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ORIGINAL ARTICLE

Risk Assessment of Work-Related Musculoskeletal Disorders and Body Mass Index Amongst the Traffic Control Personnel in Ogun State, Nigeria

Adekunle I. MUSA[1*] and Ayomide I. MUSA[2]

[1*]Department of Mechanical Engineering, Olabisi Onabanjo University, Ago Iwoye, Ibogun Campus, Nigeria
[2]Department of Mechanical Engineering, Bells University of Technology, Ota, Nigeria

*Corresponding author email: musa-olokuta.adekunle@oouagoiwoye.edu.ng

Abstract: The study was conducted to assess the work-related musculoskeletal disorders (WRMSDs) and body mass index (BMI) relatives to the effect among the TCP) in Ogun State which was sought and selected using the snowball technique. Twelve out of twenty local government areas which cut across the entire three senatorial districts of Ogun State were selected, which is sixty percent of the entire local government in the state. Data analysis was performed using a statistical package for social sciences (SPSS) V23 and Microsoft Excel (2010). The results were presented using descriptive statistics, means, standard deviations, frequencies, percentages, pie charts and a bar chart. The result showed that 177 TCP (88.5%) participated with 32.5 ± 0.97 years as the mean age of the respondents. However, 76.3% reported daily pains while 95.5% complained of major pains in the body. The majority 79.1% spent less than 8 hours in a standing position when controlling the traffic while 48% enjoyed rest at the close of work. The result also revealed that 80.2% had normal BMI, 33.35% were smokers and 54.8% drank alcohol respectively. Occupational health was considered as 45.2% engaged in self-medication. The study shows that age is significantly correlated with BMI (P>0.01) and alcohol drinking (P<0.01) with WRMSDs and other factors such as working hours, gender and years of experience. The study concluded that prolonged standing, walking and repetitive twisting of the hand and shoulder may have seriously affected the health of TCP.

Keywords: WRMSDs, BMI, traffic, personnel, health, smoking,

1.0 INTRODUCTION

Work-related musculoskeletal disorders (WRMSDs) have been identified as common health problems all over the world among different professionals. The WRMSDs have resulted in a professional reduction in the working capacity as well as productive and effective hours [1]. Work-related musculoskeletal disorders have also been contemplated to be the most customary cause of acute and chronic pains in the entire world amongst individuals. These WRMSDs include diseases from acute conditions to lifelong disorder. Picavet and Schouten [2] reported that the most common WRMSDs were low back pain which is regarded to be the major cause of disability among workers. However, other WRMSDs are shoulder, neck, knee, and wrist/hand pains. A study showed that cognitive risk factors may have the same footprint on WRMSDs with respect to physical risk factors [3]. WRMSDs are injuries that exert influence on the human body's movements or any part of the musculoskeletal system such as muscles, nerves, ligaments, tendons, and blood vessels. Workplace design played a fundamental role in the evolution of WRMSDs. Hence, more exposure to these workplace risk factors put workers at a higher level of WRMSDs risk.

Body mass index (BMI) is a measure of body corpulence and is described as the body mass (BM) divided by the body height (BH) which is also known to be related to the growth of WRMSDs [4]. Similarly, BMI is an indicator of a person's total body fat than a direct measurement. It is the measurement of a person's BM with respect to his/her BH. The World Health Organization (WHO) described BMI as one of the instruments or tools utilised to assist a person with health dangers linked with obesity and overweight. For instance, an individual with a high BMI is in danger of high blood pressure, high cholesterol levels, and many other disorders. In the determination of BMI in individuals, factors which include gender, age, waist circumference, level of physical activity, and smoking status are taken into contemplation while assessing health risk.

World Health Organization described an adult who has a BMI beneath 18.5 kg/m^2 as underweight, between 18.5 kg/m^2 and 22.9 kg/m^2asnormal, between 23 kg/m^2 and29.9kg/m^2 as overweight, and 30 $kg/m^2$and above as obese. Generally, an individual with a normal BMI is acclaimed to be healthy. Viester et al. [5] described an individual with big BM tends to possess WRMSD pains more than lower or smaller BM. BMI is shown to be an independent danger factor for the growth of WRMSDs.

