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Investigation of Prevalence of Back Pain and Its Risk Factors (Case Study: Female Students of Babol University of Medical Sciences)

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ABSTRACT

Back pain is the most common musculoskeletal complication. Due to inactive lifestyle and long hours of working in hospital, medical students are prone to back pain. Patients with back pain have a disturbed quality of life because of being affected by physical problems and functional constraints. Therefore, the present research investigates the prevalence of back pain and its risk factors in female students of Babol University of Medical Sciences (Iran). This research is a cross-sectional descriptive study, and data collection has been done by a pre-designed questionnaire and Oswestry questionnaire. 300 female students of medical subjects with the average age of 22.9 ± 2.4 years and the average body mass index (BMI) of 21.9 ± 3.2 were included in the study (2017-2018). Twelve students were excluded from the study because of the background of back trauma. Among the 250 female students affected by back pain (86.8%), 169 people (58.7%) reported the background of back pain in at least one of the family members; 45.1% of this population lived in dormitory. The highest prevalence of back pain (29.2%) was reported in students of medicine. However, no significant relationship was observed between prevalence of back pain, living in dormitory, and university subject. Nevertheless, back pain had a significant relationship with the weight changes over the past six months, using computer, family background, and not exercising (P=0.000). Regarding the results suggesting the 86.8% prevalence of back pain among female medical students of Babol University of Medical Sciences and their inactive lifestyle, it is suggested to provide them with sport programs with an emphasis on strengthening central (back) muscles in order to prevent back pain.

Keywords: Back pain, medical sciences, severity of disability, risk factor

Introduction

Back pain is the most prevalent cause of severe and long term physical disability, and it is considered as a major problem for individuals and the society (1). Back pain is a symptom that cannot be usually attributed to a special pathology such as infection, tumor, fracture, structural deformities, inflammatory diseases, or cauda equina syndrome (CES) (2). Rather, it is related to the interaction between anatomic, mental, social, economic, and occupational factors which cause different degrees of disability (3). As a musculoskeletal disorder, back pain has an almost 90% prevalence in human societies; so that people have experienced that at least once in their life (4). Among the diseases that make people refer to doctors, back pain has the second rank after cold. It has been estimated that in America, every year 18 million people refer to doctors for back pain (5).

With regard to environmental factors, it has been estimated that 27% of prevalent back pains in the world can be attributed to job-related risk factors (4). From the viewpoint of occupational health, back pain is the most important cause of absence from work, occupational disability, and working compensation. According to the estimations, 16-20% of the cases of compensation and 34-40% of the compensation costs are related to back pain. Regarding the multifactor nature of back pain, researchers have focused on both medical and non-medical factors including socioeconomic factors (6). One of the probable predicting factors is age. Several studies have found the relationship between age and back pain. Although it is not common among the youth to refer to a doctor for back pain, it has been reported that the percent of

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the 18-24-year-old young population affected by back pain ranges from 13.5% to 39.8%, and the most prevalent cause of limited daily activities in the population of below 45 years old is back pain (5). The other predictive factor is gender, and it has been suggested that back pain is more prevalent in women than men (6).

Students may develop muscle weakness and back pain over time due to inadequate mobility and prolonged sitting, as well as the wrong posture they assume while studying. Back pain is one of the issues that should be considered especially in health related professions. The prevalence of chronic and acute back pain among medical students is relatively high and indicates a serious health threat to the younger generation in this area that will affect the provision of health services. (7).

In 2016, Lotfi et al studied 1000 male university students in Saudi Arabia to investigate the prevalence of risk factors of back pain. They used socio-demographic questionnaires and risk factors questionnaire evaluating factors such as smoking, exercise, caffeine intake, depression, nervousness, study posture, type of the chair used for studying, daily studying hours, and family background of back pain. They reported a 30% prevalence of back pain over the past 3 months. They found a significant relationship between back pain and academic years, studying medicine, older ages, marital status, and having a large family. Back pain was significantly more prevalent among smokers, people drinking more than two cups of tea and coffee per day, people with high BMI, and people with a background of psychiatric diseases or family background of back pain (8).

