Research Article

LOW BACK PAIN AND ASSOCIATED FACTORS AMONG AUTO MECHANICS IN TWO SUBURBS OF ACCRA, GHANA - A CROSS-SECTIONAL STUDY

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Abstract

Background: Universally, work-related illness and injury continue to be of great concern because it is the principal cause of surge in work productivity. It is estimated to cost nearly $2.8 trillion (4%) of annual Gross Domestic Product (GDP) due to sickness absence, lost workday, worker's compensation and daily production interruption. Amongst these work-related illness and injuries, musculoskeletal pain is rife. It is projected to constitute about 32% of work-related injuries. Musculoskeletal pain affects most body parts of the individual. It may affect the neck, shoulders, back, thighs, elbow, wrists, or legs. Leading amongst these is the low back accounting for over 60% of all musculoskeletal pain. Low back pain is almost ubiquitous amongst all class of professionals. **Methods:** The study employed a cross-sectional study design with a quantitative approach to determine the factors influencing the risk of developing low back pain amongst auto mechanics. Participants were selected using multistage random sampling. Fisher's exact test and Logistic regression were employed to test association and predict the likelihood to experience low back pain. **Results:** Of the192 total Auto Mechanics who participated in the two communities (Korle Gonno and Mamprobi), 80% were "Apprentices", 11.5% were "Masters", and the remaining 9.9% are "Coworkers". The prevalence of Low Back Pain (LBP) among the studied respondents was high (92.1%). However, the back pain intensity level shows that 21.9% of respondents have Minimal disability, 62.0% have Moderate disability, and 9.4% have severe disability, while 6.8% of the participants are crippled. The study realized that factors influencing the risk of developing LBP include job support, the level of knowledge, and the position held in the job. **Conclusion:** The prevalence of LBP amongst study participants was high, with most of the studied participants experiencing moderate disability. Nevertheless, majority of them had adequate knowledge of body mechanic techniques. Job support, Job Position and Knowledge were found to significantly influence the determination of the condition among study recruits.

Keywords: Low Back Pain, Musculoskeletal Disorders, Korle Gonno, Mamprobi, Ghana.

INTRODUCTION

Body mechanics is the use of one's body to produce motion that is safe, energy conserving, and efficient, all of which allows the person to maintain balance and control. It involves how we hold our bodies when we sit, stand, lift, carry, bend, and sleep. The inability to assume good body mechanics in terms of moving and handling may cause back pain and lower back injuries. Auto mechanics and general car mechanics engage in jobs that require a lot of bending of backs, flexing of arms and legs, and the pushing and pulling of heavy metals and engines. Occupational related musculoskeletal disorders often constitute one of the major parts of work-related medical concern. The prevalence of such medical-related problems weakens one's ability and quality of work, thereby increasing workers' medical cost and loss of working days (Barkhordari *et al.,* 2017). According to a report by the National Institute of Occupational Safety and Health and (NIOSH) of America, work-related musculoskeletal disorders have a second grade compared to other illnesses in terms of importance, frequency, and the possibility of advance (Ghasemkhani *et al.,* 2008). Also, findings from previous studies show 4 million workers have work-related musculoskeletal disorders in Europe (Ghasemkhani *et al.,* 2008). Low back pain (LBP) and Lower back injuries (LBI) are some of the work-related diseases, and major public health problem in both developed and developing industrialized societies and the socio-economic burden of this problem has a huge dimension.

According to the World Health Organization (WHO), about 800,000 Disability Adjusted Life Years (DALY) are lost because of low back pain problems in the world (WHO, 2002). The ways people sit, stand and walk are among the strongest of all habits, with deep roots in an individual's personality. Hence, changing posture may be as difficult as quitting any type of major behavioural change. People have all been told since childhood to "stand up straight", but it is easy to get into bad habits. Children when they are socialized from an early age into poor posture when are at school by sitting cross-legged on the floor and being made to use one-size-fits-all chairs. It is little wonder people's posture is poor. Musculoskeletal disorders (MSDs) are impairments of body structures such as muscles, joints, tendons, ligaments, nerves, bones and the localized blood circulation system. Moreover, back pain is defined as chronic or acute pain, aches or trouble in the lumbar or buttock area sometimes called lumbago, or in the upper leg region, which is a major work-related disorder in almost all physically demanding jobs (Wami *et al.,* 2019). Work-related musculoskeletal disorders (WMSD) caused by carrying manual load, i.e. lifting, carrying, moving, pushing and pulling may lead to physical disorders and impose stress and strain in the girdle, shoulders, and arms. Disorders of such nature might result in constant and prolonged pain and disability (Mohammadi *et al.,* 2012). WMSD does not only cause pain and disability for employees and their families but also results in elevated social costs, taking into account productivity and wage losses, workers' compensation and medical expenses (Da *et al.,* 2010). In the United States, WMSDs, account for 65% of all occupational diseases. In the European Union (EU) countries, 39% of all occupational

