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Ergonomic and Sociodemography Risk Factors for Low Back Pain among Faculty Staff

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Abstract

Low back pain (LBP) is a common condition. While most of those affected by acute episodes recover, many develop recurrent back problems and some have poor functional outcome. Because of this, it is considered the second leading cause of work absenteeism which results in more lost productivity than any other medical condition. This study aimed to determine the prevalence of LBP and its associated factors among faculty staff in a local university. **Methods:** A cross sectional study was carried out and a modified Standardized Nordic Questionnaire (SNQ) was used to collect the data. The questionnaire includes questions pertaining to socio-demographic factors, life styles, occupational factors, and presence of back pain for the last 12 months. Height and weight of each respondent was also measured. **Results:** The one-year prevalence of LBP during the last 12 months of working life among faculty staff was 70.1%. There was significant association between LBP and three occupational factors; prolonged sitting ($p<0.001$), prolonged standing ($p=0.031$) and awkward posture ($p=0.003$). However, association with sociodemographic factors and life style were not significant. **Conclusion:** This study highlighted the high prevalence of LBP among faculty staff with significant association with work postures. Hence, problems related to back pain need to be pursue with necessary ergonomic work improvement to maintain a safe and healthy workplace.

Keywords: Low back pain, SNQ, Faculty, Awkward posture.

1. Introduction

More than 80 percent of people experience back problem, either at the upper part or lower region during their life time and is among the common conditions for which patients seek medical care[1]. Low back pain (LBP) in particular, is a significant health problem due to its impact on disability, personal suffering and costs to the

health care system. Worldwide, 37 percent of LBP was deemed attributable to occupational risk factors and is considered the second leading cause of work absenteeism and lost productivity[2]. LBP is defined as any non-traumatic musculoskeletal disorder affecting the low back with pain localizing between the 12th rib and inferior gluteal folds, with or without leg pain[3].

Previous studies found that sociodemograpic and lifestyle factors including increased age, female gender, increased body weight and smoking affect the musculoskeletal system especially the back area[4, 5, 9]. Few studies have shown that various type of jobs have different prevalence of LBP and revealed that occupational factors such as duration of working, prolonged standing and sitting, abnormal posture, stress at workplace and repetitive hand motion were significantly associated with LBP[5-8]. However, these studies were mainly done among commercial vehicle drivers, industrial workers and health care workers. A study that was previously done in a higher learning institution only concentrated on a certain group of workers that was the laboratory staff[9]. Therefore, there is not enough information on the extent of this problem especially among the university faculty population. Hence to address the issue, this study was done to determine the prevalence of LBP and its associated factors among faculty staff in a local government university.

2. Materials and Methods

A cross sectional study was carried out in one of the faculty of a local government university between April-July 2007. The inclusion criteria for this study were permanent staff with at least one year working experience while the exclusion criteria were pregnant women, foreign contract workers, staff with present and past back injury and certain medical diseases such as Autoimmune diseases - Rheumatoid Arthritis, Systemic Lupus Erythematosus; Gouty Arthritis, Diabetes Mellitus as well as those with Chronic Pain. Respondents were randomly sampled from the staff name list and based on the criteria, 116 respondents were selected[9, 10]. Faculty staff was defined as staff working in the faculty and was later categorized into two groups; academic (lecturers and tutors) and non-academic (administrative staff, technicians, science officers and laboratory staff). Each respondent was asked to self administer the modified Standardized Nordic Questionnaire (SNQ) which is a standard questionnaire used to estimate and record musculoskeletal symptoms among working population[11]. The questionnaire has three sections with the first section covering the socio-demographic characteristics (age, gender, educational level and marital status), the second section focusing on lifestyle (smoking habit, exercise) whilst the third section concentrate on the occupational factors.

As for postures, prolonged sitting was defined as a sustained upright trunk posture with limited possibilities to change position while prolonged standing is a relatively stationary posture in the upright position and without much leg movement, both for at least ten minutes duration during most of the working hours[12, 13]. All these variables were the independent variables while the dependant variable was the information related to LBP (experience of back pain in the last 12

months). Pre-testing of the questionnaire was done prior to the study and yields an average 0.85 of Cronbach's alpha reliability coefficient.

