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Research Article

Low Back Pain and its Associated Factors among First-Year Health Science Undergraduate Students: A Cross Sectional Study

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Abstract

Objective: To determine the prevalence and risk factors of LBP among health science students in the state of Israel.

Methods: Two hundred and twenty two students of the first-year health science programs (Nursing, Physical Therapy, Medical Laboratory Sciences and Emergency Medical Services) at Zefat Academic College were invited to participate during May 2021-2022 academic year. A cross-sectional survey with structured self-administered questionnaire that sought information about demographic as well as physical activity and sedentary behavior was used.

Results: One hundred ninety seven (88.7%) students participated in this study with mean age of 23 ±3.5 years. The prevalences of LBP at lifetime and last month were 74% (146/197) and 61% (121/197), respectively. No significant differences were noted in the prevalence and characteristics of LBP among the different programs. The results revealed that history of disability (OR-3.591) and seeking care from clinicians due to pain (OR=4.729) increase the likelihood for LBP whereas, physical activity for at least 20 minutes attenuates the risk.

Conclusions: Students from health science programs, manifested high prevalence of LBP. We believe that physical activity should be implemented in these programs in order to relief back pain.

Keywords: Health science students; Low back pain; Physical activity; Risk factors

Introduction

Low Back Pain (LBP) is a worldwide condition that affects individuals in all age groups [1]. It is commonly recognized as a health, social and economic burdens in western countries. The onset of LBP is believed to be influenced by numerous variables such as age, gender, smoking habit, poor working posture and stress [2-4]. Although the frequency of LBP increases with age [1], the prevalence among adolescents (18 to 24 years) varies between 14% to 40% [5,6]. Previous studies found that students are prone to various musculoskeletal disorders such as LBP since they are exposed to stress and spend hours in prolonged sitting in most of their daily activities [7-9]. Cakmak and colleagues for example, have reported that lifetime prevalence of LBP among Turkish university students is approximately 41% [10]. Students in the health professions face extra physical demands in their clinical experiences, which include manual and repetitive activities that increase the risk for LBP. In addition, they seem to be at a higher risk for back pain during their academic years before commencement of their full-time clinical duties [11,12]. A recent study has found that final year Swiss female students in health professions manifested a higher prevalence of LBP compared to the general and demography-stratified population [13]. Others have found that the onset of LBP among physiotherapists and nurses begins during their academic studies [14-16]. This leads to the realization that LBP preventive strategies should be initiated among undergraduate students due to their considerable influence on the future workforce and economy. Reported overall prevalence of LBP in health science students ranges between 40% to 58%, but there is controversy regarding which program has the highest prevalence of LBP [1,17]. Accordingly, a prospective study in order to reveal whether health science undergraduates are considered risk factors for LBP is required. Therefore, the aims of the current study are (1) to determine the prevalence and the characteristics

of LBP among first-class health science undergraduate students and (2) to establish the common associated factors related to this population.

Methods

Study Design

Quantitative cross-sectional study was conducted at four health science programs (Nursing, Physical Therapy, Medical Laboratory Sciences and Emergency Medical Services), at Zefat Academic College in the north of Israel. A consent form, which included the purpose of the study and the right of the participant to withdraw at any time, was received from each participant. This survey was conducted in adherence to the Helsinki Declaration and approved by the Departmental Research Ethics Committee, Zefat Academic College (no. 19-2022).

Subject Selection And Instrument

All first-year students (n=222) who were enrolled during May 2021-2022 academic year in the health science programs at Zefat Academic College were eligible to participate. Only first-year students were invited in order to enable follow-up of these undergraduates and their LBP characteristics for the next 2-3 years. There were no exclusion criteria. First-year curriculum for all the health science programs contains a predominance of theoretical courses without clinical experiences. A self-administered written questionnaire considers the most common method to determine the prevalence of LBP [18]. The hardcopy questionnaire was distributed and explained by one of the authors (towards the end of the second semester) at the beginning / or end of the class at which all students are expected to be present. Completing the questionnaire took 10-15 minutes and they were then collected by the research assistants. The study data were collected from the forms that had been completed in full. In order to ensure the anonymity of the participants, we assigned each with a code number for the purpose of statistical analysis. A structured and anonymous questionnaire that was based on the validated Standarised Nordic Questionnaire [19] included the following variables: gender, age, marital status, program, dominant hand, height, weight, pregnancy and ethnicity (e.g., Jewish and Muslims). We also collected information about religion/faith, sedentary behavior, tobacco use and study-related stress [20] that was graded as follows: (a) very high to quite high and (b) none to very little" (Table 1). Data about physical activity were adapted from the American College of Sport Medicine guidelines [21] and then were graded into three levels: low, moderate and high. History of hospitalization as well as medication use, disability and seeking care due to LBP during the previous year were also reported.

