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# Comparison of the prevalence of fibromyalgia in pre-clinical and clinical years among medical students of the *Collegium Medicum* of the University of Warmia and Mazury in Olsztyn

## ABSTRACT

**Introduction:** Fibromyalgia is a chronic soft tissue rheumatic disease of unknown aetiology and marked by chronic, multi-sited pain persisting for at least three months and concomitant fatigue. The pathogenesis is still not precisely understood; disturbances of biochemical, metabolic, and immunological processes are suspected, and the impact of chronic stress is also undeniable. This study aims to compare the prevalence of fibromyalgia among students of different years of medical course at the University of Warmia and Mazury in Olsztyn.

**Material and methods:** The Fibromyalgia Survey Questionnaire (FSQ) incorporating the 2011 and 2016 diagnostic criteria for fibromyalgia was used for the survey. Questionnaires were distributed in hard copy during lectures (1–2 years of study) or credits (3–6 years of study).

**Results:** A total of 451 students representing all years were surveyed, sequentially from the first ( $n = 125$ ), second ( $n = 96$ ), third ( $n = 80$ ), fourth ( $n = 62$ ), fifth ( $n = 68$ ) and sixth years ( $n = 20$ ). Seventeen respondents (3.77%) met the diagnostic

criteria for fibromyalgia according to the ACR 2016. In the pre-clinical years, fibromyalgia was slightly more frequent, however, the difference was not statistically significant ( $p = 0.1867$ ). In contrast, in the pre-clinical years there was a statistically significantly higher prevalence of symptoms such as headaches, fatigue, trouble thinking or memory problems, waking up feeling tired, and pain in various parts of the spine. Also, students in their pre-clinical years were significantly more likely to meet fibromyalgia criteria such as symptom severity scale, widespread pain index and duration of symptoms of more than 3 months.

**Conclusions:** Although this study did not reveal an increased incidence rate of fibromyalgia among medical students compared to the general population, nor was there a statistically significant difference in terms of the prevalence of fibromyalgia between the first two years of study and the remaining years of study, it clearly highlighted the reduced quality of life in this population group.

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**KEY WORDS:** fibromyalgia; medical students; stress; fatigue

## INTRODUCTION

Fibromyalgia (FM) is a chronic soft tissue rheumatic disease of unknown aetiology and is marked by chronic multi-sited pain in at least four out of five areas of the body, persisting for at least three months, and con-

comitant fatigue [1–3]. At the onset of the disease, pain is most often located in the spinal region.

The pain present in FM is not related to tissue inflammation; moreover, in these patients, there is no damage to or deformation of the affected tissues [4].

