

Musculoskeletal Symptom Survey Among Construction Workers in Indonesian: A Case Study in Construction Project

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ABSTRACTS

The objective of this study was to find out the prevalence, characteristics, and distribution of musculoskeletal pain among construction workers in Indonesia based on a case-study in a construction project. Construction jobs is closely related to cases of musculoskeletal disorders caused by job characteristics. Musculoskeletal disorders developed after work with awkward positions and high workload. Complaints of the musculoskeletal in construction workers are in the neck, upper back, lower back, knees, shoulders, elbows, hands / wrists, thighs and ankles. A questionnaire about musculoskeletal pain in different parts of body was completed by 33 construction workers from the construction project in Bandung city. The majority of respondents had elbow pain (60.61%) followed by low back and shoulder pain (54.55%). The implications of this study is developing ergonomics intervention in further research to prevent musculoskeletal disorders in construction jobs.

Keywords: musculoskeletal symptoms, construction jobs, prevalence

1. INTRODUCTION

Jobs with a physical load that exceeds the capacity limit may cause a risk of disruption to the skeletal system. Musculoskeletal disorders (MSD) is divided into two, namely sudden injury due to sudden loading or abnormalities of the musculoskeletal system (Iridiastadi and Yassierli, 2014). Musculoskeletal disorders (MSDs) refers to abnormalities that occur in body tissues, such as muscles, nerves, tendons, ligaments, or joints due to persistent loading. The term musculoskeletal disorders (MSDs) refer to conditions that involve the nerves, tendons, muscles and supporting structure of the human body (Deros et al., 2004).

Musculoskeletal disorders are the most common cases and major problems faced by construction work. Workers who are performing heavy physical work have a significantly higher prevalence of MSDs in different regions of the body. There were 79,890 cases of MSD in construction work in 2015 in the United States (BLS, 2016). This amounts to 60% of the total cases of MSD in manufacturing and more than mine work. There are 990 cases of backs disorders of 100,000 construction workers in 2013-2015 in the UK (HSE, 2016). These data indicate a problem of musculoskeletal disorders in construction work, but these data are not available in Indonesia.

There are seven risk factors that cause musculoskeletal disorders in general at various jobs, the pressure caused by the work position, work by excessive muscle strength, repetitive motion, static retention, local mechanical contact pressure, vibration, and low environmental temperatures (Albers et al., 2005; Jaffar et al., 2011). Work related

activities, working in static position and awkward posture are the most frequently reported worker-related activities that caused musculoskeletal symptoms among building construction workers (Deros et al., 2004).

Specific risk factors in construction work include the use of excessive muscle strength (working hand over shoulder, heavy lifting) (Moriguchi et al., 2013; Lei., 2005; Yassierli et al., 2009), poor work position repeatedly (HSE, 2016; Yassierli et al., 2009), and use of vibrating equipment (Lei et al., 2005).

Musculoskeletal disorders begin with pain complaints. This pain, if not treated immediately will cause excessive pain and lead to anatomical abnormalities of body tissues (Iridiastadi and Yassierli, 2014). Musculoskeletal disorders occur for a long time and are uncertain. Therefore, musculoskeletal disorders in this study were measured through the indicator of musculoskeletal system complaints.

2. MATERIALS AND METHODS

This study used a cross-sectional survey as the research design to determine the prevalence of musculoskeletal symptoms among construction workers.

The questionnaire consist of two sections: Section A (i.e. socio-demographic data and working details) and Section B (i.e. self-reported MSDs symptoms). The socio-demographic data and working details requested information about age, height, race, year of experience, working hours/ day, working hours/ week, etc. Questionnaire for self-reported musculoskeletal symptoms section adapted

from the standardized Nordic Questionnaire.

About 33 manual construction workers were selected randomly to be recruited as respondents for this research. The respondent come from Sunandese and Javanese. The selected respondents doing the different tasks such as safety inspector, finishing, plaster, electricians, and interior.