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diseases are WMSDs (Widanarko *et al.,* 2014). WMSDs impact workers' efficiency, threatens their health and lives, and as well as bringing huge financial burdens on the mining sector and the nation (Fernández *et al.,* 2014). Globally low back pain is the leading cause of disability (Ahenkorah *et al.,* 2019). According to the WHO, 800,000 Disability Adjusted Life Years are lost because of low back pain problems in the world (WHO, 2002). Working as an auto mechanic is known to be physically laborious hence predisposing mechanics to an increased risk of developing low back pain. A study conducted in Spain about the effectiveness of the body mechanic checklist tool. Revealed that with the addition of knowledge of good body mechanic techniques, there was an increase in the practices of the body mechanic techniques (Akhtar *et al.,* 2017). To decrease low back pain, an ergonomic intervention such as the use of mechanical or other aide equipment must be combined with the training and education to be most effective with an overall goal to have little to no stress placed on one's spine during heavy lifts or transfers. The research, therefore, seeks to assess the knowledge, attitudes, and practices of auto-mechanics on body mechanic techniques and its health implications in Korle-Gonno and Mamprobi communities within the Accra Metropolitan District in the Greater-Accra Region of Ghana.

METHODS

Profile of Study site

The study area of the research was Korle-Gonno and Mamprobi communities. Both communities share a common boundary and are located in the Accra Metropolitan District which is one of the ten districts in the Greater Accra Region. It has a population of 27,826 (Ghana Statistical Service, 2012). Within the Korle-Gonno enclave is the Korle-Bu Teaching Hospital, one of the largest teaching hospitals in West Africa. There are many auto shops in and around these communities that specialized in there pairs and maintenance of vehicles. These fitting shops serve as training facilities and also a source of income for the indigenes, especially the youth.

Study Method and Design

The research was a descriptive cross-sectional survey design that employs a quantitative method for data collection. The questionnaire administration method was adopted as the mode of collecting data on the respondents' socio-demographics. The Oswestry Disability Index form was also used. Each section is scored on a 0–5 scale, with 5 representing the greatest disability. The index is calculated by dividing the summed scores by the total possible score, which is then multiplied by 100 and expressed as a percentage. If a participant marks more than one statement in a question, the highest-scoring statement is recorded as a true indication of disability. A 0-20% score is described as a "*minimal disability*",21-40% is described as a "*moderate disability*",41-60% is described as a "*severe disability*",61-80% is described as "*crippled*", and 81-100% is considered "*bed ridden*".

Study population

The target population for this study is auto-mechanics in selected mechanic workshops operating for more than a year in the Korle-Gonno and Mamprobi communities, both in the Accra Metropolis in the Greater-Accra Region of Ghana.

Sample Size and Sampling technique

The projected sample size for the study was 169 respondents. This was calculated using the Cochran 1977 Sample Size calculation formula (Cochran, 1977), with a known low back pain prevalence of 87.4% (Nasaruddin *et al.,* 2014) on a 95% Confidence Interval with a margin of error of 5%.

$$n = \frac{Z^2 \times p \times q}{d^2} = \frac{1.96^2 X\,(0.874) \times (0.126)}{0.05^2} = 169$$

Where, n = the required sample size,
p = estimated prevalence of LBP
q = complement of the estimated prevalence
Z = score at 95% confidence level
d = precision (fixed at 5%)

A 15% non-respondent rate adjustment brought the total estimated sample size to about 195. Multistage random sampling was used in selecting the respondents for the study. Each community was divided into 12 clusters according to the major streets within the community. Each cluster was numbered, and eight (8) randomly selected using an online random number generator. Selected clusters were initially scanned for available auto mechanic shops. Each identified auto mechanic was numbered and selected using a simple random sampling technique.

Data Analysis

The field data collected were coded and analyzed using STATA statistical software package (*StataCorp. 2007. Stata Statistical Software. Release 15. StataCorp LP, College Station, TX, USA*) version 14. Frequency distribution tables and graphs were adopted to help create visual impressions for easy interpretations. Fisher's exact test was carried out between the dependent variable and the various independent variables. Variables that are statistically significant under the multivariate analysis were considered as the factors influencing the dependent variable, low back pain. Statistical significance was considered for a p-value < 0.05.

