The Prevalence of Low Back Pain and Its Associated Risk Factors Among the Medical Imaging Undergraduate Students at the International Islamic University Malaysia (IIUM) Kuantan

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Abstract:

Introduction: University students are at risk of developing low back pain (LBP) because of the curriculum task load that lead them to practice a sedentary lifestyle. This study aims to determine the prevalence of LBP and its associated risk factors among the Medical Imaging undergraduate students at the International Islamic University Malaysia (IIUM), Kuantan. **Methods:** Ninety-two respondents were randomly selected for the study. Data was collected using a self-constructed questionnaire with content and reliability validation. The Statistical Package for Social Science (SPSS) Version 26 was used to analyze the data. **Results:** The findings showed that 72% of the respondents have LBP once in their lifetime. Fatigue and body posture were found to be the most associated risk factors of LBP (p=0.001 and p=0.02) respectively. A significant difference between the respondents' year of study and the prevalence of LBP (p=0.037) was also indicated. **Conclusion:** The prevalence of LBP among the university student was relatively high, possibly due to the curriculum task load that resulted in long study hours and a sedentary lifestyle that could lead them to be fatigue and possess poor body postures. Furthermore, it could indirectly pose increased risk of developing LBP. A significant difference between the respondent's year of study and the prevalence of LBP could be due to the increased task load, stress and clinical posting accumulated throughout the years of studying. As such, higher learning institutions should create awareness to reduce the prevalence of LBP and its effect on the well-being their students.

Keywords: LBP, sedentary lifestyle, university students

Introduction:

Lower back pain (LBP) can be acute, subacute, or chronic depending on the duration suffered by an individual. As approximately 85% of individuals suffered from LBP at least once in their lifetime (Aggarwal, et al., 2013), it remains a common societal health problem.LBP affects over 50% of people globally irrespective of age (Ganesan, et al., 2017). Individuals usually suffer from it at around the age of 30, with the peak incidence between the ages of 45 to 60, probably due to the loss of bone strength and muscle elasticity (Aggarwal, et al., 2013) However, the incidence of LBP among young adults should not be disregarded as it can affect their ability to carry out physical activities (AlShayhan and Saadeddin, 2017). Furthermore, the fore-mentioned problem can affect their growth, academic and co-curriculum performance.Literature has suggested that LBP prevalence is influenced by gender. It was reported that women are three times more likely to suffer from the ailment compared to men due to degenerative spondylolisthesis, lower bone mass and osteoarthritis (Herman, 2017).

Numerous studies have reported that obesity and physical spine stress from vigorous physical activity can result in LBP. This is because a high body mass index (BMI) causes pressure on the vertebral column leading to LBP (Sheng, et al., 2017). Individuals that are too thin due to eating disorders or osteoporosis are also at risk of developing LBP. In addition, individuals with an inactive lifestyle, depression and muscle fatigue were also reported to be at risk of LBP (Parreira, 2018; Steffens, et al., 2014; Sullivan et al., 1992; Citko et al., 2018). Individuals suffering from chronic LBP are more likely to be depressed due to the pain suffered by them (Sullivan, et al., 1992). Those with chronic LBP tend to use similar neuromuscular strategies in their effort to protect the spine when responding to an unexpected external load, thereby could lead to muscular fatigue (Citko et al., 2018). LBP can also be caused by anxiety, stress, sleeplessness and poor anger management. These can then affect the physical activity and performance and in its worse scenario, morbidity and health deterioration (Ogunbode, et al., 2013). Prolonged LBP can also cause an economic burden on the sufferers due to work absenteeism and the incurred management cost (Ogunbode, et al., 2013).

Studies have reported that approximately 30% to 80% of university students experienced LBP (Anggiat, et al., 2018; Korovessis, et al., 2010; Morais, et al., 2018). LBP is prevalent among the university students possibly due to the nature of tertiary education that requires students to practice a sedentary lifestyle such as sitting for a long period, doing assignments and attending lectures. Thus, less time is spent on physical activities and exercise. Previous studies conducted among the undergraduate university students found that years of study, prolonged sitting, lack of exercise, sleeping hours, stress and improper body posture were the contributing factors to the cause of LBP (Ganesan et al., 2017; Hoogendoorn, et al., 2002).

