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PREVALENCE AND SEVERITY OF LOW BACK PAIN IN CONSTRUCTION WORKERS

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ABSTRACT

Objective: This study determined the prevalence of low back pain; the association between the severity of low back pain and the type of work involved; and the level of disability affecting daily living caused by low back pain in construction workers.

Method: 194 construction workers at MRT Seri Kembangan construction site were given 2 sets of questionnaires. The first questionnaire comprises demographic-related questions. Oswestry Low Back Pain Disability Questionnaire was used to assess the level of disability in construction workers with low back pain. The data collected were analysed using SPSS version 24.0. Chi-square test or Fisher Exact test for categorical variables, and t-test for continuous variables.

Result: The study showed a 45.4% prevalence rate of low back pain in construction workers. Workers who perform more types of jobs are associated with milder pain disability. Most construction workers have a minimal level of pain disability (48.9%), followed by moderate (28.4%) and severe disability (22.7%). This study did not show significant functional disability.

Conclusion: A low prevalence rate of low back pain and a mild level of disability were identified. Total type of work has a significant impact on the level of disability.

Keywords: *Low back pain, construction worker, pain disability*

1. Introduction

Low back pain is the greatest cause of job-related disability and a leading cause of absence at work. The intensity ranges from a dull, constant ache to a sudden, sharp sensation that leaves the person incapacitated. Pain can develop abruptly as a result of an accident or by lifting heavy items. It may also develop over time due to repetitive use of the back muscles in performing work every day.

Construction workers are known to have a high incidence of low back pain (LBP) [1-3]. There are many studies done to investigate the risk factors of LBP in construction workers. According to Nippon Medical School in 2001, a significant relationship between construction workers and LBP has been proven. The study identified risk factors such as stress at work, postures during work and unstable body balance on scaffoldings [2-3]. In regards to posture, twisting and deep forward bending are reported to have higher incidence rates [2-3]. Enough rest and doing pre-work exercises are found to have a role in decreasing the incidence of LBP [2]. In conclusion, good physical working environments, instructive and psychological care are important factors in the prevention of LBP in construction workers [2].

A study done at Sao Luis, Brazil investigated the prevalence of lower back pain and level of disability amongst 84 construction workers [1]. Questionnaires and Mann Whitney U test was used to measure functional incapacity. In this study, the workers performed 8 hours of labour with a one-hour break, reportedly, 91.7% significant physical exertion and low back pain were most frequent during labour (38.1%) followed by at home after work (23.8%) [1]. Hence, there is a close relationship between pain and physical exertion during laborious activity[1, 4-5]. The extensive laborious activity puts a heavy strain on the muscles and joints, causing fatigue and pain by the end of the day explained the presence of pain after work. This study showed that low back pain did not cause functional incapacity in workers and further study needs to be done on this.

Another study investigates the interrelations between physical, psychosocial, and individual risk factors and different endpoints of low back pain in scaffolders using questionnaires and an instant interval sampling method with frequent observations as a measurement [4]. Comparison of type of work carried out and type of low back pain they experienced between scaffolders and supervisors was made in this study [4]. They noted that scaffolders had a higher grade of disability compared to supervisors [4]. This proved that there is an interrelation between manual handling of materials, strenuous arm positions, awkward back postures, perceived exertion and poor perceived health.

This study aimed to determine the prevalence of low back pain in different categories of work gauged using Oswestry Pain Score. The objectives of this research are to determine the prevalence of LBP in construction workers at MRT construction sites in Malaysia, the level of pain disability due to LBP and the association between the type of work and severity of LBP. We hypothesized that there is a prevalence difference in LBP in different categories of work.

2. Materials and Method

This is a cross-sectional study that investigates the prevalence of low back pain; the association of the severity of low back pain; the type of work involved and identify the level of disability affecting daily living caused by low back pain in construction workers from MRT construction campsite. Construction of MRT stations and trackways involves a lot of manual labour which may lead to occupational injury such as low back pain. Hence, we decided to achieve our objectives by researching MRT construction sites.