Ethical Consideration

Ethical approval was acquired from the Ensign College of Public Health Ethics Review Board. Participants were informed orally about the objective of the study and to seek their consent. Participants within each selected shop were educated and informed on the rationale for the conduct of the study. They were told that they have the liberty to withdraw from the research whenever they wished, and moving forward their identity would be given the necessary security.

RESULTS

Demographic characteristics of the respondents

The total number of respondents who completed the questionnaire in this study was 192 out of a projected sample size of 195, yielding a 98.5% response rate. Amongst this number, 41.7% were within the age category of less than 20 years, while 45.3% of the respondents are between the ages of 20 to 39 years. The remaining proportion of respondents are 40 years and older. Considering the job position of the respondents, nearly, 80% of the respondents are Apprentices,

11.5% are Masters, and the remaining 9.9% are Coworkers. An evaluation of the respondents' attainable highest level of education at the time of participation revealed 30.2% of them have no formal education, 40.1% have up to primary education, 24.5% have a secondary level of education and about 5.2% have tertiary education. Married participants made up 25.0% of the respondents of this study, while the majority (71.4%) reported being single and 3.7% were divorcee. It was also observed from the data that most of the respondents are Christians and made up 77.6% of the study population. 17.2% of the participants were Muslims, while the remaining proportion was from other religions. The prevalence of Low Back Pain amongst the respondents was 92.1% (Table 1).

Table 1. Demographic Characteristics of the Study Population

Variable	Categories	Frequency	Percentage
	Less than 20	80	41.67
Age Groups (yrs)	20 – 39	87	45.31
	Greater than 39	25	13.02
	Master	22	11.46
Position	Coworker	19	9.90
	Apprentice	151	78.65
	No education	58	30.21
Educational Level	Primary	77	40.10
	Secondary	47	24.48
	Tertiary	10	5.21
	Less than 4years	134	69.79
Years of Experience	4 – 6years	41	21.35
	Greater than 6	17	8.85
	Married	48	25.00
Marital Status	Single	137	71.35
	Divorced	7	3.65
	Christianity	149	77.60
Religion	Islam	33	17.19
	Other	10	5.21
Low Back Pain	No	16	7.94
	Yes	176	92.06

Health-related characteristics of auto mechanics

Univariate analysis of health-related factors in Table 2 shows that 3.6% of the respondents are underweight, 24.0% have normal (healthy) weight, 33.9% are overweight, and obesity was 38.5%. About 54.2% of the respondents consume alcohol, while nearly 12.0% of the respondent smoke cigarette.

Among the respondents who answered in the affirmative to the drinking of alcohol, the majority (80.68%) hinted they drink at least once per week. The results show that 84.9% of the respondents have a family history of low back pain (Table2).

Table 2. Health-Related Characteristics of the study population

Variable	Categories	Frequency	Percentage
	Underweight	7	3.65
	Normal	46	23.96
BMI	Overweight	65	33.85
	Obese	74	38.54
	Slim	100	52.08
Waist Circumference	Large waist	78	40.63
	Extra-large Waist	14	7.29
Family History	No	29	15.10
	Yes	163	84.90
Smoking Status	No	169	88.02
	Yes	23	11.98
Alcohol Consumption	No	104	54.17
	Yes	88	45.83
Among the respondents who drink alcohol (n = 88).			
	Once	71	80.68
Alcohol consumption rate	Twice	15	17.05
	Thrice	2	2.27

Work-related characteristics of auto mechanics

The work-related characteristics of the respondents indicate that 10.4% of the respondents work for less than 10 hours a day. A little over three-quarters (76.6%) of the respondents work for 10-12hours and the remaining work for over 12hours. 84.9% of the participants stand for long hours, and 94.3% of the respondents lift objects weighing more than 50kg. 33 out of 192 respondents find their work environment stressful, majority (66.7%) consider their work environment to be conducive. On whether respondents have received education from work on body mechanics, it was realized the majority of the respondents have no education on body mechanic techniques (Table3).

Table 3. Work-Related Characteristics of the Study Population

Variable	Categories	Frequency	Percentage
Work hours per day	Less than 10hours	20	10.42
	10 – 12hours	147	76.56
	Greater than 12hours	25	13.02
Break	No	54	15.10
	Yes	138	84.90
Among the respondents who take a break at work (n = 138).			
Break hours	1hour	21	15.22
	1.5hours	43	31.16
	2hours	74	53.62
Stand for long hours	No	29	15.10
	Yes	163	84.90
Lifting weight greater than 50kg	No	11	5.73
	Yes	181	94.27
Work Environment	Stressful	33	17.19
	Conducive	128	66.67
	Excellent	31	16.15
Education on Body Mechanic	No	152	79.17
	Yes	40	20.83

Psychosocial characteristics of auto mechanics

The majority (98.9%) of the respondents indicated they are satisfied with their job. 99.5% of the respondents agree that their job can provide for their needs. 99.0% of the respondents have control over their job. Again 99% of the respondents, consider their job to be demanding, while 75.0% of the respondents receive support from their job(Table4).