As for anthropometric characteristic, height and weight of respondents were also taken. Height was measured using Body Meter (SECA Model 208) and was rounded up to 0.05 centimeter while weight with accuracy up to 0.1 kilogram was taken using a digital weighing scale. Based on the two measurements, Body Mass Index (BMI) of each respondent was also calculated for the purpose of analysis.

All data was analyzed using the Statistical Package for Social Sciences (SPSS) version 14.0. Chi-square test and Fisher exact test were used to test for the association at a significant level of 0.05.

3. Results

Of the total 116 respondents, 107 agreed to participate, giving a response rate of 92.2%. Majority of respondent (42.1%) were young (< 30 years old) with a range from 20 to 65 years old. As for ethnicity, majority were Malay (91.6%) followed by Indian (3.7%), Chinese (2.8%) and others (1.9%). Result also showed that 60.7% of the respondents had higher education level (university). This study found that the one-year prevalence of LBP during the past 12 months of working life among faculty staff was 70.1%.

Table 1 represent the association between socio-demographic (gender, age, ethnicity, marital status and educational level) and life-style factors (exercise and smoking status) with LBP. As shown, there was no significant association between sociodemography and life-style factors with LBP ($p > 0.05$).

Table 1: Association between Respondents Sociodemography and Lifestyle Factors with LBP (n = 107)

		Low back pain		χ^2 test p value
		Yes n (%)	No n (%)	
Gender	Male	32 (72.7)	12 (27.3)	0.619
	Female	43 (68.3)	20 (31.7)	
Age	≤ 30	32 (71.1)	13 (28.9)	0.761
	31- 39	23 (65.7)	12 (34.4)	
	≥ 40	20 (74.1)	7 (25.9)	
Ethnicity	Malay	68 (69.4)	30 (30.6)	0.721[a]
	Non-Malay	7 (77.8)	2 (22.2)	
Marital status	Married	45 (67.2)	22 (32.8)	0.392
	Single	30 (75.0)	10 (25.0)	
Educational level	Non-university	33 (78.6)	9 (21.4)	0.124
	University	42 (64.6)	23 (35.4)	
Physical exercise	Active	37 (64.9)	20 (35.1)	0.211
	Sedentary	38 (76.0)	12 (24.0)	

*p<0.05 [a]Fischer Exact Test

Table 2 summarizes the association between occupational factors and LBP. For job category, there was no significant difference between the academic and non academic staff (p=0.135) with LBP. Among the five postures, prolonged sitting (p< 0.001), prolonged standing (p=0 031) and awkward posture (p=0.003) were found to be significantly associated with LBP.

Table 2: Association between Occupational Factors and LBP (n = 107)

Variables		Low back pain		χ^2 test p value
		Yes n (%)	No n (%)	
Job category				0.135
Academic (Lecturer & Tutor)		34 (65.4)	18 (34.6)	
Non academic (Administrative staff, Science Officer & Laboratory Assistant)		41 (74.5)	14 (25.5)	
Duration of work				0.297
≤ 8 hours		46 (66.7)	23 (23.3)	
> 8 hours		29 (76.3)	9 (23.7)	
Posture :				
Prolonged sitting	Yes	22 (95.8)	1 (4.2)	**< 0.001*** [a]
	No	52 (61.9)	32 (38.1)	
Prolonged standing	Yes	8 (80.0)	2 (20.0)	**0.031*** [a]
	No	65 (67.0)	32 (32.3)	
Awkward posture	Yes	14 (87.5)	2 (12.5)	**0.003*** [a]
	No	59 (64.8)	32 (31.1)	
Static posture	Yes	3 (75.0)	1 (25.0)	**0.315** [a]
	No	71 (68.9)	32 (32.1)	
Sudden movement	Yes	3 (75.0)	1 (25.0)	**0.315** [a]
	No	71 (68.9)	32 (32.1)	

*p<0.05
[a]Fischer Exact Test

LBP was seen to be more prevalent among those who were taller than 170.0cm (81.3%), weigh more than 70 kg (77.1%) and were overall obese (80.0%) even though its association with the respondents anthropometric measurements were not statistically significant (Table 3).

