

Role of Stress in Burnout among Students of Medicine and Dentistry – A Study in Ljubljana, Slovenia, Faculty of Medicine

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ABSTRACT

Medical education is challenging, but for some students it can be very stressful. Studies suggest that stress during medical education can have a negative impact on students' mental health and that burnout is frequent among medical school students. The aim of this study was to measure burnout among students of medicine/dentistry (M/D) at the Faculty of Medicine, University of Ljubljana, Slovenia, in relation to their perception of stress, so as to enable planning preventative activities for students at risk. The data were collected in a cross-sectional study, carried out in spring 2008 among the total population of M/D students of 1st, 3rd, 4th and 6th year, using a self-administered online questionnaire. Oldenburg Burnout Inventory (OLBI) instrument was used. Separate burnout scores were calculated for the exhaustion and disengagement dimensions of burnout, and related to students' perception of stress. Multiple linear regression method was carried out to adjust the association estimates for several potential confounders (gender, study program, relationship status, and grade). The overall response rate was 47.2%, and a total of 476 students participated. Students scored higher on exhaustion than on disengagement dimension – the mean value of burnout scores on the exhaustion dimension scale was –1.68, while it was –4.58 on the disengagement dimension scale. The results showed a statistically significant difference between high and low risk-for-stress groups of students in both burnout dimensions (average value of burnout scores on the exhaustion scale: high risk-for-stress group –3.69, low risk-for-stress group 0.19, $p < 0.001$; average value of burnout scores on the disengagement scale: high risk-for-stress group –5.57, low risk-for-stress group –3.65, $p < 0.001$). After adjustment for potential confounders differences on both burnout subscales remained almost unchanged. Results confirmed our hypothesis that M/D students of Ljubljana Faculty of Medicine who frequently experience stress (especially those with poor coping mechanisms), exhibit higher degree of burnout.

Key words: burnout, stress, medicine students, dentistry students

Introduction

Burnout is a concept which was established more than thirty years ago^{1,2}. However, to this date researchers are not unanimous in its definition^{1,3}. Generally, burnout is a measure of professional distress. Some describe it as a form of extreme fatigue, some as a multi-dimensional construct, and some as a state in which individuals receive little reward and considerable punishment from work because of low control over the work process, and/or lack of skills/competencies⁴.

It is known that the work of health professionals, among them physicians and dentists, is highly stressful, and often leads to burnout^{5,6}. It has been hypothesized

that burnout and mental distress originate in medical school⁷.

Study of medicine is considered as highly demanding and stressful. Several studies suggest that medical schools and studies dominate students' lives, and that experiencing high stress levels during medical training can negatively influence students' mental health, their cognitive functioning and their ability to learn^{8–10}. High prevalence of distress among medical students has been found in several studies^{5,7}. Presence of mental disorders, especially depression and anxiety, is also common among students of medicine and dentistry^{5,7,8–10}. Some authors be-

lieve that the inability to effectively and constructively cope with stress contributes to burnout, and others find that burnout and student distress are reactions to negative life events and pressing environment^{5,7,11,12}. Moreover, highly burnout individuals reported a history of depression more often than individuals with low levels of burnout¹⁰.

Several instruments for measurement of burnout exist. Two widely used instruments for establishing burnout among medical students are Maslach Burnout Inventory (MBI) and Oldenburg Burnout Inventory (OLBI)^{13,14}. Authors of OLBI consider burnout as consisting of two dimensions – exhaustion and disengagement¹⁴. In this model, disengagement (feeling detached from study) corresponds to depersonalization scale of MBI, and exhaustion is defined as cognitive, emotional and physical exhaustion (for example the feeling of being drained and exhausted by medical courses)^{3,4}.

At the Faculty of Medicine, University of Ljubljana, one of two medical schools in Slovenia, the study programs of medicine and dentistry are currently still conducted by traditional curriculum, where the first three years are dominated by preclinical courses and the final three by clinical courses and hospital rotations. Although these study programs are considered stressful, up to the present study only some aspects of health behavior of students have been studied – mainly their nutritional habits¹⁵. Distress and burnout among M/D students have not been studied yet. Stress (especially perceived sources of stress and coping with stress) among different kinds of students in Slovenia has been studied, but to our knowledge this research was never complemented by research of burnout. However, the problem of medical doctor burnout was noticed by the Slovenian Medical Chamber, and a study on burnout among Slovenian medical doctors was planned a few years ago. Unfortunately, it has not been conducted yet.