2.2 Sampling Method

This study was outlined cross-sectional. The total number of construction workers at MRT Seri Kembangan campsite is 300. By using Raosoft Sample Size Calculator, the sample size needed for 95% confidence level is 169 people. This sample size allows effective statistical analysis besides serves as a good representation of the researched population. Among 300 workers, this study observed 194 construction workers at the campsite. Data was collected in June-July 2018. 10 minutes was spent on each participant to fill in the questionnaires, 1 day each week for 2 weeks at the campsite to collect the data. The questionnaires were distributed manually during the construction workers' break time. Data related to the participants' demographics, health-related issues and pain disability score was collected. The selection was randomized, and the baseline characteristics of the study population were similar.

2.3 Study Instrument

Two (2) sets of questionnaires were used. The questionnaires were in English and were translated into Malay and Bengali. The first questionnaire contains questions about basic demographics and characteristics of the study population, questions about duration of back pain, usage of pain killer and types of work carried out were included to assess the severity of back pain affected by hard laborious work. Participants without low back pain need not proceed to the second questionnaire. The second questionnaire is the Oswestry Low Back Pain Disability Questionnaire used to assess the impacts of low back pain on the study population.

Male manual construction workers of 20-50 years old, of all races, nationalities and those with previous back injuries were included. Construction workers with motor-vehicle accident injuries are excluded, non-manual workers and females were excluded. Questionnaires with incomplete data and construction workers with low back pain less than 3 months were excluded.

2.3.1 Oswestry Low Back Pain Disability Questionnaire

Oswestry Low Back Pain Disability Questionnaire comprises 10 questions [6]. They focused on pain intensity; ability on personal care; the effect of LBP on lifting, walking, sitting, standing, sleeping, social life, traveling and changing the degree of pain. The level of

pain disability is then determined using the scoring for Oswestry Low Back Pain Disability Questionnaire. There are 5 answers for each question. For each question, there is a possibility of 5 points; 0 for the first answer, 1 point for the second answer etc. The answers for all the questions were added up and the participants were rated based on the scale of the scoring system. There are 5 disability levels: No disability (score 0-4); mild disability (5-14); moderate disability (15-24); severe disability (25-34) and completely disabled (35-50). Participants will be categorised based on the disability level and the relationship between pain disability and type of work is determined.

2.4 Statistical analysis

The results were outlined in descriptive statistics. Data was presented in categorical variables in frequency and percentage. P-value for each variable was stated. Statistical analyses were undertaken using SPSS version 24.0. The dependent variable was the severity of low back pain whereas the independent variable was the type of work. The analysis determined the association between severity of low back pain with the independent variable using Chi-square test or Fisher Exact test for categorical variables and t-test for continuous variables. Logistic regression was done to identify the severity of low back pain according to types of work. A P-value of 0.05 defined the statistical significance.

3. Results

3.1 Respondents socio-demographic background

This study includes 194 subjects. The frequency of participants based on demographic is displayed in Table 1. Majority of participants are of age 31 - 40 (n=88; 45.4%), followed by age 20 – 30 (n=86; 44.3%) and 41 – 50 (n=20; 10.3%). 140 (72.2%) subjects are from Bangladesh, and subjects from Nepal and Indonesia are 24 (12.4%) each. There are also 3 (1.5%) subjects from India, 2 (1.0%) from Pakistan and 1 (0.5%) from Malaysia.

In total, 88 subjects (45.4%) experiences back pain, amongst 37 (19.1%) has less than 3 months and 51 (26.3%) had back pain for more than 3 months. Most subjects (n=157; 80.9%) have not experienced a back injury. We surveyed the variation of operation each worker is assigned to. 81 (41.8%) of workers are assigned with 10 – 12 different tasks, and 70 (36.1%) of the subjects are assigned to 1 – 3 types of tasks.

