

ASSESSMENT OF CAUSES OF STRESS IN A PHARMACY STUDENT POPULATION DURING SEMESTER AND EXAM PERIOD

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ABSTRACT

Stress is one of the most significant factors that can influence the academic performance of students. To explore the causes of stress in students, the cross-sectional online survey was conducted during semester (in 2019 year) and during exam (in 2020 year) period at the University of Belgrade - Faculty of Pharmacy. The main results indicated that female gender was the most significant cause of stress during the exam period, and the most frequent stress cause was limited time to prepare exams and/or colloquia. The role of family, friends, and boyfriend/girlfriend showed to be of great importance in stress reduction during the semester and especially during the exam period. The most frequent manifestations of stress were feeling nervous, tired and worried. For stress reduction students usually listened to music and talked with friends. Therefore, student's obligations and their overall living conditions should be observed comprehensively. These results may indicate further actions to decrease stress levels in students, and need for academic environment that may help students to achieve the best academic performance.

Keywords: Sources of stress, pharmacy students, academic performance.



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INTRODUCTION

Stress is the natural body reaction to various external factors and can be defined as "the nonspecific response of the body to any demand made upon it" (1). Several studies revealed that higher levels of stress in healthcare students' population might lead to anxiety, depression, and higher risk for other diseases (2-4). The stress may intervene with academic performance, behavioral changes, low quality of mental health, lack of empathy and lower decision-making ability (5-7). The stress level in the student population is high because the study period is characterized as a period when making important life decisions, both professional and personal (8-10).

At the beginning of a student life, students are facing a lot of challenges: usually change of place of residence, adaptation to a new living and social environment, development of new learning strategies, adaptation to new methods of learning and studying (11). All of these challenges may lead to feelings of uncertainty and low self-esteem that may cause stress from the beginning of studies career. Stress levels in students may increase during exam periods or when some tasks should be finished in limited time such as colloquia and submission of seminar papers (11).

Master degree of integrated academic programme "Pharmacy", at the University of Belgrade – Faculty of Pharmacy includes 51 courses, 3 professional trainings and defense of master theses. Studies last 5 years (10 semesters) and provides 300 ECTS credits. During this period, each student has to attend 2061 theoretical classes (412.2 on average per year), 1644 practical classes (328.8 on average per year) and 1066 classes of professional trainings (12). Considering that most of the practical classes are performed in the laboratory after theoretical classes, students usually spend most of the day at the faculty facility during semester.

Studies examining stress in health care students have been conducted predominantly in the United States, as well as in other foreign countries such as the United Kingdom, the United Arab Emirates (UAE), China, Malaysia, and India (8, 13-17). These studies indicated different stressors in students: worries regarding the future and expectations of parents (14), health studies, lifestyle, health and academic factors (13, 17) and gender (15). The study conducted in UAE pointed out that there was no difference in stressors and coping strategies related to students' gender (14), opposite to study conducted in India (13). Exposure to stressors could lead to higher risks of several chronic health conditions in students' population (16).

There are several published studies, which included population of Serbian students, that examined stress predictors, burnout (18-20), stress perception and stress levels during COVID-19 (21, 22). Two studies included medical sciences students (19, 20), veterinary students (18), one without specific students type of study (21) and one which included both medical students and academic staff (22). The most common

stressors in these studies were: exams (18-20), communication with teaching staff (20), contacts with patients (19) and performing autopsy (19). In two studies the stress levels were higher in female students (19, 21) and one study did not found difference in burnout between students of different gender (18). During the COVID-19 outbreak, new factor that influence stress levels in students was taking care of disabled people (21). Studies on population on pharmacy students had not been previously conducted in Serbia.

THE AIM OF THE PAPER

This study aimed to assess the causes of stress in pharmacy students concerning study year, and periods in school year.

METHODS

The study was conducted as cross sectional study at two points (during semester (December 2019) and during exam period (February 2020)) at the University of Belgrade - Faculty of Pharmacy. All students were invited by e-mail to fill the online survey. Eligible students were those who had active e-mail address, were willing to participate and had internet access. Since the participation in the study was voluntary and all students data was anonymous and protected the approval of the ethics committee was not required.