In 2016, Yucel et al studied 520 first-year students of dentistry, pharmacology, health sciences, and medicine to investigate the prevalence and severity of back pain and its risks factors. They used a 35-item questionnaire evaluating age, gender, height, dominant hand, smoking, exercise, weight changes over the past six months, duration of watching TV, and the background of inherited diseases, etc. They found a significant difference between the students of medicine and other subjects in terms of prevalence of back pain, and the relevant factors mainly included: the recent weight changes, dissatisfaction with study desk, gender, and anxiety (9).

In 2013, Aggarwal et al studied 160 medical students of different programs in University of Dehli to investigate back pain and its risk factors using a specific questionnaire. They reported the back pain prevalence as 47.5% in the past year and 32.5% during data collection. It was proved that back pain prevalence has a significant relationship with the frequency of drinking coffee, inappropriate study posture, studying place, family background, carrying a backpack, moderate depression, anxiety, and work fatigue (10).

In 2013, Alshagga et al studied 232 Malaysian medical students of 18-24 years old to investigate the prevalence and risk factors of neck pain, shoulder pain, and back pain using Nordic questionnaire. 45.7% of students reported the experience of back pain in the past week, and 65.1% of them reported the experience of back pain in the past year. They found a significant relationship between the prevalence of back pain and academic program, family background of back pain, BMI, trauma background, and using computer. They suggested the necessity of more ergonomic studies (11).

In 2013, Hafeez et al studied 183 students of medicine and nursing in different programs by using a questionnaire. They reported the lifelong prevalence of back pain as 57.9%; this rate was reported as 72% in students of medicine and 41% in students of nursing. It suggests that students of medicine are at a higher risk of back pain. The risk factors were reported as smoking and the time of using computer and laptop. The researchers suggested taking preventive actions to improve the quality of life for these people (12).

In 2011, Moroder et al studied 103 students of medicine and compared them with 107 students of physical education in a medical university of Austria. This retrospective study was done aimed at investigating the prevalence of back pain by a questionnaire. They found no significant difference between the two groups in terms of the prevalence of back pain; whereas students of medicine have a 2.5 times less activity and they sit for a 3 times longer peroid per day. Prevalence of back pain in the past year was reported as 53% in the group of medicine students and 60% in the group of PE students. So, the difference between the two groups was not significant and the data indicate that compared to the general population, there is a high prevalence rate among the students in spite of their young age (13). According to the review of literature, previous studies have reported different rates of prevalence for back pain and its risk factors. Regarding the lack of studies investigating medical students of Babol University of Medical Sciences and also, the importance of this issue, it seems necessary to investigate that. Due to their strict curriculums, being exposed to stress, inactive lifestyle, and long

hours of working in hospital, students of health-related subjects are prone to back pain. Regarding the stated facts and the lack of studies in this area, the present research is aimed at investigating the prevalence of back pain and determining its risk factors in female students of Babol University of Medical Sciences in the period of 2017-2018.

Materials and Methods

Three hundred female medical students from all academic programs were selected randomly; 150 students lived in a dorm and 150 students were native and did not live in a dorm. All the students were 18-32 years old. The inclusion criterion was choosing female students studying at Babol University of Medical Sciences. The exclusion criteria included: background of back trauma, positive background of malignancy, people waking up because of back pain, people with a background of anatomic abnormalities, background of discopathy, and people experiencing a back pain accompanied with perineal anesthesia and urinary incontinence or fecal incontinence. In this research, 150 female students living in a dorm and 150 native female students studying at Babol University of Medical Sciences (Iran) were selected by random sampling.

Data collection: Data collection has been done by modified Oswestry disability questionnaire and a pre-designed questionnaire evaluating demographic information and the data of the probable risk factors. Furthermore, necessary laboratory tests were done for students with a background of back pain for more than two weeks. A consent form was received from the students. For data collection, researchers first distributed the mentioned questionnaires among the students living in a dorm and the questionnaires were filled in the presence of the researcher.

In order to collect the data of native students, the researcher distributed some announcement papers in the university and the affiliated hospitals, and 150 students were randomly selected out of the volunteer students. Then, the questionnaires were filled in the researcher's presence. Before filling the questionnaires, a written consent letter was received from all the 300 students participating in the study. After collecting the filled questionnaires, the students reporting a background of back injury, surgery, or malignancy were excluded from the study. The students reporting the background of back pain for more than two weeks referred to the laboratory of Ayatollah Rouhani Hospital of Babol for doing the necessary tests. So, 300 questionnaires were filled by 150 female students living in a dorm and 150 native students. 12 students were excluded from the study because of having a background of back trauma.