Considering this background, we started a study aimed at measuring burnout among medicine/dentistry (M/D) students of the Faculty of Medicine, University of Ljubljana, Slovenia, especially in relation to students' perception of stress. Our main hypothesis was that M/D students who frequently perceive stress, experience higher degree of burnout than other students.

Participants and Methods

Participants

The data were collected in March and April 2008 in a cross-sectional study. Total populations of the 1st (N=299), the 3rd (N=273), the 4th (N=238), and the 6th grade (N=198) of M/D students of the Faculty of Medicine, University of Ljubljana, Slovenia, were invited to participate in the survey (in total 1,008 students). The structure according to study program was 807 (80.1%) students of medicine, and 201 (19.9%) students of dentistry, and the structure according to gender was 321 (31.9%) males, and 686 (68.1%) females.

Ethics

The research protocol for the survey was approved by the National Medical Ethics Committee of the Republic of Slovenia in February 2008.

Study instruments

A self-administered online questionnaire was used, prepared by the first author predominantly on the basis of two internationally approved questionnaires: Countrywide Integrated Non-communicable Diseases Intervention (CINDI) Program Health Monitor Core Questionnaire¹⁶, and OLBI questionnaire¹⁴. CINDI Health Monitor Core Questionnaire was translated from the original English version into Slovene by the experts at the Ministry of Health of the Republic of Slovenia in 2001.

The factorial and convergent validity of the OLBI in respect to MBI instrument were previously established¹⁴. For translation of OLBI questionnaire into Slovene the English version of OLBI was used. The questionnaire was modified so that questions about work were replaced by identical question about the medical course. The version of OLBI questionnaire used in our study consisted of 14 items: 7 items on the disengagement, and 7 items on the exhaustion subscales. Three items on the disengagement subscale were worded positively as well as four items on the exhaustion subscale. Each item had four response alternatives, which ranged from 1 (strongly agree) to 4 (strongly disagree). Items from both subscales were listed in a mixed order.

Implementation of the study

The study was extensively introduced to students by the main researcher (a student of medicine herself) personally. Each student received a leaflet with a short description of the research objectives, a unique, pseudo-randomly assigned access code, and the web-address of the questionnaire. The access code enabled access to the questionnaire only to the students of Ljubljana Faculty of Medicine, and once submitted, was deactivated; repeated access to the questionnaire was disabled. The used access codes were saved in a separate file, and it was impossible to link answered questionnaire with the access code. Access logging, which would enable a skilled computer user to gather such information, was disabled in advance.

We attempted to increase responsiveness by reminding students through representatives of each grade, and by a lottery with winning prize (ten gift coupons, each valid 20 Euro for purchase of medical books, one per student). These ten gift coupons were gifted to the researchers by a local bookshop specializing in medical and stomatological books. The recipients of coupons were randomly determined by a computer program.

Observed outcomes

The main observed outcome was burnout, measured by the OLBI instrument. Burnout score was calculated separately for the disengagement and the exhaustion sub-

scales. Calculation of the score was designed in a manner, where for each response predicting greater possibility for burnout the response alternative was added to the subscale score, while for each response predicting lower possibility of burnout, the response alternative was subtracted from the score. Thus, the lower the final score on a subscale, the lower degree of burnout on this subscale was reported by the student, and vice-versa. Burnout scores on both subscales were related to the perception of stress.

An additional observed outcome was the prevalence of students which were burned out on both subscales more than the average. To get the estimate, we first calculated the average values on both subscales. Afterwards, we classified students into two groups: 1 = burned out more than average, 0 = burned out less than average. Finally, we combined both subscales. Students who were classified on both subscales as burned out more than average were considered the observed group.

Risk factors

Stress in medical education was considered as the main risk factor. It was assessed on the basis of two questions: (a) »How often do you feel tense, stressed or under a lot of pressure?« (1 – never; 2 – rarely; 3 – sometimes; 4 – often, 5 – every day, and (b) »Do you feel that you are able to cope with these feelings?« (1 – I can cope with them easily; 2 – I can cope with them with moderate effort; 3 – I can cope with them with major effort; 4 – I can barely cope with them, 5 – I cannot cope with them at all, my life is almost unbearable). The participants were classified into two groups according to the frequency of distress and their ability to cope with it. Those who answered that they felt tense, stressed or under a lot of pressure frequently or every day, excluding all who stated that they could cope with these feelings easily, were classified in the high risk-for-stress group, and the others in the low risk-for-stress group.