Table 4. Psychosocial Characteristics of the study population

Variable	Categories	Frequency	Percentage
Job Satisfaction	No	6	3.13
	Yes	186	96.88
Job Provision	No	1	0.52
	Yes	191	99.48
Job Control	No	2	1.04
	Yes	190	98.96
Job demand	No	2	1.04
	Yes	190	98.96
Job Support	No	48	25.00
	Yes	144	75.00
Knowledge of Body Mechanics	Low	151	78.65
	High	41	21.35

Level of knowledge of respondents

The variable knowledge was measured as an eight-item composite variable with each item of the variable assessing respondents on body mechanic techniques. A score of one is assigned for each correct response to an item. In total, a score of eight would be obtained for obtaining correct responses for all item and a score of zero for an incorrect response for all items. Knowledge is categorized as poor if a respondent scores less than 3, Adequate if a respondent scores between 4 and 6 and a respondent is considered to have excellent knowledge if the respondent obtains a score above 6. From the analysis, it

was observed that 4.2% of the respondents have poor knowledge of the importance of body mechanic, 74.5% have adequate knowledge, while 21.3% have excellent knowledge.

Pain intensity of respondents using Oswestry disability index

The Oswestry Disability Index (ODI) scale was generated from a set of self-completed questions on ten topics regarding the respondents' assessed intensity of pain on the lifting of objects, ability to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and ability to travel. Each topic category is followed by six (6) statements describing different likely pain scenarios the respondent might deem fit to explain his/her situation and then checks out the answer that best fit. Each question is scored on a scale of 0–5. Each section score is summed and then multiplied by two (2), and the degree of disability is expressed as a percentage. Higher ratings on the Oswestry questionnaire indicate more significant levels of perceived disability. It was revealed that 21.9% of respondents have Minimal disability, 62.0% have Moderate disability, and 9.4% have Severe disability, while 6.8% of the participants are crippled.

Bivariate analysis of pain and demographic factors

From Fischer's exact test for association between Low Back Pain on selected socio-demographic and clinical variables it was observed that none of the selected socio-demographic indicators including the respondents' age group, educational marital status and professed religious belief have no significant statistical association with the experienced level of backpains. All test results showed p-values way and above the chosen threshold of 0.05. On the clinical front, it was only the reported alcohol consumption status that revealed a statistically significant association with the back pain experienced at a p-value of<0.001. All other test results in the clinical category were not significant (Table 5).

Table 5. Association between Low Back Pain and Selected Demographic and Clinical Variables

Variable	Categories	Low Back Pain		p-value
		No (n=16)	Yes (n=176)	
Socio-Demographic Characteristics				
Age Group	Less than 20	7	73	1.00
	20 - 39	7	80	
	Greater than 39	2	23	
Position	Master	3	19	0.63
	Coworker	1	18	
	Apprentice	12	139	
Educational level	No education	2	56	0.08
	Primary	5	72	
	Secondary	8	39	
	Tertiary	1	9	
Marital Status	Married	3	45	0.576
	Single	12	125	
	Divorced	1	6	
Religion	Christian	12	137	0.791
	Muslim	3	30	
	Other	1	9	
Clinical Characteristics				
Waist Circumference	Slim waist	8	92	0.558
	Large waist	6	72	
	Extra-large waist	2	12	
BMI	Underweight	1	6	0.060
	Normal	8	38	
	Overweight	4	61	
	Obese	3	71	
Alcohol Consumption	No	15	89	0.001*
	Yes	1	87	
Family History	No	5	24	0.060
	Yes	11	152	
Smoking status	No	15	154	0.402
	Yes	1	22	

*Statistically significant at a 95 % C.I

Low back pain and work-related factors

On the work-related variables, it was observed that lifting weight greater than 50kg, standing for long hours, break hours, education on body mechanics was found not to be statistically significant to having Low Back Pain. The working environment and the number of work hours per day were, however, found to be statistically associated with having Low Back Pain (p-values<0.01, <0.02) respectively (Table 6).

