Knowledge and practices of ergonomic working positions among industrial workers

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Abstract

Objective: Industrial workers encounter several ergonomic hazards, giving rise to the risk of work-related injuries and diseases. Thus, they should be knowledgeable about and apply ergonomic working positions. This study explored the knowledge and practices of ergonomic working positions among workers.

Methods: This cross-sectional study included 150 workers. A questionnaire was used for data collection, comprising three sections: workers’ characteristics, knowledge, and practices of ergonomic working positions.

Results: The mean score of workers’ knowledge was relatively high, but the mean score of practices of ergonomic working positions was low. The study showed a strong, linear, and significant relationship between knowledge and practices of ergonomic working positions. Additionally, knowledge contributed 43.2% to the practices of ergonomic working positions. The average score of workers’ knowledge was relatively high, whereas the average score of practices was quite low. A strong, linear, significant association was found between knowledge and practices of ergonomic working positions. Furthermore, knowledge contributed 43.2% to the practices of ergonomic working positions.

Conclusion: The results indicated the essential role of knowledge to improve the practices of ergonomic working positions among workers and recommended the provision of policy and workplace environment that supports ergonomic positions for workers. Further, this study recommended occupational health nurses to develop and implement programs for health promotion, work-related injury and disease prevention, treatment, follow-up, and referrals.

Keywords: ergonomic working positions; knowledge; practices; workers

Introduction

The number of working-age population in Indonesia is burgeoning over the years. It increased by 5.8 million within a year, from 114.82 million people in August 2015 to 118.41 million in August 2016. Industry is among the major sectors of economy that deploys a great number of workers. The population of industrial workers was disproportionately scattered throughout provinces in Indonesia. The top four provinces with the highest number of workers in industrial sectors included West Java (11,910,254 workers), East Java (9,363,773 workers), Central Java (8,083,625 workers), and DKI Jakarta (3,361,028 workers).

The rising number of workers can have both positive and negative effects. The positive effect includes the decline in unemployment. The increase in the number of workers indicated a decrease in unemployment. In Jakarta, for instance, the unemployment rate decreased by 2.59%, from 8.36% in 2015 to 5.77% in 2016. However, the increase in the number of workers increases the risks associated with occupational injuries, diseases, and even deaths. The number of deaths at workplaces worldwide reached 2.3 million annually. In Indonesia, 24,910 cases of accidents and 40,964 cases of occupational diseases were recorded. These results reflected the need of a great concern in occupational health and safety for workers.

Some studies have attributed the cause of work-related injuries and diseases to occupational hazards. The environmental factor, as an external factor, is one of the most common occupational hazards at workplaces. It is associated with work processes or working conditions which, if repeatedly, can lead to health problems. Examples are repetitive movements, unsafe workplaces, messy workplaces, and lifting weights.
Knowledge deficit, as an internal factor, could also influence the practices of ergonomic working positions. The knowledge level and practices varied according to each worker. A study on 335 nurses in Iran reported that 96.4% of nurses have moderate knowledge levels with regard to ergonomic principles. On the contrary, a study on 95 farmers in Jember reported that 54.7% of farmers did not apply ergonomic position at work. Similarly, a study among industrial workers at PT X in 2012 demonstrated that most workers did not apply ergonomic positions and were at risk of work-related musculoskeletal disorders.

Occupational Health Nurses (OHNs) are a part of community nurses who focus on promoting the health status of workers, without neglecting the prevention of occupational morbidities and mortalities and the provision of treatment and referrals.

OHNs play an essential role in improving the knowledge of workers. Activities could be both formal and non-formal education, including continuous professional development, trainings, short courses, seminars, and workshops. A study in Missouri proved that 3 months of training significantly improved workers’ knowledge and behaviors on ergonomics.

Given the importance of knowledge on the practices of ergonomics, this study aimed to evaluate the relationship between knowledge and practices of ergonomic working positions and to provide recommendations for OHNs in determining interventions to improve both the knowledge level and practices of ergonomic working positions.

Methods

This cross-sectional study used a descriptive correlitive design to identify the relationship between knowledge and practices of ergonomic working position among workers at PT TG in 2017.

The study involved a simple random sample of 150 respondents who worked in the injection division of PT TG; they were literate and were willing to participate in the study. The exclusion criteria were applied to those who were on leave, on duty outside the office, or were absent.

Data were collected using a questionnaire that comprised three sections: Section A (identified workers’ characteristics), Section B (measured workers’ knowledge regarding ergonomic working position), and Section C (explored practices of ergonomic working position). Section B was adapted from a questionnaire developed by Marsiiliana in a study entitled “Knowledge of ergonomics and back pain complaints among computer use workers,” whereas Section C was adapted from the General Risk Factor Ergonomics Checklist developed by NIOSH.

The questionnaire on Section B had been tested for validity and reliability. We omitted two statements [statements 15 (r = 0.072) and 17 (r = 0.077)] with r values less than the r table. Further, we performed reliability test with a Cronbach’s alpha value of 0.961. These results showed the validity and reliability of the questionnaire on Section B.

