# Prevalence and Pattern of Musculoskeletal Disorder in Panteka Mechanic Village, Kaduna

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Musculoskeletal disorders (MSDs) are illnesses that make working people disabled and generate significant economic loss worldwide. Automobile mechanics are at risk of injury at the onset of MSDs due to repetitive tasks, uncomfortable posture, and heavy lifting of objects. The frequency and pattern of work-related musculoskeletal disorders among auto mechanics in Panteka Village, Kaduna State, are investigated in this study. Using a version of the standard Nordic Musculoskeletal questionnaire, a quatitative method was used to gather data on the prevalence pattern of musculoskeletal illnesses at Panteka Village. To analyze the data obtained, purposive sampling method was employed. The study found that there was a high prevalence of MSDs among auto mechanics in Panteka village, with rates of 90% (Neck), 92.3% (shoulder), 56.4% (knee) and over 70% prevalence of MSD for lower and upper back. The results of relationship between age of respondents, years spent as a mechanic and prevalence of the musculoskeletal disorders showed no significant relationship. However, there was a significant relationship between the respondent's section of mechanic activities ie the nature of their job and MSD. These are primarily the result of poor ergonomics and insufficient rest periods at their workshop. Also, manual handling of heavy loads, repetitive tasks and force exertion were the identified factors. Ergonomic and MSD awareness among workers should be increased through training. In addition, govermnents should investigate more in other to reduce or eliminate risk factors leading to musculoskeletal disorders. Members of the Panteka village committee can use the research's findings to enhance the working environment for mechanics. Therefore, Mechanics will need to be educated more on risk factors associated with MSDs.
**Keywords:** Mechanics, musculoskeletal disorders, automobile, pain

## INTRODUCTION

The term "work-related muscular skeletal disorder" refers to a variety of pains that people experience in their muscles, tendons, and nerves as a result of repetitive motions or awkward postures during work (Middlesworth, 2019; Schneider *et al*., 2010). According to the Health and Safety Executive, musculoskeletal diseases (MSDs) can affect any portion of the body, including the muscles, joints, and tendons. These could have an episodic or cumulative duration and could result from an injury from a work-related accident (HSE, 2019). The International Classification of Diseases lists 150 diseases that have an influence on various bodily areas, according to the Health and Safety Executive (HSE, 2019). Additionally, they can progress from mild to severe diseases, endangering the lives of most adults and affecting their quality of life (HSE, 2019). Depending on the activity performed on the body and underlying conditions, several effects might be seen on the body. According to a study by Gallagher and Heberger (2013), risk factors for MSD include things that put pressure on the body physically. These physical characteristics include repetitive motions that are frequent, awkward work postures, prolonged tasks, and tasks that need a lot of power. The lower body, neck, shoulder, forearm, and hand are the most often affected body parts (Sambo *et al*., 2018; Hakim *et al*., 2017; HSE, 2019). According to the Orthopaedic Research Society (ORS, 2020), more than 2.78 million people worldwide lose their lives to diseases and accidents related to their place of employment each year. The effects of MSDs go beyond just health; the economic impact should also be taken into consideration (Middlesworth, 2019). Public and private organizations spend a lot of money on sick days and employee health care (Ambedkar, 2018).

According to Saha *et al*. (2010), workers in large-scale industries have better working conditions than those in small-scale ones. The lack of established healthcare management arrangements poses a greater hazard to the health of workers in small-scale companies. For any healthcare issues, they must rely on the generosity of their employers. Numerous small-scale industries, including auto mechanics, are devoid of formalized healthcare services (Ataro *et al*., 2018). Before an automobile workshop is founded in Nigeria, the regulations controlling the labour market do not mandate that the workers receive standardized healthcare services (Adeyemi *et al*., 2016). The manual handling of heavy equipment and the hauling, lifting, supporting, or transferring of big or bulky goods using one's hands or one's entire body force make up some of the jobs that put workers at risk for occupational accidents (HSE, 2011). A garage for auto repairs is a place of employment where workers spend a lot of time under the hood and underneath the automobile, repeatedly flexing their shoulders