The survey consisted of items developed by literature search and from discussion with students. The survey was created and conducted online using the Google forms. The completion of online survey was voluntary and anonymous.

The first part of the survey consisted of items regarding the student's age, gender, study year, number of ECTS credits achieved during the studies, student working status and permanent residence. The second part of the survey consisted of multiple choice items that examined causes that may contribute to stress, the self-assessment of overall stress level, the manifestations of stress on students, ability to function under stress, mechanisms for stress reduction and efficiency of those mechanisms. The self-assessment of overall stress level was also estimated by one question with answers rated on 5 point Likert scale (from "no stress" as 1 to "extreme stress" as 5).

Item that examines 13 different causes (living with roommate, living separately from family, financial situation, working/employment during studies, grades, exams/colloquia, scope of teaching, family relationships, friends relationships, health condition, doing sports, relationship with a boyfriend/girlfriend, limited time to prepare for exams) that may contribute to stress were estimated using the 5 point Likert scale where a value of 1 indicates the lowest contribution and 5 the highest contribution of cause to the stress.

The general students' characteristics were analyzed using the descriptive statistics analysis. The chi-squared test of independence has been used to test group differences for categorical data. To test differences between two groups of

interval non-normal distributed variables the Mann Whitney-U test has been used. Association between variables was established using the Spearman correlation. Ordinal logistic regression was used to test association of dependent ordinal variable stress levels (scale from 1 “no stress” to 5 “extreme stress”) and variables: gender (male gender as reference category), and 13 examined above mentioned causes of stress (categories from “no stress at all” to “moderately cause” were grouped as a reference category, and categories “causes” and “extremely causes” were grouped as second category). The values of $p < 0.05$ have been considered statistically significant in all performed tests.

The results analysis has been conducted using Microsoft Office Excel 2007 and Predictive Analytics SoftWare, version 28 (SPSS Inc. Chicago, Illinois, SAD).

RESULTS

At the first study point (during semester) 402 students accepted to participate in study and 335 students participated at the second point (during exam period). Responses of 3 students at the first and 4 students at the second study point were excluded due to incompleteness. Therefore data of 399 students during semester and 331 students during the exam period were analyzed.

The most prevalent were female students and students at the fifth and third study year (Table 1).

Table 1. General students' characteristics.

Variable	During semester (N = 399)	During exam pe- riod (N = 331)	Difference between two students groups
Gender, n (%)			$\chi^2 = 2.1, p > 0.05$
Female	366 (91.7)	293 (85.5)	
Male	33 (8.3)	38 (11.5)	
Age in years, average (SD), range	22.14 (1.84), 18-27	22.17 (1.89), 18-32	$U = 65416, p > 0.05$
Study year, n(%)			$\chi^2 = 5.4, p > 0.05$
1 year	15 (3.8)	10 (3.0)	
2 year	70 (17.5)	64 (19.3)	
3 year	98 (24.6)	92 (27.8)	
4 year	84 (21.1)	80 (24.2)	
5 year	132 (33.1)	85 (25.7)	
ECTS, average (SD), range	147 (74.22) 0-330	141.68 (73.68) 0-320	$U = 63984.50, p > 0.05$
Place of study, n (%)			$\chi^2 = 0.65, p > 0.05$
in hometown	121 (30.5)	98 (29.6)	
in other city	276 (69.5)	233 (70.4)	

Using the five point Likert scale, the stress level was rated significantly different during semester and exam period ($\chi^2 = 16.24, p < 0.05$). The most frequent levels of stress in students during exam period were: higher level of stress (36.25%), moderate stress level (28.70%) and extremely stress (27.19%). During semester these most frequent levels were: higher level of stress (40.35%), moderate stress level (35.59%) and extremely stress (16.04%).

The causes of stress ranked as the highest percentage of extreme stress were limited time for exam preparation and

exams/colloquia itself. Causes that contributed to the least grade of stress were: performing sports, working during studies and living with roommate. Causes such as relationships with friends, family members and boyfriend/girlfriend and living with roommate were the least stressful during the exam period (Figure 1). The difference in stress grades during the semester and period of exams was not statistically significant (for all χ^2 statistics, $p > 0.05$).

