



Relation Between Musculoskeletal Symptoms and Ergonomic Risk Assessment Among Mechanics at Car Service Centre: NMQ and REBA

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Abstract: One of the most occupational diseases is related to Musculoskeletal Disorders (MSDs) which mainly affects the lower back pain, neck and upper and lower extremities and this research highlights the relationship between Musculoskeletal Symptoms (MSS) and Ergonomic Risk Assessment (ERA) among mechanics at car service centre. This study focuses on three objectives which are the musculoskeletal symptoms among mechanics at car service centre using Nordic Musculoskeletal Questionnaire (NMQ), the level of ergonomic risk assessment using Rapid Entire Body Assessment (REBA) method, and the relationship between NMQ and REBA. This cross-sectional study was conducted among mechanics (male : 40; age : ≥ 20 yrs) from eleven selected workshops in Perak. Data were collected using a structured questionnaire consist of demographic questions, NMQ for MSDs assessment and REBA method for ergonomic assessment. Based on the survey that had been done, the results showed that the highest and the least reported Musculoskeletal Symptoms is lower back with a percentage 62.5% and neck with a percentage 45% respectively. REBA score also showed that further investigation needed as the results showed that 60% has medium risk and 17.5% of them are high risk.

Keywords: Musculoskeletal Symptoms (MSS), Musculoskeletal Disorders (MSDs), Ergonomic Risk Assessment (ERA), Nordic Musculoskeletal Questionnaire (NMQ), Rapid Entire Body Assessment (REBA)

1. Introduction

Musculoskeletal disorders (MSDs) are injuries or pain in the human musculoskeletal system, including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back. The leading cause of work related disabilities and injuries in the developed and industrially developing countries are commonly related to MSDs [1]. However, the nature of work itself may be exposed to the hazards such as MSDs which affect the health of employee because of continuously

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performing repetitive tasks, working in repeated and sustained or difficult postures, performing strenuous physical work, and using forceful exertion [2]. Automotive sectors also can be classified as the most hazardous working environment [3][4]. A research by S.Torp *et al* , showed that 103 car mechanics was answered the questionnaire. Almost all of the mechanics had been troubled with MSDs and the most common symptoms were low back, neck, head and shoulder. Besides, poor work ability was significantly associated with longer work duration, experience of draught at the workplace, absence from work due to health reasons, and physical inactivity during free time [5].

The increasing number of injuries caused by ergonomics has become a critical factor in workplace safety [6]. The difference between ergonomics and human factors are focuses on how work affects works, and emphasize designs that reduce the potential for human error respectively [7][6]. However, both describe the interaction between worker and the job demands.

1.1 Low Back Pain

In automotive environments, back pain is the most highest reported among car mechanics because of continuously work standing on a floor made with cement or hard material which tends to suffer from pain in the legs and low back compared to other workers from other sectors [8][9]. Figure 1 below illustrate the area of low back pain in human body.

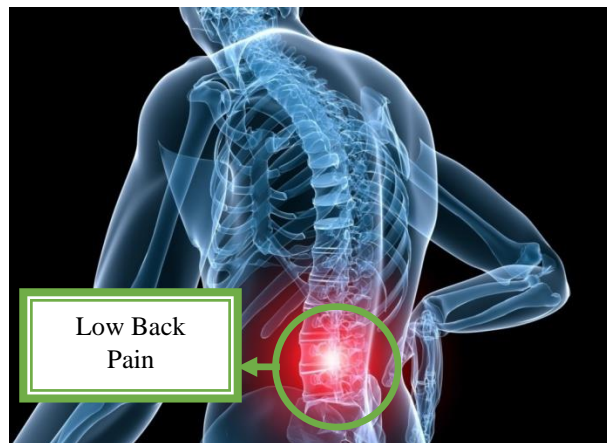


Figure 1: Low Back Pain [10]

1.2 Shoulder Pain

Generally, the shoulder has three major bones; the humerus which is the long arm bone, the scapula or shoulder blade, and the clavicle or collabone. Shoulder complaints are common and have an unfavourable outcome in many patients [11][12]. Statistics reported that, only 50% of patients who visited a general practitioner still reported complaints after 12 months [13]. In the Netherlands in the general population, shoulder paints has recently been estimated at 21% and in british had reported with a lower point prevalence of 14% [12][14]. In other study stated that the prevalence of shoulder pain in the general population under the age of 50 years may be as high as 6% to 11%, increasing in elderly people which is 16% to 25% [11].