Table 6. Test of Association between Low Back Pain and Work-Related Variable

Variable	Categories	Low Back Pain		p-value
		No (n=16)	Yes (n=176)	
Work hours per day	Less than 10hrs	3	17	0.02*
	10 – 12hours	8	139	
	More than 12hrs	5	20	
Break hours	1hour	1	20	0.470
	1.5hours	2	41	
	2hours	1	73	
Stand for long hours	No	2	27	0.55
	Yes	14	149	
Lifting weight greater than 50kg	No	2	9	0.23
	Yes	14	167	
Work Environment	Stressful	2	31	0.01*
	Conducive	7	121	
	Excellent	7	24	
Education on Body Mechanic	No	14	138	0.311
	Yes	2	38	

*Statistically significant at a 95 % C.I

Low back pain and psychosocial factors

Job Satisfaction, Job Provision, Job Control and Job Demand were found not to be statistically significant to having Low Back Pain. However, Job support was found to be statistically associated with having Low Back Pain (p-value<0.01). Knowledge of the importance of body mechanics was also found to be associated with the risk of developing low back pain (p-value<0.01) (Table 7).

Table 7. Test of Association between Low Back Pain and Psychosocial Variables

Variable	Categories	Low Back Pain		p-value
		No (n=16)	Yes (n=176)	
Job Satisfaction	No	0	6	0.589
	Yes	16	170	
Job Provision	No	0	1	0.917
	Yes	16	175	
Job Control	No	0	2	0.840
	Yes	16	174	
Job Demand	No	0	2	0.840
	Yes	16	174	
Job Support	No	14	34	<0.01*
	Yes	2	142	
Knowledge	Low	3	148	<0.01*
	High	13	28	

*Statistically significant at a 95 % C.I

Multivariate analysis of factors influencing low back pain

The multiple logistic regression results show that variables such as Alcohol consumption, Work hours per day, Body Mass Index and Work environment were not statistically associated with having Low Back Pain. However, Job Support was statistically significant (AOR=17.34; 95%CI=1.10–273.16). Having high knowledge is significantly associated with low back pain (AOR=0.06; 95%CI=0.01–0.48). Participants classified to have "high" knowledge of Body Mechanic Techniques and its health implications have a decreased

likelihood of experiencing body pains compared to their counterparts with "low" knowledge after adjusting for all other variables. Also, being an apprentice is found to be statistically associated with low back pain (AOR=0.13; 95%CI=0.04 – 0.86).Thus, respondents who reported to be apprentices at the time of participation in the study were 0.87 times less likely to experience low back pain compared to those who reported being "master" controlling for all other covariates (Table 8).

Table 8. Multivariate Logistics Regression Analysis

Variable	Categories	COR	95%CI	AOR	95%CI
Alcohol consumption	No	Ref		Ref	
	Yes	14.66	1.90 – 113.41	1.53	0.09-26.56
Work hours per day	Less than 10	Ref		Ref	
	10 – 12	3.07	0.74 – 12.68	0.65	0.07-5.95
	More than 12	0.71	0.15 – 3.40	1.15	0.11-11.83
Work Environment	Stressful	Ref		Ref	
	Conducive	1.12	0.22 – 5.64	2.38	0.24- 23.31
	Excellent	0.22	0.04 – 1.16	2.98	0.24-37.50
Job Support	No	Ref		Ref	
	Yes	29.24	6.34 – 134.76	17.34*	1.10-273.16
Knowledge	Low	Ref		Ref	
	High	0.04	0.01 – 0.16	0.06*	0.01-0.48
BMI	Underweight	Ref		Ref	
	Normal	0.79	0.08 – 7.51	0.16	0.01- 2.81
	Overweight	2.54	0.24 – 26.55	0.17	0.01- 3.34
	Obese	3.94	0.35 – 43.99	0.18	0.01- 4.66
Position	Master	Ref		Ref	
	Coworker	2.84	0.27- 29.90	4.30	0.34-55.19
	Apprentice	1.83	0.47 – 7.08	0.13*	0.04-0.86

DISCUSSION

Of the 192 total Auto mechanics who participated in the study, it was revealed that the majority were less than 40 years. Presupposing that they are in their active working years and have their livelihood depending on it. Considering the job position, nearly eight out of tenfrom both study sites were Apprentices who need to take instructions from their bosses on whatever work stress they have to be engaged in. Per their level of formal education and marital status, it was noted that the majority just had up to primary education and not married. It was observed from the data that, most of the Mechanics were Christians.