As potential confounders gender (male, female), study program (medicine, dentistry), relationship status (married or living in a consensual union, regular partner but not living together, single), and grade (1st, 3rd, 4th, 6th) were considered.

Statistics

At first, the association between burnout scores on both subscales and the perception of stress was univariately assessed by Student t-test and simple linear re-

gression. The association between burnout scores and potential confounders was assessed by Student t-test or analysis of variance.

Afterwards, multiple linear regression method was performed to adjust the estimates of association between burnout scores on both subscales and perception of stress for potential confounders. The dummy variables were created using a simple method for coding dummy variables (one group was assigned as the reference group). P-value of 0.05 or less was considered significant.

The SPSS statistical package for Windows (Version 15.0, SPSS Inc., Chicago, IL, USA) (Licence: University of Ljubljana, Slovenia) was used as a tool for analysis.

Ethics

The research protocol for the survey was approved by the National Medical Ethics Committee of the Republic of Slovenia in February 2008.

Results

Out of 1,008 invited students, 476 participated in the study. The overall response rate was 47.2%. It was the highest in the 3rd grade (150/273; 55.0%), and the lowest in the 6th grade (64/198; 32.3%). The response rate in the 1st year was 44.7% (134/299) and 52.9% (126/238) in the 4th grade. The response rate was 44.3% (89/201) among students of dentistry and 47.6% (385/808) among students of medicine. The responders did not differ statistically from the student population either in study program (medicine: 81.2%; dentistry: 18.8%; $p=0.526$), or in gender structure (males: 27.9%; females: 72.1%; $p=0.070$).

The responders did not differ statistically from non-respondents in age distribution or distribution of size of settlements of permanent residence, but the response to the survey was slightly lower among men (47.0%) than among women (53.0%) at a ratio 1:1.1 (according to 2001 population data the ratio was 1:1). The questionnaires of 9,034 respondents (median age 45 years) were eligible for analysis (eligibility criteria: gender and age provided by Statistical Office of the Republic of Slovenia).

The burnout scores on the exhaustion dimension were possible to establish for 460/476 respondents (96.6%). The average value was $-1.68 (\pm 3.50; \text{min } -13, \text{max } 8)$. The burnout scores on the disengagement dimension were possible to establish for 463/476 respondents (97.3%). The average value was $-4.58 (\pm 2.97; \text{min } -13, \text{max } 4)$.

TABLE 1
TYPICAL VALUES OF OLDENBURG BURNOUT INVENTORY (OLBI) SCORES ON THE EXHAUSTION AND DISENGAGEMENT DIMENSIONS SUBSCALES IN HIGH AND LOW RISK-FOR-STRESS GROUPS OF MEDICINE/DENTISTRY STUDENTS AT FACULTY OF MEDICINE, UNIVERSITY OF LJUBLJANA, SLOVENIA

OLBI Dimension	Risk-for-stress Group	N	\bar{X}	SD	p
Exhaustion	low	221	-3.69	3.20	<0.001
	high	237	0.19	2.65	
Disengagement	low	221	-5.57	2.75	<0.001
	high	240	-3.65	2.86	

TABLE 2
TYPICAL VALUES OF OLDENBURG BURNOUT INVENTORY (OLBI) SCORES ON THE EXHAUSTION AND DISENGAGEMENT DIMENSIONS SUBSCALES IN CATEGORIES OF POTENTIAL CONFOUNDERS IN MEDICINE/DENTISTRY STUDENTS AT FACULTY OF MEDICINE, UNIVERSITY OF LJUBLJANA, SLOVENIA