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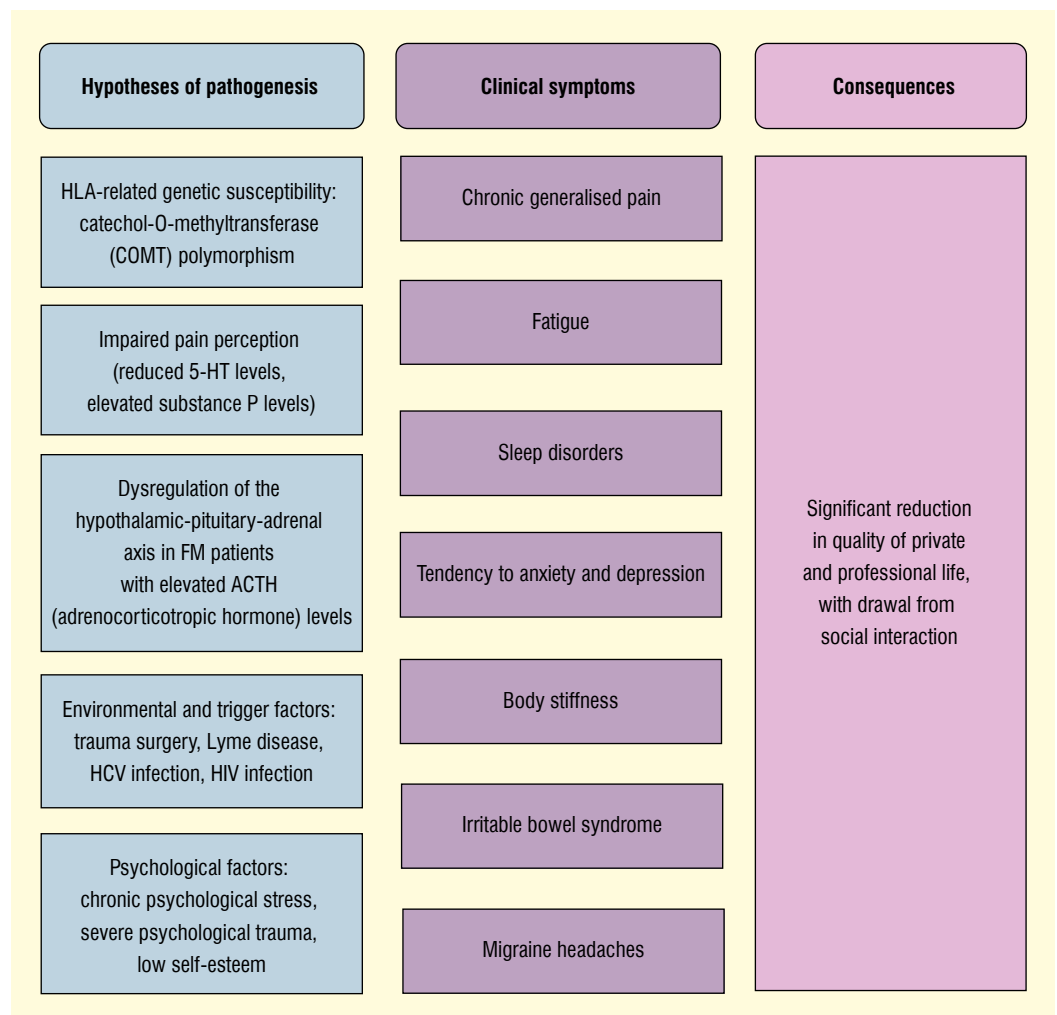
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The WPI (widespread pain index) is used for assessing the extent of pain while the SSS (symptom severity scale) is used for assessing the severity of symptoms.

Moreover, patients affected by fibromyalgia experience sleep disturbances, fatigue, and body stiffness, as well as a tendency to anxiety and depression, and there are also vegetative and functional disorders of varying severity [1–5]. Fibromyalgia is not an immediately life-threatening condition for patients [4], however, the complaints they experience are intractable, leading to a deterioration in daily functioning [3].

Fibromyalgia is estimated to affect approximately 2–8% of the population [1, 5, 6], however, this may be an underestimation as the Polish population is under-researched. FM is suspected to be a syndrome of complex aetiology. Despite the increased incidence rate of FM in recent years and our know-

ledge of this disease entity, the exact pathomechanisms still remain unknown [5, 7]. The contribution of biochemical, metabolic, and immunological processes is marked, and the influence of psychological predispositions is also undeniable [1, 4]. There is a noticeable prevalence of this entity among relatives. Genetic susceptibility may be due to the involvement of genes responsible for serotonin action [2]. This compound has a modulatory effect on the nervous system in the process of pain sensation through presynaptic inhibition of the release of neurotransmitters involved in pain sensation (e.g. substance P) [1]. Interestingly, 5-HT levels are reduced in patients with a diagnosis of FM [1], which may explain the frequent co-occurrence of depression in FM patients. Chronic psychological stress, severe psychological trauma or low self-esteem appear to have a significant impact on the development of the disease [5, 7].



**Figure 1.** Pathogenesis of the development of fibromyalgia

The available literature points out that health-related students, particularly medical students, are exposed to chronic high-frequency stress [3, 5, 7, 8]. This stress is due to the nature of the studies — a large amount of material that has to be learnt in a short period of time, peer pressure, high expectations from relatives and one's own expectations mean that there is a deterioration in psychological well-being of medical students with the commencement of their studies [5, 7, 8].

To cope with the tasks set before them, students often work beyond their means and have little leisure time [8], and this, combined with the huge responsibilities associated with patients' lives, makes them a group at particular risk of developing chronic stress-related syndromes [7], including FM.

However, there is still a small amount of research that takes into account such a specific research group (Fig. 1).

## MATERIAL AND METHODS

This study aims to compare the prevalence of fibromyalgia among students of different years of medical course at the University of Warmia and Mazury in Olsztyn.

A total of 451 students representing all years were surveyed, sequentially from the first ( $n = 125$ ), second ( $n = 96$ ), third ( $n = 80$ ), fourth ( $n = 62$ ), fifth ( $n = 68$ ) and sixth years ( $n = 20$ ).