Disability was defined according to the four items of Oswestry Disability Index (ODI) following the study of Falavigna and colleagues [22]. Body mass index (BMI) was calculated as weight (kg) divided by height squared in meters. The students were asked if they had ever experienced LBP at some point in their lives (lifetime prevalence), and if they had suffered during the previous month. Pain frequency during the previous year was also recorded and ranged from (1) several times a day to (4) rarely or never (Table 4). LBP was defined as pain in the area from below the ribs to the hips [23]. Pain intensity during the previous month was assessed by the numerical rating scale ranging from zero to ten [23] and the severity of pain was defined as when the intensity scale was above five. The questionnaire was piloted on 10 student, who were selected randomly from the physiotherapy department (second and third years) to ensure its clarity.

Statistical Analysis

Statistical analysis was carried out via SPSS version 20. The parametric variables (e.g., age, and height) were checked for normal distribution. In order to compare programs of study and gender for categorical and metric variables, we used Chi square test, Mann-Whitney test or independent T-test analyses, respectively. Logistic regression analysis (method - forward LR) was also used to detect the odds factors for LBP during the previous month (dependent variable - LBP, independent variables - age, gender, BMI, physical activity, sedentary behavior etc.). Significant difference was noted when the P value was ≤ 0.05.

Results

Demographic and Lifestyle Feature of the Students

A total of 197/222 (88.7%) students were evaluated, in which the majority were females (75%) (Table 1). The mean age and BMI values for all the participants were 23 ±3.5 years (19-47) and 23 ±3.8 (15.6-38), respectively. The majority of the students were Muslim (38.6 %) and Jewish (36.5%) versus Christian (13.2%) and Druze (11.7%). However, the distribution of this ethnicity was significantly different among the four courses ($P<0.001$). We also noted that the mean age of the physical-therapy students was significantly higher than the students in the other courses of study. Ninety-three percent (n=184) of the students were single and 15% were habitual smokers. It was observed that 43% of the students defined themselves as traditional, 30% as secular, 18% as religious or orthodox and 14% others. This distribution was significantly different among the courses of study ($P<0.001$) (Table 1). Among all students, a great prevalence (85%) of them experienced study-related stress graded from very high to quite high. Regarding gender, males have greater BMI and reported more smoking than females ($P<0.001$) (Table 3). In addition, 44.9% of males define themselves as secular versus 25.7% of females ($P<0.002$). In this study there were no pregnant students.