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forward and extending their arms fully (Wami *et al*., 2019), which increases the risk of MSD. Therefore, the purpose of this study was to investigate the incidence and distribution of MSD among auto mechanics in Panteka Village, Kaduna. This study focused on the prevalence and patterns of work-related musculoskeletal disorders among auto mechanics in Panteka, a hamlet in Kaduna, Nigeria, even though little investigations were carried out on the impact of MSD in people working in a Northern Nigerian auto repair shop. The objectives are:

i. To determine the prevalence and pattern of MSDs among the automobile mechanics in Panteka.

ii. To evaluate the similarities in pattern of MSDs among different aspects of car repairers.

## LITERATURE REVIEW

According to a study by HSE (2019), there are three basic categories that can be used to classify musculoskeletal disorders. The upper limb dysfunction (ULD) affects the hands, arms, and shoulders, which are the portions of the body we use most frequently for grasping, holding, and moving objects. The repetitive and quick motion of these bodily components puts a harmful strain on the affected area of the body, causing pains, inflammation, and pain in the soft tissue. Lower limb diseases (LLD) are conditions that affect the legs, knees, and hips. They typically manifest as lower limb aches, pains, and numbness without any apparent sickness (HSE, 2020) and usually result from the lengthy and tiresome workdays that employees endure. Last but not least, back pain is a disorder that is characterized by aching, pain, and tension, which disturbs the muscles, bones, and damages the spine, ribs, and vertebral discs as a result of repetitive motions from the neck to the hips. (HSEf, 2018). It is a condition that affects automobile mechanics (DBC, 2016) and over 80% of people who work in positions for extended periods of time (Honga & Shinb, 2020). It is linked to manual handling or lifting of heavy loads, repetitive tasks, standing at a position for a long time, sitting in an uncomfortable position, and packing of products. It is well known that persons who work long hours standing up are more likely to experience lower back pain and pain in their legs. Additionally, it is well-known that most auto technicians stand while performing their work on hard surfaces like cement floors (Ogunbunmi, 2014). According to research, auto mechanics spend a lot of time bending their spine forward and raising their arms over their shoulders in order to do repairs. The majority of the car's mechanical and electrical components are found underneath and in the car's bonnet. The placement of the car's key components assures that mechanics adopt improper postures that put pressure on their shoulders and backs (Hassam & Mahamad, 2012; Aicale *et al*., 2017). Shoulder tendinitis is linked to prolonged abduction or flexion of the arms at work (Morrissey, 2017). There are other uncomfortable positions that technicians must labour in for extended periods of time in order to fix an automobile, and there is a huge demand for auto maintenance (Aicale *et al*., 2017). These elements contribute to the emergence of MSD. Numerous studies have been conducted on musculoskeletal disorders throughout the world, and a sizable body of literature has been made available that highlights the prevalence of WMSD among various professions and occupations in Nigeria. For example, a study by Tinubu *et al*. (2010) who investigated the prevalence of WMSD among nurses and observed a lifetime incidence of 84.4%. Ekpenyong and Inyang (2014) pointed the fact that there is a lower percentage (39.25%) of WMSD documented among construction workers in Nigeria, though they fell short of providing the type of construction site they utilized as their case study. In a survey of butchers, Kaka *et al*. (2016) found point prevalence rates of 74.5% and 12-month rates of 88.2%, respectively.

## RESEARCH METHODOLOGY

This study adopted a quantitative research design whereby data was gathered through questionnaire. The study targeted the mechanics operating in Panteka mechanic village, purposive sampling technique was used. The mechanics community of Panteka is entirely made up of men. Therefore, all participants were men. To ensure that respondents' privacy and discretion were respected, participant consent was requested before they answered the questionnaire, and no personal information was gathered. An online version of standard Nordic musculoskeletal questionnaire (SNQ) commonly used among researchers was used to obtain information on the prevalence and pattern of musculoskeletal disorders was used (López-Aragón *et al*., 2017)**.** Descriptive and inferential statistics were used in analysing the data using SPSS to determine the link between the affected body region and the type of work.

