**An Evaluation of Stress in Medical Students at a South African University**

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**Key words**: stress, medical students, South Africa

**Abstract**

**Background**

All medical educational programmes strive to produce competent and skilled graduates. Studies have however 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 the coping strategies in a racially diverse cohort of final year medical students exposed to a problem-based learning curriculum in South Africa.

**Methodology**

This descriptive cross-sectional study was undertaken among final year medical students in 2008 at a South African medical faculty with a racially diverse student population. Semi-structured interviews were conducted. Data was thematically analysed.

**Findings**

Ninety four students representing 47% of the final year medical student cohort participated in the study**.** Seventy eight percent of all 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 in undergraduate medical students. Mentorship and educational support programmes should be integrated within 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.

**(242 words)**

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**Background**

Stress results when an individual is unable to cope with a perceived past, present or future situation.[1](#_ENREF_1) Stress may arouse feelings of fear, incompetence, uselessness, anger, aggression, and guilt, and if unresolved may even result in associated physical and psychological morbidity.[2](#_ENREF_2) However, due to individual differences, the same situation that may induce stress in one individual, may not have the same effect on another.[3](#_ENREF_3)

The primary aim of all medical training programmes is to produce knowledgeable, skilful, competent and professional graduates who will render comprehensive health care services within their communities. These are achieved through a variety of methods which include lectures, tutorials, experiential learning placements, apprenticeships and mentoring. Unfortunately, most medical programmes are overloaded with facts, and the students inevitably spend many hours per day trying to achieve the expected academic outcomes. These programmes may therefore result in unintended negative consequences on personal mental and physical health. It has also been postulated that burnout (a measure of distress) among newly graduated doctors and older physicians, has its origins in medical school.[4](#_ENREF_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 related to academic pressures, 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 necessary and positive in terms of personal psycho-social development, not all students find stress constructive. [2](#_ENREF_2)

A high prevalence of stress has been recorded in medical students internationally. Reported levels of stress in medical students range from 25% to 90%.[2](#_ENREF_2),[5-7](#_ENREF_5) This stress occurs from the start of the students’ training [8](#_ENREF_8) until their graduation. High levels of stress and burn-out 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](#_ENREF_4) Higher levels of psychological distress have been reported in female medical students compared to their male counterparts.[7](#_ENREF_7),[9](#_ENREF_9)

A number of stress factors were found in a large cohort of 528 medical students (years 1-5) in CapeTown, South Africa, with females reporting equal or more stress than males.[10](#_ENREF_10) In this study, academic and relationship factors were the main causes of stress in students across all five years of the curriculum, followed by personal issues (time and uncertainty about the future), and environmental factors (transport, accommodation) being the least stressful. Males in this study reported higher stress levels in years 1, 3 and 5 of their studies, while the females in this study reported similar levels of stress in years 1 to 3, and the highest level being in year 5. Severe stress was reported in less than 10% in both sexes in all years, with third year being the most stressful for males and fifth year for females. Examination results were associated with high anxiety levels in students taking Anatomy and Physiology.[10](#_ENREF_10) However, the study by Vawda (1999) focussing on stress in South African medical students reported identical levels of stress for students in the preclinical and clinical years. This study also found that students in clinical years were lacking in 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 clinical years were more likely to be in denial or resorted to venting and substance use to cope.[11](#_ENREF_11)

Stress impacts negatively on health (mental and physical) and performance (academic and physical) resulting in emotional exhaustion.[12](#_ENREF_12) 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 worry about financial debt during their studies perform poorly in their course work and examinations.[13](#_ENREF_13)

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.

**Methods**

This cross-sectional descriptive study was conducted in 2008 among all final year students at a South African medical school. This purposive sample comprised senior students who had already completed various clinical rotations and had extensive exposure to the clinical environment since their third year of study. The student population at this medical school is multi-racial and comprises Black African, Indian, White and Coloured students. The school has over the last 10 years enrolled students from each racial/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 students in each academic level (from year one to five) and collectively at the medical school are Black African (69%) followed by Indians (19%), Coloureds (9%) and Whites (3%). A problem-based curriculum has been in existence at this medical school since 2001. All participants in this study were therefore exposed to this modified curriculum since the inception of their studies.

Semi-structured interviews were conducted with all participants. A structured questionnaire was administered by a two person-team of 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 all elicited responses (written and audio) were corroborated by an independent analyst. Field notes were immediately captured and entered onto Excel data spread sheets. 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). Each participant was assured of confidentiality and anonymity and provided informed consent.

**Results**

***Socio-demographic characteristics of 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. In terms of religion, the majority were Christians (78%), 12% Hindu and 8% Islam. The median age (± S.D) of participants was 23 ± 4 years.