	Total (n=197)	**Nursing** (n=89)	**Physical Therapy** (n=41)	**Medical Lab** (n=37)	**Emergency Medical Services** (n=30)	**P value**
Response rate	88.70%	95.70%	91%	88%	74%	
Gender (%)						
Female	75 (n=148)	82 (n=73)	56 (n=23)	92 (n=134)	60 (n=18)	<0.001
Male	25 (n=49)	18 (n=16)	44 (n= 18)	8 (n=3)	40 (n=12)	
Ethnicity (%):						
Jewish	36 (n=72)	25 (n=22)	98 (n=40)	8 (n=3)	23 (n=7)	<0.001
Muslim	39 (n=76)	45 (n=40)	0	54 (n=20)	53 (n=16)	
Druze	12 (n=23)	16 (n=14)	0	11 (n=4)	17 (n=5)	
Christian	13 (n=26)	14 (n=13)	2 (n=1)	27 (n=10)	7 (n=2)	
Mean age (years) ±SD	23.1±1	22.2±3	25.8 ±4	21.9 ±3	23.6±3	<0.001
Mean BMI (kg/m^2) ±SD	23.1±3	22.7±3	23.5±3	22.6±3	24.8±4	0.56
Right hand dominance (%)	91 (n=179)	92 (n=82)	88 (n-36)	92 (n=34)	90 (n=27)	0.871
Marital status (%):						
Single	93 (n=184)	93 (n=83)	90 (n=37)	95 (n=35)	97 (n=29)	0.485
Other	7 (n= 13)	7 (n=6)	10 (n=4)	5 (n=2)	3 (n=1)	
Smoking (%)	15 (n=30)	15 (n=13)	17 (n=7)	3 (n=1)	30 (n=9)	0.021
Religion & faith (%):						
Secular	30 (n=60)	20 (n=18)	66 (n=27)	16 (n=6)	30 (n=9)	
Traditional	43 (n=84)	54 (n=48)	12 (n=5)	52 (n=19)	40 (n=12)	**<0.001**
Religion & orthodox	13 (n=26)	15 (n=13)	17 (n=7)	8 (n=3)	10 (n=3)	
Others	14 (n=27)	11 (n=10)	5 (n=2)	24 (n=9)	20 (n=6)	
Sport activity (%)						
Level:	55 (n=108)	45 (n=40)	68 (n=28)	57 (n=21)	63 (n=19)	
Low	47 (n=51)	45 (n=18)	46 (n=13)	57 (n-12)	42 (n=8)	0.059
Moderate	35(n=38)	45 (n=18)	32 (n=9)	19 (n=4)	37 (n=7)	
High	18 (n=19)	10 (n=4)	22 (n=6)	24 (n=5)	21 (n=4)	
Daily prolonged sitting (%):						
Up to 3 hours	40 (n=78)	37 (n=33)	39 (n=16)	41(n=15)	47 (n=14)	
Between 3-5 hours	23 (n=45)	25 (n=22)	20 (n=8)	32 (n=12)	10 (n=3)	0.416
> 5 hours	37 (n=74)	38 (n=34)	41 (n=17)	27 (n=10)	43 (n=13)	
Daily sitting (%):						
Up to 6 hours	32 (n=63)	26 (n=23)	12 (n=5)	51 (n=19)	53 (n=16)	**<0.001**
Between 6- 8 hours	30 (n=60)	37 (n=33)	29 (n=12)	16 (n=6)	30 (n=9)	
> 8 hours	38 (n=74)	37 (n=33)	59 (n=24)	33 (n=12)	17 (n=5)	
Study-related stress (%):						
Very high to quite high.	85 (n=167)	87 (n=77)	76 (n=31)	95 (n=35)	80 (n= 24)	0.104
None to very little	15 (n=30)	13 (n=12)	24 (n=10)	5 (n= 2)	20 (n=6)	

BMI-body mass index, SD-standard deviation, n-number.

Table 1: General characteristics of sample and comparisons between programs.

Variable	OR	CI (95%)	P value
Physical activity	0.332	0.173-0.639	0.001
Disability	3.591	1.627-7.927	0.002
Seeking care	4.729	1.498-14.922	0.008

OR- odds ratio, CI- confidence interval.

Table 2: Variables significantly associated with the prevalence of LBP at the last month among all students.

	Males (n=49)	Females (n=148)	P. value
Mean BMI (kg/m2) ±SD	25.2 ± 3.8	22.5 ± 3.5	<0.001
Smoking (%)	34.7 (n=17)	8.8 (n=13)	<0.001
Religion & faith (%):			
Secular	45 (n=22)	26 (n=38)	0.002
Traditional	20 (n=10)	50 (n=74)	
Religion & orthodox	20 (n=10)	11 (n=16)	
Others	15 (n=7)	13 (n=20)	
Physical activity (%)	77.6 (n=38)	47.3 (n=70)	<0.001
Last-month prevalence (%)	46.9 (n=23)	66.2 (n=98)	0.016

BMI-body mass index, SD-standard deviation.

Table 3: Variables significantly associated with gender.