Traffic control personnel are saddled with the responsibilities of directing vehicle and pedestrian traffic in an organised way to ensure public safety. Majority of these TCP suffered tiredness due to the extensive and long standing while controlling the traffic. The risk of WRMSDs in TCP varies across states; each state faces different risks and causes of injury and ill health which lead to workers' absenteeism. The volume of traffic controlled determined the risks and injuries faced by TCP. Thus, these led to the main aim of this study to appraise the WRMSDs and BMI among the traffic personnel controlling in Ogun State and recommend an appropriate remedy for health challenges. The outcome of this study will facilitate the development of intervention necessary to reduce the high prevalence and complications associated with WRMSDs among the TCP in Nigeria.

2.0 MATERIALS AND METHODS

Study Area and Participants

The study was conducted among personnel controlling the traffic (police traffic wardens and State Traffic Compliance and Enforcement Corps, (TRACE) which was sought and selected within Ogun State Southwest Nigeria between 1 August 2021 and 17 September 2021 using a snowball technique. Twelve out of twenty local government areas which cut across the entire three senatorial districts (Central, West and East) of Ogun State were selected, which is sixty percent of the entire local government in State.

The control of traffic in Ogun State is performed by the police in traffic division known as wardens and TRACE. Due to the enormous work of police in the traffic division, the Ogun State government establishes the TRACE to further complement the efforts of the state traffic police in the

control of traffic on our major and busy roads. Prior to the commencement of the study, ethical approval was sought but the approval could not be achieved due to the security situation of the country (Nigeria). In view of this, a snowball technique was used to reach out to the participants due to the importance of this study. The aim of this study was explained to the traffic officers before administering the questionnaire. A physical interview was employed to get the socio-demographic, age, sex, marital status, and educational level respectively. In reference to the administration of the questionnaire, a verbal interactive rating scale for the pain region was used. The participants (traffic officers) voluntarily consented to participate but declined the capturing of their photograph and requested confidentiality and anonymity of their personal information.

Data collection

Two hundred questionnaires were administered using the snowball technique to the Traffic Control Personnel (TCP). A structured modified Nordic Musculoskeletal Disorders Questionnaire (SNMQ) was used to assess the body parts with musculoskeletal disorders and their perceptions of health risk during the peak and off-peak periods of their duty [6]. The questionnaire was designed to include (i) socio-demographic variables such as gender, age, marital status and education level of the respondents, (ii) the work organization and scheduling, (iii) musculoskeletal pains connected with occupational risk factors such as the neck, upper back, wrist/hand, leg, low back, knee, ankle, thigh, feet pains, smoking and alcohol drinking status, and (iv) health implications. The self-administered questionnaire took less than 15 minutes to complete.

The BMI was computed by measuring the weight and height of each respondent in reference to the WHO guideline. BMI described as BM in kilograms divided by the product of BH in square meters and is simply classified as underweight, normal, overweight and obese. A PD300MDHR stadiometer (Cardinal Scale manufacturing company, USA) column scale with digital height rod was used to measure the body weight (kg) and height (cm) of the respondents simultaneously.

Figure 1: Detecto PD300DHR column scale with digital height rod

Data Analysis

The obtained data were analysed using the Statistical Package for Social Sciences (SPSS) Version 23and Microsoft Excel (2010). The results were presented using descriptive statistics to find the mean, standard deviation, frequency, and percentages, and also draw them in pie and bar charts. Respondents' percentage values on the prevalence of neck, hand, wrist /leg, knee, upper back, low back, thigh, and ankle/feet pains were calculated and a chi- square test was utilized in exploring the association among the variables. The significant level was set at $p < 0.05$.

3.0 RESULT AND DISCUSSIONS

Two hundred questionnaires were administered using the snowball technique to the TCP. A total of 177 TCP participated and returned the completed questionnaire which represented an 88.5% response rate. The average age of the respondent was 32.5 ± 0.97 years

Table 1: Socio-demographic characteristics of the TCP (n = 177)

	Variables	Frequency (n)	Percentage (%)	p-value (P<0.05)
A	**Gender**			
	Male	119	67.2	
	Female	58	32.8	0.000
B	**Age (years)**			
	21 – 25	8	4.5	
	26 – 30	24	13.6	
	31 – 35	76	42.9	
	36 – 40	53	29.9	
	41 – 45	16	9.0	0.000
C	**Marital status**			
	Married	137	77.4	
	Single	16	9.0	
	Divorced	24	13.6	0.000

D	**Education level**			
	Secondary school	121	68.4	
	*ND/**NCE	52	29.4	
	***HND/Degree	4	2.3	0.000

*ND – National Diploma
**NCE – National Certificate of Education
***HND –Higher National Diploma

Table 1 above, the socio-demographic characteristics of the TCP shows that 119 (67.2%) were male while 58 (32.8%) were female. Also majority, 137 (77.4%) were married while 16 (9.0%) and 24 (13.6%) were single and divorced respectively. In reference to the education level, 121 (68.4%) of the TCP had completed their secondary education while 52 (29.4%) had a National Diploma (ND) or National Certificate of Education (NCE) and 4 (2/3%) had Higher National Diploma (HND) or degree.

