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RESEARCH

An evaluation of stress in medical students at a South African university

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Background: Medical educational programmes strive to produce competent and skilled graduates. However, studies have shown that undergraduate medical students experience varying degrees of stress which impacts on their health, academic performance and social functioning. This study explored the prevalence and causes of stress, its impact on students and their coping strategies in a racially diverse cohort of final-year medical students exposed to a problem-based learning curriculum in South Africa.
Method: This descriptive cross-sectional study was undertaken by final-year medical students in 2008 at a South African medical faculty with a racially diverse student population. Semi-structured interviews were conducted. Data were thematically analysed.
Results: Ninety-four students, representing 47% of the final-year medical student cohort, participated in the study**.** Seventy-eight per cent of the participants ($n = 73$) experienced stress during the programme, and the majority ($n = 49$) were females. Ethnic and gender differences were observed for the variables studied. Academic and personal problems were the main sources of stress. Coping strategies included individual lifestyle adaptations, family support, religious structures and study groups.
Conclusion: Maladaptive stress impacts negatively at multiple levels on undergraduate medical students. Mentorship and educational support programmes should be integrated into the undergraduate medical curriculum and made available to all preclinical and clinical students. Students need to be taught and guided to identify and monitor their own well-being and to select positive strategies to overcome stress. These measures should assist students to manage their workload and time effectively.

Keywords: medical students, South Africa, stress

Introduction

Stress results when an individual is unable to cope with a perceived past, present or future situation.[1] Stress may arouse feelings of fear, incompetence, uselessness, anger, aggression and guilt, and if unresolved, may even lead to associated physical and psychological morbidity.[2] However, owing to individual differences, the same situation that induces stress in one individual may not have the same effect on another.[3]

The primary aim of medical training programmes is to produce knowledgeable, skilful, competent and professional graduates who will render comprehensive healthcare services within their communities. This is achieved through a variety of methods, including lectures, tutorials, experiential learning placements, apprenticeships and mentoring. Unfortunately, most medical programmes are overloaded with facts, and the students inevitably spend many hours a day trying to achieve the expected academic outcomes. Therefore, these programmes may have unintended negative consequences with respect to students' personal mental and physical health. It has also been postulated that burnout (a measure of distress) in newly graduated doctors and older physicians has its origins in medical school.[4]

In addition to coping with stressors in daily life, medical students have to deal with stressors specific to their studies and their learning environment. These include problems relating to academic pressure, social and financial issues viz. career choices, information and input overload, financial issues, inter-personal issues at the institution or within the family and lack of leisure time. Although a degree of stress is considered to be necessary and positive in terms of personal psycho-social development, not all students find stress constructive.[2]

A high prevalence of stress has been recorded in medical students internationally. Reported levels of stress in medical students range from 25–90%.[2,5] It occurs from the start of the students' training[6] until their graduation. High levels of stress and burnout have also been observed in medical doctors after graduation, and these are believed to have originated in pre-graduate medical training and exposure to stressful working environments.[4] Higher levels of psychological distress have been reported in female medical students than in their male counterparts.[7,8]

A number of stress factors were found in a large cohort of 528 medical students (years 1–5) in Cape Town, South Africa, with females reporting equal or more stress than males.[9] Academic and relationship factors were the main causes of stress in students across all five years of the curriculum in this study, followed by personal issues (time and uncertainty about the future). Environmental factors (transport and accommodation) were the least stressful. Males in this study reported higher stress levels in the first, third and fifth years of their studies, while the females in this study reported similar levels of stress in years 1–3, and the highest in the fifth year. Severe stress was reported in less than 10% in both sexes in all the years, with the third year being the most stressful for males, and the fifth year for females. Examination results were associated with high anxiety levels in students taking Anatomy and Physiology.[9] However, the study by Vawda, which focused on stress in South African medical students, reported identical levels of stress in students in the preclinical and clinical years. This study also found that students in the clinical years lacked coping strategies compared to their preclinical counterparts. Both groups complained about the limited time available within the course to pursue other activities. While the preclinical students reported a range of coping strategies, which included emotional and institutional support, students in the clinical years were more likely to be in denial or to resort to venting and substance use to cope.[10]