3. RESULTS

3.1 Demographic Data

Descriptive analysis of test data was done to determine the prevalence of MSDs symptoms and demographic factor among employees. Table 1 details the participant characteristic. Twenty respondents are below 40 years and 4 respondents are more than 40 years. Four respondents have elementary school or lower. Twenty nine respondents have secondary school or higher. Average height of respondents is 163 cm. Average weight of respondents is 61 kg. Average working hours/day is 11 hours.

Table 1. Respondents Demographic Data

| Variable | Number |
|-----------------------------|----------|
| Age (years) | |
| <40 | 21 |
| ≥40 | 4 |
| Not fulfilled | 8 |
| Mean ± SD | 32 ± 9 |
| Educational level | |
| Elementary school and lower | 4 |
| Secondary school and higher | 29 |
| Height | |
| Mean ± SD | 163 ± 16 |
| Weight | |
| Mean ± SD | 61 ± 12 |
| Working hours/ day | |
| Mean ± SD | 11 ± 4 |

3.2 Response Rate

The response rate of this survey of musculoskeletal symptoms is 100%. In spite of the response rate is 100%, the number of respondents should be increased for further research.

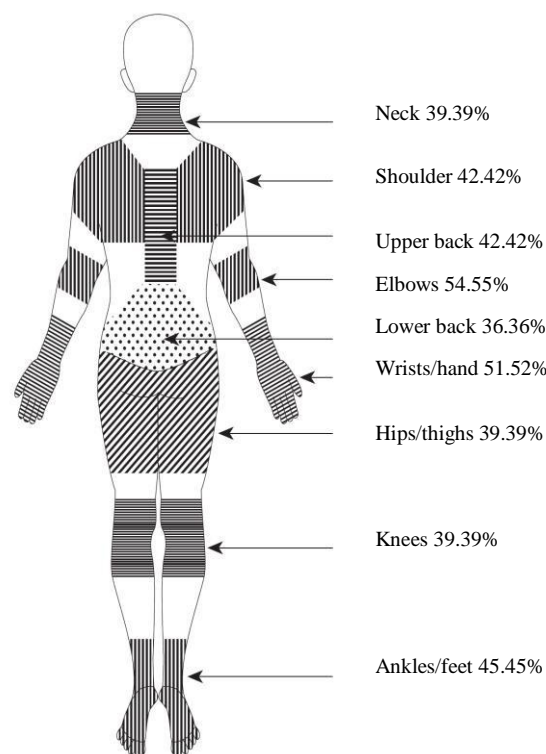
3.3 Prevalence of Musculoskeletal Symptoms

Table 2 shows the prevalence of musculoskeletal symptoms in term of percentages of complaints from the construction workers. Point prevalence (PP) means musculoskeletal symptoms perceived in last 7 days. One-year prevalence (YP) means musculoskeletal symptoms perceived in last 12 months. Point prevalence shows the majority of

respondents had pain in the elbows (54.55%), wrists/hands (51.52%), ankle/ feet (45.45%), shoulder (42.42%), upper back (42.42%), hips/thighs (39.39%), knees (39.39%), and neck (39.39%), and lower back (36.36%). One-year prevalence shows the majority of respondents had pain in the elbows (54.55%), shoulder (54.55%), lower back (54.55%), wrists/hands (51.52%), hips/thighs (51.52%), knees (51.52%), ankle/ feet (51.52%), upper back (48.48%), and neck (42.42%).

Table 2. Prevalence of Musculoskeletal Symptoms

| Body part | PP (%) | YP (%) |
|---------------|--------|--------|
| Neck | 39.39% | 42.42% |
| Shoulder | 42.42% | 54.55% |
| Upper back | 42.42% | 48.48% |
| Elbows | 54.55% | 60.61% |
| Lower back | 36.36% | 54.55% |
| Wrists/ hands | 51.52% | 51.52% |
| Hips/ thighs | 39.39% | 51.52% |
| Knees | 39.39% | 51.52% |
| Ankles/feet | 45.45% | 51.52% |



