

An Assessment of Stress-induced Life Change in Students of Health Sciences: The Path toward a Coping Strategy

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Abstract

Background and Objectives: Stress among students of the health sciences can lead to reduced performance of future healthcare human resources. To address this threat there is a need to develop a robust understanding of the nature and intensity of stress in these professionals. To help approaching this goal, the present study assessed stress-induced life change in students of Tehran University of Medical Sciences by quantifying their stressful life events.

Methods: A cross-sectional descriptive-analytical study was carried out. Using a cluster sampling method, 248 students were randomly selected from the students of medicine, nursing, dental medicine, pharmacy, allied-medicine, health, midwifery, medical management and information, and rehabilitation disciplines. Based on the concept of Life Change Units (LCU), a questionnaire was developed to quantify the stressful events in student life. The questionnaire contained 54 weighed items about stressful life events related to four groups of interpersonal (10 items), personal (16 items), academic (14 items), and environmental (14 items) stress sources. Validity of the questionnaire was determined by expert opinion. The questionnaire reliability was ensured by Cronbach's alpha of 0.88. The mean LCU loading of demographic groups was compared using t test and ANOVA.

Findings: The average LCU loading in student was 71. Twenty seven percent of the students reported an average LCU loading < 50, 46%, LCU loading between 150-300, and 27%, LCU loading > 300. The highest reported life changes were related to personal factors (86), followed by interpersonal (79), environmental (63), and academic (55) factors. Male students showed significantly higher life change as compared with their female counterparts ($P < 0.01$). Students of medical and graduate courses jointly expressed significantly higher life change as compared with the under graduate students ($P < 0.01$). Students of nursing showed significantly higher life change in comparison to other students except medical students ($P < 0.01$). Upper-year students reported higher life change as compared with freshman students ($P < 0.01$). LCU loading was found significantly higher in students with sleeplessness ($P < 0.05$) and muscle spasm ($P < 0.05$), whereas no significant effect was observed for other clinical symptoms.

Conclusions: Our study indicated that a considerable percentage of students are exposed to a high risk of health problems. This observation points out the urgent need for implementing effective stress management strategies to assist students in coping with stress. Such a strategy should primarily focus on enhancing students' personal life management and communication. Male and upper-year students need to receive particular attention. Stress in students of medical and nursing disciplines needs to be specifically characterized and addressed.

Keywords: Stress, Life Change Unit, Students of Medical Sciences

Background and Objectives

Student life is accompanied by a diverse range of stressful conditions. In the first year of college, students experience unprecedented changes in life style. Transition from a personal to an impersonal life, stay-

ing away from home, missing direct support of family and friends, the need to interact with individuals of various cultures and beliefs, increased academic demands, and the need for time and task management skills are among the most common challenges of early student life [1, 2]. As the students progress through their respective courses, some of these stressful conditions are alleviated. By contrast, other potential stressors including those directly involved with the course – competing for good grades, coping with excessive homework, and dealing with unclear

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assignments – together with the typical sources of strain in a young individual's life – financial problems, family duties, and concerns about future career – can persist during a student's time at the university [3]. In addition to these common stressors, students of medical sciences are exposed to a unique set of stressful conditions imposed by the nature and complexity of medical educational process. Multiple clinical, teaching and research assignments, heavy academic workload, length of work hours, lack of leisure time, and the need to work with patients are among these factors [4-7]. Students of medical and nursing professions are also required to experience stressful clinical courses. To attend these courses the students may need to travel some distance and use complex technical equipment [2]. Furthermore, they must perform procedures that have the potential to harm their patients, which in turn can serve as a significant source of stress due to the possibility of mistakes and the consequences [2]. These facts justify the findings of several studies identifying higher stress among the students of medical disciplines when compared with other students [8-11].

Despite the existence of these stressors, the students of medical sciences have little control over stressful events, a situation that if continued, can lead to serious problems [12-14]. According to some reports approximately 10% of medical students suffer from disorders due to depression, and 6% have a history of suicidal thinking [15]. Other studies have indicated that excessive stress levels can lead to a diverse spectrum of psychological adversities such as feeling of loneliness and nervousness, sleeplessness, excessive distress [2] and, in general, reduced well-being [16]. These effects, in turn, can lead to other mental and physical problems and behavioral disorders. Evidence also shows that distress resulting from stressors has harmful effects on professional development, and can negatively impact empathic and humanitarian attitudes among medical students [17, 18]. Based on these facts, stress should be regarded as a phenomenon that influences all domains of activity in health professionals, from personal life, to learning and educational success, and to the ability to fulfill assigned duties [19].

