Junior students	senior students	p-value
Studies control my life and i have little time for other activities	76.20	90.9	0.036
The teachers often fail to clarify the aims of the studies	78.60	56.1	0.014
The requirement for frequent presentations is a source of worry for me	42.9	66.7	0.013
I feel that the training is not preparing me well for my future profession	81	97	0.007
I am worried about my future financial status	59.9	78.8	0.027
The teachers do not often give feedback on the students' knowledge and skills	64.3	34.8	0.003

Table 3. Very few students show evidence of lack of commitment

	Agree
The studies do not stimulate my personal development	13.90%
I am not satisfied with my choice of career.	8.30%
I am not proud of my future profession	5.60%
I feel that the training is not preparing me well for my future profession	9.30%

3. Discussion

A wide range of different measures have been used to screen for depression and stress among medical students. Depression has been assessed with different tools like Beck's Depression Inventory (Sherina, Rampal, & Kaneson, 2004), General Health Questionnaire , Kessler Psychological Distress Inventory and other common and less common instruments. (Firth 1986; Sherina et al., 2004; Styles, 1993; Singh, Hankins, & Weinman, 2004; Tyssen et al., 2005)

Depression is prevalent in n12% of medical students with higher prevalence among preclinical students and in home staying (as opposed to hostel staying) students (Cuttilan, Sayampanathan, & Ho, 2016).

The instrument Higher Education Stress Inventory (HESI) which has been developed Dahlin and colleagues (Dahlin et al., 2005)specifically to serve the purpose of assessing stress in medical students was used. Based on the Perceived Medical School Stress Scale, (PMSS) (Peter P. Vitaliano, Maiuro, Mitchell, & Russo, 1989), HESI is a more comprehensive. It has also been used in other higher educational settings besides medical schools, which allows for comparative studies We have had a good response rate to our survey of 99%, which provides an adequate sample size to fulfill the objectives of this study. The results of this study showed that medical students had a high prevalence of stress. Overall the prevalence of stress in this study is 54.7%, which is similar to the study done at King Saud University in Riyadh (Abdulghani et al., 2011)but higher than a study done on British medical students of 31.2%.(Firth, 1986).

The overall mean stress level was higher in the 4th year students (2.64) compared to 1st year students (2.52) (p= 0.01). The increase in stress in our senior students was expected as it is the clinical teaching where students are loaded with clinical schedules at the hospitals.(Abdulghani et al., 2011)(Fares, Al Tabosh, Saadeddin, El Mouhayyar, & Aridi, 2016)

This is in agreement with other studies whish report that the level of stress increases as the student progress in medical school (Dahlin et al., 2005; Niemi & Vainiomäki, 2006)Other studies have also reported that mental health worsens after students are admitted to medical school and remains poor throughout the training(Dyrbye, Thomas, & Shanafelt, 2005) especially in the transition from basic science teaching to clinical training. (Helmers, Danoff, Steinert, Leyton, & Young, 1997). There are , however other studies where the level of stress was found to decrease as the students' progress in medical school, especially after the basic sciences years. (Abdulghani et al., 2011) (Dahlin et al., 2005) In one report, it was found that distress is more common among female medical student (Bore, Kelly, & Nair, 2016).

The stressors were different in junior when compared to senior medical students More junior than senior students were stressed by lack of clarity of the aims of the study (p=0.014) and lack of feedback from the teachers (p=0.003). On the other hand, more senior than junior students were stressed because of lack of time for other activities (p=0.036), financial worries (p=0.027)) and worries about preparedness for future profession (p=0.007)

Resiliency skills building exercise. may be useful in reducing stress among medical students (Wald, Haramati, Bachner, & Urkin, 2016) (Bore et al., 2016)

Nevertheless, despite the high scores indicating stress that still only a very small minority of the students felt that "the studies do not stimulate their personal development" (13.9%), that "they are not satisfied with their choice of career".(8.3%), that "they are not proud of their future profession" (5.6 %) or that "they feel that the training is not preparing them well for their future profession (9.3%)

The negative effects of long and tiring medical education on the psychological status of students might explain the increased prevalence of stress and depression among medical students. A British study showed that one third of psychiatrically ill students did not graduate from the college. (Salmons, 1983). Beside educational obligations, social factors are reasons for psychological disturbance in students. Financial worries might be attributed to the comparison of students to their peers in other disciplines. Worrisome thinking has been suggested to act not only as a stressor by itself, but also as a mediating the effect of psychosocial stressors.(Borschos, Kühlhorn, & Rydberg, 1999)

The data in this study suggest that special care must be taken in senior medical students, who have higher level of stress. Setting up a student support system might contribute in easing the higher level of stress along the study course and especially in the third and fourth year of study. Preventive strategies targeted at the students must be implemented in order to prevent the development of more serious conditions. Psychiatric disorders were the most common cause of premature retirement among UK doctors.(Abramovitch, Schreier, & Koren, 2000) The effect of stress in medical students and the development of a burnout syndrome had been shown in one study.(Dahlin et al., 2005)

Wellness and mental health programmes are needed to help students to make an appropriate transition between different learning environments with changing learning demands. Medical schools in the United States and Canada have initiated health promotion programmes and have reported positive results in reducing the negative effects of stress upon medical students' health and academic performance. (Abramovitch, Schreier, and Koren 2000; Lee & Graham, 2001; Wolf, Randall, & Faucett, 1988)