Stress impacts negatively on health (mental and physical) and performance (academic and physical), resulting in emotional exhaustion.[11] The impact on health may manifest as depression, substance use and abuse, burnout and suicidal behaviour. Stress can also impact negatively on cognitive functioning and learning. It has been shown that those who worried about financial debt during their studies performed poorly in their course work and examinations.[12]

This study was undertaken to assess the prevalence and causes of stress in a diverse student population exposed to a recently introduced problem-based curriculum at a South African university.

Method

This cross-sectional descriptive study was conducted in 2008 on final-year students at a South African medical school. This purposive sample comprised senior students who had already completed various clinical rotations and who had had extensive exposure to the clinical environment since their third year of study. The student population at this medical school is multiracial and comprises black African, Indian, white and coloured students. Over the last 10 years, the school has enrolled students from each racial or ethnic group according to a racially based quota policy which reflects the racial demography of the province in which the medical school is situated.

The majority of the students in each academic level (from year 1–5), and collectively at the medical school, are black Africans (69%), followed by Indians (19%), coloureds (9%) and whites (3%). A problem-based curriculum has been in existence at this medical school since 2001. Therefore, the participants in this study were exposed to this modified curriculum since the inception of their studies.

Semi-structured interviews were conducted with the participants. A structured questionnaire was administered by a team of two researchers. Each interview, lasting 35–40 minutes, was audio-recorded and field notes were taken by one of the researchers. The interviews were transcribed and the elicited responses (written and audio) were corroborated by an independent analyst. Field notes were immediately captured and entered onto Excel® data spreadsheets. The responses were analysed by each individual researcher and categorised into themes. The themes were discussed and consensus agreement obtained at a meeting of the research team.

Institutional ethical approval was granted before the study commenced (UKZN HSS/0404/07). Participants were assured of confidentiality and anonymity and provided informed consent.

Results

The socio-demographic characteristics of the participants

The socio-demographic characteristics of the participants are presented in Table 1. The majority were from the African racial group (61%), single (90%) and female (65%). Indian students comprised 26% of the sample, while coloured and white students represented 6% and 3%, respectively. The majority were of the Christian faith (78%), followed by the Hindu (12%) and Islam (8%) faiths. The median age (± standard deviation) of the participants was 23 ± 4 years.

Fifty-nine participants (63%) reported financial obligations to a third party (state, parents or family, or a loan or sponsor). The majority in this group (n = 48, 81%) were expected to pay the borrowed finances back to either a governmental agency, private financial agency or banking institution.

Table 1: The socio-demographic characteristics of the participants (n = 94)

Characteristics	*n*	%
Sex		
Male	33	35
Female	61	65
Age (years)		
Range	21–46	–
Median (± standard deviation)	23 (± 4)	–
Marital status		
Single	90	96
Married	4	4
Race		
Black African	61	65
Coloured	6	6
Indian	24	26
White	3	3
Religious groups		
Christian	73	78
Hindu	11	12
Islam	8	8
Non practising or other	2	2
Financial obligations		
None	17	18
Parent or family	10	11
State contracts	27	29
Loans	21	22
Sponsor	1	1
No responses	18	19

Prevalence of stress in the participants

Seventy-three participants (78%) indicated that they experienced stress at some point during their undergraduate medical studies. Only 10 female and five male students in this sample, representing 16% of the total cohort sampled, reported stress-free medical studies. The breakdown of stress according to racial group and gender is illustrated in Table 2.

Forty-nine (67%) of the students who experienced stress were female. More females experienced stress than their male counterparts in all racial categories.

Perceived causes of stress

A total of 58 responses (single and multiple) were received relating to perceived causes of stress, and these were thematically analysed. These themes (workload, personal problems and communication difficulties) are summarised and presented in Table 3.