2. Materials and Methods

This subtopics explain the methods and tools that will be used through out this research. The tool and method that will be used are Nordic Musculoskeletal Questionnaire (NMQ) and Rapid Entire Body Assessment (REBA). This method and tool are used to determine the musculoskeletal symptoms (MSSs) and examine the ergonomic risk factors among mechanics at car service centre sectors. Figure 2 shows the flow chart of the procedures and method of this research.

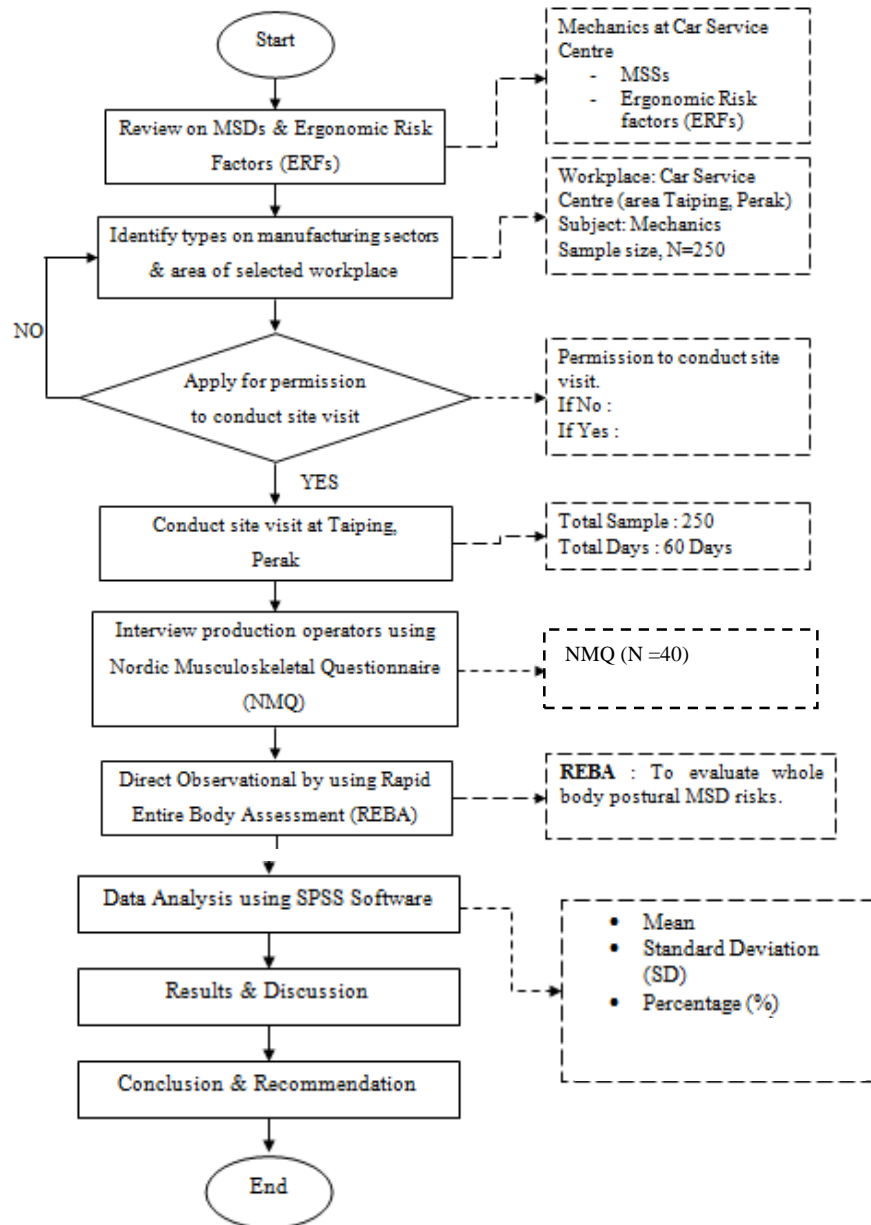


Figure 2 : The flow chart of the methodology

3. Results and Discussion

NMQ contains demographic data and number reported lower back, shoulder and neck symptoms. Table 1 illustrates demographic data where male subjects consists of 100%. It is because majority numbers of mechanics in Malaysia were male. The percentages of their total year of working experience for less than 12 months, in a range between 1 to 2 years, in a range between 3 to 5 years, in a range between 6 to 10 years are 7.5%, 52.5%, 35%, and 5% respectively. Based on the interview that had been done among mechanics, it showed that 47.5% of them are overweight where this also contribute to the Musculoskeletal Problems.

Table 1: Demographic data (N=40)

Characteristics	N	%	Mean	Standard Deviation (SD)
Gender				
Male	40	100	-	-
Female	0	-		
Age (Yrs)				
≤20	3	7.5	27.64	5.68
21-30	28	70		
31-40	7	17.5		
≥41	2	5		
Working Experience (Year)				
≤12 months	3	7.5	3.08	1.95
1-2	21	52.5		
3-5	14	35		
6-10	2	5		
≥10	0	-		
Body Mass Index				
Underweight	2	5	25.23	4.21
Normal weight	16	40		
Overweight	19	47.5		
Obesity	3	7.5		