Table 2; Characteristics of Work-Related

	Variable	Frequency (n)	Percentage (%)	p-value (p<0.005)
A	**Year of experience (years)**			
	0 – 5	8	4.5	
	6 – 10	63	35.6	
	11 – 15	86	48.6	
	16 – 20	20	11.3	0.000
B	**Body Mass Index (BMI)**			
	18.5 – 22.9 –Normal	142	80.2	
	23.0 -24.9 – Overweight I	23	13.0	
	25.0 – 29.9 – Overweight II	12	6.8	0.000
C	**Working hours per day**			
	> 8hours	103	58.2	
	= 8hours	41	23.2	
	<8hours	33	18.6	0.000
D	**Frequency of traffic controlling (Standing)**			
	>8hours	140	79.1	
	= 8hours	33	18,6	
	<8hours	4	2.3	0.000
E	**Frequency of sitting down**			
	Occasionally	75	42.4	
	Rear cases	17	9.6	
	Closing time	85	48.0	0.000
F	**Occupational health attention**			
	Visit hospital	38	21.5	
	Self-medication	80	45.2	
	Sleep/rest	59	33.3	0.000
G	**Smoking**			
	Yes	59	33.3	
	No	118	66.7	0.000
H	**Drinking Alcohol**			
	Yes	97	54.8	

No	80	45.2	0.000

Table 2 shows the work-related characteristics of the traffic control officers. The results revealed that 86 (48.6 %) had between 11 - 15 years of engagement in traffic control. The result also shows that the majority 142(80.2%) of TCP had a normal BMI between 18.5 – 22.9kg/m² while 23(13.0%) and 12(6.8%) were overweight and at risk of poor health leading to obesity. This result is n accordance with Tamura et al. [7]. It was evident that the majority, 103 (58.2%) of the officers work more than eight hours a day and 140 (79.1%) remain standing for more than eight hours. The result also revealed that 85 (48.0%) only had an opportunity to rest after the closing hour or duty.

Furthermore, Table 2 above also showed the occupational health problem of the personnel which cannot be left behind due to the prolonged standing in the controlling traffic. The table above shows that majority, 80 (45.2%) TCP engaged in self-medication, purchasing drugs from roadside drug hawkers on a periodic schedule. The study shows that only 38 (21.5%) TCP visited the clinic or hospital for diagnosis and treatment. However, only 59(33.3%) TCP were smokers with the majority 118(66.7%) not engaging in smoking but 97(54.8%) drank alcohol while 80(45.2%) do not drink alcohol.