Curriculum workload problems were reported by 38 participants, particularly by African (63%), followed by Indian (29%), white (5%) and coloured (3%), students. Female students generally outnumbered their male counterparts in all groups for this variable.

Table 2: Stress prevalence by race and gender

Stress by race and gender	Male		Female		Total
	n	%	*n*	%	*n*
African (*n* = 61)					
Yes	19	31	29	47	48
No	2	3	7	12	9
Unsure	3	5	1	2	4
Coloured (*n* = 6)					
Yes	0	0	3	50	3
No	1	17	1	17	2
Unsure	0	0	1	17	1
Indian (*n* = 24)					
Yes	4	17	15	63	19
No	2	8	2	8	4
Unsure	1	4	0	0	1
White (*n* = 3)					
Yes	1	33	2	67	3
No	0	0	0	0	0
Unsure	0	0	0	0	0
Total	**33**	**35**	**61**	**65**	**94**

Table 3: Perceived causes of stress (*n* = 58)

Theme	Male		Female		Total	
	n	%	*n*	%	*n*	%
Workload (*n* = 38)						
African	11	29	13	34	24	63
Coloured	0	0	1	3	1	3
Indian	4	10	7	18	11	29
White	0	0	2	5	2	5
Personal problems (*n* = 18)						
African	6	33	6	33	12	66
Coloured	0	0	1	6	1	6
Indian	1	6	3	16	4	22
White	0	0	1	6	1	6
Language or communication problems (*n* = 2)						
African	2	100	0	0	2	100
Total	**24**	**42**	**34**	**59**	**58**	**100**

Eighteen participants experienced personal problems during the undergraduate programme. African students (*n* = 12) outnumbered other race groups for this variable.

Language, understanding content and communication difficulties were reported by a minority of participants.

Coping strategies used by participants

Participants who reported stress during their training were asked to elaborate on how they dealt with or handled this issue. Their responses (*n* = 76) have been categorised and are presented as themes in Table 4. The majority (*n* = 41, 54%) reported participating in a lifestyle change or adaptation, such as exercise, swimming, dancing, or going to watch a film, as a way of balancing their workload with relaxation activities. More females (*n* = 27) than males (*n* = 14) reported these adaptations in all the racial groups studied. A supportive network was identified by 16 (21%) students. This was provided by friends, family, peers, study groups and religious affiliations or structures. In general, females (*n* = 11) relied more on this strategy than their male counterparts (*n* = 5), and this was evident within each racial group. Twenty-four per cent of the respondents (13 females and five males) identified using both lifestyle and support networks to overcome stress during their medical studies.

Discussion

The racial composition of our study cohort was relatively similar to the institutional admission quotas for each racial group per year, i.e. Africans 69%, Indians 19%, coloureds 9% and whites 3%.

Table 4: Coping strategies used by the participants (*n* = 76)

Theme	Male		Female		Total	
	n	%	*n*	%	*n*	%
Lifestyle change (*n* = 41)						
African	10	24	13	32	23	56
Coloured	0	0	3	7	3	7
Indian	3	7	10	24	13	31
White	1	3	1	3	2	6
Support structure (*n* = 16)						
African	4	25	7	44	11	69
Coloured	0	0	1	6	1	6
Indian	1	6	3	19	4	25
White	0	0	0	0	0	0
Lifestyle and support structures (*n* = 18)						
African	4	22	9	50	13	72
Coloured	0	0	1	6	1	6
Indian	1	6	3	17	4	23
White	0	0	0	0	0	0
Non-identifiable method (*n* = 1)						
African	0	0	1	100	1	100
Total	**24**	**32**	**52**	**68**	**76**	**100**

The results of this study revealed that the majority of participating students (*n* = 73, 78%) experienced stress at some point during their medical studies. Similar findings were made in a number of other studies.[2,5,7,13,14] The students in our study enrolled in a problem-based learning curriculum which commenced in 2001. As found in a study conducted in Glasgow in the UK, medical students generally experience difficulties in adapting to unfamiliar curricula and the inherent academic demands thus created.[15]