Undergraduate students might not be aware of the impact of LBP and its consequences. As such, rarely do they visit a physician due to the back pain. The progression of LBP and its effect on morbidity can be prevented or reduced if young adults are aware and take early precautions in avoiding and preventing it from developing to chronic LBP (Ganesan, et al., 2017). As LBP prevalence and its associated risk factors can affect the university students' quality of life (Aggarwal, et al., 2013), this study is pertinent to determine the LBP prevalence and its associated risk factors. The findings obtained can be used by the university management to enhance the awareness on LBP and take appropriate steps to prevent its occurrence.

Materials and Methods:

A self-constructed questionnaire was used to find out the prevalence of LBP and the associated risk factors among the respondents. The content of the questionnaire was validated by two academicians from the Department of Diagnostic Imaging and Radiotherapy (DDIR), IIUM Kuantan. The operational definition of LBP for this study is pain and discomfort, localized below the costal margin and above the inferior gluteal folds which are not due to spinal deformity or require medical management six months or more.

A pilot study was carried out on 50 IIUM undergraduate students from the Kulliyyah of Allied Health Sciences (KAHS) using the Google Form to check for the reliability of the questionnaire. The Cronbach alpha test indicated that the internal consistency of the questionnaire was 0.835. The inclusion criteria for this study were the Medical Imaging undergraduate students who had no

history of LBP. The minimum sample size at 95% confidence level and 5% margin error required for this study using Slovin's formula was 79 students. A random sampling method was used to recruit the respondents. Their phone numbers were obtained from the DDIR office and the questionnaire was sent to the respondents via WhatsApp. The study information sheet was embedded at the start of the survey and the participant's willingness to answer the survey was assumed that they have given their informed consent. The response from the respondents was checked daily and the data was transferred to SPSS for data analysis.

Statistical Analysis

The data obtained were analyzed using the SPSS version 26. Descriptive data were used to describe the respondents' demographic characteristics, LBP prevalence and risk factors of LBP. The Chi-Square test was used to determine the association of risk factors of LBP with LBP prevalence. The Kruskal-Wallis test was used to compare the prevalence of LBP among the first, second, third and fourth-year respondents. The significance level was set as $p<0.05$.

Ethical Approval

The research was approved by the Kulliyyah Postgraduate and Research Committee (KPGRC, KAHS 15/21) and IIUM Research Ethics Committee (IREC).

Results:

Ninety-two students consented to take part in the study. The demographic characteristics of the respondents are summarized in Table 1.

Table 1 Demographic information of the respondents

Items	Frequency (%)	Presence of LBP n (%)
Age		
19	24 (26.1)	17 (70.8)
20	19 (20.7)	10 (52.6)
21	20 (12.0)	16 (80.0)
22	11 (12.0)	8 (72.7)
23	17 (18.5)	15 (88.2)
26	1 (1.1)	1 (100)
Gender		
Male	17 (18.5)	14 (82.4)
Female	75 (81.5)	53 (70.6)
Years of study		
Year 1	25 (28.7)	18 (72.0)
Year 2	20 (23.0)	11 (55.0)
Year 3	17 (19.5)	17 (100)
Year 4	25 (28.7)	21 (84.0)
Job status		
Yes	13 (14.1)	11 (84.6)
No	79 (85.9)	56 (70.9)
Body mass index		
Underweight	12 (13.0)	8 (66.7)
Normal	56 (60.9)	40 (71.4)
Overweight	20 (21.7)	17 (85.0)
Obese	4 (4.3)	2 (50.0)