Prevalence of low back pain amongst Auto mechanics at Korle Gonno and Mamprobi

The prevalence of low back pain amongst Auto mechanic at the Korle Gonno and Mamprobi communities was found to be 92.06% (Table 2). This prevalence is high compared to the global estimation of 70 to 85% (Tinitali *et al.,* 2021) and also higher compared to a similar study conducted in Malaysia that reported the prevalence of low back pain amongst Auto mechanic to be 87.4% (Nasaruddin *et al.* 2014). It can be concluded that the prevalence of low back pain amongst the Auto mechanics working at the Korle Gonno and Mamprobi communities is higher and of great public health concern. This is because the Auto mechanic profession forms one of the highest risk professions for work-related musculoskeletal disorders (Tamene *et al.,* 2020). Another reason for the high prevalence of low back pain is the repetitive nature of most of their tasks, e.g. body positions especially bending to be in an awkward position for long periods. A critical look at the nature of the work of the Mechanics at Korle Gonno and Mamprobi, one would realize that these Mechanics undergo rigorous, laborious activities. These include lifting heavy objects, carrying, pounding etc. Most of these activities are done with human strengths without mechanical aids and this exerts lots of strain on the muscles of these workers.

Level of pain intensity using Oswestry disability index

The Global Burden of Disease Study reported that among 310 conditions, back pain ranked highest in terms of disability and overall burden (Ludwig *et al.,* 2016). The Oswestry Disability score obtained for the participants in this study revealed that the majority (62%) had a moderate disability, 9% had a severe disability, and 7% were crippled as a result of their low back pain. A similar study assessing the level of pain intensity amongst patients in Slovenia assigned the following five groups according to the level of their disability: minimal disability (39.0%), moderate disability (22.7%), severe disability (14.9), crippled (2.8%), and bedbound (0.7%) (Klemenc-Ketis, 2011). The proportion of respondents with moderate disability in our study was twice that of Klemenc-Keti's. This indicates that most of the Auto mechanics in the Korle Gonno and Mamprobi communities were experiencing some limitations as a result of their low back pain. This could impact their work rate and hence their work output. Another consequence of this is that it may havean impact on the quality of life of the individual both at work and away from work. Mobility impairment has been established to be a leading consequence of low back pain. In addition, depression and anxiety have also been implications of poorly managed back pains (Ludwig *et al.,* 2016). It is therefore imperative that Auto mechanics with moderate and/or severe disability be closely monitored for signs of depression or anxiety while managing their back pain.

Level of Knowledge of Auto mechanics on the importance of body mechanic techniques

Adequate knowledge of body mechanics has been established to be essential at reducing the risk of developing musculoskeletal pains (Al Eisa and Al-Abbad, 2013). This research established that 1.2% of the study participants had poor knowledge of the importance of body techniques. However, nearly a third of a quarter had adequate knowledge of body techniques while 21.4% had excellent knowledge on the importance of body mechanic techniques. Comparing these findings to a study conducted amongst nurses in Mangalore in 2014, it was realised that most of the Auto mechanics in our study had some form of knowledge about the importance of body mechanic techniques (Vidya *et al.,* 2014). Though the proportion of respondents in our study who had excellent knowledge on the importance of body mechanic techniques was lesser compared to Vidya *et al.,*(2014), it is critical to note that the respondents in that study were nurses and thus may have been taught during training or practice (Vidya *et al.,* 2014). Nonetheless, a more significant proportion of Auto mechanics had adequate knowledge and that would inure to the benefit of Auto mechanics at reducing their risk of developing musculoskeletal pain, this is because they would observe the appropriate ways of body posture when they go about their daily duties. Since the proportion of Auto mechanics with excellent knowledge was few, it is expected that focus should be drawn towards interventions that would increase the knowledge of this category of workers on body mechanic techniques. Some suggested interventions include constant education through media, face-to-face discussions and seminars. The education should not only target the body mechanic techniques; it should cover the scope of the impact of not observing body mechanic techniques on the quality of life of an individual. Auto mechanics may also be made to take exams on somebody mechanic techniques they need to observe

in order to prevent musculoskeletal pain. These exams may be part of their annual registration with their various unions.