## RESULTS AND DISCUSSION

The respondents age distribution is seen in Table 1, 28% of respondents are between 36 and 45 and 46 and 60 years old, respectively. People in their mid-twenties and thirties make up 19% of respondents, respectively. While 14% of the population were young adults and teenagers. The bulk of respondents (32%) have been working in their current position for 11 to 15 years, while only 4% have worked for less than five years. 47% of the workers are between the ages of 26 and 45, which is considered prime age. The age range was discovered to be between 15 and 30 years old at 78% (n = 100) in a related study among car mechanics in Dhaka (Akter *et al*., 2016). When Abaraogu *et al*. (2016) conducted a cross-sectional study to ascertain the prevalence of work-related back discomfort among automobile maintenance technicians in Eastern Nigeria, they found that 67.7% (n = 684) of the participants were between the ages of 20 and 49. According to Marck *et al*. (2017), a likely reason for


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this age range is the drop in locomotor function that occurs as people age as a result of steady loss of muscle mass and cumulative deterioration in muscle strength and power.

Table 1: Participant age and years spent on current job

| Participants age | | |
|---|---|---|
| **Age** | **Male (n)** | **Percentage (%)** |
| 16 – 25 | 17 | 14.0 |
| 26 – 35 | 23 | 19.0 |
| 36 – 45 | 34 | 28.1 |
| 46 – 60 | 34 | 28.1 |
| 60 – Above | 13 | 10.7 |
| Total | 121 | 100.0 |
| **Years spent on current job** | | |
| **Time in present job (years)** | **Frequency (n)** | **Percentage (%)** |
| 0 -5 | 5 | 4.1 |
| 6 – 10 | 30 | 24.8 |
| 11 – 15 | 39 | 32.2 |
| 16 – 20 | 33 | 27.3 |
| 21 and above | 14 | 11.6 |
| Total | 121 | 100 |

The prevalence rate of MSD is shown in Table 2 depending on daily working hours. Compared to those who work less hours, those who spend between 5 and 9 and between 10 and 14 hours per week reported higher rates of MSD. Painter and mechanical sections of the auto repair industry have higher MSD prevalence rates than the others, along with higher rates of shoulder and lower back complaints. 46.7% of respondents in the mechanical section feel pain as a result of exerting force when working, and 40% of them feel pains as a result of working in uncomfortable positions while removing and replacing tires and working under the bonnet. In the electrical section, 47.1% of the workers reported repetitive motion from screwing and unscrewing car parts to reach wires as the cause of body pain. This finding does not rule out the influence of other factors, such as the Panteka town being as the main hub for mechanics in Northern Nigeria, which results in a large volume of clients who require them to work quickly. It is clear that repetitive motions raise the risk of MSD modestly for low force activity and quickly for high force activity (Gallagher & Heberger, 2013). Yoon and Lee (2019) found a low prevalence of wrist/hand discomfort, 39.4%, in their study on musculoskeletal complaints in car industry workers and 52.9% in the electrical section reported bad posture when working under the wheel. 80% of painters see lifting of objects when applying paint to automobiles as the cause of pains. The results of this study are comparable to those from Abaraogu *et al.* (2016) study, which found a significant prevalence of back discomfort. According to a study by Ahmed *et al*. (2014), upper and lower back MSD prevalence among auto repair mechanics was 63% and 68%, respectively. They linked the high rate to intense exertion. Abd Rahman *et al*. (2014) conducted a cross-sectional study on the relationship between uncomfortable posture and MSD in the automotive industry. They found that the lower back accounted for the majority (50.9%) of MSD complaints. Antwi-Afari *et al*. (2017) discovered that repetitive lifting increased the risk of MSD in their study. The respondent's section of mechanic activities and the nature of their job have a significant relationship ($P < 0.05$).