In general, a larger number of females than males reported finding their studies stressful in our study. A similar trend was observed in each of the race groups studied, particularly with respect to the African and Indian students who formed the majority of our study cohort. Recent studies in Sweden and in Pakistan showed similar results in terms of overall gender differences.[7,16] However, a study conducted in Egypt on 288 undergraduate medical students reported no gender differences for stress.[17]

Stressors identified in our study included academic curriculum workload issues, personal problems, communication and/or language difficulties. These findings were similar to those found in other studies.[6,9,12,16,18] Problems associated with academic workload were cited as the major cause of stress by the majority of our students who experienced stressful studies (*n* = 38). Academic workload was the dominant stressor, compared to other identified stressors, within each race group studied, and especially in females within each race group. Personal problems, such as financial difficulties, interpersonal problems, the inability to match family or peer expectations, poor organisational and adaptation skills, and a changed curriculum, were identified in 31% (*n* = 18) of total responses. It was shown in a study in Aberdeen, Scotland, that students with financial burdens and accumulated debt during their studies performed less well in their studies and examinations than other students.[12]

Language and communication difficulties were cited by only two students in our study, one of whom was a returning student who had completed the first four years of training in Cuba in terms of a government-to-government agreement. Spanish is the official medium of instruction in Cuba, and in most South African medical schools it is English, including the institution in which this study was carried out.

A variety of personal coping strategies can be used to cope with stress. These differ depending on the academic year of study, source of the stress and supportive networks. These strategies may impact positively or negatively on an individual's psycho-social development and physical or mental health.[6] Strategies typically include personal engagement or disengagement.[6] There may be negative consequences for those who focus on disengagement, such as self-criticism, problem avoidance and social withdrawal. These consequences include poor mental and physical health. Those who focus on engagement, such as problem-solving, positive thinking, social integration and emotional expression, are more likely to adapt to the perceived situation, thereby reducing their anxiety and depression, as well as ill-effects on their health.[6] A study conducted in Pakistan by Shaik et al showed that participants used sports, music, "hanging out" with friends, sleeping or isolating themselves as coping activities. In their study on 679 first-year medical students at the University of Virginia School Of Medicine in the USA, Gutgesell et al found that two thirds of the students exercised at least two hours a week, and less than 5% did not exercise at all. Identical findings were reported in another study.[19] However, it was also observed in this study that physically active students engaged in more harmful social habits, such as excessive coffee consumption, smoking, and regular alcohol use and illicit drug use, than those who were less active.[19] In a review of clinical studies on stress management programmes in medical training from 1996-1999, Shapiro et al. noted that medical trainees who participated in stress-management programmes demonstrated greater use of positive coping skills, a decrease in depression and anxiety, improved knowledge of the effects of stress, enhanced knowledge of alternative therapies for future referral, the ability to resolve role conflict, and improved immunological functioning and increased spirituality and empathy.[20]

Students in our study used similar coping strategies to those in other studies.[6,7,19,21] These included lifestyle changes, and/or constructive engagement with support structures within and outside the family system. Female students in our study favoured both methods generally, more so than their male counterparts.

Study limitations

Our study was limited to final-year medical students only, and thus precluded a comparison with preclinical medical students. Our study population comprised a small number of coloured and white students, and therefore differs from those on other South African medical schools. Therefore, the results of this study, especially those relating to racial comparisons, cannot be generalised to other medical schools in South Africa.

Conclusion

Medical education is "inherently stressful and demanding" for the majority of students enrolled in undergraduate programmes. Academic curriculum designers should guard against curriculum overload and must promote the well-being of students throughout the undergraduate medical programme period. Training programmes need to nurture and equip medical students with the requisite skills for adaptation, the re-organisation of personal management and the development of personal well-being and personal health, and thus lay the foundations for personal career growth, professionalism and resilience throughout their careers.

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