The survey of third-year–sixth-year students took place in May/June 2022 while first- and second-year students were surveyed in October 2022. Questionnaires were distributed in hard copy during lectures (1–2 years of study) or credits (3–6 years of study). It is key to note that the timing of the completion of the questionnaires by third-year–sixth-year students coincided with the stressful moment for survey participants to pass their final tests, just before the start of the summer exam session. In contrast, the first- and second-year students were surveyed in the second week of the newly started academic year.

The Fibromyalgia Survey Questionnaire (FSQ) incorporating the 2011 and 2016 diagnostic criteria for fibromyalgia was used for the survey. This questionnaire contains a set of three questions assessing the mental state of the study participants in terms of the presence of selected symptoms listed in the questionnaire and their severity over the past seven days, as well as questions about symptoms ob-

served over the past 6 months, such as lower abdominal pain/cramps, depression, headaches. Moreover, respondents were asked to indicate the areas of the body in which they had experienced pain in the last seven days and specify whether the symptoms mentioned in the previous questions had been experienced collectively for a period of at least three months.

The 2016 ACR criteria for a diagnosis of FM are met by individuals who score  $WPI \geq 7$  and  $SSS \geq 5$  or  $WPI 4-6$  and  $SSS \geq 9$  on the FSQ, have generalised pain in at least 4 out of 5 areas of the body, and a period of sustained symptoms of persistent severity is  $\geq 3$  months. The WPI specifies the number of painful points, while the SSS is the symptom severity scale used for the first 6 questions of the questionnaire.

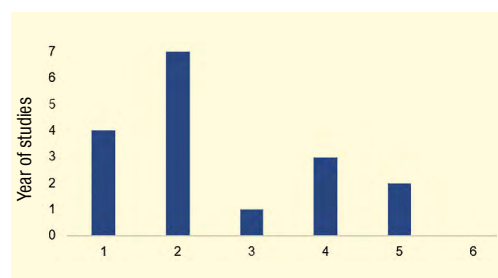
Data were compiled using Excel and Statistica. A non-parametric  $\chi^2$  test of concordance was used for the development and analysis of statistical data.

## RESULTS

A total of 451 medical students took part in the survey. The survey included 125 first-year medical students (27.7%), 96 second-year medical students (21.3%), 80 third-year medical students (17.7%), 62 fourth-year medical students (13.7%), 68 fifth-year medical students (15%), and 20 sixth-year medical students (4.4%). The diagnostic criteria for fibromyalgia were met by 17 participants (3.77%).

Seventeen participants (3.77%) met the diagnostic criteria for fibromyalgia according to the ACR 2016, which meant that they met all conditions:  $WPI \geq 7$  and  $SSS \geq 5$ , or  $WPI 4-6$ , and  $SSS \geq 9$ . In addition, there was generalised pain, occurring in  $\geq 4$  out of 5 body areas. Those symptoms persisted for  $\geq 3$  months.

The prevalence of fibromyalgia was compared by year of study among the participants



**Figure 2.** Distribution of persons with fibromyalgia in each year of the medical course

to determine the impact of chronic stress. Four participants (23.5%) of those with fibromyalgia were first-year students, seven (41%) were second-year students, one person (5.9%) was a third-year student, three (17.6%) were fourth-year students, five (29.4%) were fifth-year students, while there was no single participant among sixth-year students who met the diagnostic criteria for fibromyalgia (Fig. 2). Pre-clinical years were defined as the first two years of study — 11 participants (64.7%) met the criteria — and clinical years were defined as the 3rd-6th year of study — 6 participants (35.3%). In the pre-clinical years, fibromyalgia was slightly more frequent, however, the difference was not statistically significant ( $p = 0.1867$ ).