Students of medical sciences and related disciplines are the future professionals of the health system. To develop a healthy community, the health workforce should be healthy itself. Persistent psychological and physical effects of stress on the students of health sciences can harm the effectiveness of healthcare human resources. To address this threat, development of effective stress coping strategies tailored to

the needs of students of health sciences is an imperative requirement. For effectiveness, such strategies should be based on a realistic description of major stressors in student life.

Over decades of research in stress, several methods have been developed for evaluating stress level and ranking causative factors. One of the widely used methods in assessing stress is the method developed by Holms and Rahe that allows for indirect evaluation of stress level by quantifying life changes induced by stressors [20]. Based on the theoretical ground that stressful events can increase the probability of illness, the method of Holms and Rahe enables estimating such a probability based on the intensity of stressful events in the recent past. Therefore, besides allowing an estimation of stress levels based on factual life events, this method provides the additional possibility of interpreting an individual's stress-induced life change in terms of his/her health status [21, 22]. In addition, by including a wide variety of stressful events, this method allows considering the effects of not only the most unpleasant events, but also the routine and daily events that cumulatively can function as a significant source of stress [22].

Stress among medical and nursing students and its consequences has been the focus of several lines of research in Iran [23-26]. However, the importance and persistence of the challenge requires provision of further data to develop a broader understanding of the state of stress in Iranian students of health sciences [2]. To this end, herein we report an assessment of stress induced life change among students of various health disciplines in Tehran University of Medical Sciences (TUMS). Comparison of the results with previous observations and implications of the study for coping programs are also discussed.

Methods

Study Design and Sampling

This cross-sectional descriptive-analytical study was conducted between October 2010 and September 2011 in Tehran University of Medical Sciences (TUMS). The students of schools of Medicine, Nursing, Dental Medicine, Pharmacy, Allied Medicine, Health, Midwifery, Rehabilitations, and Medical Management and Information were considered as the study population. Using a cluster sampling method and Kukran formula, 248 students were randomly selected.

Measurement Instrument

Inspired by the concept of Life Change Units (LCU)

Table 1 Frequency of stressful life events in students

Life Events	Impact Coefficient	Frequency (Number)	Frequency (%)
Personal Factors			
Change in sleeping habits	89	45	89
Change in eating habits	74	44	87
Accepting new responsibilities	73	10	21
Financial issues	71	47	93
Finding a job	65	5	11
Speaking in public	60	24	48
Changes in use of alcohol or substance abuse	39	4	8
Performing difficult tasks	35	11	22
Being admitted to the university	32	28	55
Breaking the law	14	15	29
Change in religious habits	13	26	52
Death of a family member	12	6	13
Death of a friend	6	5	10
Emotional problems	32	18	35
Marriage/ engagement	2	4	8
Health risk	44	26	52
Interpersonal Factors			
Change in social activities	71	38	75
Conflict with classmates	61	10	20
Becoming acquainted with new classmates	57	24	48
Quarrel with friends	41	20	36
Conflict with parents	21	21	41
Finding new friends	36	20	38
Gain of new family member	39	5	10
Family member health risks	44	19	37
Conflict with college staff	21	12	23
Addiction of family member to alcohol or drugs	49	6	13
Academic Factors			
Increase in the number of classes	73	11	22
Obtaining a lower grade than expected	68	8	17
Absence from class and the consequences	21	24	47
Postponement of the time of graduation	20	8	16
Scientific challenges with professors	11	11	21
Change in school location	20	30	58
Time management challenges	60	15	30
Problems with academic laws and regulations	8	14	28
School being distant from home	20	32	63
Study before exam	62	10	119
Exams	68	15	29
Patient examination	65	13	26
Use of new equipment in apprenticeship periods or clinical training	65	9	18
Research activities	22	12	23

Table 1 Frequency of stressful life events in students (*continued*)

