

A study of Stressors Amongst Helicopter Maintenance Personnel in East Coast of Malaysia: A Case Study

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Article Info

Article Info

Volume 83

Page Number: 60 - 65

Publication Issue:

July - August 2020

Abstract

Human beings are susceptible to some form of stress in life either physically, psychologically or physiologically. The stress level can directly affect human performance either towards positive or negative impact based on its intensity. In a highly regulated environment such as aviation maintenance, the ground crews are exposed with uncomfortable working conditions such as adverse temperature, limited space and awkward postures, just to name a few, that can add on to the existing stress. Hence, a study was carried out in identifying the maintenance personnel's stress level and the common stressors that contributed towards their stress experience at workplace. There were 70 respondents involved, which represented more than half of the total technical staff in a Maintenance, Repair and Overhaul (MRO) organisation; a service provider that maintains helicopter for oil and gas company. Results obtained from the questionnaires showed that 59% of the respondents were experiencing very high/ high level of stress at the workplace. Respondents claimed that the physical, psychological and physiological stressors were due to work space, over-worried about job performance and working in an unhealthy condition. Hence, there is a need for practical countermeasures by the top management of the organisation before the current situation deteriorates and detriment its workforce.

Article History

Article Received: 06 June 2020

Revised: 29 June 2020

Accepted: 14 July 2020

Publication: 25 July 2020

Keywords: Stress, stressors, aircraft maintenance, MRO, pressure

I. INTRODUCTION

Humans tend to experience multiple types of stress in the environment they are in. Stress is defined as a physical, chemical, or emotional factor causing physical or mental tension [1]. The stress that inflict us in our surroundings exist in different forms either physically (environmental factors), physiologically (body reaction) or psychologically (mental response). These causes of stress are known as stressor. The effect of stress can be positive or negative [2] and the way human respond to any types of stress varies individually. There are a number of studies that focus on stress and its solutions to improve human job performance. As described by Epel et al. [3], stress can be viewed in

different angles depending on the interest of study, either on mentally, physiologically or behaviourally. Human response to stress can influence their behaviour, personality, health and well-being. Research done by Slavich and Shields [4] specifically stated that stressful life can have a direct impact towards health and contributes to premature mortality, if it is not well managed by the individual. Related studies did give suggestions on how to manage such stressors [3, 5, 6]. Therefore, this study intended to identify the stressors that the aviation maintenance personnel experience at one maintenance, repair and overhaul (MRO) organisation in Malaysia that maintains helicopters for oil and gas industry.

A. Stress in aviation maintenance environment

In the aviation maintenance environment, stress is one of the factors that could lead to human error while performing their tasks as described in the “Dirty Dozen” factors [7]. History has shown that multiple aviation disasters occurred due to stress experienced by the aviation maintenance personnel [6,7]. In fact, improper maintenance can directly contribute towards aviation accidents [9] as stated by Drury [10] that aircraft maintenance activities contributed 18% towards aircraft disaster in US alone. Moreover, there are multiple events link to a disaster such as management issues, environment, economy, personalities and others [7, 11].

II. METHODOLOGY

The method used for this study was quantitative, by distributing questionnaires to the employees in a MRO organisation. 70 respondents participated in the study, which involved almost all technical staff in the organisation. In order to identify the staff’s perception on their current stress level, they were required to choose the options given, either “very high”, “high”, “medium”, “low” or “very low”. There were also questions where they needed to answer the frequencies of having the stressors (physically, psychologically, physiologically) with options of either “always”, “sometimes”, “seldom” or “never”. There were also questions on their medical issues as well as unhealthy symptoms currently being experienced, which they needed to choose from the list given.

III. RESULTS AND DISCUSSION

Table 1 shows the respondents’ gender, age and designation in the organisation. 87% of respondents were male while 13% respondents were female. In terms of age, majority of them were in the range of 30 to 39 years of age (26 %), followed by 24 % of the respondents in the range of 20 to 29 years old. These two groups of age range can be considered as young adults. In terms of their designation in the company, majority of them were technicians, with 29 % participants followed by 27 % of them work as aircraft maintenance engineer.

