

# The influence of excessive stress on the quality of life of medical students in the Czech Republic – National sample

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## Research Article

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# Abstract

## Purpose

The Czech Republic has been dealing with a long-term shortage of doctors, which, according to demographic forecasts, will continue to worsen due to the retirement of stronger generations of doctors in contrast to the gradual aging of the population, which will require more health care over time. The country's political set is trying to respond to this shortage and demographic forecasts by gradually increasing financial funding of medical faculties with the aim of increasing the production of graduates of the program in the field of general medicine. The proportion of medical students in the Czech Republic who do not complete their studies for various reasons varies between 7.7% and 21.6% depending on the faculty.

## Methods

We conducted anonymous questionnaire survey among students and graduates of general medicine at all eight Czech medical faculties. A total of 3183 respondents participated in our survey. There were 2843 medical students, which represents approximately 28% of all medical students in the Czech Republic. The distribution of respondents within the study years was approximately even. The distribution of respondents in our survey approximately corresponded to the real distribution of students between individual faculties in the Czech Republic, which makes our survey a national sample. The statistical processing was performed in the statistical software R. Apart from the basic comparison using percentage relative frequencies and Person's chi-squared test, in this study we used Odds ratio (OR) for a better interpretations of some outputs.

## Results

Our results show that the vast majority of Czech medical students experience excessive stress during their studies, which increases the risk of students' somatic problems (OR = 7.97,  $p < 0.001$ ), targeted alcohol use (OR = 2.69,  $p < 0.001$ ) and the use of anxiolytic or antidepressant medication to reduce it (OR = 9.16,  $p < 0.001$ ), which reduces the students' quality of life. Students experiencing higher levels of excessive stress are more likely to leave their studies based on their own decision (OR = 3.91,  $p < 0.001$ ) and not to enter clinical practice after graduation (OR = 1.27,  $p = 0.18$ ).

## Conclusions

Our work shows the need for an open discussion at the highest level about the possibilities of reasonable reduction of unnecessary stress during medical studies. Medical students in the Czech Republic are exposed to excessive stress with all the consequences described above. All that remains is to state the

existence of unnecessary components of stress, which represent an opportunity to reduce it, thereby achieving a higher quality of life for medical students, a higher quality of health care provided in the future, an improvement in the staff situation in the Czech healthcare system and a reduction in inefficiently spent financial resources for the education of young doctors.

### **Trial registration:**

No registration.

## **Introduction**

Medical faculties around the world strive to educate competent and empathetic doctors, capable of providing professional medical care, advancing the level of medical progress and improving public health in their country. The study of general medicine is one of the most demanding university disciplines because of its length, emotional demands and extent of demands on students, which can cause stress in students. (1) It is no different in the Czech Republic, where the duration of study program of general medicine lasts at least six years with further obligatory education, which follows after graduation.

One of the many definitions defines stress as a subjectively felt state of imbalance between the demands on individual and the capacities to cover these demands. (2, 3) In the case of medical students, these are requirements resulting from the curricula of individual medical faculties, which put high demands on their students. (4) Previously published studies confirm that students of medicine suffer from excessive stress more in the comparison with students in other fields and compared to the general population. (5, 6, 7, 8, 9)

Exposure to long-term and excessive stress leads to both psychological (fear, anxiety, panic attacks, depressions, memory disorders), and somatic problems (vomiting, diarrhea, rash, insomnia, weight loss, weakness, shortness of breath, palpitations). (10, 11, 12) Students suffering from excessive stress may more often decide to consume alcohol or medications (anxiolytics and antidepressants) (1). All of the above mentioned consequences lead to a decrease in the quality of life of students. Exposing students to excessive levels of stress can significantly increase the tendency of students dropping out. Last but not least, it is necessary to note, that students who successfully complete their studies bear the consequences of excessive long-term stress into their professional and personal lives.

The Czech Republic has been dealing with a long-term shortage of doctors, which, according to demographic forecasts, will continue to worsen due to the retirement of stronger generations of doctors in contrast to the gradual aging of the population, which will require more health care over time. The country's political set is trying to respond to this shortage and demographic forecasts by gradually increasing financial funding of medical faculties with the aim of increasing the production of graduates of the program in the field of general medicine. The proportion of medical students in the Czech Republic who do not complete their studies for various reasons varies between 7.7% and 21.6% depending on the

faculty (13, 14). For this reason, we believe it is important to search for causes that would eliminate non-completion of medical studies.