OLBI Dimension	Potential Confounder	Category	N	\bar{X}	SD	p
Exhaustion	Gender	Male	128	-2.68	3.56	<0.001
		Female	331	-1.30	3.41	
	Study program	Dentistry	86	-1.66	2.94	0.987
		Medicine	372	-1.67	3.61	
	Relationship status	Married/consensual union	23	-1.74	4.00	0.866
		Regular partner	210	-1.78	3.34	
		Single	223	-1.60	3.63	
	Grade	1 st	128	-1.23	3.31	0.061
		3 rd	145	-1.59	3.69	
		4 th	122	-1.76	3.66	
6 th		64	-2.67	2.98		
Disengagement	Gender	Male	128	-4.69	3.08	0.638
		Female	334	-4.54	2.93	
	Study program	Dentistry	88	-4.45	2.52	0.673
		Medicine	373	-4.60	3.07	
	Relationship status	Married/consensual union	23	-4.09	3.45	0.694
		Regular partner	212	-4.64	2.92	
		Single	224	-4.62	2.96	
	Grade	1 st	132	-4.75	2.54	0.620
		3 rd	145	-4.52	3.12	
		4 th	123	-4.68	3.17	
6 th		62	-4.18	3.08		

When univariately related to the perception of stress, average burnout score was statistically significantly higher in the high than in the low risk-for-stress group on both burnout dimensions (exhaustion dimension: for 3.88 score units; disengagement dimension: for 1.92 score units) (<0.001). Other details are presented in Table 1. Simple linear regression model additionally showed that 30.6% of variability of OLBI score on the exhaustion dimension could be explained only by stress ($R^2=0.306$), while this was true for 10.4% of variability of OLBI score on the disengagement dimension ($R^2=0.104$). In Table 2, mean values of scores on the exhaustion and disengagement subscales in different categories of potential confounders are presented. In the exhaustion dimension, only gender was statistically significantly related to burnout score among potential confounders, while grade was near the statistical significance (Table 2). In the disengagement dimension, neither of potential confounders was statistically significantly related to burnout score (Table 2).

Multivariate models for both burnout dimensions showed that after inclusion of information on gender, study program, relationship status, and grade as potential confounders, the difference in average burnout score between the high and the low risk-for-stress group of stu-

dents remained almost unchanged (Tables 3 and 4). The impact of stress was identified as predominant in both dimensions, as both models were statistically significant only, or almost only, on the account of perception of stress (<0.001) (Tables 3 and 4). On the exhaustion dimension with inclusion of confounders, percent of explained variability increased to 31.8% ($R^2=0.318$), while it increased to 11.6% on the disengagement dimension ($R^2=0.116$).

It was possible to determine burnout on both subscales simultaneously for 457/476 participants (96.0%). Out of them, 172 (37.6%) scored less than average on both subscales, 132 (28.9%) on one subscale (exhaustion subscale: 77; disengagement subscale: 55), while 153 (33.5%) scored more than average on both subscales.

Discussion

The main results of our study confirmed a strong relationship between stress and burnout in the studied group. This is similar to results of many other studies^{17,18}. Especially the exhaustion subscale coincides well with stress¹⁸. We have found a statistically significant difference in

TABLE 3
RESULTS OF MULTIPLE LINEAR REGRESSION OF OLDENBURG BURNOUT INVENTORY (OLBI) SCORES ON THE EXHAUSTION DIMENSION SUBSCALE IN MEDICINE/DENTISTRY STUDENTS AT FACULTY OF MEDICINE, UNIVERSITY OF LJUBLJANA, SLOVENIA (N=457)

Factor	Observed category	Reference category	b	p
Stress	High-risk	Low-risk	3.741	<0.001
Gender	Males	Females	-0.602	0.055
Study program	Dentistry	Medicine	-0.091	0.798
Relationship status	Married/consensual union	Regular partner	0.289	0.660
	Single	Regular partner	0.200	0.486
Grade	3 rd	1 st	-0.340	0.349
	4 th	1 st	-0.500	0.186
	6 th	1 st	-0.797	0.094
(Constant)			-3.176	

TABLE 4
RESULTS OF MULTIPLE LINEAR REGRESSION OF OLDENBURG BURNOUT INVENTORY (OLBI) SCORES ON THE DISENGAGEMENT DIMENSION SUBSCALE IN MEDICINE/DENTISTRY STUDENTS AT FACULTY OF MEDICINE, UNIVERSITY OF LJUBLJANA, SLOVENIA (N=460)