Table 2 Respondents Risk Factors of LBP and Its' Association with LBP

No	Questions	Characteristics	With LBP n = 67 *n* (%)	Without LBP n = 25 *n* (%)	*p*-value (Chi-Square Test)
Q1	Time spent sitting per day at university.	4– 6 hours	28 (41.8)	10 (40.0)	.355
		6 – 8 hours	21 (31.3)	7 (28.0)	
		More than 8 hours	15 (22.4)	4 (16.0)	
Q2	Hours of study per day.	Less than 5 hours	44 (65.7)	16 (64.0)	1.000
		More than 5 hours	23 (34.3)	9 (36.0)	
Q3	Where do you normally study?	At the study table	31 (46.3)	8 (32.0)	.416
		On the bed	5 (7.5)	2 (8.0)	
		Both	31 (46.3)	15 (60.0)	
Q4	How many hours do you spend on physical activities per week?	Less than 10 hours	57 (85.1)	20 (80.0)	.802
		More than 10 hours	5 (7.5)	3 (12.0)	
Q5	How do you rate your own fitness physical activeness?	Poor	29 (43.3)	6 (24.0)	.139
		Moderate	36 (53.7)	17 (68.0)	
Q6	How many hours do you sleep per day?	4- 6 hours	42 (62.7)	15 (60.0)	.938
		6- 8 hours	21 (31.3)	9 (36.0)	
		More than 8 hours	3 (4.5)	1 (4.0)	
Q7	How do you rate your sleep satisfaction?	Very satisfied	10 (14.9)	1 (4.0)	.137
		Satisfied	24 (35.8)	14 (56.0)	
		Neither satisfied nor dissatisfied	22 (32.8)	9 (36.0)	
		Dissatisfied	11 (16.4)	1 (4.0)	
Q8	How do you rate the condition of your bed mattress?	Moderate	40 (59.7)	13 (53.0)	.505
		Good	24 (35.8)	12 (48.0)	
Q9	How often do you suffer from mental stress leading to LBP during the examination period?	Never	6 (9.0)	5 (20.0)	.068
		Rarely	15 (22.4)	11 (44.0)	
		Sometimes	33 (49.3)	8 (32.0)	
		Often	9 (13.4)	1 (4.0)	
Q10	How often do you suffer from fatigue due to task load, thereby causing LBP?	Never	1 (1.5)	6 (24.0)	.001
		Rarely	10 (14.9)	8 (32.0)	
		Sometimes	38 (56.7)	9 (36.0)	
		Often	12 (17.9)	2 (8.0)	
Q11	What is your mode of travel to attend class?	Car	18 (26.9)	2 (8.0)	.099
		Motorcycle	8 (11.9)	2 (8.0)	
		Bus	14 (20.9)	4 (16.0)	
		Walking	27 (40.3)	17 (68.0)	
Q12	How often do you carry a heavy bag to class?	Regular	5 (7.5)	3 (12.0)	.466
		Occasional	53 (79.1)	17 (68.0)	
		Never	9 (13.4)	5 (20.0)	
Q13	What is the method used by you to carry your bag to class?	On one-shoulder	33 (49.3)	16 (64.0)	.245
		On both shoulder	34 (50.7)	9 (36.0)	
Q14	What is your work duration in front of a PC/laptop per day?	Less than 4 hours	7 (10.4)	1 (4.0)	.523
		4- 10 hours	51 (76.1)	22 (88.0)	
		More than 10 hours	9 (13.4)	2 (8.0)	
Q15	How do you rate your own body posture?	Good	12 (17.9)	12 (48.0)	.020
		Poor	27 (40.3)	6 (24.0)	
		Unsure	28 (41.8)	7 (28.0)	
Q16	How often do you drive long-distance?	Regular	7 (10.4)	2 (8.0)	.788
		Occasional	31 (46.3)	10 (40.0)	
		Never	29 (43.3)	13 (52.0)	

Table 3 LBP Prevalence among Respondents

No	Questions	Characteristics	Frequency	(%)
Q1	Do you have a family history of low back pain?	Yes	24	26.1
		No	68	73.9
Q2	Do you have low back pain?	Never	25	27.2
		Rarely	42	45.7
		Frequently	20	21.7
		Always	5	5.4
Q3	If yes, what type of low back pain do you have?	Lifetime prevalence	43	46.7
		12-month prevalence	7	7.6
		Point prevalence	14	15.2
		Chronic low back pain	3	3.3