Behaviors contributing to low back pain amongst the Auto mechanics

Certain behaviors have been known to impact the risk of developing musculoskeletal pain. This study assessed a plethora of these behaviours that may be accounting for the high prevalence of low back pain. Lifestyle modification could be targeted at reducing musculoskeletal pain, such as low back pain as suggested by several research articles (Yang and Haldeman, 2018). It is, therefore, necessary to take a critical look at the lifestyle characteristics of Auto mechanics. These behaviours may be work-related or even health-related. Some studies have identified smoking as a contributor to low back pain. A study by Petre *et al.,* (2015) on the impact of smoking on chronification of low back pain, the researchers found that compared with nonsmoking participants, those who smoked had a stronger connection between the nucleus accumbens and the medial prefrontal cortex, increasing their risk of chronic back pain. It can be concluded from other related study that smoking behaviour has a direct impact on the risk of developing low backache (Petre *et al.,* 2015). Findings from this study, however, suggest that less than 12% of Auto mechanics are smokers. Nonetheless, intervention strategies should be targeted at reducing the proportion of smokers further. Auto mechanics who smoke should be made to understand the imports of smoking on their risk of developing musculoskeletal pain and its subsequent negative effect on the quality of life of an individual. Many people turn to consume alcohol to numb their pain or help them relax their muscles. Nonetheless, it has been established that excess alcohol consumption increases the constriction of blood vessels, thereby worsening any existing pain (Zale *et al.,* 2015). Some postulations are that the dehydrating effect of alcohol increases the friction between intra-vertebrae discs leading to back pain. It is also known that ethanol potentiates nociceptor responses thereby increasing sensitivity to pain (Trevisani *et al.,* 2002). From this study, 45.8% of Auto mechanics consume alcohol. Amongst these proportion of Auto mechanics, 80.7% consume alcohol on averagely once daily, 17.1% consume alcohol twice daily while the remaining proportion consumes alcohol thrice daily. Weight lifting has been recommended in the management of back pain when incorporated in a routine exercise (Coenen *et al.,* 2014). It was observed in a study conducted by Welch *et al.,*(2015) that there was a significant reduction in fat infiltration at the L3L4 and L4L5 levels and an increase in lumbar extension time to exhaustion of 18% when free base weight lift is incorporated in exercise (Welch *et al.,* 2015). Regardless, excess weight exerts lots of strain on the body muscles and impacts the pressure on the vertebra discs leading to an increase in low back pain. Hence, lifting heavier weights could lead to backache. With Auto mechanics, there is an increased likelihood of lifting heavy objects. In lieu of this, the study sought to assess the proportion of Auto mechanics that lift weights heavier than 50kg. It was realized that the proportion of Auto mechanics who lift weights heavier than 50kg was 94%. This proportion is very huge. It could account for the enormous proportion of Auto mechanics developing low back pain. As observed by (Toraman *et al.* 2014), failure to observe proper body mechanic behaviours increased the risk of low back pain amongst workers at a car maunfacturing unit. Toraman opined that these behaviours are modifiable yet may pose threatnening costs if they are not targetted for

interventions. The habit of standing for long hours also exerts loads of pressure on the spinal cord leading to low back pain (Andersen *et al.,* 2007). The proportion of Auto mechanics who stand for long hours was 84%. This work-related habit has been known to increase low back pain and therefore, may be accounting for the high prevalence of low back pain. Auto mechanics should be educated to understand that they are required to balance between standing and sitting. Therefore, the habit of standing for long hours could have dire consequences for their health.

Effects of other contributing factors on low back pain

According to (Akter *et al.,* 2016), socio-demographic and physical risk factors were significantly associated with reported musculoskeletal symptoms (Akhtar *et al.,* 2016). Farrokhi *et al.,* (2017), identified that the prevalence of LBP had been reported to increase with age (up to 65), with onset typically occurring in the third decade of life. This shows that age could influence one's risk of developing low back pain (Farrokhi *et al.,* 2017). This assertion is contrary to this study findings where the age of the respondents appeared not to have any association with the risk of developing low back pain. Unlike a study by Farrokhi *et al.,* (2017) that states that being married may influence one's risk of developing low back pain compared to being single or divorced (Farrokhi *et al.,* 2017), our findings indicated that marital status did not influence the odds of developing low back pain amongst Auto mechanics working in Korle Gonno and Mamprobi communities. Other demographic factors, such as level of education, did not influence the risk of developing low backache amongst Auto mechanics. On the other hand, the respondents' position at the work place appeared to be contributing to the pain level in this study. It was realized that "Apprentices" had a reduced chance of developing or having low back pain compared to Auto mechanics who are Masters. This is because the apprentices are younger and inexperienced compared to their Masters. They are relatively starting to work as Auto mechanics and are therefore less exposed to the rigorous activities of the job. The Masters, on the other hand, have been working for several years and may have undergone strenuous duties, which increases their risk of developing back pain. For an intervention to reduce musculoskeletal pain, it would be therefore important and cost-effective to target the Masters than the apprentices. Some studies have suggested that obese persons are more likely to develop musculoskeletal pain (Yang and Haldeman, 2018). This observation has been attributed to fat disposition, reduced muscle integrity and increased body weight that exerts pressure on the skeletal system, most importantly, the spine. However, from this study, the BMI of the Auto mechanics didcorrelate to their risk of developing low backache. This is because while obesity may increase risk, it could be confounded by other factors such as regular exercise, which could reduce muscle strains and hence reduce low back pain. A critical look at the work of the Auto mechanics shows that the routine of these professionals is full of activities such as lifting, pounding, squatting etc. and these activities could relax muscle strain and hence reduce the risk of developing low back pain. It is a fact that low back pain is an occupational hazard associated with workers in the automobile industry. These hazards do not happen by themselves but are however influenced by the activities relating to the line of job. Some studies have also identified other related factors that are associated with developing musculoskeletal pain. For example, Sazarina *et al.,* (2014) established that amongst automobile