Factor	Observed category	Reference category	b	p
Stress	High-risk	Low-risk	1.981	<0.001
Gender	Males	Females	0.229	0.445
Study program	Dentistry		0.233	0.491
Relationship status	Married/consensual union		0.224	0.723
	Single	Regular partner	0.158	0.566
Grade	3 rd	1 st	0.383	0.269
	4 th	1 st	0.174	0.629
	6 th	1 st	1.055	0.022
(Constant)			-16.714	

scores on both burnout subscales between the high and the low risk-for-stress group of observed students. Considering previous reports discussing the same issue, this finding was not unexpected^{18,19}. Observed higher scores on both burnout subscales in the high risk-for-stress group could be explained by the fact that students who experience high levels of stress and ineffectively cope with stress, are at a high risk of becoming burned out. All stress is not bad in itself, but an overwhelming amount of stress, particularly when the student does not possess adequate coping skills, can drain the energy and motivation, and results in burnout. Comparing both subscales of OLBI instrument, students on average scored higher on exhaustion than on the disengagement dimension. Similar results were found in a Swedish study¹⁰. Unfortunately, the results of the two studies are comparable only to some extent, as the scores in our study are negative on both subscales, and the Swedish scores are positive, which is probably due to different approaches to calculating the final score.

Furthermore, the results of our study indicate that a third of the students score higher than the average on

both subscales of burnout. Fortunately, this percentage is lower than established by Dahlin and Runeson (47%)¹⁰, or Dyrbye et al. (45%)⁷. Nevertheless, a third of students scoring high on both burnout subscales, is a fact that needs to be explained further. Study programs of M/D at the Faculty of Medicine, University of Ljubljana, are proverbially more demanding compared to other undergraduate courses offered by the University of Ljubljana, and take 6 years to complete, while the majority of other undergraduate courses take 3–4 years to complete (depending on the course). Despite the fact that only the best students from secondary schools enter these study programs, some of them have significant problems. This age period in itself is a very stressful period, since it is characterized by major changes in biological and social spheres of life²⁰. Additionally, students might not be prepared to deal with negative experiences brought by M/D study programs: the amount of information that needs to be memorized in a short time, and lack of resources/people on which one could rely in difficult times. At our Faculty of Medicine, at the time of the study there was no designated person who would consult students on their

personal or academic problems. It is often expected of medical students today to possess skills and virtues (patience, professionalism, empathy, good communication skills etc.) that they are not taught during their previous education or in medical school. What is more, they can witness older colleagues and their mentors delivering substandard care, exhibiting poor communication and self-care skills, being unsympathetic or plainly rude. This duality and inconsistency can contribute to confusion in an evolving professional personality. Furthermore, students are not prepared to deal with competition between colleagues (e.g. numerous students striving for perfect grades and perfect grade average, refusing to help other colleagues or hindering their successful completion of study tasks). Getting accustomed to this new situation can be exhausting. Additional factor for exhaustion is striving for perfection – many students want to be among the best every time. As a result, they are more engaged in the studies (or try to give such an impression), which may lead to further exhaustion and increased burnout.

Some additional information was found in our study that could be important in planning an intervention. Firstly, on the exhaustion subscale a strong association was found in univariate analysis between gender and burnout score, where females scored significantly higher than males (Table 2). A similar situation was observed before^{7,10}. This begs the question – do women recognize and report exhaustion more frequently than men or do they deal less effectively with exhaustion and are sooner cognitively, emotionally and physically exhausted? A similar observation was made in studies of depression – women report it more frequently than men. According to the campaign entitled »Real Men. Real Depression« led by United States' National Institute of Mental Health, which began in 2003, men are unlikely to admit depressive symptoms and seek help²¹. Epidemiological data also show that the prevalence of depression among women is twice as high as that among men, further establishing gender-related differences in depression²². Because OLBI measures cognitive, physical and emotional exhaustion³, these findings should be interpreted in all three exhaustion »subdimensions«. Do females have less developed methods of dealing with emotional and cognitive exhaustion, or is this related to how women are traditionally brought up? Does this imply that men are less likely to admit emotional »weakness«? Our results might simply mean that females self-report exhaustion more frequently as they recognize it in themselves more frequently. However, in multivariate analysis this association was much less obvious, even though it was borderline significant (Table 3). Secondly, on the exhaustion subscale in univariate analysis, a weak association was found between grade and burnout score (Table 2). The results show that 1st grade students had the highest scores on the exhaustion dimension of OLBI of all grades. This is most probably due to the fact that the 1st grade students are still adjusting to the new situation in their lives and have not developed proper coping mechanisms yet. The first year at medical school is a departure from home into