Table 2 explained the prevalence of Musculoskeletal Symptoms among mechanics by body parts and the highest symptoms affected is the lower back pain with a percentage 62.5%. While the least reported Musculoskeletal Symptoms is neck with a percentage 45% only. In the last 12 months, the lower back pain also has the highest percentage in terms of reducing work activity with a percentage of 47.5% while neck still has the least percentage of 12.5%.

Table 2: The prevalence of Musculoskeletal Symptoms by body parts among mechanics

Symptoms	N = 40		
	Lower Back (%)	Shoulder (%)	Neck (%)
Any trouble	62.5	57.5	45
Ever had accident	-	-	-
Change Job	-	-	-
Total time with trouble last 12 months (Days)			
0	2.5	-	2.5
1 to 7	35	27.5	15
8 to 30	42.5	32.5	25
≥ 30	5	2.5	0
Everyday	0	0	0
Reduce work activity last 12 months	47.5	37.5	12.5

From Table 3, association between the risk level of car mechanics according to REBA score sheet, the results showed that 60% (N=24) of them reported medium risk which required further investigation regarding to the work tasks or body posture of mechanics itself.

Table 3: Association between the risk level of car mechanics according to REBA method.

REBA Score	Respondents (%)	
	Yes (%)	No (%)
1 (Negligible)	-	-
2-3 (Low Risk)	9 (22.5)	-
4-7 (Medium Risk)	24 (60)	-
8-10 (High Risk)	7 (17.5)	-
11-15 (Very High Risk)	-	-

4. Conclusion

The study found that upper back, shoulder, and neck were the most affected area among car mechanics. Some of the workers were working at medium and high risk because they do not practice good body posture while working and sometimes, mechanics were bending their neck, and shoulder to unacceptable limit. REBA method is the most suitable for mechanics at car service centre as the results showed a significant correlation between risk level achieved by REBA and the prevalence of MSDs. Moreover, NMQ findings also showed that the level of exposure to MSDs risks is high related to the work tasks and body posture of mechanics.

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