Pre-designed questionnaire: This questionnaire was designed based on the study performed by Hafeez et al in 2013 [12]. It evaluated demographic information, anthropometric data, and the probable factors such as marital status, university subject and residence place during education, the time and type of exercise, using computer and watching TV, smoking, the time and posture of studying, duration of attending the classes and hospital, daily sleeping hours, frequency of drinking tea and coffee, daily hours of driving, background and duration of back pain, background of back trauma or surgery, and back pain caused by menstruation.

Oswestry disability questionnaire: Oswestry low back pain disability questionnaire has been designed for evaluating disability in people affected by back pain, and it was first introduced by Fairbank et al [14, 15]. This questionnaire includes 10 chapters evaluating the individuals' major activities. Each chapter includes six items reflecting the effect of back pain on the individuals' daily activities; the items include pain severity, personal activities such as wearing clothes, lifting objects, walking and sitting, sleeping, social activities, travelling, occupational and home activities. The subjects answer the items and then, their score is calculated based on the items. Each chapter determines the severity of disability in the range of 0-5.

Laboratory tests: The health status of students reporting a back pain lasting for more than two weeks was evaluated by a set of laboratory tests including complete blood count (CBC) and brucellosis screening tests such as Wright and 2ME, ESR, CRP, and RF inflammation tests, and quantitative measurement of calcium and vitamin D.

Data Analysis: Data analysis was done by SPSS 22 software. Prevalence, dispersion, and mean of the data were evaluated by descriptive statistics. For qualitative variables, the hypotheses were tested by Chi-square. Kolmogrov Smirnow test had been used for normalite testing. With Kolmogrov Smirnow test, it is possible to determine a random sample of the statistical population whether the statistical population follows the desired distribution or not! Also, with this test, it is possible to examine the all-distribution between the two statistical populations Pearson correlation analysis had been used to determine correlation between back pain disability (Oswestry Disability Index) and the studied parameters.

All statistical data of the study have been evaluated based on International statistical standards (16) and are presented in the tables and graphs of this section and its interpretations are reported.

Before reporting the results of every test, it should be mentioned that P-value was considered less than 0.05 as the significance level, even if it is less than 0.001.

Statistical description of the variables data: In this cross sectional study, 300 female students studying at Babol University of Medical Sciences were investigated in the academic year 2017-2018. The participants' average age was 22.9 ± 2.4. All the 300 students filled the two questionnaire including demographic information, physical conditions, hours of studying, frequency of using computer, automobile, TV, the time of presence in hospital and class, background of back pain, duration of back pain, and severity of pain, and also Oswestry questionnaire. Regarding the exclusion criteria, 12 participants with the background of trauma and spine surgery were excluded from the study. Among the 288 female students, 79 married people (27.4%) and 145 single people (50.3%) lived in a dorm during the period of education. In 2017, lifelong back pain prevalence has been reported as 86.8% for female students of Babol University of Medical Sciences. Moreover, they reported the prevalence of back pain as 75.7% over the past year and 38.5% over the past month. Prevalence of back pains occurred only during menstruation was reported as 29.5%.

Among the 288 participants, the majority of students (92 people, 31.9%) studied medicine and 13.5% studied dentistry (figure 1).

The highest prevalence of back pain was reported in the students of medicine (29.2%). However, no significant relationship was observed between the students' subject and prevalence of back pain (P-value=0.072). Figure 2 presents the frequency of back pain in female students living in a dorm and native students.

Two hundred and fifteen participants (86.8%) complained about experiencing back pain over the past year; out of this population, 45.1% lived in dormitory (figure 2). The highest rate of back pain prevalence was reported in students living in a dorm. However, we did not find any significant relationship between back pain and living in a dorm (P-value=0.103). Figure 3 presents the frequency of sports attended by the students during a week. Among the 288 participants, 67.7% reported taking no exercise during a week. Walking (12.2%) was reported as the most popular exercise among the remaining participants (figure 3).