Table 1. Gender, Age and Designation of Respondents (n=70)

Gender	Male	61 (87 %)
	Female	9 (13 %)

Age (years)	20 - 29	24 (34 %)
	30 - 39	25 (36 %)
	40 - 49	18 (26 %)
	50 - 59	3 (4 %)
Designation	Technician	21 (29 %)
	Maintenance Engineer	19 (27 %)
	Apprentice	12 (18 %)
	Management	10 (14 %)
	Others	8 (12 %)

A. Perceived stress level

One of the questions asked in the questionnaire was how they perceived their current stress level, with five options as either “very high”, “high”, “medium”, “low” or “very low” ratings. As shown in Figure 1, majority of them perceived that they were experiencing “high” stress level with 39 % from a total 70 respondents. This was followed by 20 % of them perceived their level of stress as “very high”.

This result is quite alarming as more than half of them perceived themselves as having very high or high level of stress at workplace. Previous studies did highlight the plight of maintenance personnel where there are multiple pressures were being felt by this group of workers due to tight deadlines, shift work, lack of resources, budget constraints as well as safety issues [12, 13]. Hence, the top management should pay much attention to reduce the level of stress amongst its workforce. The lack of focus to overcome this issue amongst employees in aviation maintenance could lead to industrial accidents, lower productivity, absenteeism as well as employees turnover [14, 15].

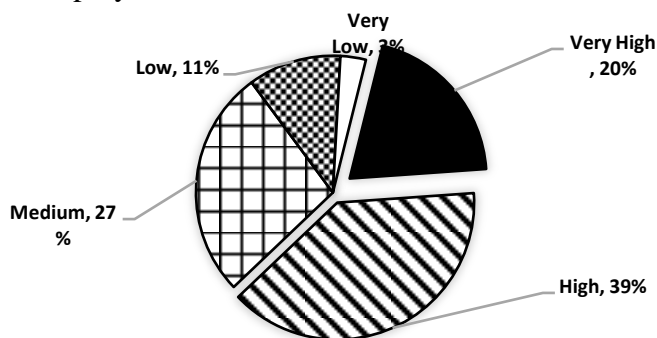


Fig. 1. Perceived stress level

In order to identify which stressors significantly affecting their stress level, they were asked to answer related questions based on physical, psychological and physiological stressors.

B. Physical stressors

Figure 2 shows the result obtained on physical stressors. Majority of the respondents stated that they “sometimes” experienced stress due to small work space (44%), high temperature (43%) and poor lighting (43%). Meanwhile, some respondents “always” felt the sense of stress due to the same factors, ie. small work space (34%), high temperature (34%) and poor lighting (30%).

The findings were probably due to the small space of the helicopter where they had to work in a very limited area, with an uncomfortable body posture while doing the maintenance activities. The limited space of the helicopter size creates heat, especially during daytime and limited visual due to poor lighting especially at night time. The results are consistent with the findings by Gomesa et al. [16] where constraint working area particularly in a helicopter, do deteriorate the workers in tasks execution, mainly due to high ambient temperature.