The main goal of our survey was to objectify the problematics of subjective perception of excessive stress by students of general medicine in the Czech Republic and to assess the effect of this stress on the quality of life of students, their motivation to further remain in the system of Czech healthcare and possibly to identify the relationship between excessive stress and failing to complete medical studies. The partial goal of our work was to map the sources of stress of medical students and to try to name the unnecessary components of overall stress, the systematic reduction of which can contribute to improving the conditions of study and the quality of life of medical students while preserving the professional level of graduates of Czech medical faculties.

## Methods

We conducted anonymous questionnaire survey among students and graduates of general medicine at all eight Czech medical faculties. A total of 3183 respondents participated in our survey. There were 2843 medical students, which represents approximately 28% of all medical students in the Czech Republic (see annual reports of individual medical faculties). The rest of the respondents (340) were graduates within five years of graduation. Nearly 73% of this survey were women. The distribution of respondents within the study years was approximately even. (graph 1) The distribution of respondents in our survey approximately corresponded to the real distribution of students between individual faculties in the Czech Republic, which makes our survey a national sample. (graph 2)

### Graph 1: Year Of Study

### Graph 2: Distribution by faculty

Our own questionnaire survey “PM 2021” contained a total of 22 questions, of which 19 questions were closed-ended and 3 questions were open-ended. (Supplementary material 1 and 2) The closed-ended questions at the beginning of the questionnaire related to basic demographic data about the respondents (gender, year and studied faculty), other questions contained statements with a range of possible answers: 1-strongly agree, 2-moderately agree, 3-undecided, 4-moderately disagree, and 5-strongly disagree. The open-ended questions were aimed at mapping specific sources of stress during the course study and the motivation for continuation of stay in the Czech healthcare system. Responses to specific stress factors were then categorized for quantitative graphical processing. Answers to all questions in our survey were optional for respondents. The main purpose of this publication is to focus primarily on the objectification of the degree of excessive stress among medical students in the Czech Republic, its possible effect on the quality of life of students and the motivation to continue working in the Czech healthcare system.

Collection of data took place in November and December 2021 through online questionnaire, which respondents from the target group were invited to fill out. The statistical processing was performed in the statistical software R. Apart from the basic comparison using percentage relative frequencies and Pearson's chi-squared test, in this study we used "Odds ratio" (OR) for a better interpretation of some outputs.

## Results

### 3.1 Overall level of perceived stress

A total of 94.8% of all respondents agreed with the statement "I experience excessive stress while studying medicine", of which 64.36% of respondents chose the answer "strongly agree" and 30.44% of all respondents chose the answer "moderately agree".

Graph number 3 shows that students report a comparable overall level of stress at individual faculties. There are certain statistical differences between the faculties, but they are not significant from the point of view of the monitored issue.

### Graph 3: Amount Of Stress Among Faculties

### 3.2 The consequences of excessive stress on Czech students of medicine

According to the questionnaire survey, 70% of all respondents experienced somatic problems related to stress during their studies. Students who reported a higher level of stress during their studies experience somatic problems more often than students reporting a lower level of stress (OR = 7.97,  $p < 0.001$ ).

The goal of our survey was also the analysis of abuse of alcohol and pharmaceuticals for the targeted reduction of study-related stress. 29.7% of all respondents moderately or strongly agreed with the statement about the targeted consumption of alcohol to reduce stress. Overall, 17.9% of respondents agreed with the statement about the use of anxiolytic or antidepressant medication. Excessive stress experienced during medical studies increases the risk of targeted use of alcohol (OR = 2.69,  $p < 0.001$ ) and medication to reduce this stress (OR = 9.16,  $p < 0.001$ ).

Students who answered that they experience stress during their studies (1 – strongly agree, 2 – moderately agree) said that they wanted to leave their medical studies (1 – strongly agree, 2 – moderately agree) in 48.39%. On the contrary, students who did not suffer from stress stated that they wanted to leave their studies only in 18.52%. According to OR = 3.91 ( $p < 0.001$ ), students experiencing a higher level of stress are more prone to drop out of their studies based on their decision than students who experience a lower level of stress during their studies.

Students who answered that they experience stress during their studies (1 – strongly agree, 2 – moderately agree) said that they considered not entering practice (1 – strongly agree, 2 – moderately agree) in 30.86%. On the other hand, only 25.77% of students who did not suffer from stress said that they thought about not entering practice. Students who experience higher levels of stress may be more likely to not enter clinical practice after graduation than students experiencing lower levels of stress during their studies (OR = 1.27,  $p = 0.18$ ).