Likewise, the questionnaire on Section C had been tested for validity and reliability. Two statements were eliminated: statements 9 (r = 0.18) and 17 (r = 0.208). The reliability test showed that the Cronbach’s alpha value was 0.816 and indicated the validity and reliability of the questionnaire on Section C.

Results and Discussion

The results of our study demonstrated the workers’ knowledge, practices of ergonomic working position, and their interrelationships. Our study revealed that the mean score of workers’ knowledge on ergonomic working positions was 13.19 (SD = 1.641), with the lowest score of 9 and the highest score of 16. The result indicated that the workers’ level of knowledge was relatively high. Conversely, our study indicated poor practices of ergonomic working position, with the mean score of 37.15 (SD = 2.321) ranging from 31 to 44 (Table 1).

Table 1. Knowledge and Practices of Ergonomic Working Positions (n = 150)

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>Med</th>
<th>SD</th>
<th>Min–max</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>13.19</td>
<td>14.00</td>
<td>1.64</td>
<td>9–16</td>
<td>12.93–13.46</td>
</tr>
<tr>
<td>Practices</td>
<td>37.15</td>
<td>37.00</td>
<td>2.32</td>
<td>31–44</td>
<td>36.77–37.52</td>
</tr>
</tbody>
</table>

Furthermore, this study demonstrated a strong, positive correlation between knowledge and practices of ergonomic working positions (r = 0.658, p < 0.005). The results indicated that an increase in the knowledge level would significantly improve workers’ practices of ergonomic working position. In addition, the results showed that knowledge contributed 43.2% to the practices of ergonomic working position (r2 = 0.432) (Table 2).

Table 2. Correlation of Knowledge and Practices of Ergonomic Working Positions (n = 150)

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>r²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge–practices of ergonomic working position</td>
<td>0.658</td>
<td>0.432</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Our study result was inconsistent with those of Garcia, Gottardello, Presoto, and Campos that aimed to identify theoretical knowledge and ergonomic practices among dentistry students at a University in Brazil. Their study
revealed a very weak, linear, and non-significant relationship between theoretical knowledge and ergonomic practices \( (r = 0.10; p > 0.05) \). Furthermore, their study showed that knowledge only contributed 1% to the ergonomic practices \( (r^2 = 0.01) \)\(^13\).

Differences in the results of these studies might be caused by several factors. The first factor was differences in population characteristics. Our study included industrial workers, whereas that of the study performed by Garcia, Gottardello, Presoto, and Campos included dentistry students at a University. The second factor was differences in the number of subjects involved. The last factor was differences in the components measured in each study. Our study measured knowledge and practices of all ergonomic positions, ranging from sitting, standing, and dynamic positions, as well as manual lifting activities, whereas by Garcia, Gottardello, Presoto, and Campos merely measured the activities of students during handling patients in a sitting position\(^13\).

In contrast, a study conducted by Khan, Surti, Rehman, and Ali, which aimed to identify knowledge and practices of ergonomics in computer users, supported the results of our study and revealed that computer users’ knowledge was significantly associated with their ergonomic practices \( (p < 0.005) \)\(^14\).

Similarly, our study was consistent with a study conducted by Tam and Fung\(^15\). Their study aimed to identify knowledge, practices, and trainings of ergonomics among construction workers in Hongkong showed a strong, linear, and significant relationship between knowledge and practices of manual moving techniques \( (r = 0.61; p < 0.05) \)\(^15\). Their results also showed that knowledge contributes 37% to practices of manual moving techniques.

Some studies demonstrated that knowledge significantly contributes to the practices of ergonomic positions. This indicated that knowledge plays an essential role in individual behaviors. It helps individuals to shape favorable behaviors and is the foundation for the formation of individual behaviors\(^16\).

Besides knowledge, company policy and work design could positively affect the practices of ergonomic positions. Policies that support ergonomic working activities and environment would help workers gain knowledge and apply ergonomics during work. In addition, ergonomic work design enables workers to better apply ergonomic working positions\(^6\).

OHNs play a crucial role in advocating workers to have safe and ergonomic working environment. They can provide recommendations for company leaders to develop and implement policies with regard to ergonomics at the workplace and to provide ergonomic working design and environment. Further, they can establish and implement programs for health promotion, ergonomic-related injury and disease prevention, treatment, follow-ups, and referrals.

**Conclusion**

Results of our study demonstrated that the average score of workers’ knowledge was relatively high, whereas the average score of practices was quite low. There was a strong, linear, and significant association between knowledge and practices of ergonomic working positions. Furthermore, our analysis showed that knowledge contributed 43.2% to the practices of ergonomic working positions. This study recommended the provision of policy and workplace environment that supports ergonomic positions for workers. This study also recommended OHNs to develop and implement programs for health promotion, work-related injury and disease prevention, treatment, follow-ups, and referrals.

**References**