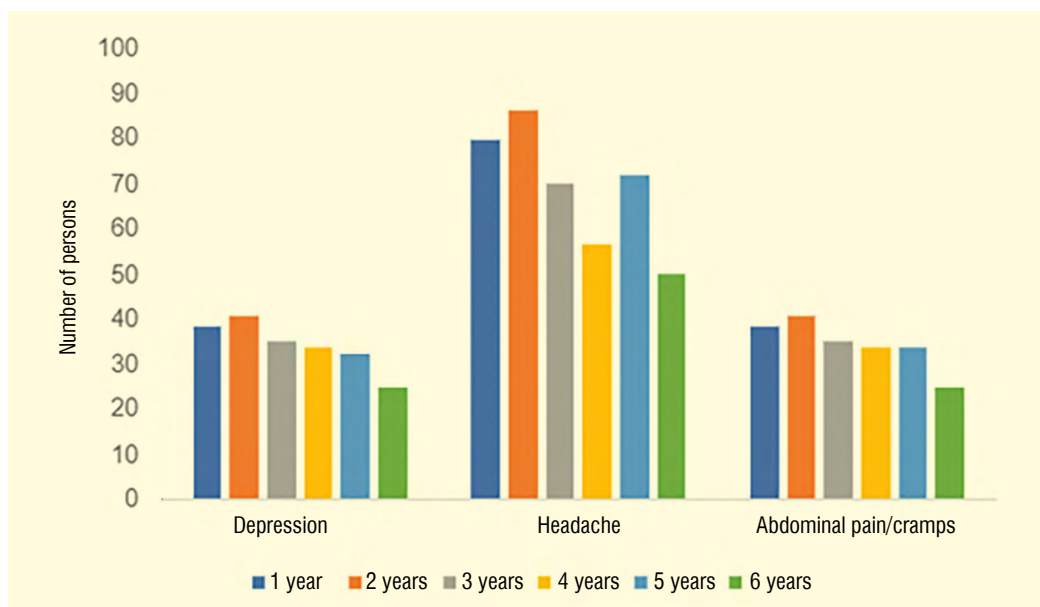
Furthermore, it was noted that both SSS and WPI were significantly more likely to meet the diagnostic criteria for fibromyalgia in pre-clinical years — 71 (32%) than in clinical years — 22 (9.6%). A greater number of participants in their pre-clinical years had been experiencing those symptoms for more than 3 months 92 (41.6%) compared to 57 (24.8%) in their clinical years. The differences were statistically significant ( $p < 0.001$ ). Generalised pain occurred with similar frequency in the pre-clinical 17 (7.7%) and clinical 12 (5.2%) years ( $p = 0.2841$ ).

The presence of the following FM symptoms was also assessed over the previous six months: depressive states, headache, lower abdominal pain/cramps (Fig. 3). There were

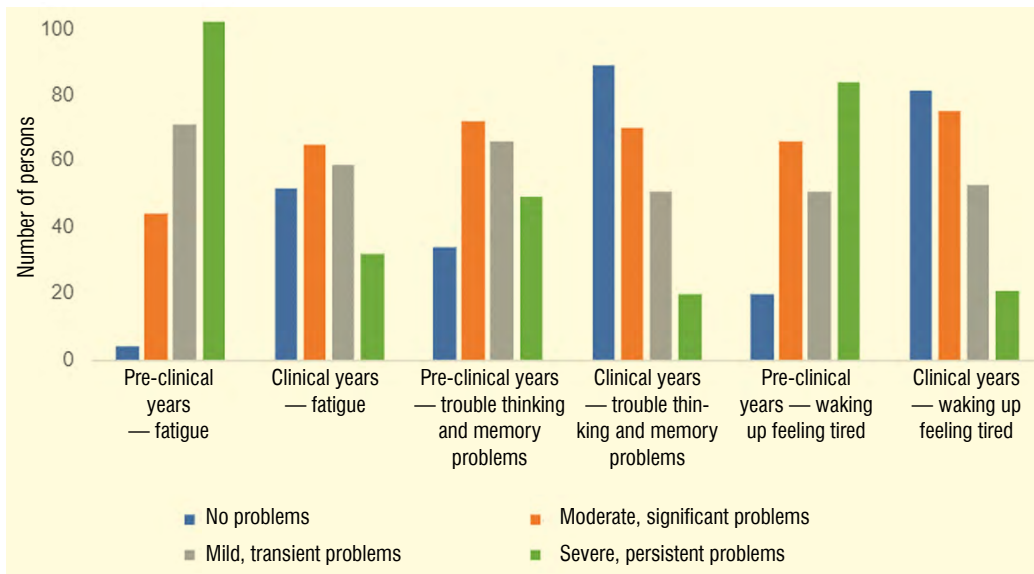
164 participants (36.36%) who reported symptoms of depression, 241 (53.4%) experienced abdominal pain/cramps and 337 (74.72%) reported headaches. Depressive symptoms were reported in 87 participants in their pre-clinical years (39.4%) and 76 participants in their clinical years (33%). Headache was experienced by 183 participants (82.8%) in their pre-clinical years and 150 participants (65.2%) in their clinical years. Abdominal pain/cramps were reported by 131 participants in their pre-clinical years (59.3%) while 110 participants in their clinical years (47.8%). There was no statistically significant relationship in terms of the frequency of depression and abdominal pain ( $p = 0.1623$ ;  $p = 0.0148$ ), however, there was a significant difference for headaches ( $p < 0.001$ ).