self-dependent life, without direct support of primary family, and a significant change in living conditions for many Slovene medical students. Students at the beginning of their studies do not have meaningful previous experience in such a highly competitive and demanding environment. This was also found by Dahlin et al.²³. In higher grades, exhaustion (as a dimension of burnout) is less and less obvious. This supports the hypothesis that as they progress through medical education, students' coping mechanisms improve. They become better at dealing with medical school-specific stressors, which results in less exhaustion. Perhaps accumulating medical school specific experience and successful coping with difficult situations in the past enable students to navigate their studies with more ease than when they first began medical school. However, in multivariate analysis this association seems to be weaker (Table 3). Finally, while 1st grade students scored the highest on the exhaustion dimension, they also surprisingly scored the lowest of all grades on disengagement dimension. It seems that while 1st grade students are very exhausted, they stay engaged in their studies, which can perhaps be attributed to a strong desire to help alleviate suffering, a sense of service and high idealism upon matriculation¹². It is interesting to observe that disengagement is higher in the 3rd grade (the last year of pre-clinical courses) than in the 1st grade and then drops a bit in the 4th grade (the first year of clinical courses). Students matriculated into traditional medical curricula often complain that they desire more contact with patients and clinical medicine in their preclinical years. From the 4th to the 6th grade, disengagement increases almost twice as much as it does from the 1st to the 3rd grade (Table 2). Perhaps this is due to a growing disillusionment which students face at hospital/clinical rotations. Progressing through medical education, they are frequently exposed to cynicism, a culture of emotional detachment from patients, witness student abuse, social injustice, substandard care, unprofessional or unethical behavior by their teachers, and gain experience working in an imperfect healthcare system. All this may contribute to dissolving idealism, internalizing detachment from patients, and a growing concern that they will not be able to really help their patients, and thus resulting in increasing disengagement¹². This dichotomy is indicative of the different natures of burnout among 1st and 6th grade students, where exhaustion predominates in the 1st year and disengagement is the predominant characteristic of burnout in the 6th year. This finding is replicated in multivariate analysis of the disengagement subscale where 6th grade students exhibited significant difference in disengagement in comparison to the 1st grade students (Table 4). Above we suggested one possible explanation for the dichotomous nature of burnout observed in our study. However, taking into account the low response rate of 6th grade students it is difficult to make any firm conclusions about this finding at this stage of burnout research among M/D students in Slovenia.

The present study has some limitations. Firstly, one methodological limitation of our study is the fact that two original versions of OLBI exist: an English and a

German version. The English version of OLBI was translated into Slovene, and according to our knowledge, it was correct. It was only later observed that English and German versions of OLBI are not completely identical in meaning, as far as translation into Slovene is concerned. Therefore, one item (»I feel more and more engaged in my work«) on the translated disengagement subscale could potentially be interpreted in two ways by the responders. Because of specificities of Slovenian language, this error could not have been easily avoided, unless one of OLBI's original creators was involved in the process of translation. Secondly, using an online questionnaire could have influenced the quality of collected data. The advantages of using an online questionnaire are that students can complete the questionnaire from their own computer, where they have privacy and the ability to decide when they want to complete the rather lengthy questionnaire. We had hoped that by enabling the students to respond to the questionnaire via Internet, the privacy and anonymity it offered would induce them to be as honest as possible. The disadvantage of using online questionnaires is the problem of limiting access to the desired subpopulation. By using access codes we attempted to prevent non-students at Ljubljana Medical Faculty from completing the questionnaire, but it is impossible to ascertain to what extent we have succeeded. Thirdly, the response rate in our study was rather low compared to certain similar studies^{10,19,23}, and comparable to some other studies⁷. Many studies so far faced the problem of low response rates – because some of the questions are of very personal nature, and there might be concern that such information could be abused. However, the response rate was much higher than in an online cross-sectional study on self-reported chronic conditions in student population in Slovenia (in total population of Ljubljana and Maribor Universities students), which was conducted almost exactly at the same time than ours (1,294/52,425 students; 2.5%)²⁴, and the respondents didn't differ statistically from the student population either in study program or in gender structure. We were aware of this possible limitation already in the planning phase of the study and attempted to increase the responsiveness by arranging a lottery for the participants. The whole questionnaire was quite lengthy and took more than 30 minutes to complete. Considering this, we do not deem a coupon worth 20 € that could only be used for purchase of medical books an important confounding factor. However, we allow the possibility that a minority of students did find the lottery an additional stimulation for participating in the study, which they would have probably done anyway. The relatively low response rate could provide biased results. Burnout scores might have been lower if more students participated, assuming that non-responders were less likely to be burned out. However, they might have been much higher since people who experience burnout are likely to only perform the most essential tasks and it is possible that they do not have the energy or motivation to participate in a study, where implications for participants for improving their own situation are unclear and certainly not immediate. It is our be-