Physical Activity and Sedentary Behavior

We found that approximately half of the participants (54%) were involved in physical activity (Table 1) and 53% of them exercised a moderate to high level. Males were significantly more active than females (P<0.001) (Table 3). Our results also indicate that 32% of students spend up to 8 hours a day sitting down, 30% of them between 6-8 hours and 38% sit more than 8 hours a day (Table 1). Forty percent of the students were involved in prolonged sitting up to 3 hours a day.

Low Back Pain (LBP)

For all students, the prevalence of LBP at some point in life and during the last month were 74% (146/197) and 61% (121/197), respectively (Figure 1). No significant differences were found in the prevalence of LBP (lifetime and previous month) among the four programs. However, females had a greater prevalence of LBP during the previous month compared to males (P=0.016) (Table 3). We also noticed that 38.8 % of students who suffered from LBP during the previous month (47/121) reported that their LBP pain reached above 5 on the pain intensity scale (Figure 2). The highest prevalence of pain severity was found among nursing students (46%) whereas the lowest one was in the medical laboratory program (24%). However, no significant difference was noted in pain severity between the different courses (P=0.090) (Figure 2). Frequency of LBP among all students during the last year was variable: 17% (n=34) of them suffered several times a day, 24% (n=47) several times a week and 22% (n=43) several times a month (Table 4). The impact of LBP on those undergraduates who experienced pain (several times/day to several times/month) was as follows: 31.4% (n=39/124) sought care from clinicians and used medication, 52.4% (n=65/124) had disability in daily activities and 6.4 % (n=8/124) have been hospitalized (Table 4). No significant differences were found regarding LBP features between the four courses (P>0.05) (Table 4).

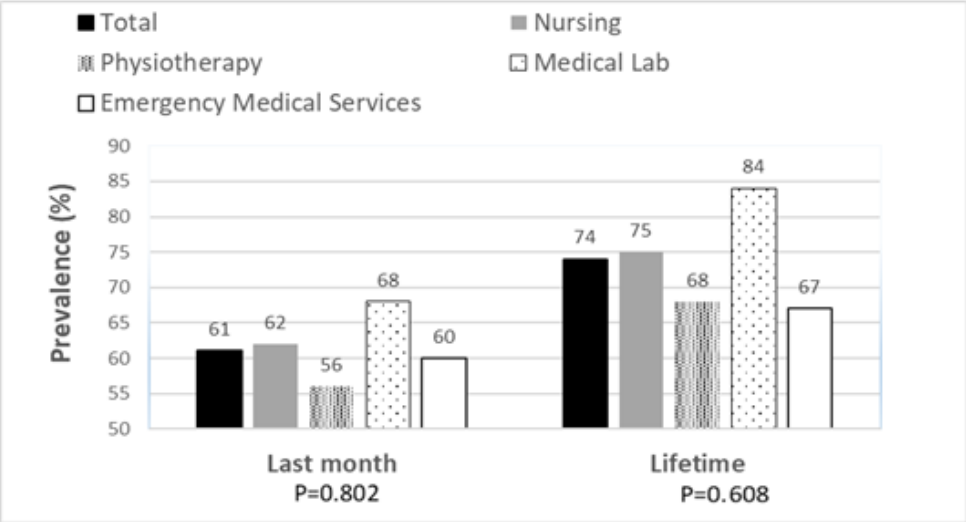

Figure 1: Prevalence of low back pain at the last month and lifetime by program.