workers, frequent standing increases the prevalence of low back pain experienced by the automobile workers for the past 12 months compared to those who do not stand frequently (Sazarina *et al.,* 2014). This may be so because the habit of standing for long hours also exerts loads of pressure on the spinal cord leading to low back pain (Andersen *et al.,* 2007). Conversely from our findings, standing for long hours did not influence the risk of an Auto mechanic developing low back pain. This may be so because once the standing posture is appropriate, there is reduced stress on the spine of an individual; thus, the prevalence of low back pain decreases. This is to say that observing proper body mechanic techniques could decrease one's risk of developing musculoskeletal pain. The number of working hours has been found to influence the risk of developing musculoskeletal pain. A study by Ezzatvar *et al.,* (2019) identified that persons who work for over 45hours per week were 1.7times more likely to experience musculoskeletal pains compared to persons who work for less than 35 hours per day (Ezzatvar *et al.,* 2019). With our study, it was determined that working for long hours did not influence the risk of an Auto mechanic developing low back pain. Thus, our findings are contrary to that of Ezzatvar *et al.,* (2019).

A study by Wami *et al.,* (2019) assessing factors that influence the risk of low back pain amongst low wage workers determined that job demand exerts both physical and psychological exertion on the workers thereby increasing low back pain risk. Though the work of Auto mechanics is demanding our study findings indicated that this did not influence their risk of developing low back pain as observed in other studies such as (Wami *et al.,* 2019). This is because, besides the factor of job demand, other factors such as job satisfaction and job support may influence the risk of developing back pain. Hence, if an individual is satisfied and has adequate support from their occupation, they may not consider their work to be demanding. It was realized from our study that Job support tends to influence low back pain amongst Auto mechanics. From Table 8, Auto mechanics who received adequate support at work were 17.3times more likely to develop low back pain compared to participants who do not receive support at work. A study conducted in Spain about the effectiveness of body mechanic checklist tool revealed that with the addition of knowledge of good body mechanic techniques there was a reduction in musculoskeletal injuries and there was an increase in the practices of body mechanic techniques (Akhtar *et al.,* 2017). Our findings are consistent with Akhtar *et al.,* (2017). It was realised from this study that having high levels of knowledge on the importance of body mechanic techniques decreased the Auto mechanic's risk of developing low back pain by 94% compared to having a low level of knowledge on body mechanic techniques. In other words, Auto mechanics with high levels of knowledge on the importance of body mechanic techniques are 17times more likely to have low back pain compared to Auto mechanics with poor knowledge. Once the Auto mechanic has adequate knowledge of the importance of body mechanic techniques, they would observe these techniques at work. These techniques have been established to reduce musculoskeletal pains. Hence efforts should be made to increase the knowledge of Auto mechanics on body mechanic techniques.

Conclusion

Conclusively, it was realized from this study that the prevalence of low backache amongst Auto mechanics working at Korle Gonno and Mamprobi communities was high. Also, the level of pain intensity measured using the Oswestry Disability Score revealed that 22% of the Auto mechanics had minimal disability from the lower back pain, majority, i.e. 62% had moderate disability while 9% of the mechanics had a severe disability and the remaining 7% were crippled as a result of their low back pain. The level of knowledge of Auto mechanics indicates that 1.2% of the Auto mechanics at the Korle Gonno and Mamprobi communities had poor knowledge of the importance of body techniques. However, nearly a third of a quarter had adequate knowledge of body techniques while 21.4% had excellent knowledge on the importance of body mechanic techniques. Demographic characteristics such as Age, Educational level, Marital status and Years of experience of Auto mechanics did not influence their risk of developing musculoskeletal low back pain. Demographic factor such as the Position of an Auto mechanic at work was found to influence the risk of developing low back pain. Health-related factors such as Smoking status, Alcohol consumption, Body mass index did not also influence the risk of developing low back pain. Work-related factors such as Standing for long hours, lifting weight heavier than 50kg, and Work environment did not influence the risk of developing low back pain. Psychosocial factors such as Job satisfaction, Job demand, and Job Control were found not to influence the prevalence of low back pain amongst Auto mechanics working at Korle Gonno and Mamprobi communities. However, Job support was found to influence low back pain.

Authors' contributions

This work was carried out in collaboration between all authors. DMB and SM participated in conceiving the study and in the development of data collection tools. DMB carried out data collection. SM and DMB participated in the data analysis and drafting of the manuscript. All authors read and approved the final manuscript.

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