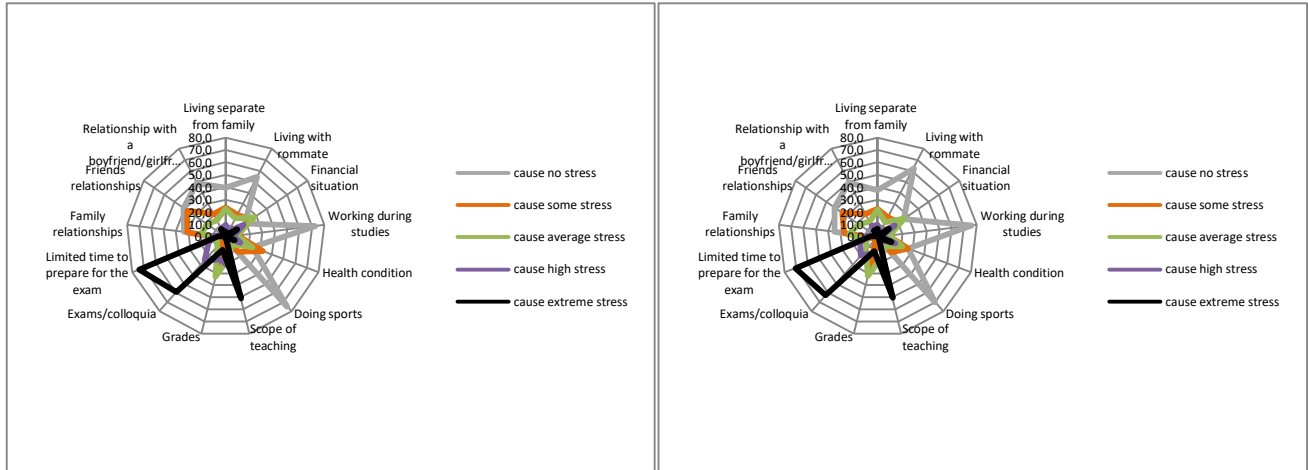


Figure 1. Causes of stress during semester (left) and during exam period (right) (the percentage value of each response level for each cause).

Correlation between students study year and stress grades were low and not statistically significant ($p=0.03$, $p>0.05$ and $\rho=-0.05$, $p>0.05$ during the semester and exam period respectively). Level of stress during semester was in positive correlation with students' age, but the correlation between these variables was not significant during exam period ($\rho=0.11$, $p<0.05$ and $\rho=0.03$, $p>0.05$, respectively).

During the exam period, female gender was associated with increase in the odds of higher stress grade, with $OR=1.56$ (95% CI: 0.90 to 2.21), Wald $\chi^2(1) = 21.65$, $p < 0.001$) opposite to semester period when this association was not significant ($OR=0.41$ (95% CI: -0.25 to 1.08), Wald

$\chi^2(1) = 1.50$, $p > 0.05$). During semester 57.4% students could perform everyday activities under stress as opposed to 48.6% of students during exam period. This difference was statistically significant ($\chi^2= 5.56$, $p < 0.05$). Stress had different manifestations in students at two study points (Figure 2), but the overall difference was not statistically significant ($\chi^2= 11.78$, $p > 0.05$).

Contributions of stress causes were not significantly associated with the increase in stress levels during exam and semester (Table 2).