Fisher Exact-Chi Square test: The mean time of exercise during a week was reported as 1.6 ± 09. Only 7 participants (2.4%) took more than 5 hours of exercise during a week (table 2). In this study, most students (67.7%) had an inactive lifestyle in terms of physical activity, and no significant relationship was found between physical activity and the type of exercise and back pain (P=0.113). The mean duration of studying was 2.1 ± 1.4 per day. The most common study posture was sitting at the desk (33.7%) (table 3). There was no significant relationship between study posture and prevalence of back pain (P=0.234).

61.1% of the students were dissatisfied with sitting at the desk, and 50% of the students who studied only sitting at the desk did not feel comfortable during the time of studying (table 3). There was a significant difference between the students' study posture and their satisfaction with the study desk (P=0.009). Also, there was a significant relationship between satisfaction with study desk and the prevalence of back pain (P=0.000). Studying while sitting at the desk prevents back pain in female students of medical sciences (Odd Ratio=1.304, 95% Confidence Interval: 1.160 - 1.465).

47.9% of the participants attended the classes for 2-5 hours a day, and only 10% of the students attended the classes for more than 5 hours a day (table 4); whereas, the mean time of active presence in hospital was reported as 24.5 ± 22.9 hours a week.

The mean hours of daily sleeping was reported as 7.3 ± 1.3, and 56% of the students slept for 6-8 hours per day. Table 5 presents the mean hours of sleeping for students living in a dorm and native students affected by back pain. No significant relationship was found between the time of sleeping and prevalence of back pain among the students living in a dorm and native students (P=0.284).

The mean BMI was reported as 21.9 ± 3.2 for all the participants, and 67.7% of them (195 people) reported weight changes in the form of both weight loss and weight gain. The results suggest that there is a significant relationship between BMI and prevalence of back pain (P=0.000). Also, there was a significant relationship between BMI and duration of back pain (P=0.000). Table 6 presents the mean BMI in each group of students in terms of being affected by back pain.

Out of 288 people surveyed, 250 have chronic back pain (86.8%).130 people with chronic back pain live in dormitories (52% of people with chronic back pain or 45.1% of all people surveyed). 120 of these people do not live in dormitories (48% of people with chronic back pain or 41.7% of all people surveyed).On the other hand, 38 people have no chronic back pain (13.2%). Fifteen people without chronic back pain live in dormitories (39.4% of people without chronic back pain or 5.2% of all people surveyed). 23 people without chronic back pain do not live in dormitories (60.6% of people without chronic low back pain or 9.7% of all people surveyed). From the above, it can be seen that living in a dormitory has a great impact on the development of chronic back pain in students.

Among the 250 students affected by back pain, 160 people (556%) reported weight change over the past month; also, among the 38 people without any background of background, 9 people (3.1%) reported weight change over the past month (figure 4). A significant relationship was found between the weight changes, prevalence of back pain, and duration of back pain (P=0.000). Weight change can be considered as a risk factor for occurrence of back pain (odd Ratio=0.799, 95% Confidence Interval: 0.717- 0.890).

The studied students spent an average of 1.5 ± 1.6 hours on using computer and 1.4 ± 1.3 hours on watching TV (table 7). There was a significant relationship between the duration of using computer and being affected by back pain (P=0.000); whereas, it has no relationship with the duration of back pain (P=0.481). Moreover, there was no significant relationship between watching TV during the day and prevalence of back pain in female students (P=0.060).

Investigation of driving frequency showed that 117 people (40.6%) drove every day and the mean time of driving was 24 ± 10 minutes a day. A significant relationship was found between the time of driving and prevalence of back pain (P=0.000) and duration of back pain (P=0.000).

29 people (10.1%) reported smoking during the day or week. 3.4% of the female students reported the use of more than one cigarette per day. Nevertheless, no significant relationship was found between smoking and prevalence of back pain (P=0.116). However, there was a significant relationship between smoking and duration of back pain and back pain disability coefficient (Oswestry Disability Index) (P=0.000).