To illustrate the complexity of the point of view, we add that 75% of all respondents agreed with the statement that on average they spend more than 8 hours a day studying medicine. After a targeted question, the majority of respondents also agreed with the statement that they do not have enough time for leisure activities (71%) and their loved ones (64%).

In situations where psychological problems exceed the tolerable limit, the ability to seek professional help is important in order to prevent serious health consequences, such as the burnout syndrome, severe depression or suicide attempts. 22% of all respondents to our survey moderately or strongly agreed with the statement about seeking professional help in connection with excessive stress during studies. Excessive stress experienced during medical studies increases seeking professional help (OR = 24.18,  $p < 0.001$ ).

### 3.3 The Main Sources Of Stress

When searching for specific factors causing stress in medical students, we asked the students an open-ended question about specific situations causing stress in them during their studies. We present the results in categorized form. (graph 4)

When asked about specific factors causing stress, the dominant answer was “exams, exam periods and the amount of knowledge required”, which was given by a total of 57.8% of respondents. The second most frequently mentioned cause of stress was the subjectively felt lack of time both for studies (13.9%) and for family, friends or leisure activities (2.6%). Another widely represented response was a stressor, which we named “Psychological factors” (fear of failure, perfectionism, pressure to perform, comparison to others, peer pressure, etc.). This stressor was stated as the main cause of stress by 9.1% of all respondents. Of the other stressors that are described in graph 4, we can mention the approach of teachers and examiners (5.4%), where the respondents indicated frequent humiliation, ridicule, discrimination or sexism as the main stressor. We can also mention teaching system at the faculties (5%) or the feeling of insufficient preparation of students for practice (1.5%) as some other stressors.

All the above-mentioned stressors vary with variability across individual medical faculties, the differences between faculties are statistically significant ( $p < 0.001$ ), which means an opportunity for faculty management to name and reduce unnecessary stress with specific measures. Despite the aforementioned variability, all faculties in the Czech Republic show a comparable overall level of reported stress. (graph 3 and 4)

## Graph 4: Source Of Stress

### 3.4 Do women and men perceive excessive stress during studies in the same way?

An indisputable trend in recent years at Czech medical faculties is the growth of predominance of women, who nowadays represent approximately  $\frac{3}{4}$  of all students, which also corresponds to the distribution of respondents in our survey.

When comparing the subjective experience of stress between genders, women report stress more often (women 96.34% versus men 90.84%,  $p < 0.001$ ). Similar result was obtained when comparing reported somatic problems (73.79% of women versus 61.00% of men,  $p < 0.001$ ) and when comparing the frequency of seeking professional help (24.77% of women versus 14.24% of men,  $p < 0.001$ ).

When comparing the use of anxiolytics/antidepressants, we get a result of 19.60% women versus 12.82% men,  $p < 0.001$ . Only the use of alcohol in connection with stress is reported more often by men (27.25% of women versus 35.38% of men,  $p < 0.001$ ).

## Discussion

Our survey provides a comprehensive and, in both the Czech and global context, a unique view of the stress subjectively felt by students of general medicine throughout the country (Czech Republic), its effect on the quality of life of students and their motivation to remain in the Czech healthcare system. Thanks to the scale and the even distribution of students across the faculties, we were able to name the main sources of stress at individual medical faculties.

Our above-presented results show that the vast majority of Czech medical students experience excessive stress during their studies, which increases the risk of students' somatic problems (OR = 7.97,  $p < 0.001$ ), targeted alcohol use (OR = 2.69,  $p < 0.001$ ) and the use of anxiolytic or antidepressant medication to reduce it (OR = 9.16,  $p < 0.001$ ), which reduces the students' quality of life. Students experiencing higher levels of excessive stress are more likely to leave their studies based on their own decision (OR = 3.91,  $p < 0.001$ ) and not to enter clinical practice after graduation (OR = 1.27,  $p = 0.18$ ).