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Table 2: Distribution of MSD based on working Hours, section of car repairs, hours spent working

**Experience of MSD discomfort based on daily working hours**

| Part of the body | 0 - 4 hr % (n =2) | 5 - 9hr % (n = 79) | 10 – 14hr % (n =39) | 15 above % (n = 1) | P value | Prevalence |
|---|---|---|---|---|---|---|
| Neck | 100.0 | 88.6 | 94.9 | 100.0 | 0.946 | **95.875** |
| Shoulder | 100.0 | 93.7 | 94.9 | 100.0 | 0.971 | **97.15** |
| Elbow | 0.00 | 63.3 | 64.1 | 0.00 | 0.457 | **31.85** |
| Wrist/hand | 100.0 | 89.9 | 89.7 | 100.0 | 0.880 | **94.9** |
| Upper back | 100.0 | 81.0 | 94.9 | 100.0 | 0.491 | **93.975** |
| Lower back | 100.0 | 92.4 | 100.0 | 100.0 | 0.007 | **98.1** |
| Hips/thigh | 100.0 | 43.0 | 61.5 | 0.00 | 0.194 | **51.125** |
| Knees | 0.00 | 12.7 | 10.3 | 0.00 | 0.987 | **5.75** |
| Ankle/feet | 50.0 | 64.6 | 48.7 | 100.0 | 0.324 | **65.825** |

**Experience of MSD discomfort based on section of car repair**

| Part of the body | Mechanical % (n =30) | Electrical % (n = 34) | Panel beater % (n =32) | Painter % (n =25) | P value | Prevalence |
|---|---|---|---|---|---|---|
| Neck | 90.0 | 94.1 | 93.8 | 100.0 | 0.587 | **94.475** |
| Shoulder | 93.3 | 94.1 | 96.9 | 100.0 | 0.727 | **96.075** |
| Elbow | 56.7 | 55.9 | 71.9 | 68.0 | 0.490 | **63.125** |
| Wrist/hand | 90.0 | 94.1 | 93.8 | 92.0 | 0.939 | **92.475** |
| Upper back | 83.3 | 91.2 | 96.9 | 100.0 | 0.431 | **92.85** |
| Lower back | 93.3 | 91.2 | 96.9 | 100.0 | 0.495 | **95.35** |
| Hips/thigh | 43.3 | 26.5 | 26.5 | 65.6 | 0.017 | **40.475** |
| Knees | 10.0 | 8.8 | 18.6 | 8.0 | 0.462 | **11.35** |
| Ankle/feet | 60.0 | 55.9 | 68.8 | 52.0 | 0.592 | **59.175** |

| Nature of job | Mechanical % (n =30) | Nature of job and section of car repair Electrical (rewire) % (n = 34) | Panel beater % (n = 32) | Painter % (n = 25) | P value |
|---|---|---|---|---|---|
| Force exertion | 46.7 | 0.0 | 3.1 | 4.0 | |
| Lifting | 3.3 | 0.0 | 9.4 | 80.0 | 0.000 |
| Repetitive movement | 10.0 | 47.1 | 0.0 | 0.0 | |
| Awkward posture | 40.0 | 52.9 | 6.3 | 16.0 | |
| Vibration | 0.0 | 0.0 | 81.3 | 0.0 | |

Table 3 displays the prevalence rate of MSD in relation to the number of years at the current work. It can be seen from the table, MSD in the upper extremities is quite high, particularly in workers with 11 to 15 years of experience, but few cases of MSD in the hips, thighs, and knees when compared to other body parts. The table also reveals that both the upper and lower extremities of the body have high prevalence in adults between the ages of 46 and 60. Abaraogu *et al.* (2016) found that adults between the ages of 40 and 59 had a significant risk of MSD in upper and lower back discomfort. Palmer and Goodson (2015) assert that MSDs are widespread among older workers and have a major impact on their capacity for work. Similarly, entry-level mechanics, or those with 0 to 5 years of work experience, have the highest rate of MSD discomfort throughout the anatomical body region. The most plausible answer is that they spend much of their time moving around, trying things out for themselves, and learning from watching their superiors at work.