Stress manifestations

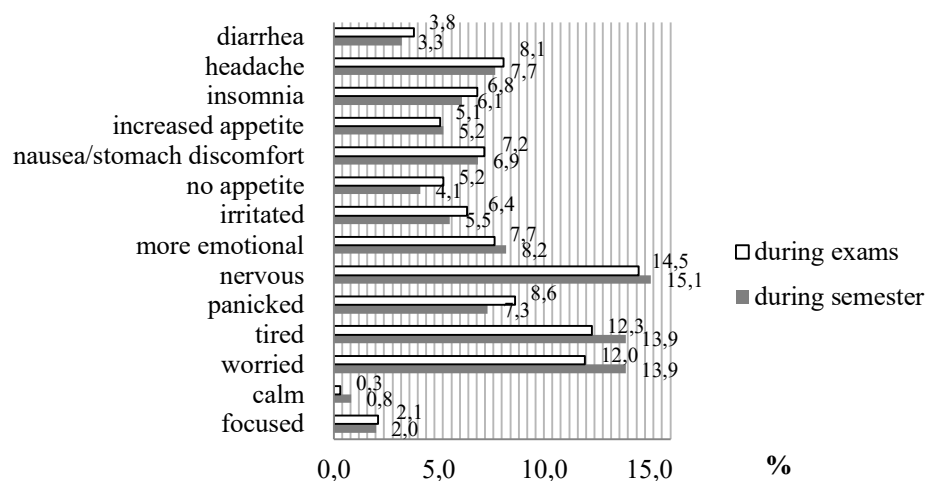


Figure 2. Stress manifestations in students during semester and exam period.

Table 2. Assessment of the impact of stress causes on the stress score, the results of the ordinal logistic regression analysis.

Causes of stress				95% Confidence Interval	
During semester	Sig.	Estimate	Wald χ^2	Lower	Upper
Living with roommate	0.95	-0.01	0.00	-0.31	0.29
Living separate from family	0.15	-0.35	2.10	-0.83	0.12
Financial situation	0.18	-0.21	1.82	-0.52	0.10
Working during studies	0.20	-0.40	1.65	-1.02	0.21
Grades	0.13	-0.33	2.30	-0.77	0.10
Exams/colloquia	0.12	-0.87	2.42	-1.96	0.22
Scope of teaching	0.14	-0.43	2.21	-0.99	0.14
Limited time to prepare for the exam	0.46	-0.23	0.56	-0.85	0.38
Family relationships	0.17	-0.31	1.85	-0.76	0.14
Friends relationships	0.78	-0.06	0.08	-0.51	0.39
Relationship with a boyfriend/girlfriend	0.54	-0.08	0.37	-0.36	0.19
Health condition	0.18	-0.23	1.76	-0.58	0.11
Doing sports	0.99	0.00	0.00	-1.21	1.20
During exam period					
Living with roommate	0.37	0.65	0.81	-0.77	2.08
Living separate from family	0.29	-0.94	1.12	-2.69	0.80
Financial situation	0.41	-0.28	0.69	-0.95	0.39
Working during studies	0.56	0.40	0.34	-0.93	1.73
Grades	0.31	-0.83	1.04	-2.43	0.77
Exams/colloquia	0.30	-1.83	1.07	-5.30	1.63
Scope of teaching	0.43	-0.61	0.64	-2.11	0.89
Limited time to prepare for the exam	0.31	-2.05	1.01	-6.04	1.94
Family relationships	0.50	-0.35	0.46	-1.36	0.66
Friends relationships	0.91	-0.11	0.01	-2.02	1.80
Relationship with a boyfriend/girlfriend	0.41	-0.31	0.67	-1.06	0.44
Health condition	0.31	-0.65	1.05	-1.90	0.60
Doing sports	0.37	0.47	0.79	-0.57	1.51

The most frequent actions that students performed to reduce stress during the semester were: listening to music (23.1%), talking with friends (21.6%), sleeping (16.0%), physical exercising (9.3%), eating (6.8%) and smoking (6.3%). Similar actions were performed during the exams period: talking with friends (26.6%), listening to music (20.2%), sleeping (16.9%), physical exercising (7.6%) and smoking (6.9%). The difference in actions frequencies during semester and exam period was not statistically significant ($\chi^2 = 16.61$, $p > 0.05$). On a Likert scale, most students rated the effectiveness of these actions as moderate (51.4% during semester vs. 44.7% during exam period) but the difference in rating was significant ($\chi^2 = 20.66$, $p < 0.001$).

DISCUSSION

Pharmacy students at the University of Belgrade are constantly under pressure caused by numerous teaching activities (theoretical and practical) that require spending a lot of time at the facility, usually from the early morning and sometimes until the evening hours. This may lead to social isolation of students. Recommendations to decrease social isolation listed in the paper by Haas et al. are focused on activities

to improve social interactions, for example, student-led walking initiatives (23). Similar to these recommendations, students at the University of Belgrade-Faculty of Pharmacy are supported in many activities within the sports society of students, the choir, the group who prepare the students' magazine, and the photographic section (24).