Among the 250 students affected by back pain, the mean amounts of drinking tea and coffee were respectively equal to 2.1 ± 1.1 glasses and 0.7 ± 0.9 glasses. There was a significant relationship between the daily frequency of drinking tea and prevalence of back pain in both groups of students living in a dorm and native students (P=0.034). However, no significant relationship was found between the frequency of drinking coffee and prevalence of back pain (P=0.757).

According to the results of investigating the family background of back pain, 169 students (58.7%) reported the background of back pain in at least one of the family members. Out of this population, 29.2% complained about back pain over the past month (table 8). There was a significant relationship between the background of back pain in family members and being affected by back pain (P=0.000). Also, there was a significant relationship between the background of back pain in family members, duration of back pain, and back pain disability (Oswestry Disability Index) (P=0.000).

Seventy three married students (92.4%) and 177 single students (84.7%) complained about back pain. However, no significant relationship was found between back pain and marital status (P=0.058); whereas, a significant relationship was observed between the duration of back pain, back pain disability, and marital status (P=0.000).

The mean of education years was reported as 3.5 ± 1.7 for the studied subjects, and there was a significant relationship between prevalence of back pain in female students and duration of studying at Babol University of Medical Sciences (P=0.048). The results of clinical tests on 3 native students and 4 students living in a dorm reported severe back pain accompanied with a high back pain disability coefficient. These people did not report any active infection or any record of infection such as brucellosis. Furthermore, CBC report was normal for these people; the mean serum calcium and vitamin D levels were respectively reported as 8.8 ± 0.7 mg/dl and 12.8 ± 5.2 ng/ml.

Correlation between back pain disability (Oswestry Disability Index) and the studied parameters: Scoring instructions of Oswestry Disability Index is according to the Fairbank and Pynsent method (14, 15). In this regard, for each section, the total possible score is 5: if the first statement is marked the section score = 0; if the last statement is marked, it = 5. If all 10 sections are completed the score is calculated as follows:

Example:

16 (total scored), 50 (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated:

16 (total scored), 45 (total possible score) x 100 = 35.5%

Minimum detectable change (90% confidence): 10% points (change of less than this may be attributable to error in the measurement).

The correlation coefficient, or Pearson product-moment correlation coefficient (PMCC) is a numerical value between -1 and 1 that expresses the strength of the linear relationship between two variables. When r is closer to 1 it indicates a strong positive relationship. A value of 0 indicates that there is no relationship. Values close to -1 signal a strong negative relationship between the two variables.

There are many formulas to calculate the correlation coefficient (all yielding the same result). This calculator uses the following:

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{(n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2)(n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2)}}$$

Where n is the total number of samples, xi (x1, x2, ... ,xn) are the x values and yi are the y values.

Results

Among the 50 female students affected by back pain, 169 people (58.7%) reported the background of back pain in at least one of the family members. Out of this population, 45.1% lived in a dorm. The highest prevalence of back pain was reported in students of medicine (29.2%). However, no significant relationship was found between the prevalence of back pain, living in a dorm, and university subject. In this section, the results are discussed and compared with the findings of similar studies.

Investigation of the prevalence of back pain among female students of Babol University of Medical Sciences showed that 86.8% of the students are affected by back pain. In other words, more than half of the female students suffer from back pain, and it suggests the high prevalence of back pain and its importance for female students studying health-related subjects.

Prevalence of back pain among the medical students of other countries has been reported as 64.6-13.5% (4, 12, 17, 20) that is less than the prevalence rate reported in this study. The results of this study suggest that back pain is so prevalent among female students of this university. The difference between the prevalence rates reported in different studies may be due to the difference between the students in terms of education year and social factors (17). It should be noted that this study has investigated only female students and this gender is considered as one of the risk factors of back pain. According to the results, the highest prevalence of back pain was reported for the students of medicine (29.2%); however, no significant relationship was found between university subject and prevalence of back pain.

Hulya et al. reported that compared with the students of pharmacology, dentistry, etc, back pain is more prevalent among the students of medicine (18). In contrary, Falavigna et al compared the student of faculty of medicine and physiotherapy department, and they found that 77.9% of the students reported back pain in the past year; also, back pain was more prevalent among the students of physiotherapy (80.3%) than the students of medicine (19). Higher prevalence of back pain among the students of medicine compared with the students of other subjects can be attributed to the nature of their clinical education.