Fifty nine participants (63%) reported financial obligations to a third party (state, parents/family, loan or sponsor).The majority in this group (n=48; 81%) were expected to pay back to either governmental agencies or to private financial agencies and banking institutions.

|  |  |  |
| --- | --- | --- |
| **Table1. Socio-demographic characteristics of participants(N=94)** | | |
|  | **n** | **%** |
| **Sex** |  |  |
| Male | 33 | 35 |
| Female | 61 | 65 |
| **Age(years)** |  |  |
| Range | 21- 46 | - |
| Median (±S.D) | 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/other | 2 | 2 |
| **Financial obligations** |  |  |
| None | 17 | 18 |
| Parent/Family | 10 | 11 |
| State contracts | 27 | 29 |
| Loans | 21 | 22 |
| Sponsor | 1 | 1 |
| No responses | 18 | 19 |

***Prevalence of stress among participants***

Seventy three participants (78%) indicated that they experienced stress at some point during their undergraduate medical studies. Only ten female and five male students in this sample (representing16% of the total cohort sampled) reported stress free medical studies. The breakdown of stress by racial group and gender is illustrated in Table 2

Forty nine (67%) of those students who experienced stress were female. More females experienced stress compared to their male counterparts in all racial categories.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 2. Stress Prevalence 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 | 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 |

***Perceived causes of stress***

A total number 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.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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/ Communication** **Problems (n=2)** |  |  |  |  |  |  |
| African | 2 | 100 | 0 | 0 | 2 | 100 |
| **TOTAL** | **24** | **42** | **34** | **59** | **58** | **100** |

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.

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 a lifestyle change or adaptation such as exercise, swimming, dancing, or going to movies to balance 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 even within each racial group. Twenty four percent of the respondents (13 females and 5 males) had identified using both lifestyle and support networks to overcome stress during their medical studies.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 4. Coping strategies used by participants (N=76)** | | | | | | |
| **Theme** | **Male** | | **Female** | | **Total** | |
|  | **n** | **%** | **n** | **%** | **N** | **%** |
| **Life style 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 |
| **Life Style +Support structure (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** |

**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%.

The results of this study revealed that the majority of all 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](#_ENREF_2),[5-7](#_ENREF_5),[14](#_ENREF_14) The students in our study were all enrolled in a problem based learning curriculum which had commenced in 2001. As found in another study conducted in Glasgow in the United Kingdom, medical students generally experience difficulty in adapting to unfamiliar curricula and the inherent academic demands thus created.[15](#_ENREF_15)

A larger number of females in our study generally reported stressful studies compared to their male colleagues. A similar trend was observed in each of the race groups studied particularly among African and Indian students who formed the majority of our study cohort. In terms of overall gender differences, recent studies in Sweden and in Pakistan showed similar results.[7](#_ENREF_7),[16](#_ENREF_16) However, a study conducted in Egypt on 288 undergraduate medical students reported no gender differences for stress.[17](#_ENREF_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.[8](#_ENREF_8),[10](#_ENREF_10),[13](#_ENREF_13),[16](#_ENREF_16),[18](#_ENREF_18" \o "Radcliffe, 2003 #14) 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, inter-personal problems, inability to match family or peer expectations, poor organizational and adaptation skills, and changed curriculum) were identified in 31% (n=18) of total responses. It had been shown in a study in Aberdeen, Scotland, that students with financial burdens and accumulated debts during their studies, performed less well in their studies and examinations than other students.[13](#_ENREF_13)

Language and communication difficulties were cited by only 2 students in our study, one of whom was a returning student who had completed the first 4 years of training in Cuba in terms of a government to government agreement. The official medium of instruction is Spanish in Cuba whereas it is English in most South African medical schools, including the institution where this study was carried out.

A variety of personal coping strategies are generally used against stress. These may differ depending on the academic year of study, source of the stress and supportive networks. These strategies may impact (positively or negatively) on the individual’s psycho-social development and physical or mental health.[8](#_ENREF_8) Strategies typically include personal engagement or disengagement.[8](#_ENREF_8) Those that focus on disengagement such as self-criticism, problem avoidance, and social withdrawal may have negative consequences for the individual including poor mental and physical health, whilst those that focus on engagement such as problem-solving, positive thinking, social integration and emotional expressions, enable students to adapt to the perceived situation, thereby reducing anxiety, depression and ill-effects on their health.[8](#_ENREF_8) The study conducted in Pakistan by Shaik *et al.* (2004), showed that participants used sports, music, hanging out with friends, sleeping or isolating themselves as coping activities. Gutgesell and co-workers (1999) found in their study on 679 first year medical students at the University Of Virginia School Of Medicine in the USA, that two-thirds of the students exercised at least two hours per week, and less than five percent did not exercise at all. Identical findings were made in another study. [19](#_ENREF_19) This study however also observed that physically active students reported more harmful social habits (such as excessive coffee consumption, smoking, regular alcohol use and illicit drug use) than those who were less active.[19](#_ENREF_19) In a review of clinical studies on stress management programs in medical training from 1996-1999, Shapiro and co-workers found medical trainees who participated in stress-management programs 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 conflicts, improved immunological functioning and increased spirituality and empathy.[20](#_ENREF_20)

Students in our study had used similar coping strategies to those reported in other studies.[7](#_ENREF_7),[8](#_ENREF_8),[19](#_ENREF_19),[21](#_ENREF_21) These included lifestyle changes, and / or constructive engagement with support structures within and outside the family systems. Female students in our study generally favoured both methods compared to their male counterparts.

**Study Limitations**

Our study was limited to final year medical students only, and thus precluded a comparison with pre-clinical medical students. Our study population comprised a small number of Coloured and White Students and therefore differs from those in other South African medical schools. The results of this study especially those relating to racial comparisons therefore cannot be generalized to other medical schools in South Africa.

**Conclusions:**

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 should promote the well-being of students throughout the period of the undergraduate medical programme. All training programmes need to nurture and equip medical students with requisite skills for adaptation, re-organization of personal management, development of personal well-being and personal health, and thus lay the foundations for personal career growth, professionalism and resilience throughout the course of their careers.

**(2705 words incl. tables)**

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