Environmental Factors			
Holidays/ squeezed rest	82	9	18
Waiting in long lines	69	22	44
Lack of computer skill	69	8	15
Living in dirty and unorganized places	50	24	48
Change in life environment conditions	46	18	35
Personal car needing maintenance and repair	42	5	10
Parent divorce	73	5	9
Leaving job	8	15	30
Being in non-casual environments	45	16	31
Pretending for a long time	15	10	19
Inappropriate dormitory condition	50	26	52
Inappropriate transport services	40	31	62
Unsuitable classrooms	30	14	27

and by consulting Social Readjustment Rating Questionnaire (SRRQ) [20], Taylor Manifest Anxiety Scale (TMAS) [27], and Student Stress Scale (SSS) [28], a questionnaire was developed to quantify the stressful events in student life. The scale contained 54 items about life's stressful events related to four groups of interpersonal (10 items), personal (16 items), academic (14 items), and environmental (14 items) stress sources. An impact coefficient was specified to each event based on its relative importance (Table 1). To ensure scale validity, an independent panel of experts in clinical psychology was invited to evaluate the measurement tool. After obtaining their comments, the scale was revised accordingly, and the final version was approved by the panel. The internal consistency reliability of the scale was ensured by Cronbach's alpha of 0.88. Results were interpreted in terms of students' health status using Rahe's rule of thumb, which links an LCU score less than 150 to a 30% chance of stress-induced illness, 150-299 to a 50% chance, and more than 300 to a 80% chance [22].

A separate questionnaire asked participants about their demographic characteristics and any possible clinical symptom in the past 12 months in terms of headache, cardiovascular problems, menstruation, digestive problems, backache, neckache, hypertension, sleeplessness, and skin and other types of allergy.

Statistical Analysis

Data were summarized using descriptive statistical methods. Difference in mean LCU loading between demographic groups was examined using t test and ANOVA. All analyses were carried out using SPSS Software Version 18.

Results

Demographic Data

Of 248 distributed questionnaires, 198 valid questionnaires were returned (response rate = 80%). Among the respondents, 51% were female (100), and 85% were single or never married (170). Ages of students averaged 23 years varying between 19-32 years.

Descriptive Analysis

Table 1 presents the frequency of each stressful life event in the sample group. As seen, among personal factors, the highest frequency is related to "Change in sleeping habits" followed by "Change in eating habits", and "Financial issues". The lowest frequent item is "Change in alcohol or drug consumption".

Among interpersonal factors, the highest frequency was related to "Change in social activities" followed by "Acquaintance with new classmates", and "Conflict with parents". The lowest frequent item was "Gain of new family member".

Among academic factors, "Study before exam" was the most frequently chosen item, followed by "Long distance between home and school" and "Change of school location", whereas "Receiving lower than expected grades" gained the lowest frequency.

Among environmental factors, the highest frequency was related to "Inappropriate transport services" followed by "Inappropriate dormitory conditions" and "Living in filthy and unorganized places". "Parent divorce" was the lowest frequent item.

Table 2 shows mean student life changes resulted from each category of stressful event. As seen, per-

sonal factors have induced the greatest life change, whereas the lowest level for life change has been related to academic factors.

In addition, 27% of students reported an average LCU loading less than 150, 46% LCU loading between 15-300, and 27%, LCU loading higher than 300.

Inferential Analysis

We compared mean self-reported life change among different demographic and academic groups. Male respondents showed significantly higher mean LCU loading compared to females ($P=0.001$). While males showed a higher mean LCU loading due to personal factors ($P = 0.02$) and interpersonal factors ($P = 0.03$), LCU level due to academic and environmental factors was not significantly different between the two genders (Table 3). We also identified a significantly higher mean LCU loading in upper-year students compared with freshman students ($P = 0.004$). Master-of-science and professional-doctorate students jointly showed significantly higher LCU loading compared with Bachelor-of-Science students ($P = 0.003$). Comparison of LCU loading between different schools revealed higher life change in the students of Nursing school compared with other students except the students of Medicine school ($F = 3.156$, $P = 0.003$). In addition, LCU loading was found significantly higher in students with sleeplessness ($P = 0.02$) and muscle spasm ($P = 0.015$), whereas no significant effect was observed for other clinical symptoms.

Discussion

Comparative Study

The purpose of this study was to assess the level of stress-related life change among the students of Tehran University of Medical Sciences, the largest Iranian medical university. Our study indicated that three fourth of students are faced with moderate to high levels of life change induced by stressful events. Although Rahe's method does not directly measure the stress level, the proportion of students reporting moderate to high stress-related life change is indirectly comparable to the proportion of students in British medical universities experiencing moderate or high stress levels (88%) [29]. However, the proportion of TUMS students with high level of stress-induced life changes is by far lower than the relative frequency of high stress students from Seth G. S. Medical College (29% vs. 73%) [23].