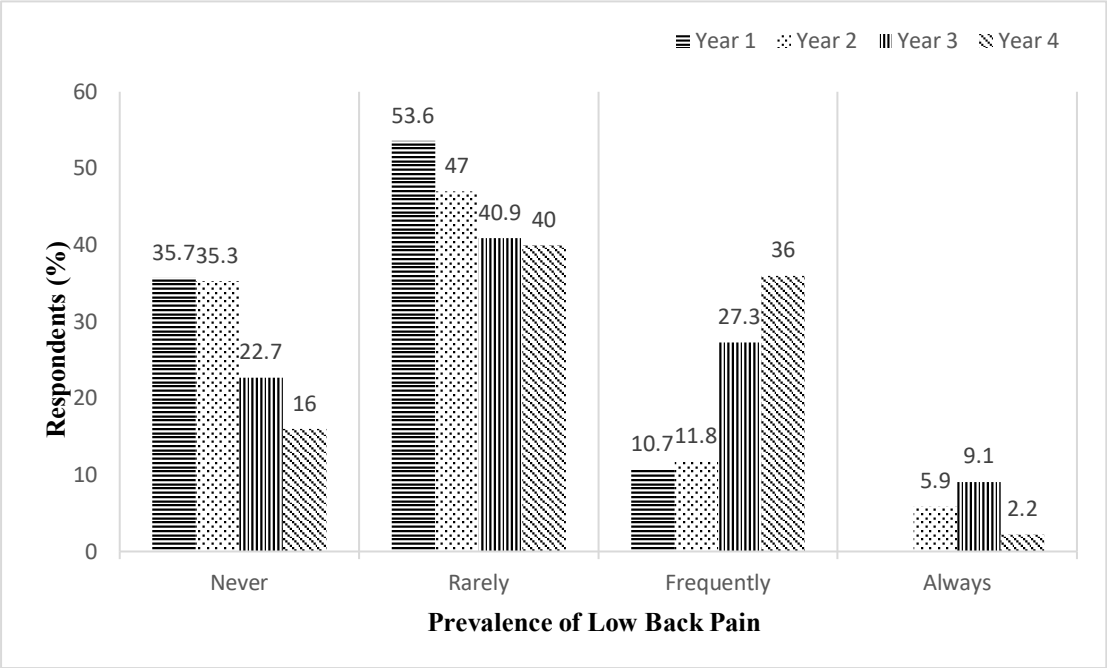

Figure 1 Respondents' LBP Prevalence According to the Year of Study

Sixty seven out of 92 respondents were reported to have LBP. Table 2 summarizes the associated risk factors among respondents and the Chi-Square analysis between risk factors of LBP and the prevalence of LBP among respondents.

Mental stress during the examination period (p=0.068) showed no association with LBP. However, fatigue due to task load (p=0.001) was highly associated with LBP. Both fore-mentioned risk factors showed a moderate correlation with the prevalence of LBP. Mode of travel to class (p=0.099) was not significantly associated but had a low correlation with LBP prevalence. No significant association was found between the frequency of carrying a heavy bag to class (p=0.466) and the method used to carry bags (p=0.245) with LBP. However, a low correlation was indicated between the fore-mentioned risks with the prevalence of LBP. Work duration in front of the desktop or laptop (p=0.523) was also insignificant with the prevalence of LBP. However, a low correlation was found between them. Self-rated body posture (p=0.020) was significant and correlated moderately with the prevalence of LBP among respondents.

It was found that 73.9% of the respondents do not have a family history of LBP. The breakdown of the frequency of LBP is as shown in Table 3. The LBP prevalence among the respondents' years of study is as shown in Figure 1. The Kruskal-Wallis test indicated a significant difference between respondents' years of study and the prevalence of LBP (p=0.037).