lief that non-responders in our study are likely to be less healthy, more burned out and unable to cope well with stress. The motivation for participating in our study was certainly not high enough for this vulnerable group of students since the participation was voluntary (i.e. it was not a part of a study course). Apart from the possibility of partaking in the lottery, there was no financial, material or academic compensation for participants. Because this was the first such study among Slovenian M/D students, this population also was not yet aware of possible benefits of such a study for the student body. With interventions aimed at reducing student stress and burnout, the importance of studies such as ours could be recognized in the students' community, and thus more impetus for participation could be gathered. Furthermore, the responders could provide socially acceptable answers. However, as students are not well educated in professional burnout and its implications, this source of bias is less likely. Finally, when we had to decide where to place the cut-off points on both subscales of the OLBI instrument, we decided to use the average value, as to the time of submission of this paper there were no established cut-off points validated in a Slovenian context for any subscale yet. The cut-off point, which classifies burnout score on an individual level as »burned out« or »not burned out«, is not a single consensual and universally accepted value³. Some countries (e.g. United States of America) have established their own cut-off scores, while others either adopted cut-off values from other countries or made conclusions without them^{10,19}. If we adopted different cut-off points our results could be different. However, we should be aware that diagnosis of burnout on the individual level cannot be based solely on the OLBI score. Nevertheless, such an approach is very convenient for statistical and research purposes, and has been employed in such situations numerous times.

On the other hand, this study has considerable strengths. The main strength of this study is that we have found positive association between stress and burnout in Slovenian M/D student population, and so evidence based interventions could be planned in this population group. Our findings could lay the foundation for reaching the goals of the healthy settings concept in the higher education environment in our country. Additionally, despite the limitations, this study also makes a good starting point for international comparisons in the region. As far as we know, some data is already being collected at Andrija Stampar School of Public Health, Medical School, University of Zagreb, in the 1st grade as part of the Social medicine course, concerning health and social problems of adolescents.

Basing on the results of the present study, the framework for necessary actions can be addressed. While certain subpopulations have stronger predispositions for burnout, appropriate actions have to be directed to all students – those already affected and those (yet) unaffected, because medical school environment is a risk factor for burnout in itself^{10,19,23}. Studies prove that workplace burnout is chronic in nature (irrespective of sample characteristics, cultural context and length of time for the follow-up survey)

and some indicate it might even be »contagious« as it spreads in work environment from a burned out individual to co-workers³. The same applies to the academic environment – work environment for the students¹². Thus, academic environments with high burnout rates should aim to also prevent burnout rather than just to treat it. Interventions to prevent burnout among M/D students of Ljubljana Faculty of Medicine should be organized at individual and on institutional levels. At the beginning, educators need to become aware of the high prevalence of student distress and student burnout, and decide to take the appropriate course of action. Secondly, students need to be thoroughly educated about anxiety, depression, substance abuse, burnout (its symptoms and consequences for health) and effective coping strategies for dealing with stress and burnout. We propose a series of short problem-based presentations aimed at smaller groups of students, focusing on the themes mentioned above. Thirdly, the staff and students should aim to promote student and faculty wellness, encourage professionalism, self-care, and help-seeking behavior while trying to destigmatize help-seeking. Students should encourage help-seeking behavior in their colleagues. Counseling services and support groups should be easily accessible to students. If possible, these services should be provided free of charge or at a minimal fee. Attempts by faculty to create less stressful conditions for studying, working and living should be made. Furthermore, students should take repeat courses after completing the initial training. Lastly, University of Ljubljana or its Faculty of Medicine should devise, publish and advocate policies for dealing with student distress, substance abuse, and prevention of student burnout.