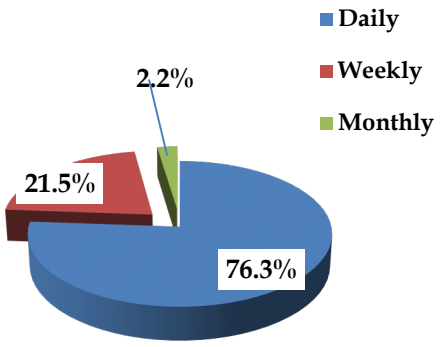

Figure 2: Frequency of pains

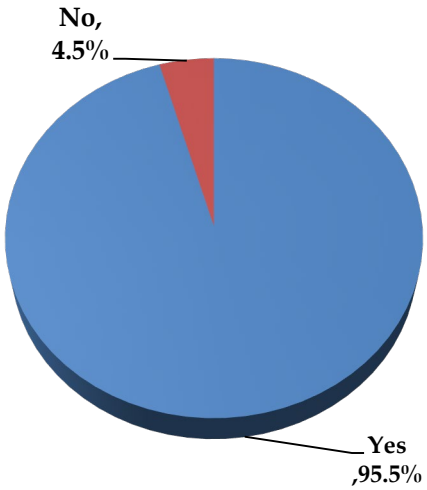

Figure 3: Percentage of the presence of WRMSDs among TCP

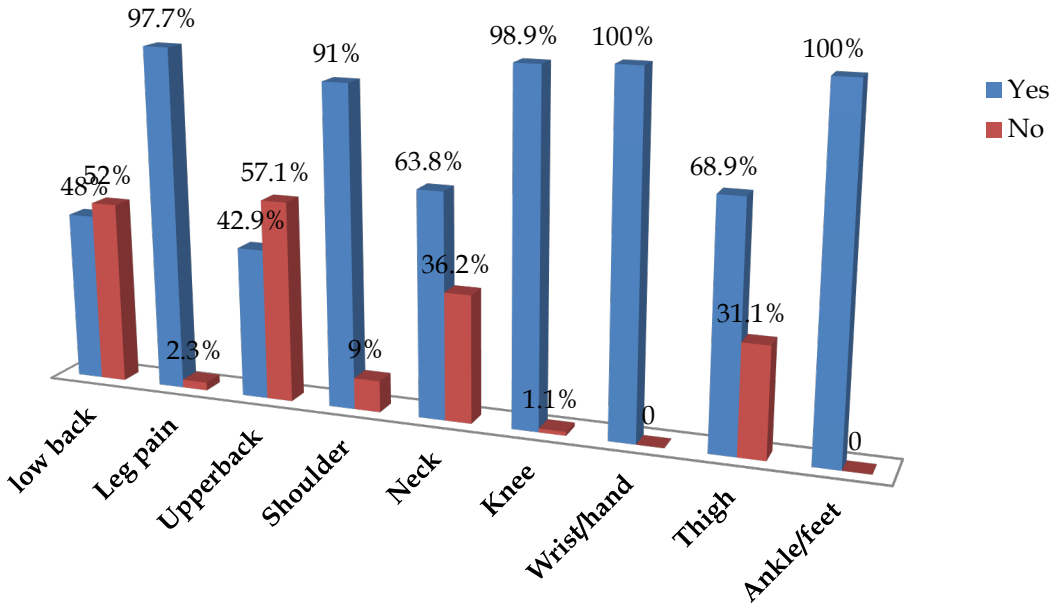

Figure4: Percentage of WRMSDs based on body regions

In addition, Figure 2 to Figure 4above, shows the graphical representation (pie and bar) charts of self-appraised WRMSDs of the TCP with 135(76.3%) had daily musculoskeletal pains while the majority, 169(95.5%)reported work musculoskeletal pains on their major parts of the body. Most of the TCP also reported pains in multiple body parts such as leg (97.7%), shoulder (91.0%), neck (63.8%), knee (98.9%), and thigh (68.9%) respectively while all the traffic control personnel had pains in wrist/hand and ankle/feet. This is a result of prolonged and repetitive twisting of the wrist/hand and extensive standing posture. Out of the total TCP who had work musculoskeletal pains, 85(48%) and 76 (42.9%) TCP had discomfort in the lower and upper back.

Table 3: Pearson correlation (R) characteristics between socio-demographic, BMI, WRMSDs, smoking and drinking alcohol

		Gender	Age (years)	Marital Status	Level of Education	Body Mass Index	Years of Experience	Working hours per day	WRMSDs	Smoking	Drinking Alcohol
Gender	R	1	-.450**	.034	-.294**	-.113	-.257**	.091	-.152*	.340**	.358**
	P-Value		.000	.649	.000	.134	.001	.226	.044	.000	.000
	N	177	177	177	177	177	177	177	177	177	177
Age (years)	R	-.450**	1	-.036	.350**	.247**	.717**	-.327**	.284**	-.263**	-.372**
	P-Value	.000		.638	.000	.001	.000	.000	.000	.000	.000
	N	177	177	177	177	177	177	177	177	177	177
Marital Status	R	.034	-.036	1	-.088	-.014	.058	-.109	-.111	.023	.113
	P-Value	.649	.638		.247	.855	.444	.149	.141	.766	.133
	N	177	177	177	177	177	177	177	177	177	177
Level of Education	R	-.294**	.350**	-.088	1	.229**	.178*	.191*	.068	-.370**	-.156*
	P-Value	.000	.000	.247		.002	.018	.011	.372	.000	.038
	N	177	177	177	177	177	177	177	177	177	177
Body Mass Index	R	-.113	.247**	-.014	.229**	1	.116	-.206**	-.100	-.007	-.005
	P-Value	.134	.001	.855	.002		.124	.006	.183	.927	.949
	N	177	177	177	177	177	177	177	177	177	177
Years of Experience	R	-.257**	.717**	.058	.178*	.116	1	-.417**	.247**	-.256**	-.253**
	P-Value	.001	.000	.444	.018	.124		.000	.001	.001	.001
	N	177	177	177	177	177	177	177	177	177	177
Working hours per day	R	.091	-.327**	-.109	.191*	-.206**	-.417**	1	.110	-.020	-.034
	P-Value	.226	.000	.149	.011	.006	.000		.145	.787	.651
	N	177	177	177	177	177	177	177	177	177	177
WRMSDs	R	-.152*	.284**	-.111	.068	-.100	.247**	.110	1	-.077	-.198**
	P-Value	.044	.000	.141	.372	.183	.001	.145		.309	.008
	N	177	177	177	177	177	177	177	177	177	177
Smoking	R	.340**	-.263**	.023	-.370**	-.007	-.256**	-.020	-.077	1	.642**
	P-Value	.000	.000	.766	.000	.927	.001	.787	.309		.000
	N	177	177	177	177	177	177	177	177	177	177
Drinking Alcohol	R	.358**	-.372**	.113	-.156*	-.005	-.253**	-.034	-.198**	.642**	1
	P-Value	.000	.000	.133	.038	.949	.001	.651	.008	.000	
	N	177	177	177	177	177	177	177	177	177	177