Table 3: Association between Anthropometric Characteristic and Back Pain (n = 107)

Variables	Low back pain		χ^2 test p value
	Yes n (%)	No n (%)	
Height (cm)			
≤ 159.9	37 (75.5)	12 (24.5)	0.330
160.0-169.9	27 (64.3)	15 (35.7)	
≥170.0	13 (81.3)	3 (18.7)	
Weight (kg)			
≤ 49.9	8 (57.1)	6 (42.9)	0.568
50.0-59.9	22 (73.3)	8 (26.7)	
60.0-69.9	20 (71.4)	8 (28.6)	
≥ 70.0	27 (77.1)	8 (22.9)	
BMI (kg/m^2)			
Underweight	2 (66.7)	1 (33.3)	0.544
Normal	28 (68.3)	13 (31.7)	
Pre-obese	21 (61.1)	12 (38.9)	
Obese	24 (80.0)	6 (20.0)	

*p<0.05

4. Discussion

The one-year prevalence of LBP among faculty staff during the past 12 months of their working life was high. Similar findings were also seen in other occupations such as foundry workers, doctors, physiotherapists and laboratory staff with reported prevalence of LBP ranging between 47% and 75%[4,9,14,15]. This shows that LBP is not only a common health problem among workers in the industrial and health sectors but also prevalent among faculty staff. Males showed higher prevalence of LBP compared to females even though it was not statistically significant. In a study by Punnett L et al., the prevalence of LBP was higher for men because more frequent participation by them in the labor force and in occupations with heavy physical workload and material handling than by women[16]. With regards to age, prevalence of LBP was highest among those aged more 40 years old and similar findings were seen in another study that found majority of the respondents with LBP were in the age group between 31 and 50 years[17]. This could be explained by the fact that as age increases, the occurrence of disc disease and spinal degeneration, both prominent causes of back pain, also increases[1]. In this study, ethnicity had no association with LBP. However Normadiah J who looked at

the prevalence of LBP among doctors found that Indian had higher risk of 1.12 (95% CI 0.42-2.95), but Chinese had lower risk of 0.69 (95% CI 0.30-1.58) of LBP compared to Malay ethnic group and this was probably due to the different pain threshold encountered by different ethnic group[4]. Marital status was not a significant factor for LBP. This finding is consistent with a study conducted among the Dutch and British population that showed LBP as the commonest musculoskeletal complaint and marital status as well as geographic region were not relevant indicators to define high risk groups for it[17, 18].

Regarding physical exercise, the prevalence of LBP was slightly higher among those who did not exercise regularly. This finding was also similar among welders and nurses that showed lack of exercise and overweight increases the risk of developing back disorder[5]. Another possible reason could be that those who had LBP were of older age group (> 40 years old) and that participation in physical activity declines with age[19]. As for anthropometric measurements, there was no association with LBP even though prevalence of LBP among those who were taller (≥ 170 cm) and obese were higher. This might be because the majority of respondents were of average height and weight, therefore of normal BMI. However previous study suggested that obesity was weakly associated with LBP but not causally related[19].

As for job category, even though the non academic group complained more LBP than the academic group, the difference was not statistically significance. This could be due to the type of work between the two group did not differ much as the academician are also expected to do research and administrative duty as part of their work performance and vice versa. Most of the respondents worked for 8 hours a day, however the prevalence of LBP was found to be higher among those who worked more than 8 hours per day. It has been reported that a long working day may expose the workers to many health hazards that can affect the musculoskeletal system, leading to muscle fatigue and LBP[21].

There were five types of postures that were identified as potential risk factors of LBP. Among those factors prolonged standing, prolonged sitting and awkward posture had significant association with low back pain ($p<0.05$). This finding was also consistent with studies of different occupations that found poor working postures were closely related with symptoms of musculoskeletal disorders[4,14,15,20]. In general, this result suggested that the predominant ergonomic problems among faculty staff were related to the low-back area and is consistent with observation that the nature of the job in a university setting requires staff to teach and conduct research activities. This exposes them to prolonged standing, prolonged sitting and awkward postures. It is therefore recommended that in order to maintain an appropriate working posture, following the Guideline on Occupational Safety and Health for Standing at Work 2002 and Seating at Work 2003 by the Department of Occupational Safety and Health (DOSH) [13] can minimize the potential health effect related to bad posture.

5. Conclusion

This study showed that LBP among faculty staff was prevalent with significance association with the ergonomic risk factors such as prolonged sitting, prolonged standing and awkward posture at workplace. Providing an ergonomic working environment is crucial in order to maintain the safety and health of the staff.

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