Students must be taught and encouraged to look for any cardinal signs and symptoms of stress and depression such as recent weight changes, sleeping disturbances, concentration difficulties, increasing cigarette smoking and so on so forth. The problem with help-seeking is perceived as a problem among medical students. {Citation} In one study,

17.3% of students had consulted a professional because of a mental problem at some time since they started medical school(Dahlin et al., 2005)

Studies have shown that whereas the sources of stress in medical students are generally related to personal problems (academic pressures, social/personal issues, and financial problems), (P. P. Vitaliano, Russo, Carr, & Heerwagen, 1984) .the principal stressors in PBL were related to medical training (in particular, uncertainty -bout study behaviour, progress and aptitude) rather than personal problems(Moffat, McConnachie, Ross, & Morrison, 2004). It is interesting that in our PBL-trained students, more juniors were indeed stressed by medical training-related aspects whereas more senior students were stressed by personal problems.

Another study showed that compared to medical students taught by traditional methods, the PBL students were more likely to feel that they did not know what the faculty expected of them , complain about an unclear curriculum and that there was a lack of opportunity to explore academic subjects of interest (Lewis, A. D., Menezes, D. A. B., McDermott, H. E., Hibbert, L. J., Brennan, S.-L., Ross, E. E., & Jones, L. A. (2009). 2009)**.** This finding is similar to our findings among junior students where stress factors included by lack of clarity of the aims of the study and lack of feedback from the teachers

4. Conclusions

The study suggests that higher level of stress among medical students which is noted to be higher in senior students. More junior students had stress due to medical training-related aspects whereas more senior students were stressed by personal problems.

The vast majority of students were happy with their choice of profession and optimistic about their future.

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Appendix-1: The Higher Education Stress Inventory Questionnaire

	Totally disagree	Somewhat disagree	Somewhat agree	Totally agree
1. Studies control my life & I have little time for other activities.				
2. I feel that my teachers treat me with respect				
3. I am worried that I will not acquire all the knowledge needed for my future.				
4. The studies have created anonymity and isolation among students.				
5. The teachers often fail to clarify the aims of the studies.				
6. The studies stimulate my personal development.				
7. The professional role presented in the training conflicts with my personal views.				
8. The teachers give encouragement and personal attention.				
9. There is a competitive attitude among students.				
10. I am satisfied with my choice of career.				
11. I feel that the studies have played a role in creating a cold and impersonal attitude among students.				
12. As a student, my financial situation is a worry.				
13. My fellow students support me.				
14. I worry about long working hours and responsibilities in my future career.				
15. The training is characterized by an atmosphere where weakness and personal shortcomings are not accepted.				
16. As a student you are often expected to participate in situations where your role and function is unclear.				
17. I am proud of my future profession.				
18. The requirement for doing research is a source of worry for me				
19. I am able to influence the content and process of studies				
20. The insight I have had into my future profession has made me worried about the stressful workload.				
21. There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection				
22. Expectations from my family have influenced my choice of career too much				
23. I am worried about accommodation				
24. The requirement for frequent presentations is a source of worry for me.				
25. I meet many qualified doctors that seem dejected or dissatisfied in their profession				
26. I feel that the training is preparing me well for my future profession				
27. There is a sense of community which contributes to a better working environment for students.				
28. I am worried about my future financial status.				
29. The education is highly characterized by group activities with unclear goals and with too much responsibility placed on the student.				

30. The literature is too difficult and extensive				
31. The pace of studies is too high				
32. The training demands that I join in situations that I find unethical				
33. The teachers often give feedback on the students' knowledge and skills.				

Appendix-2: Factors category of the HESI

HESI Factors	Pertaining items
Worries about Future Endurance/ Capacity (WFEC)	3. I am worried that I will not acquire all the knowledge needed for y future profession. 14. I worry about long working hours and responsibilities in my future career. 20. The insight I have had into my future profession has made me worried about the stressful workload.
Non-supportive climate	4. The studies have created anonymity and isolation among students. 7. The professional role presented in the training conflicts with my personal views. 9. There is a competitive attitude among students. 11. I feel that the studies have played a role in creating a cold and impersonal attitude among students.
Faculty shortcomings	2. I feel that my teachers treat me with respect. 5.The teachers often fail to clarify the aims of the studies. 6. The studies stimulate my personal development. 16. As a student you are often expected to participate in situations where your role and function is unclear. 19. I am able to influence the studies 21. There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection. 26. I feel that the training is preparing me well for my future profession.
Workload	1.Studies control my life and I have little time for other activities 30. The literature is too difficult and extensive 31. The pace of studies is too high. 18. the requirement of doing frequent presentation is a source of worry to me 24. the requirement of doing frequent research is a source of a worry to me
Insufficient Feedback	8. The teachers give encouragement and personal attention. 33. The teachers often give feedback on the students' knowledge and skills
Low commitment	10. I am satisfied with my choice of career. 17. I am proud of my future profession.
Financial Concerns	12. As a student, my financial situation is a worry 28. I am worried about my future economy and my ablility to repay student loans.