In the Czech Republic, the degree of non-completion of studies after six or more years is reported to be in the range of 7.7%–21.6%, depending on the studied faculty. (13, 14) In comparison, in the UK, USA and Canada, the literature mentions about 5%, 4.8% and 0.5% decline of medical students each year. (15) The specific effect of subjectively felt stress on the motivation of students to further continue to stay in the healthcare system of the given country has so far been little researched. In some parts, the work of the Thai authors Pitanupong and the collective, who investigated the proportion of medical students who thought about leaving medicine during their studies, and tried to identify the reasons for these thoughts, is comparable to our survey. The results show that 22.9% of students admitted to thoughts about leaving

medicine in the preclinical part, while 22.6% of students admitted to leaving medicine in the clinical part. (16) As the main reasons for these considerations, students cited the difficulty of studying, dissatisfaction with the study environment and their lack of interest in the content of the lesson. In comparison with these results, we note that Czech medical students admit to thinking about leaving medicine more often, in 48.3% overall. Given the higher reported levels of stress in women, this difference can be partly explained by the proportion of women in our survey, where in the above-cited Thai study women represented 54% and in our survey women represented 73%.

Excessive stress and anxiety in medical students are associated in the literature with excessive alcohol consumption with a prevalence of around 20%. This prevalence is higher than in the non-medical peer group, despite relatively high alcohol consumption in the control (non-medical) population. (17, 18, 19, 20, 21, 22, 23, 24) In our survey, the prevalence of alcohol consumption reaches almost 30% (up to 35% for men). The statement in the questionnaire that the respondents agreed with was defined as the use of alcohol for the purposeful reduction of excessive stress (i.e. not for fun or during celebrations or other occasions).

In accordance with our results, high demands on students in terms of study volume, competitive environment among medical students, lack of time for friends, family and leisure activities, high expectations of family and society or great responsibility of the future profession are repeatedly mentioned in the literature as main and specific sources of stress. Others include frequent examining, worry about the future, loneliness or encountering death. (25, 26, 5) A 2018 American authors' survey (27) of over 1,100 students adds additional factors such as faculty teaching systems, faculty attitudes, and student-hostile environments that compare to our stressors named "Teacher and examiner attitude" and "Teaching system". Together, more than 10% of all students in our survey consider these stressors to be the main ones, and at the same time, they are typical examples of unnecessary stress, the targeted reduction of which medical faculties around the world should strive for.

In literature, the female gender is repeatedly associated with a higher risk of feeling excessive stress, but also of burnout syndrome. (28, 29) The lifetime risk of developing depression is higher in women than men in the general population. (30, 31, 21) On the other hand, several studies can be found that find no difference in the prevalence of depression among medical students by gender. (32, 33, 34, 35, 36, 37, 38, 21) Even among our respondents, women report more often the subjective experience of stress (women 96.34% versus men 90.84%,  $p < 0.001$ ). Similarly, when comparing reported somatic problems, women are more often burdened (73.79% of women versus 61.00% of men,  $p < 0.001$ ) and likewise when comparing the frequency of seeking professional help (24.77% of women versus 14.24% of men,  $p < 0.001$ ). When comparing the use of anxiolytics/antidepressants, we get a result of 19.60% of women versus 12.82% of men. Only the use of alcohol in connection with stress is reported more often by men (27.25% of women versus 35.38% of men,  $p < 0.001$ ). The question in this area and in the context above is that to what extent our results reflect the general tendency of women to experience life situations as stressful and to what extent our results are a reflection of hostility, discrimination or sexism at Czech medical faculties.



Works published so far with a similar focus indicate different percentages of students experiencing excessive stress during their medical studies. Work by Konjengbam et al indicates a prevalence of stress of 28.4% among medical students studying in India. (39) In their work, Sarikaya et al report an even lower proportion of students suffering from excessive stress during their studies, namely 25.6% among Turkish medical faculty students. (40) Other results were obtained by Sidik et al with a cohort of Malaysian students and Fares et al with a cohort of Lebanese medical students, who in their studies found excessive stress in 57% and 62% of medical students, respectively. (41, 29) The work of A.N. Supe talks about the prevalence of stress of 73% among medics in Seth G.S. Medical College in India with higher prevalence in higher grades. (42) Compared to these works and while respecting the different methodologies of the cited works, Czech medical students report a greater subjective burden of excessive stress with all its consequences, which we described above.

## **Why Do We Need To Reduce Excessive Stress?**

Based on what we mentioned above, it can be said that Czech medical students are exposed to excessive stress with all its consequences during their studies. Psychological and somatic problems or the use of alcohol and pharmaceuticals to reduce stress are not desirable phenomena for future doctors. Although studying medicine is demanding in itself and requires a great deal of energy, time, patience and sacrifice, in our survey we have shown that there is unnecessary stress, which represents up to tens of percent across faculties. The degree of representation of individual stressors varies between different faculties. It is necessary to strive for a systematic reduction of unnecessary stress across the faculties by means of targeted measures, which can increase the quality of life of students and, by extension, the quality of the health care provided.