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 showed Pearson correlation characteristics between socio-demographic, BMI, WRMSDs, smoking and drinking alcohol of the TCP. The result shows that age is statistically significant and correlated with BMI ($P>0.01$) and alcohol drinking ($p<0.01$) with WRMSDs and factors such as smoking, working hours, gender and years of experience. This study was in consonance with a study that identified the association between age and BMI [8]. It was suggested that ergonomic modification of the workplace of TCP can improve their quality of life.

Keat and Sofat [9] reported that the BMI value indicates the amount of body fat a person has. Individuals with a BMI value of 25 or greater are considered overweight, and individuals with a BMI of 30 or greater are considered obese.This study shows that the majority of the TCP in Ogun State suffered WRMSDs. Previous studies conducted by other researchers on traffic police personnel showed that the majority of the traffic police suffered WRMSDs and the regions of the body most affected are the shoulder, knee, thigh, and feet while very but not too significantly affected are the lower and upper back. It was affirmed that most of these discomforts were due to uncomfortable posture, prolonged standing, walking, frequent hand twisting, longer working hours, age and cigarette smoking [10]-[15].Similarly, Ahmed et al. [16] reported that 66.1% of the traffic police experienced fatigue after duty and this is in line with the exhaustive hectic busy schedule which was also discovered in the present study. Smokers are prone to develop fragile bones. Smoking also decreases the absorption of calcium from a diet which of crucial to the mineralisation of bone. Research has shown that cigarette smoking has progressively affected the musculoskeletal system [8].

Paudel et al. reported that musculoskeletal disorders mostly affected the lower back, neck, shoulder and upper back with about 505 of the traffic personnel reported discomfort after duty [8]. Satish et al. also reported that the lower back was the major body region affected and this is due to the major working posture of the traffic personnel which is standing [17]. A cross-sectional study by Fiaz et al [14] shows that the prevalence of musculoskeletal disorders was 65.7% with leg (38.8%), low back (38.1%), shoulder (33.6%), knee (11.2%), arm/hand (6.7%), neck (6.7%) and upper back (4.5%). The study showed that most of the traffic personnel experienced leg pins and this is due to working posture. Prolonged standing causes muscle fatigue around the hip resulting in leg pain [14].

4.0 CONCLUSION

The study highlighted all body parts as susceptible to the sway of various work risk factors and this could lead to the evolution of WRMSDs in traffic personnel. The non-habitual are regarded as worthy and such pains also could lead to disability and long-life suffering [18]. It was well noted that the time span of walking, years of experience and vibration of the arm were important risk factors of WRMSDs amongst the respondents. This study acknowledged that TCP duty or line of work is tedious and demanding and which could give rise to WRMSDs. In view of this, efforts should be raised to fend off the

outturn on the health of the TCP in appalling or persistent of WRMSDs with regular counselling and the use of personal protective equipment.

There is a high prevalence of WRMSDs among TCP in Ogun State, Nigeria. The majority of the respondents in this study attributed their WRMSDs to traffic controlling and for most of these respondents, the level of pain was mild.Prolonged standing, walking, uncomfortable posture and twisting of the wrist and hand were also identified as the causes of WRMSDs. In view of this, it was recommended that the emphasis on periodic examination of traffic personnel should be encouraged to detect changes in the health status and essential amenities at the workplace, safety education and the need for more personnel could lower the task of the TCP. Additionally, TCP should be encouraged to engage more in moving up and down than standing in one location controlling the traffic to enhance good body flexion.

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