In addition, the severity of symptoms was assessed: fatigue, trouble thinking, and waking up feeling tired. Participants rated the severity of their symptoms during a given week on a scale of 0–3, where 0 meant “no problem”, 1 “mild, transient”, 2 “moderate, significant problems, present frequently or of moderate severity”, 3 “severe, persistent, disruptive problems”.

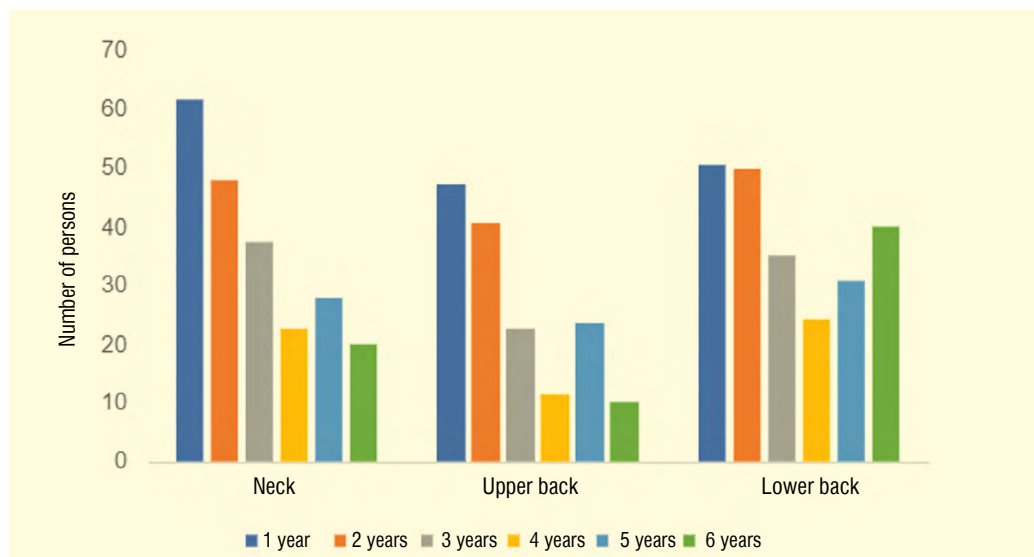
The prevalence of those problems was compared between students in their pre-clinical and clinical years fatigue was reported by 173 participants (78.3%) in their pre-clinical years and 91 (39.6%) in their clinical years. Trouble thinking or memory problems were experienced by 115 participants (52%) in



**Figure 3.** Distribution of prevalence of depression, headaches, and abdominal pain/cramps by year of study



**Figure 4.** Increase in symptoms of fatigue, trouble thinking and memory problems according to the stage of training



**Figure 5.** Prevalence of neck, upper and lower back pain symptoms by year of study

their pre-clinical years and 71 (30.9%) in their clinical years. Waking up feeling tired was reported by 135 participants (61.1%) in their pre-clinical years and 74 (32.3%) in their clinical years (Fig. 4). All variables had statistically significant relationships ( $p < 0.001$ ).

It was also noted that there was a high proportion of participants who suffered from pain in various spinal segments. Neck pain was reported in 123 participants (55.65%) in their pre-clinical years and 67 (29.1%) in their clinical years. Upper back pain was experienced by 98 participants (44.3%) in their pre-clinical years and 43 (18.7%) in their clinical years. Lower back pain was reported in

111 participants (50.23%) in their pre-clinical years and 72 (31.3%) in their clinical years (Fig. 5). All these data revealed statistically significant differences ( $p < 0.001$ ).

## DISCUSSION

This study aims to assess the prevalence of FM among medical students as a group that is particularly exposed to chronic stress, which is an important risk factor for the development of FM. This is probably the second study of its kind in Poland. The first study was conducted in 2021 by students of the medical faculty of the Medical University of Gdansk [5].