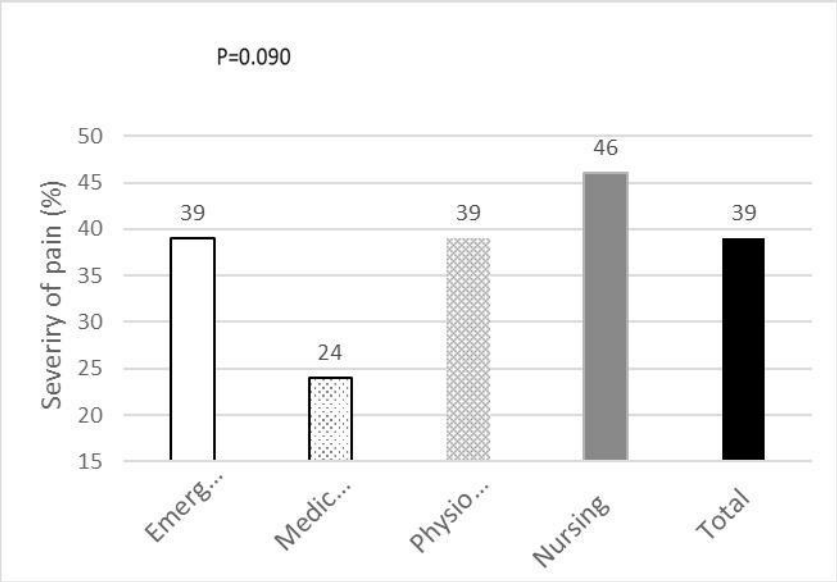

Figure 2: Prevalence of pain severity by program.

	Total	**Nursing**	**Physical Therapy**	**Medical Laboratory**	**Emergency Medical Services**	**P value**
Pain Frequency (%):						
Several times/d	17.3 (n=34)	18 (n=16)	19.5 (n=8)	21.6 (n-8)	6.7 (n=2)	
Several times/wks	23.9 (n=47)	27 (n=24)	26.8 (n=11)	13.5 (n=5)	23.3 (n=7)	0.619
Several times/m	21.8 (n=43)	19 (n=17)	17.1 (n=7)	29.7 (n=11)	26.7 (n=8)	
Rarely/or never	37.1 (n=73)	36 (n=32)	36.6 (n=15)	35.1 (n=13)	43.3 (n=13)	
Disability (%)	52.4 (n=65)	52.6 (n=30)	42.3 (n=11)	58.3 (n=14)	58.8 (n=10)	0.814

Seeking care (%)	31.4 (n=39)	28 (n=16)	30.7 (n=8)	33.3 (n=8)	41.1 (n=7)	0.725
Medication use (%)	31.4 (n=39)	22.8 (n=13)	30.7 (n=8)	33.3 (n=8)	58.8 (n=10)	0.127
Hospitalization (%).	6.4 (n=8)	1.7 (n=1)	3.8 (n=1)	12.5 (n=3)	17.6 (n=3)	0.061

Table 4: Characteristics of LBP during the last year classified by program.

Predicting Factors Associated with LBP

The multivariable logistic regression analysis for all students revealed that history of disability (OR-3.591) and seeking care from clinicians due to LBP (OR=4.729) were associated factors for LBP during the last month. In contrast, physical activity was a protective one (OR=0.332) (Table 2).

Discussion

With a high response rate (88.7%), the overall prevalence of LBP among first-year undergraduates of health sciences at Zefat Academic College ranged from 61% to 74% (previous month to lifetime). This finding is in agreement with previously reported studies [15,24-27]. On the other hand, this outcome is considered higher than others [1,17,28,29]. Yucel and Torun (2016) reported a high (83.7%) prevalence of LBP among first-year undergraduates of health sciences such as nursing and physiotherapy [24]. A recent study among undergraduate first-year physiotherapists during the COVID-19 lockdown revealed a high prevalence of LBP (70%) [30]. One study [28] that was conducted at health science programs noted that lifetime prevalence among undergraduates of nursing, physiotherapy and clinical laboratory range between 50% to 57.4%. Nyland and Grimmer (2003) reported that lifetime and 1-month prevalence among first year students of physical therapy were 57.5% and 31.3% respectively [29]. To the best of our knowledge, there are few reports in the literature that specifically address and compare the occurrence of LBP in first-year health sciences students (e.g., nursing and physiotherapy).

Although significant differences in age, sitting behavior, ethnicity and religious faith were noted among the programs, the prevalence of LBP was quite similar in both lifetime and previous month. No significant differences were noted in LBP characteristics among the courses of study. It was observed that Muslims and Christians together make up over half of the students in three of the programs. Jewish students were predominant (97.6%) in the physiotherapy program. We believe that this can explain why physiotherapy students are significantly older than others, as the Jewish adolescents usually begin their academic education after completing their mandatory military service (2-3 years) as opposed to Muslim/or Christian students. As previously confirmed, our finding indicates that over half (52%) of the undergraduates with LBP suffered from disability and about one-third of them (32%) sought care from clinician and consumed medication. Mitchell and colleagues (2008) found that 44.4 % of the first year nursing students with LBP manifested reduction in their daily activity. In a Brazilian study, about 24% to 34% of undergraduate physiotherapy students sought care and used medication for pain relief [22].

