

The Effect of Awareness Program on Fatigue Among Shift Workers in Electronics Manufacturing Industry

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Abstract: Shift workers in the electronics manufacturing industry are exposed to fatigue that can lead to accidents at work if not handled properly. This study aims to evaluate the effectiveness of a fatigue awareness program on shift workers in an electronics manufacturing factory. This quasi-experimental study involved 77 shift workers. A group of shift workers were assigned into case and control groups where the program was implemented in the case group only. The Multidimensional Fatigue Inventory was used to assess fatigue among the respondents. The result showed that there was a decrease in the prevalence and mean scores of all fatigue dimensions before and after the implementation of the program in the case group. There was a statistically significant difference between mean scores of general fatigues before and after the program ($p = 0.023$) in the case group. It was found that fatigue intervention has a small effect (Cohen's $d = 0.389$) on general fatigue score. This study proves that an awareness program can reduce the incidence of fatigue among shift workers. However, more prevention approaches should also be implemented to greatly reduce the incidence of fatigue among shift workers in the electronics manufacturing industry.

1. Introduction

Shift working systems is a working system where the workers work outside or beyond the normal working hours (typically from 8 a.m. to 5 p.m.). It is reported that 15% of the total workforce are considered as shift workers across many nations in Australasia, North and South America, and Europe [1]. Shift work was first introduced after the Industrial Revolution for several sectors such as military, security, and health. However, it is rapidly growing along with the economic development of all industrial sectors, especially in the manufacturing sector [2]. In this globalised world, to cater the needs of the customers, many trades, industrial, and commercial activities have extended their operating hours beyond the regular working hours which requires the implementation of a shift work system [3]. All these issues could expose shift workers to fatigue that can eventually lead to a reduction in their safety and health performance and can cause incidence among workers. Fatigue among shift workers happened due to the nature of shift works that prevent workers from getting enough sleep as the workers suffer from an imbalance in normal circadian rhythms and the lack of energy due to working demand either physical or psychological demand or both [4]. In the United States of America, approximately 38% of the total workforce is fatigued with more than 40 million of them suffering from different types of sleep disorders, the leading cause of fatigue among the workers [5].

Fatigue among workers is one of the consequences that usually caused by hostile psychosocial and physiological work environments. This is a significant concern for employers as it greatly affects workers' safety and health, productivity, performance, and efficiency [6]. In the United States, 37.9% of working adults, 57.9% of manufacturing workers, 80% of nurses, and 40% of police officers experience fatigue while working [7][8][9]. In Malaysia, 54.5% of shift workers in the electronics manufacturing industry

reported having fatigue in the workplace [10]. The effects of fatigue on an individual can be vary depending on the ability to adapt, ranging from mild complaints to severe disabling manifestations like burnout, overstrain, and chronic fatigue syndrome [11]. In terms of cognitive function, fatigue will decrease workers alertness that further leads to a decrease in their attention to detail, impaired their judgments, and slow their response time. All of this could affect productivity, as well as the safety and health of the workers [12]. Fatigue could also decrease situational responsiveness, reduce the ability to adapt to new information, and have difficulty concentrating and paying attention, especially to details. These resulted in diminishing performance, risk-taking attitude, and increased risks of involvement in workplace incidents among workers [13]. Workplace fatigue is a grave work-related risk that leads to fatalities, workplace incidents and hampers company's productivity that causes economic losses of about \$18 billion a year in the United States [14].

A workplace with hazards such as fatigue will potentially affect the physical and psychosocial well-being of workers at work. Since safety and productivity are closely connected to the workers' health, it is crucial that these hazards were properly managed [12]. Individuals and organisations that are unable to manage fatigue properly are at high risk of creating injuries and errors that can result in a variety of dangerous and lasting consequences. Well-managed workplace hazards will create a healthier and supportive environment that can reduce incidents and can increase productivity. Any occurrence of fatigue among workers should be managed appropriately through the implementation of fatigue risk management in the workplace [15]. As there is a lot of evidence that can link fatigue to workplace incidents, many researchers try to investigate the impact of organisational factors on workers' fatigue. This led to a fundamental shift in many approaches where the organisation is playing important roles in influencing employees' safety behaviour [16]. In managing fatigue at the