Our study identified academic factors as the lowest influencing stressors in students. On the other

Table 2 Descriptive statistics of student life change due to the stressful life event categories

Life event categories	Mean	SD	Min	Max
Personal	86	49	60	295
Interpersonal	79	41	58	200
Academic	55	51	45	123
Environmental	63	52	50	181

hand, personal stress agents were found as the major causes of stress-related life change. This replicates the findings of Dzurilla and Sheedy [30] and Firth [31], who reported personal issues as the main stressors. In addition, the fact that interpersonal factors were the second important stressors is consistent with findings of Mahat [32], in which interpersonal relationship was identified as the most frequent stressful factor, and those reported by Ross [33] who identified interpersonal sources of stress as the most common.

Our study included assessment of life change between the students of different grades and different schools. The students of medicine jointly with master-of-science students experienced higher stress-induced life change. In addition, students of nursing expressed higher stress related life change when compared with other students except the students of medicine. These observations re-emphasize that students of disciplines more directly related to patient care practices are more exposed to stress agents, as reported by several previous studies [11, 34].

Comparison of LCU loading between genders revealed higher stress-related life change in male students as compared with their female counterparts. Previous findings on the influence of gender on student stress are inconsistent. While von Bothmer and Fridlund [35] observed higher stress levels in female

Table 3 Comparison of life change originating from different categories of stressful events between male and female students

Life event categories	Males		Females		P-value
	Mean	SD	Mean	SD	
Personal	95	45	80	51	0.02
Interpersonal	89	43	69	40	0.03
Academic	63	54	44	38	0.1
Environmental	72	60	53	42	0.09

students compared to males, Yap *et al.* [36] did not find any significant effect for gender, and Health and Macfar [37] and Abouserie [29] identified higher stress levels in male students compared with females. Our study also identified higher LCU loading in upper-year students compared to freshman students, which reflects the findings of Supe [23] and Saipanish [38].

A useful application of LCU-based quantification of stressful events is the indirect reflection of the results on the subjects' health status. Based on Rahe's rule of thumb [22], our results indicated that nearly half of the students are exposed to a 50% risk of illness, whereas another 27% are likely to become ill with a risk of 80%. Some mild illnesses such as sleeping disorder and muscle spasm reported by high LCU loading students appear to be the result of stressful events.

Study Implications

The relatively high risk of stress-related health problems in the surveyed students indicates the immediate need for design and implementation of effective coping strategies. Such a strategy should have a greater focus on males relative to females as our results show a higher reporting of stress-related life change in males. The fact that personal and interpersonal life events were the highest life changing factors suggest that an effective stress management program in TUMS should emphasize on assisting students with enhancing their personal life management and communication skills. In contrast to a number of previous studies [2, 39], we found higher stress in upper-year students as compared with freshmen students. While an inverse pattern can be explained by the requirements of transition to student life in the first year of college [1, 2], the likely reasons for reportedly higher stress-related life change in upper-year students is unclear. Hence, identifying the influencing factors in this regard calls for further studies. Consistent with other studies, we found higher exposure to stressful events in students of medicine and nursing in comparison with other students. Further studies, thus, should undertake exploring the specific factors that induce higher stress in medical and nursing students, thereby providing a reference frame for development of coping strategies.

Conclusions

This study assessed stress-related life change in the students of Tehran University of Medical Sciences by quantifying stressful life changing events. The high frequency of students reporting moderate

to high stress-induced life changes, which in turn can lead to health problems, implies the immediate need for implementing stress management strategies. Students expressed higher LCU loading as a result of personal and interpersonal stressful events compared with other stressors. This indicates that a stress management program should focus on assisting students with enhancing their personal life management and communication skills. The finding that males and upper-year students expressed higher life change compared with females and freshman students, respectively, indicates the need for more in-depth investigation into the nature of stress in students of health sciences. Consistent with several other investigators, we as well identified significantly higher exposure to stressors in medical and nursing students compared to other students. Therefore, further studies should undertake closer characterization of stress causes in these groups to provide a robust frame of reference for developing coping strategies.

Abbreviations

(LCU): life change units; (TUMS): Tehran University of Medical Sciences

Competing Interests

The authors declare no competing interests.

Authors' Contributions

HD designed the study. SK contributed to data collection. HD, SJGM, and SK were involved in data analysis and interpretation of the results. SK prepared the draft manuscript. HD revised the manuscript. All authors read and approved the final manuscript.

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