The results of relationship between age of respondents, years spent as a mechanic and prevalence of the musculoskeletal disorders showed no significant relationship because it did not attain statistical significance of $P<0.05$ except for lower


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back, upper back and Neck which has a ($P < 0.05$). Though there was no statistically significant relationship between age of respondents, years spent as a mechanic and MSD, the prevalence of MSD across various body parts was very high.

Table 3: Years spent as an automobile repairer and distribution of MSD discomfort

**Relationship between years spent as an automobile repairer and distribution of MSD discomfort**

| **Part of the body** | **0 - 5y % (n =5)** | **6-10y % (n = 30)** | **11-15 y % (n=39)** | **16-20 y % (n = 33)** | **21 > years % (n =14)** | **P value** |
|---|---|---|---|---|---|---|
| Neck | 100.0 | 80.0 | 94.9 | 90.9 | 100.0 | 0.011 |
| Shoulder | 80.0 | 93.3 | 97.4 | 90.9 | 100.0 | 0.265 |
| Elbow | 40.0.0 | 60.0 | 69.2 | 60.6 | 57.1 | 0.743 |
| Wrist/hand | 100.0 | 76.7 | 89.7 | 96.7 | 100.0 | 0.160 |
| Upper back | 100.0 | 63.3 | 94.9 | 90.9 | 92.9 | 0.003 |
| Lower back | 100.0 | 73.3 | 92.3 | 90.9 | 92.9 | 0.012 |
| Hips/thigh | 40.0 | 30.0 | 61.5 | 45.5 | 57.1 | 0.182 |
| Knees | 0.00 | 13.3 | 12.8 | 9.10 | 7.10 | 0.820 |
| Ankle/feet | 40.0 | 53.3 | 64.1 | 63.6 | 57.1 | 0.759 |
| **Cross tabulation between ages of respondent with body region** | | | | | | |
| **Part of the body** | **16-25y** % (n =17) | **26-35y** % (n = 23) | **36-45y** % (n = 34) | **46-60y** % (n = 34) | **60 > years** % (n= 13) | **P value** |
| Neck | 94.1 | 95.7 | 85.3 | 100.0 | 100.0 | 0.181 |
| Shoulder | 94.1 | 91.3 | 94.1 | 100.0 | 100.0 | 0.437 |
| Elbow | 52.9 | 65.2 | 73.5 | 58.8 | 53.8 | 0.716 |
| Wrist/hand | 88.2 | 87.0 | 88.2 | 100.0 | 100.0 | 0.320 |
| Upper back | 82.4 | 82.6 | 91.2 | 100.0 | 100.0 | 0.220 |
| Lower back | 94.1 | 91.3 | 91.2 | 100.0 | 100.0 | 0.506 |
| Hips/thigh | 41.2 | 43.5 | 53.0 | 53.0 | 38.5 | 0.417 |
| Knees | 5.90 | 8.70 | 17.6 | 5.90 | 15.4 | 0.638 |
| Ankle/feet | 64.7 | 69.6 | 38.2 | 64.7 | 76.9 | 0.049 |

According to Table 4, most respondents who reported working between 11 and 20 hours per week have higher rates of MSD over the past month. Over the past month, the neck, upper, and lower back have also experienced high prevalence rates. The body part with the lowest prevalence is the elbow.

**Prevalence of MSD in the upper extremities (Neck, shoulder and elbow)**

With respect to the prevalence of MSD over the last one month and one year in relation to working hours, over 90% of the mechanics who work for more than 11 hours' experience neck pain in the past one month. it is higher with apprentice who work for 5 hours or less. this could be attributed to the fact that they are mostly very young and have spent time in school before coming to the garage. Over the last month, the results indicate that the mechanics who worked between 11 and 15 hours experience the highest prevalence (92.3%) of shoulder pains. This study's high prevalence rate of shoulder soreness is consistent with Baqar et al., (2015) 46% prevalence finding. There is less prevalence of elbow pain in the sample population in Panteka over the past one month and one year based on working hours in general. However, those who work for more than 11 hours.