In addition to reducing the above-mentioned consequences of excessive stress, it is also necessary to consider the systemic and economic side of the matter. The society invests high costs (higher than hundreds of thousands crowns to lower millions of crowns) in the education of one student, which will potentially be wasted if such a student does not finish his studies due to excessive stress or pursues another field after graduation. Reducing unnecessary stress during studies by both medical faculties and students can undoubtedly save the entire system considerable financial resources and perhaps even improve the staff situation in the Czech healthcare sector.

### **Strengths and limitations of study**

Since the preparation of the survey, we have been aware of a possible sampling bias, given that students who are more sensitive to stress may be more likely to fill out a similarly focused questionnaire, but due to the scope of our survey and the equal representation of students from individual faculties, our survey provides a robust result. Additionally, similar cohorts of students within faculties were compared.

Our survey took place during the coronavirus pandemic, when some medical students were ordered to help the overburdened healthcare system. At that time, the majority of teaching at Czech universities took

place via distance learning, and it was medical students in the upper years who were exempted from the regulation, when practical teaching was mostly preserved. According to a survey carried out at the Charles University, the largest Czech university, under which five of the eight Czech medical faculties fall, these circumstances were reflected in a better mental state of medics, who, thanks to a sense of the meaning of their future profession, even showed a lower prevalence of anxiety and depressive symptoms than other students of higher education at the Charles University. (14, 43) This bias must also be taken into account when evaluating our results.

## Conclusions

Our work shows the need for an open discussion at the highest level about the possibilities of reasonable reduction of unnecessary stress during medical studies. Medical students in the Czech Republic are exposed to excessive stress with all the consequences described above. All that remains is to state the existence of unnecessary components of stress, which represent an opportunity to reduce it, thereby achieving a higher quality of life for medical students, a higher quality of health care provided in the future, an improvement in the staff situation in the Czech healthcare system and a reduction in inefficiently spent financial resources for the education of young doctors.

### What can medical faculties do?

We see an opportunity for change in, among other things, the transparent, reproducible and fair verification of students' knowledge, the specific stating of the required range of knowledge, and above all the clarity of the criteria for successful completion of the course. We can draw inspiration from the verified experiences of foreign universities. We also perceive the need for education on the topic of mental illness in medicine and education of students in the basics of psychohygiene, effective learning methods and time management. Education and support in this issue should be considered as one of the priorities of the education of current and future doctors, as it has the potential to improve the overall quality of life and therefore the overall level of services in the current healthcare sector. Every student should have access to contacts for seeking professional help. It is the responsibility of medical schools to increase awareness among students about where they can find these contacts if needed. (table 1)

### What can medical students do?

We can only recommend honest and systematic preparation for the exams to students, without which it is difficult to cope with the demanding study of medicine. We also consider the regular evaluation of teaching quality, which is a standard part of the academic year at all Czech medical faculties, to be very important. To reduce stress during studies, it is also recommended to use the principles of proper time management and effective learning methods. Last but not least, we would like to mention the observance of well-known principles of psychohygiene. In cases where stress during the course of study exceeds the tolerable limit, it is necessary to be able to seek professional help. (table 1)

### Table 1: What can faculties and students do

# Declarations

## Ethics approval and consent to participate

According to the laws of the Czech Republic, a questionnaire survey does not require the approval of the ethics commission. All methods were carried out in accordance with relevant guidelines and regulations. Statement of the Ethics Committee of the Faculty of Medicine of the University of Ostrava - R2/2022.

The need for informed consent was deemed unnecessary according to national regulations as assessed by the Ethics Committee of Faculty of Medicine, University of Ostrava. Please, see attached document.

## Consent for publication

The manuscript has been read and approved by all listed authors.

## Availability of data and materials

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

## Competing interests

I declare that the authors have no competing interests as defined by BMC, or other interests that might be perceived to influence the results and/or discussion reported in this paper.

## Fundings

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## Authors contributions

Martin Palička, Barbora Mechúrová and Tereza Sobelová prepared the survey design and methodology. Marian Rybář, Jakub Cvek and Natália Paličková performed a complete statistical processing of the collected data. Kateřina Pokorná prepared graphic materials for the survey. Martin Palička, Marian Rybář and Kateřina Pokorná prepared the main part of manuscript.

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## Tables

Table 1 is available in the Supplementary Files section.

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