According to the study results by Gerber et al., academic performance and pressure to succeed were the most common sources of stress in pharmacy student population (2). The most frequent stress sources in our study were limited time for preparation of exams and exams/colloquia. In this regard, stress sources were related to students' academic performance.

A study conducted in Romania included enrolled pharmacy students from Romania and international students. The results pointed out that female gender, homesickness and study year may contribute to higher stress levels (25). Students who studied with relatives or old friends had less stress than others (25). In our study, the role of family, friends, and boyfriend/girlfriend showed to be of great importance in stress reduction during semester and especially during the

exam period. A study by Geslani et al. showed that the most effective way for stress reduction is time spent with family members (26). In addition, another study pointed out the significant factor in coping with stress is talking to friends (27).

According to our findings, it was interesting to see that students' employment during studies did not cause a stress in students. We have to emphasize that only 22% (1% as full-time and 21% as part-time employment status) of students during semester and only 25% (2% as full-time and 23% as part-time employment status) during the examination period were employed. Several studies indicated that employment during studies may affect academic performance (28-30). Work stress could also impact person's behavior and health state (16, 31). On the other hand, several studies presented opposite results in favor of students employment. They stated that working habits could positively influence students' performance, responsibility and feeling of success. In addition, salary also had positive impact (32-35). Nevertheless, we should interpret our results with caution as we had very small sample of students (1-2%) who had full-time job and approximately one quarter of students, part-time job.

Similar to our sample, number of female students enrolled at the University of Belgrade – Faculty of Pharmacy is around 6 times higher than enrolled males (according to official, unpublished Faculty report). Several published studies indicated that female students might have higher level of stress than their male colleagues (19, 36, 37). In addition, according to Donaldson et al., who performed a study on a sample of children and adolescents, there was no statistically significant difference in coping strategies in response to stressors related to gender (38). One more study by Gomathi et al. found that, among health-care undergraduate students, there are no statistically significant difference in stressors or coping strategies between students of different gender (14). The results presented in this manuscript pointed out that the female gender was a significant predictor of stress levels, but only during the exam period.

The results of the study by Votta et al. showed that significant predictors of stress were: gender (female students are exposed to stress more than male), age (older students are more receptive to stress compared to younger), year of study (students at the first two years have higher stress level than at higher years), type of enrolled programme (students that enrolled entire master program have more stress than students who enrolled two-stage programme (bachelor and then master) and postgraduate students) and grade point average (stress is more present in students with better achievements) (39). During the semester slightly positive correlation was established between age and stress levels. Correlation between study year and stress levels was not significant at both study points. In addition, our results did not find statistical significantly relation between causes of stress and increase of stress levels during exam and semester.

This study possesses several limitations. Stress could be in association with depression, anxiety and other disorders

(40, 41). However, we did not examine overall mental health and did not check whether students suffer from other conditions that could affect the presented results. In addition, stress could be measured using physiological, psychological, or combined methods (41). We have used only self-reported measure which could be considered as limitation. The study had to be repeated with the same students, and their results should be compared. In this regard, students had to choose abbreviated names or initials that they required to report in the repeated survey. In the repeated survey, many students indicated that they could not remember the first chosen abbreviated name. For this reason, the results were analyzed as a repeated study with a new population. As this survey was voluntary, anonymous, and all data was protected the approval of the ethics committee was not required.

To our knowledge, our study is the first that examines stress in pharmacy students in Serbia. The presented results indicated that female gender was significant predictor of stress during the exam period. The most frequent stress sources were limited time to prepare exams and exams/colloquia, and the most frequent manifestations of stress were feeling nervous, tired and worried. For stress reduction students usually listen to music and talk with friends. The information obtained from the study may contribute to understanding of the causes of stress among pharmacy students in Serbia and to decrease stress levels in students. The students' academic obligations need to be more balanced in order to provide better academic atmosphere and better academic achievements.

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