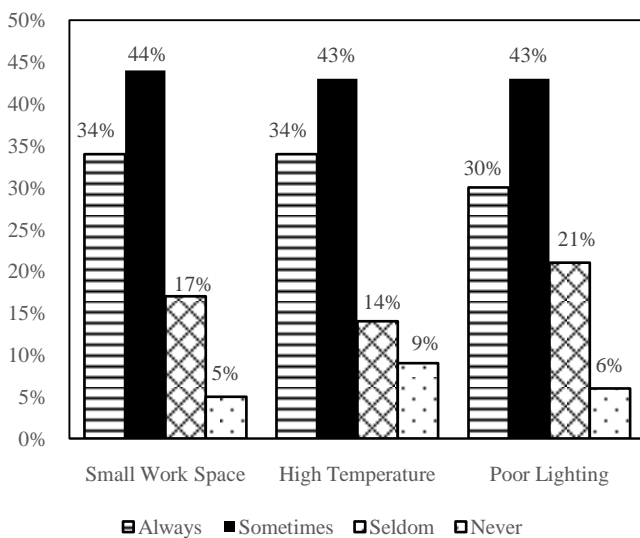


Fig. 2. Response on physical stressor

C. Psychological stressors

Figure 3 shows the result of the respondents on psychological stressors. 36 % of the respondents claimed that they “always” felt burden with their financial issues. This may be due to the current economic situation in Malaysia. Next, 34% of the respondents highlighted that issues with their superior led to their psychological stress. This may be because of the time pressure, tight work schedule and many more. Then, 29 % of the respondents said that marital issues was the cause of their stress at work. This may be due to the shift

work where in the studied organisation, the respondents were given 20 days of multiple shifts in a month. In addition, 41% of the respondents “sometimes” felt worried while 37% of them “always” felt unease of their job performance. This may be due to the work nature of an offshore helicopter service provider, to maintain the highest safety standard, i.e. the rate of fatal accident should be less than one case per year (or per million flight hours), a goal that should be attainable [17, 18]. Failure to comply this standard could affect the business contract continuation. Hence, the idea of losing their job contributed to their stress at workplace. [19]

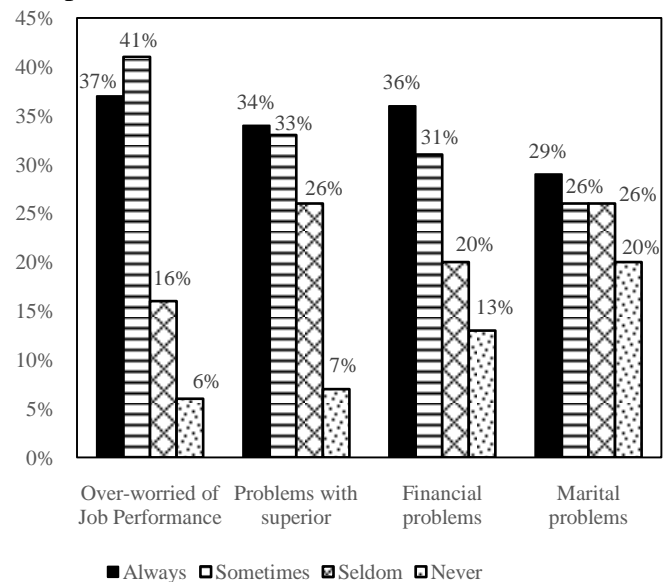


Fig. 3. Response on psychological stressor

D. Physiological stressors

Figure 4 depicts the result based on the physiological stressor questions. 40 % of the respondents claimed that they “always” felt physiological stressor due to improper meal consumption. This is probably due to working in different times in a day as a result of multiple shiftwork, which force the staff to have improper meal at inappropriate time. 39% of respondents said they “always” felt physiological stress when they had to work while they were unhealthy. In addition, 34% of them “always” experienced lack of sleep while 27% of them “always” felt that the frequent change of work shift really had caused them to feel stress. However, 47 % of them “sometimes” felt stressed due to frequent change of shiftwork. These findings are similar to the findings of Skowronski[20] and Drake et al. [21] where

shiftwork could contribute challenge towards various physiological functions, including sleep, wakefulness, body temperature, heart rate, blood pressure, digestive activity and hormone secretion to name a few.

In fact, to get concrete result on physiological responses [22], ergonomics study can be carried out to the respondents using appropriate equipment such as Electromyography (EMG) and Actiheart for measuring muscles activity, energy expenditure and heart rate.