Fortunately, some steps have already been taken to alleviate students' burnout at Ljubljana Faculty of Medicine. In the academic year 2009/2010, the revised M/D study programs were launched. Some larger courses are now split into two courses, and fewer courses take place in the same semester. The first students' responses are encouraging. Moreover, in 2006, 2007 and 2010 an elective workshop »The Healer's Art«, based on the elective from San Francisco School of Medicine, University of California, designed by Rachel Naomi Remen, was organized²⁵. This elective addresses the hidden crisis in medicine, the growing loss of purpose and commitment experienced by physicians under the stress of contemporary medicine. All participants highly praised the workshop; however, due to difficulties in securing the funds for the

elective and lack of support from the Dean's office for including it in the syllabus, its future is uncertain²⁵.

In parallel with the proposed interventions, future research should be directed towards identifying stressors which contribute the most to burnout, and monitoring the rates of burnout once the interventions are in effect. Relationship of burnout with depression, anxiety and personal life events should be explored further. Furthermore, relationships between personality traits and burnout should be explored in more depth. With future research, guidelines for establishing a clinical diagnosis of burnout could be set.

In conclusion, the results did not refute our research hypothesis, and more in-depth studies are required to assess the role which frequent perception of stress without good coping mechanisms plays in burnout of M/D students of the Faculty of Medicine, University of Ljubljana. We suggested a course of actions to prevent burnout among M/D students. Focusing on creating a less stressful study environment and promoting a culture of well-being, self-care and help-seeking on one hand, and training for good stress and burnout management strategies in the whole M/D student population on the other hand, is of vital importance if we are to educate a new generation of healthier health care professionals.

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ULOGA STRESA U IZGARANJU MEĐU STUDENTIMA MEDICINE I STOMATOLOGIJE – STUDIJA NA MEDICINSKOM FAKULTETU LJUBLJANA, SLOVENIJA

SAŽETAK

Studij medicine je izazov, ali za neke studente može biti vrlo stresan. Istraživanja su pokazala da stres tijekom studija medicine može imati negativan utjecaj na mentalno zdravlje studenta te da je izgorijevanje često među studentima medicinskih fakulteta. Cilj ovog istraživanja bio je izmjeriti izgaranje među studentima medicine/stomatologije (M/D) na Medicinskom fakultetu Sveučilišta u Ljubljani, Slovenija, u odnosu na njihovu percepciju stresa, kako bi se omogućilo planiranje preventivnih aktivnosti za rizične studente. Podaci su bili prikupljeni u presječnoj studiji, koja je bila provedena u proljeću 2008. godine u cjelokupnoj populaciji M/D studenata 1., 3., 4. i 6. godine, pomoću on-line upitnika. Kao instrument koristio se je Oldenburg Burnout Inventory (OLBI) upitnik. Odvojeno su bile izračunane ocjene za dimenziju iscrpljenosti i dimenziju neuključenosti izgaranja, i postavljene u odnošaj sa percepcijom stresa u studenata. Multipla linearna regresija koristila se je za prilagodbu procjene povezanosti između izgaranja i stresa na nekoliko ko-varijabli (spol, studijski program, partnersko stanje, godina studija). Ukupna stopa odgovora bila je 47,2%, a sudjelovalo je ukupno 476 studenata. Ocjene su bile više na dimenziji iscrpljenosti nego na dimenziji neuključenosti – srednja vrijednost izgaranja na mjernoj skali iscrpljenosti bila je –1,68, a na mjernoj skali neuključenosti –4,58. Rezultati su pokazali statistički značajnu razliku između studenata sa niskim i studenata sa visokim rizikom za stres u obje dimenzije izgaranja (prosječne vrijednosti izgaranja na skali iscrpljenosti: skupina s visokim rizikom –3,69, skupina s niskim rizikom 0,19, $p < 0,001$; prosječne vrijednosti izgaranja na skali neuključenosti: skupina s visokim rizikom –5,57, skupina s niskim rizikom –3,65, $p < 0,001$). Nakon prilagodbe na ko-varijable razlika na obje subskale izgaranja ostala je gotovo nepromijenjena. Rezultati su potvrdili našu hipotezu da je u M/D studenata Medicinskog fakulteta u Ljubljani, koji su često pod stresom (pogotovo u onih s lošim mehanizmima suočavanja sa stresom), stupanj izgaranja viši.