Table 1. Demographic of the respondents

Variable		Number of workers (%)
Age	20-30	86 (44.3)
	31-40	88 (45.4)
	41-50	20 (10.3)
Race	Malay	10 (5.2)
	Indian	5 (2.6)
	Others	179 (92.3)
Other Race	Bangladeshi	129 (66.5)
	Indonesian	24 (12.4)
	Nepalese	24 (12.4)
	Pakistan	2 (1.0)
Nationality	Malaysia	1 (0.5)
	Bangladesh	140 (72.2)
	Indonesia	24 (12.4)
	Others	29 (14.9)
Other Nationality	India	3 (1.5)
	Nepal	24 (12.4)
	Pakistan	2 (1.0)
Previous Back Injury	Yes	37 (19.1)
	No	157 (80.9)
Pain Duration	Less than 3 months	37 (19.1)
	More than 3 months	51 (26.3)
	None	106 (54.6)
Consume pain killer	Yes	52 (26.8)
	No	142 (73.2)
Total type of Work*	1-3	70 (36.1)
	4-6	29 (14.9)
	7-9	14 (7.2)
	10-12	81 (41.8)

**Total type of work implies the total types of work the participant has been involved in. The types of work include assembly of scaffolding, roof-cladding with tiles, paving streets etc.*

3.2 Relationship between different variables and Oswestry pain score

Table 2 depicts the relationship between different variables concerning the Oswestry Pain Score. The table shows that there is a strong relationship between the age group and the level of disability. Subjects who have low back pain without disability are included in the mild pain disability category. The majority of subjects from the age group 31 – 40 complains of back pain (n=51; 65.9%). Amongst, an equal distribution of degree of disability is demonstrated. In the age group of

20 - 30 and 41 - 50, most participants have mild pain disability (21.6% and 9.1% respectively). Nationality has no bearing on the level of pain disability.

Subjects with no previous back injury demonstrated significantly higher disability across all degrees ($p=0.031$) in comparison to their counterpart who suffered a previous back injury. Duration of pain that lasted more than 3 months also showed a significant impact on the level of disability ($p=0.008$). There is a significant relationship between the total types of work and the level of disability ($p<0.001$). Subjects who are assigned with 1-3 tasks and 10-12 tasks experience more pain and disability than the other subjects who are assigned with 4-6 and 7-9 tasks.

4. Discussion

The present study displayed a 45.4% prevalence rate of low back pain in construction workers. This prevalence rate is similar to that in the data reported by various other researchers. A comparison was made between our data and those on construction workers reported in various papers of the literature. Samya's study conducted in Sao Luis revealed 71.4% prevalence rate of low back pain in construction workers [1]. Research in Hamburg reported 50.1% of construction workers to have low back pain at the beginning of the study. Among the construction workers who did not have pain at the start, 30.9% developed low back pain after 1 year [3]. In the study done by Kazuhiro, Yasumasa and Masabumi, 29.3% of the construction workers had low back pain [2]. Differences in prevalence rate between our study and the others are expected, a majority of the construction workers involved in our study are migrant workers (99.5%). Among all the body parts affected by pain, lower back pain was reported to have the highest prevalence [7].

In this present study, low back pain is most common among construction workers aged between 31-40 years old (58.0%), followed by those aged between 41-50 years old (55.0%). The prevalence in these 2 age groups is about twice as high as that in the age group between 20-30 years old (30.2%). This is possibly related to the degenerative changes in bone and muscles in older workers. Furthermore, our research showed that the level of pain disability is significantly related to the age group ($p=0.004$). This result differs from that of the study by L A M Elders and A Burdorf in which age did not show significant relation with the level of disability [4].

Most of the construction workers who participated in our study have a minimal level of pain disability (48.9%), followed by moderate (28.4%) and severe disability (22.7%). This result is in line with Samya's study in which the workers interviewed did not show significant functional disability [1]. The study done by L A M Elders and A Burdorf showed 21% of scaffolders in construction sites have low back pain and disability [4]. They are considered to have a disability only when they exceeded the disability score of 50 according to the Von Korff scheme for grading disability. However, in our study, all the respondents with low back pain are having mild pain disabilities even though it was not significant. As the questionnaires used are not standardized, a comparison of the level of pain disability between the studies might not be accurate.

Our study showed that the total type of work done by construction workers has a significant impact on the level of disability. The majority of the construction workers with low back pain did 10-12 types (34.1%) and 1-3 types (33.0%) of work. Among those who did 10-12 types of work, most of them have minimal pain disability. The same pattern was observed among those who did 1-3 types of work as the assembly of scaffolding, roof-cladding with tiles, or paving streets but the number of participants with a moderate disability was noted to be high in this group. The reason for such pattern is that workers have less straining on certain parts of their body when they are rotating between different types of work, hence the less type of work they do, the more chance they are straining their lower back repetitively which will lead to a greater level of pain disability. Workers who perform more types of jobs are associated with milder pain disability, hence the need for employers to increase the job type in each worker is highlighted.