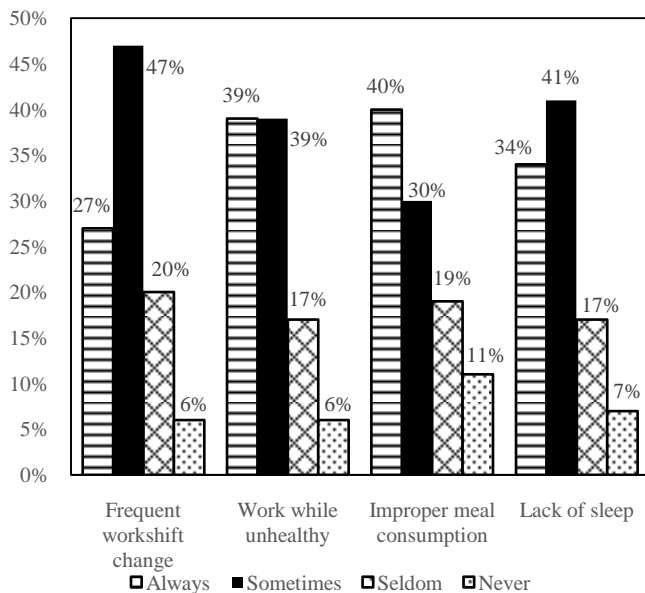


Fig. 4. Physiological stressors

E. Effect to health

Figure 5 shows the effects of stress on the respondents’ health. Most of the respondents stated that they experienced sleep disorder (73%), anxiety (40%) and addiction to caffeine (36%). These findings may be because the company practices shift work. Having night shift could affect the involved workers to experience sleep disorder and anxiety, as the quality of sleep at night time is not the same as in the daytime. Added to that, with less time to socialize with their family and friends could create anxiety to workers. Similarly, caffeine consumption is very common amongst night workers to maintain their alertness. These findings were consistent with findings by Akerstedt [23], Berthelsen [24] and Buchvold et al. [25] on those effects, respectively.

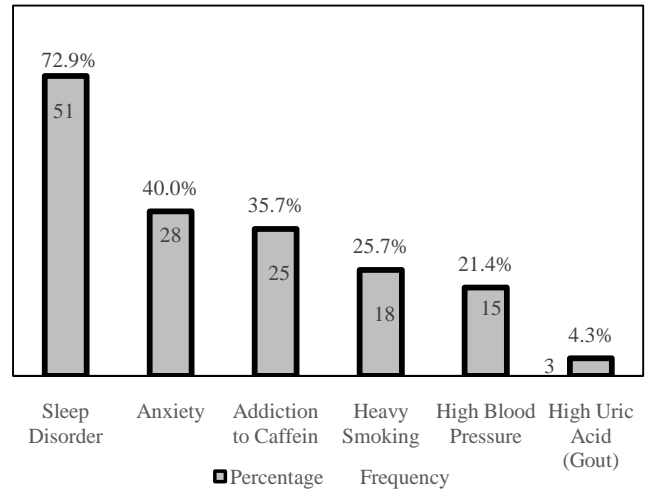


Fig. 5. Response on stress-related health issue

IV. CONCLUSION

In conclusion, this study suggests that working as a service provider; maintaining helicopters for an oil and gas industry, can trigger high level of stress. The various stressors such as physical, psychological and physiological do exist where small work space, worried of job performance and frequent of work shift change contributed to the personnel mental and physical burden. Hence, practical countermeasures must be looked into with the help from the top management to ensure the stressors can be reduced in order to increase optimal job performance and satisfaction.

The next level of this study could be improved by conducting ergonomic study, using appropriate equipment such as Electroencephalography (EEG), Electromyography (EMG) etc. to assess respondents’ physiological response. The data obtained would allow some ergonomic recommendations to be made with the aim of improving human work performance in aircraft maintenance industry.

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