Picture 1. Distribution of Musculoskeletal Symptoms in Construction Workers

4. DISCUSSION

4.1 Recent versus Previous Studies

Musculoskeletal disorders begins with pain complaints. This pain if not treated immediately will cause excessive pain and lead to anatomical abnormalities of body tissues (Iridiastadi and Yassierli, 2014). Musculoskeletal disorders occur for a long time and are uncertain. Therefore, MSD in this study were measured through the indicator of musculoskeletal complaints. The prevalence of musculoskeletal complaints of construction worker was reported in lower back (68%), knee (68%), wrist (63%) (Eaves et al., 2016), shoulder (55.6%) (Yassierli et al, 2009), neck (28.3%), upper back (13.3%), elbow (10%), thigh (8.3%), ankle (6.3%) (Deros et al., 2014), and hand (2.4%) (Alghadir and Anwer, 2015).

In the present study, the most common site of pain was elbows which is different with previous findings among construction workers. This difference result can be caused by different amount of respondent or different construction jobs included in survey of prevalences. Some construction jobs have different ways in working, working position, or equipment. Elbow pain can caused of working posture with overhead or prolonged static posture using tools as dominant position.

4.2 Prevention in MSD Development for Construction Workers

From the results discussed, ergonomics intervention should be implemented to prevent MSD in construction workers. The control measures that can be implemented at these construction sites are training and education, redesigning the workstation, introducing mechanical aids and providing personal protective equipment (PPE) for the manual construction workers (Deros et al., 2004).

Attempts to prevent musculoskeletal symptoms in construction workers through ergonomic intervention have been made in previous studies. The ergonomic interventions carried out in construction focus more on physical demands factors (Burdorf et al., 2007; Dasgupta et al., 2015; Entzel et al., 2007; Mirka et al., 2003; Vedder and Carey, 2005; Vink, 1992; Vink et al., 1997). Entzel et al. (2007) developed interventions based on organizational factors by administering administrative controls (training programs and work schedule arrangements) on brick installation work. Intervention through design or engineering is the most effective method to prevent complaints of the skeletal system (Mirka et al., 2003).

4.3 Risk Factors Caused MSD in Construction Jobs

Previous research has mapped out the risk factors that affect musculoskeletal complaints. The factor is

a latent variable that can be measured by its indicators (Hair et al., 2014). The main factors are the physical demands of the job, the physical demands of heavy manual shifting of heavy objects, exposure to vibration, exertion to grasping, repetitive motion, and poor working position (Devereux et al., 2004; McGaha et al., 2014). Previous studies have proved that manual handling, poor working position (working in a standing position continuously or kneeling in prolonged position), and the energy spent for a significant grasp affect musculoskeletal complaints (Maakip et al., 2017; McGaha et al., 2014).

In addition to job demands, individual factors also significantly influence musculoskeletal complaints (Devereux et al., 2004; Sadeghian et al., 2014). Indicators of individual factors include age, sex, marital status, smoking status, education level, and physical exercise (Devereux et al., 2004; Sadeghian et al., 2014). It is known that age significantly affects complaints on the hands/wrists, shoulders, elbows/forearms, and neck (Devereux., 2004; Sadeghian et al., 2014; Norandder et al., 2016). It is also known that the prevalence of complaints on the lower back of male workers in the UK (2013-2016 period) at the age of 35-44 and 44-55 years is 890 and 940 cases per 100,000 workers. Female workers aged 35-44 and 44-54 years are 730-830 cases per 100,000 workers. These prevalence data confirmed that musculoskeletal complaints in the 44-54 age range were higher than the 35-44 age range in both groups of men and women (HSE, 2016).

4.4 Limitations

There are several limitations to the present study. The study was limited to only male respondents. The cause and effect cannot establish in this study was a cross-sectional study. The different circumstances of questionnaire administration such as self-reported or interview-based should be considered and the comparison of results should always be made some caution. The questionnaire administered through interviews, as in this study, instead of self-reported, can ensure greater validity of the answer.

5. CONCLUSION

It can be concluded that the prevalence among construction workers in Indonesia based on a case-study in construction project is high. The majority of respondent had elbows pain followed by shoulder and lower back pain. This results is different with previous study because different methods in working.

CONFLICT OF INTERESTS

The authors declared that there is no conflict of interests regarding the publication of this paper.

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