In this series, history of disability (OR=3.591, P=0.002) and seeking care (OR=4.729, P=0.008) due to pain increase the possibility for LBP at the previous month. In contrast, the high rate (85%) of study-related stress among undergraduates was not found to be associated with LBP. Although the prevalence of LBP among students is common, factors that predict LBP recurrence are still unclear in the literature due to high-risk bias (e.g., heterogeneity, small number) of the existing studies. A previous systematic review study (2017) showed that history of previous episodes of LBP was the only factor that consistently predicted recurrence of LBP in the general population [31]. A study conducted among female nursing students revealed that smoking, increased physical activity, higher stress, reduced back muscle endurance and mal-posture position in sitting, were independent predictors of new-onset LBP at follow-up [32]. In a prospective cohort study, Feyer et al. [33] also reported that preexisting psychological stress in addition to the history of LBP was a predicting factor for new episodes of LBP among nursing students.

Physical activity of at least 20 minutes (frequency ≥ 2weekly) was a preventive variable for LBP in this study (OR= 0.332, P=0.001). The association between physical activity and LBP is conflicting. It has been reported that lack of exercise is a risk factor for LBP [34-36]. Others have found that physical activity was associated with an increased risk of LBP in adolescents [37-39]. The impact of physical activity on LBP depends on the type of activities and the degree of loading and stress on the lumbar spine [40,41]. Skoffer and Foldspang (2008), for example, noted that gymnastics, volleyball and football are at high risk, whereas swimming has a lower risk for causing LBP [38]. Across-sectional survey in an Australian nursing study revealed that vigorous physical activity contribute to the presence of LBP [39]. Amelot and colleagues (2019), however, have recently reported that weekly exercise and walking at least 30 minutes a day significantly improved LBP among medical students [42]. It has also been reported that a moderate level of physical activity was associated with a general conditioning effect that may reduce the risk of LBP
[43]. It is well-accepted that physical activity promotes health benefits in all age groups [44]. In adolescents, physical activity improves cardiovascular parameters and bone mineral density, reduces obesity and its risk factors, and increases the chances of being active in adulthood [45].

It was noted that females manifested a greater prevalence of LBP in their final month of the first-year compared to males. Gender, however, was not found to be a high- risk factor for LBP.

This result is consistent with previous studies [1,2,24,42,46] but also contradicts others [10,47,48]. Although a higher (68%) prevalence of undergraduates in this series, spend their daily time in sitting position (≥ 6 hours), no association has been noted between sitting duration and LBP. This finding is in accordance with previous studies [47,49,50] though it contradicts others [1,28,51,52]. Similar to previous reports [1,42,48,53,54] no association was noted between BMI, age, and smoking habit with LBP. On the other hand, some studies achieved different results [1,17,55,56]. Limitation of the study. This is a cross-sectional study with a small number of participants (n=197) that enables associations between variables without considering the time-based dimension or cause- effect relations. In Addition, the study was conducted in a single academic institution with a self-reported questionnaire that could be involved in various biases such as recall, socioeconomic status as well as emotional and cognitional factors. Data regarding depression, heavy loading and duration of pain were not addressed in this study.

Conclusions

This study indicates a high prevalence of LBP among first-year undergraduate students in health science programs. However, no significant differences were noted between the courses regarding the prevalence and characteristics of LBP. Lack of physical activity and history of disability and/or seeking care were significantly associated with LBP during the last month. Our findings suggest that physical activities should be included in the curriculum of undergraduate health sciences programs, in order to alleviate or minimize the onset of LBP in these students. We believe that this adjustment could improve the students' clinical-training and prosperity. In addition, future follow-up research projects in these health programs are essential and could shed light on the association between undergraduates and LBP onset.

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