There is a significant relationship between the education years and back pain (20). In the present study, the mean of education years was reported as 3.5 ± 1.7, and it had a significant relationship with prevalence of back pain in female students of Babol University of Medical Sciences. As aging is considered as one of the risk factors of back pain, it can be expected that students of higher years are mostly older. The other probable explanation can be related to passing more study years and more clinical courses and getting experienced in practice of health promoting behaviors. Several studies support the claim that students of final years are more probable of being affected by back pain (20).

In the present study, most of the students (67.7%) had an inactive lifestyle. However, no significant relationship was found between physical activity and back pain. Although lack of exercise has been mentioned as a risk factor for back pain in several studies [19, 20], there is still contradictory evidence about the relationship between exercise and back pain in general population and students. As this research, several other studies have suggested that there is no significant relationship between back pain and exercise (21).

Jones et al reported that a medium level of physical activity can decrease the risk of being

affected by back pain (22). Also, several studies have shown that sports such as football and swim decrease the risk of back pain (23). In another study investigating PE students, it was reported that some of the sport fields are closely related to back pain. However, no relationship was found between the type of exercise and back pain in this study. Anyway, physical activity is considered as a preventive and therapeutic strategy for treating back pain (24). In this study, it was found that most students studied sitting at the desk (97, 33.7%). Nevertheless, no significant relationship was found between the hours of studying, study posture, and prevalence of back pain.

Yucel et al (9) reported the most common study posture as sitting at the desk. In this study, the students' back pain was attributed to long time sitting. Furthermore, 77.5% of the students claimed that the chairs and desks existing in classrooms are not comfortable and most of them complained about back pain (93.5%). Other studies suggest that long term sitting is one of the risk factors for back pain (25, 26). On the other hand, another study has reported that sitting posture is not a risk factor for back pain (27). Also in the study performed by AlShayhan et al, no significant relationship was found between study posture and back pain (4). Therefore, further studies should be done to investigate this issue. The findings about the relationship between back pain and sleeping hours showed that there is no significant relationship between sleeping duration and prevalence of back pain in none of the students living in a dorm or native students. These findings are consistent with the results of the study performed by AlShayhan et al (4).

Weight gain and tallness are the risk factors of back pain (28). Several studies have shown a relationship between obesity and back pain among the university students (29, 30). Furthermore, a study showed a significant positive relationship between BMI, back pain, and disability in the adult population affected by back pain (31). In the present study, there was a significant relationship between BMI and duration of back pain. Several studies have suggested that back pain is not affected by BMI. Nevertheless, the relationship between weight changes and back pain was not statistically significant (32). Also, this study showed a significant relationship between weight changes, prevalence, and duration of back pain among students. Therefore, weight changes can be considered as a risk factor for back pain (odd Ratio=0.799,95% Confidence Interval:0.717-0.890).

It has been reported that the duration of using computer or laptop has a close relationship with back pain (4, 12, 18). The results of this study have been consistent with other research works, and we proved that back pain is more prevalent among the students using computer for more than one hour per day. However, there was no significant relationship between watching TV and prevalence of back pain in female students.

Several studies have suggested that there is a systematic relationship between smoking and back pain (6). Bertan et al. studied the first year students of eight universities, and they reported the smoking rate as 22.5% (32). In this study, smoking rate among female students was reported as 10.1% that is a lower value than the rates reported in other studies. So, no significant relationship was found between smoking and prevalence of back pain. However, there was a significant relationship between smoking, duration of back pain, and back pain disability coefficient (Oswestry Disability Index). Yucel et al. did not report any significant relationship between the daily duration and amount of smoking and severity of pain (9). Contrary to this study, AlShayhan found a significant relationship between back pain and smoking and also duration and severity of back pain disability (4). Frequency of drinking coffee was increased in the students affected by back pain (33). However, no significant relationship was found between drinking coffee and back pain in the present study. Nevertheless, there was a significant relationship between daily use of tea and prevalence of back pain in both students living in a dorm and native students.

The results of this study suggest the high risk of back pain among female student of Babol University of Medical Sciences. This risk was higher in students living in a dorm and students of medicine. The present study has reported the risk factors of occurrence of back pain in the students as study year, weight changes, duration of using computer, and the frequency and amount of drinking tea.

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