However, this might not be a feasible idea to reduce pain disability because some workers have specialization in certain jobs, hence they are required to spend more time on those particular jobs, instead of rotating between different jobs. Besides, certain work postures are related to a higher risk of having low back pain and greater disability level [2, 4]. However, this is not studied in our research and we recommend future studies on the prevalence and severity of low back pain related to different work postures among construction workers in Malaysia.

The strong aspect of our study is that it includes many types of work that are routinely done by construction workers; hence the result may also be expected in

construction workers in different parts of Malaysia. Also, our study involved a big sample size. The number of respondents in our study exceeds the sample size needed for 95% confidence interval.

The weak aspect of our study is the language barrier while collecting data. Even though translated questionnaires were used, the participants may not have completely understood the questions because they are not written in their mother tongue, hence, slight misunderstanding is expected, and the data collected may not be accurate. Besides, the working time of the construction workers was not recorded which may improve our accuracy and accountability of this study. Last but not least, convenient sampling was used in this study, hence the samples were not randomized. Certain demographic property has a higher frequency in this study which may have affected the prevalence calculated.

5. Conclusion

The data obtained in this research showed a prevalence rate of low back pain in construction workers of 45.4%, and the level of disability remained mild in scale. In addition, a close relationship between the total type of work and level of disability is observed during the study. Furthermore, the study also found a significant relationship between age and level of disability. This study highlights the need for further research on risks and level of disability associated with different work postures of construction workers for a better understanding of the problems associated and future mitigation. This research may help to minimize the prevalence of low back pain, aiming to improve the health and quality of work of construction workers

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Conflicts of Interest

The author declares no conflict of interest.

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Table 2. Relationship between different variables and Oswestry pain score

Variable		Oswestry Pain Score			P value
		Minimal N (%)	Moderate N (%)	Severe N (%)	
Age	20-30	19 (21.6)	5 (5.7)	2 (2.3)	*0.004
	31-40	16 (18.2)	18 (20.5)	17 (19.3)	
	41-50	8 (9.1)	2 (2.3)	1 (1.1)	
Race	Malay	5 (5.7)	0 (0.0)	0 (0.0)	0.093
	Indian	2 (2.3)	0 (0.0)	0 (0.0)	
	Others	36 (40.9)	25 (28.4)	20 (22.7)	
Other Race	Bangladeshi	30 (34.1)	20 (22.7)	17 (19.3)	0.475
	Indonesian	5 (5.7)	4 (4.5)	3 (3.4)	
	Nepalese	1 (1.1)	1 (1.1)	0 (0.0)	
Nationality	Malaysian	1 (1.1)	0 (0.0)	0 (0.0)	0.721
	Bangladeshi	33 (37.5)	20 (22.7)	17 (19.3)	
	Indonesian	5 (5.7)	4 (4.5)	3 (3.4)	
	Others	4 (4.5)	1 (1.1)	0 (0.0)	
Other Nationality	Indian	2 (2.3)	0 (0.0)	0 (0.0)	0.536
	Nepalese	2 (2.3)	1 (1.1)	0 (0.0)	
Previous Back Pain	Yes	17 (19.3)	5 (5.7)	2 (2.3)	*0.031
	No	26 (29.5)	20 (22.7)	18 (20.5)	
Pain Duration	Less than 3 months	17 (19.3)	16 (18.2)	4 (4.5)	*0.008
	More than 3 months	26 (29.5)	9 (10.2)	16 (18.2)	
Consume Pain Killer	Yes	12 (13.6)	14 (15.9)	17 (19.3)	**<0.0001
	No	31 (35.2)	11 (12.5)	3 (3.4)	
Total type of Work	1-3	18 (20.5)	9 (10.2)	2 (2.3)	**<0.0001
	4-6	1 (1.1)	9 (10.2)	7(8.0)	
	7-9	2 (2.3)	3 (3.4)	7 (8.0)	
	10-12	22 (25.0)	4 (4.5)	4 (4.5)	

*** p is significant when <0.05*