Discussion:

The findings of this study showed that only fatigue and body posture are significantly associated with LBP among respondents. This is possibly due to the sedentary lifestyle of the respondents in which they probably spent more time staying in the room and play with their electronic devices. The lack of physical activity can result in the reduction of muscular power and strength of the back.This lifestyle can lead to a reduced ability of the vertebral disc to maintain normal water concentration that can result in LBP (Citko, et al., 2018). The findings of this study also showed a significant association between the body posture and LBP prevalence. Most of the respondents rate their body posture as poor or unsure. Poor body posture such as slouching in the chair, sitting on the bed while working on the laptop and bending the back to lift heavy objects from the floor can lead to LBP (Vad, 2020). As such, the likelihood of LBP increases as these incorrect postures cause stress to the muscle tissue, spinal joint and discs.

This study also indicated the overall prevalence of LBP among respondents was high. This finding is in line with the finding of a study carried out on the prevalence of LBP among undergraduate students in Indonesia (Anggiat, et al., 2013) The high prevalence of LBP among undergraduate university students may be due to long study duration and poor body posture (Pope, et al., 2002; Anggiat, et al., 2013). The aforementioned risks may cause an increase intra-disc pressure and strength reduction of the lower back muscles leading to metabolic exchange reduction, which eventually causes an increased prevalence of LBP (Beach, et al., 2005; Kong, 2010).

A significant difference was found between the prevalence of LBP among the first, second, third and fourth-year respondents. This finding is similar to the finding of a study conducted on Health Science students in India, Saudi Arabia and Brazil. The study reported an LBP increment with each year of study (Aggarwal, et al., 2013; Morais, et al., 2018). The risk factors of LBP delineated in the study include study load, mental stress, anxiety and clinical attachment load with each year of study. Clinical attachment in the Medical Imaging field requires a long-standing duration. A study suggested that standing at work without sitting is related to LBP (Tissot, et al., 2009). On the contrary, systematic reviews of epidemiologic studies could not support an association of LBP with prolonged standing, walking, or sitting (Burdorf and Sorock 1997; Hoogendoorn, et al. 1999; Hartvigsen, et al., 2000, Lis, et al., 2007) even though biological plausibility and evidence from laboratory studies suggested such associations. The inconsistent findings possibly arise from the lack of precision in defining standing and sitting postures (Gupta, et al., 2015).

Mental stress and or anxiety can affect individuals such as headaches and mood swings. However, the effect of mental stress on the neck and back is often overlooked. Repeated mental stress in the fore-mentioned areas could also cause musculoskeletal problems. The “fight or flight” phenomenon associated with mental stress increases the blood pressure and blood supply. This then caused the muscles around the spine to tense up and cause spasms in the individual that need to flee from the source of the stress (Trevidi, 2019). Even though back pain is very common, not all individuals respond the same way to this frequently disabling condition as the responses depend on the individual’s psychological attitudes and outlooks (Pillay, 2016).

Limitations of the Study

As this is a cross-sectional study, the findings of this study can only be generalized to the undergraduate Medical Imaging students population at a given point in time. In addition to that, the responses obtained from the respondents is self-rated. Therefore, it might not reflect the genuine prevalence of LBP and its risk factors.The study is also limited in its capacity to draw valid conclusions about possible causality or association due to the existence of risk factors and outcomes that are measured simultaneously. As such it is not possible to infer confidently which came first, the ailment or exposure. The information collected on the risk factors is also retrospectively collected resulting in recall bias risk.

Conclusion:

The prevalence of LBP among respondents was relatively high possibly due to study load, leading them to practice a sedentary lifestyle. This sedentary

lifestyle could result in fatigue and bad body posture due to muscular strength reduction and the ability of the vertebral disc to maintain normal water concentration. The study found a low correlation of sitting duration, study place, physical activity, sleep satisfaction, mental stress, mode of travel to class and carrying a heavy bag with LBP prevalence. However, a significant difference was indicated between respondents' years of study and the prevalence of LBP. Among the reasons suggested were increased study load, mental stress, anxiety and clinical attachments with each year of study. Thus, it is recommended that the university authority should take proactive steps to create awareness by providing continuous information on LBP to students to prevent and reduce the prevalence of LBP.

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