The prevalence of FM among medical students in our study was 3.77%, which is not different from the prevalence of FM in the general population (2–8%) [1, 5, 6]. Similar results are reported in papers from Turkey and Japan. According to those studies, 2% of 306 Turkish medical students, met the criteria for FM diagnosis, while 1.48% of 539 Japanese working in healthcare met the criteria [9, 10]. However, it should be emphasised that both of those studies were based on the 1990 ACR diagnostic criteria.

In contrast to ours, in studies from the Medical University of Gdansk and King Abdulaziz University in Saudi Arabia, the prevalence of FM among medical students was higher than in the general population. In a study by the Medical University of Gdansk, it was 10.48% while in a study by King Abdulaziz University — 9.6% [5, 7]. Similar results were also reported among pharmacists and pharmacy students in Saudi Arabia [3].

The differences in results between this study and those from Gdansk and Saudi Arabia may be due to the different ethnic groups taking part in the survey. In ours, only Poles took part, while the study from Gdansk also surveyed English Division students, most of whom were of Arab origin like the participants in the study from Saudi Arabia.

In our study, we compared the prevalence of FM between pre-clinical (first-year–second-year) and clinical (third-year–sixth-year) year students. The criteria for a diagnosis of FM were met slightly more often by first- and second-year students, however, this was not a statistically significant difference. However, students in their first two years of study were significantly more likely to meet the diagnostic criteria for FM in terms of SSS and WPI. Symptoms also persisted for more than three months in more pre-clinical year students. Based on these findings, it can be concluded that although students in their first years of study do not meet the FM criteria significantly more often than clinical year students, their quality of life is significantly worse.

Similar results were obtained in the study from King Abdulaziz University in Saudi Arabia [3].

Our study also assessed the prevalence of symptoms such as depressive states, headache and lower abdominal pain/cramps occurring within 6 months preceding the survey period. The analysis revealed that almost 40% of students struggle with depressive

states and more than half with headaches and abdominal pain. For these symptoms, a significant difference in prevalence was only observed in headache, which is more common in pre-clinical students. These results clearly show that the stress and pressure to which medical students are subjected have a significant impact on their quality of life. The higher prevalence of headaches among students in their first 2 years of study may be due to the fact that they spend considerably more time on pure theory from textbooks and learning remotely, whereas clinical year students spend more time on practical learning. Clinical year students are likely to have already developed more effective methods of learning that reduce the time spent studying from books. A high incidence of headaches and depressive states may also be due to sleep deprivation [11, 12], which undoubtedly accompanies medical students throughout their studies, but mostly affects students in their initial years of study. It is evident from symptoms such as fatigue, trouble thinking or memory problems and waking up feeling tired, which are significantly more frequent in the pre-clinical years.

The high rate of depression among medical students was confirmed in independent studies [13, 14].

Students in their first 2 years of study were also significantly more likely to report spinal pain than students in their clinical years. Again, this may be due to the number of hours spent studying theoretical subjects and the lack of physical activity.

Based on the above results, it is clear that medical students are exposed to factors that favour the development of fibromyalgia, such as chronic stress and sleep deprivation [15].

A limitation of this study was the relatively small sample size, especially among final year students. Furthermore, the gender distribution and several other factors that may affect the development and diagnosis of fibromyalgia were not taken into account, such as physical activity, stimulants, other chronic diseases.

## CONCLUSIONS

Although this study did not reveal an increased incidence rate of fibromyalgia among medical students compared to the general population, nor was there a statistically significant difference in terms of the prevalence of fibromyalgia between the first two years

of study and the remaining years of study, it clearly highlighted the reduced quality of life in this population group.

It clearly appears from the study that students in their first two years of study cope less well with stress and experience more fatigue than clinical year students, however, all face high rates of depressive states, headaches, abdominal pain, and back pain.

These results give food for thought as to whether the training of future doctors is being delivered optimally and whether certain

changes should not be made so that young people taking their first steps in the medical profession do not begin their professional path burdened physically and mentally by the shortcomings of the system, as this may have a negative impact on the quality of their work and thus on the well-being of patients.

## ARTICLE INFORMATIONS AND DECLARATIONS

### CONFLICT OF INTEREST

None declared.

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