**MSD prevalence in lower and upper back**

According to the study, the prevalence rates for the upper and lower backs were both over 70% for mechanics who work for 11 – 15 hours in the last one month. similarly, a higher prevalence rate was noticed with apprentice who work for 5 hours or less. The most likely cause of the high rate of MSD discomfort in the upper and lower back is the nature of work.

**Prevalence of musculoskeletal disorder in the Knee and hip/thigh**

Only a small percentage of respondents reported incidents of pains in the hips/thighs and knees over the past one month when compared to the other regions of the body. Similarly, the higher rate was experienced by people who work for between 11 and 15 hours (56.4%). Baqar et al., (2015) found a similar finding, with an overall prevalence rate of 26% and 24% for knees and hips/thighs, respectively. Ahmed et. al., (2014) found the opposite finding, citing a prevalence rate of 62% for knee pain. This mismatch might be brought on by the mechanics' usage of different tools from those in the Panteka mechanic village.

The study findings showed there was a significant relationship between upper back, lower back, shoulder pains and hours of work over the past one month with a ($P < 0.05$). However, the results of this study showed no significant relationship between elbow, wrist/hand, knees, hip/thighs and hours of work over the past one month because it's not statistically significant.


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Table 4: Distribution of MSD on different body region based on frequency of occurrence

| Parts of the body | Never | Last month | Last year | Never | Last month | Last year | Never | Last month | Last year | Never | Last month | Last year | Never | Last month | Last year | P Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 – 5 hr (N=5) % | | | 6 – 10 hr (N=30)% | | | 11 – 15 hr (N=39)% | | | 16 – 20 hr(N=33)% | | | 21-Above(N=14)% | | |
| **Neck** | 0 | 100 | 0 | 13.3 | 73.4 | 3.3 | 2.6 | 89.7 | 7.7 | 0 | 90.9 | 9.1 | 0 | 85.7 | 14.3 | 0.401 |
| **Shoulder** | 20 | 80 | 0 | 13.3 | 86.7 | 0 | 0 | 92.3 | 7.7 | 0 | 88 | 12 | 0 | 78.6 | 21.4 | 0.043 |
| **Elbow** | 80 | 20 | 0 | 36.7 | 56.7 | 0 | 20.5 | 76.9 | 2.6 | 27.3 | 69.7 | 3.0 | 28.6 | 64.3 | 7.1 | 0.322 |
| **Wrist/hand** | 0 | 100 | 0 | 10 | 80 | 10 | 5.1 | 71.8 | 23.1 | 0 | 84.8 | 15.2 | 0 | 85.7 | 14.3 | 0.596 |
| **Upper back** | 0 | 100 | 0 | 23.3 | 56.7 | 20 | 2.6 | 71.8 | 25.6 | 0 | 75.8 | 24.2 | 0 | 78.5 | 21.4 | 0.004 |
| **Lower back** | 0 | 100 | 0 | 16.7 | 56.7 | 26.7 | 0 | 74.3 | 25.6 | 0 | 75.8 | 24.2 | 0 | 85.7 | 14.3 | 0.007 |
| **Hips/thigh** | 60 | 40 | 0 | 60 | 30 | 10 | 33.3 | 56.4 | 10.3 | 57.6 | 30.3 | 12.1 | 42.9 | 50 | 7.1 | 0.822 |
| **Knees** | 100 | 0 | 0 | 83.4 | 10 | 6.6 | 79.5 | 15.4 | 5.1 | 81.8 | 18.2 | 0 | 78.6 | 21.4 | 0 | 0.786 |

## CONCLUSION

This study used the online version of the Standard Nordic questionnaire to investigate the frequency and pattern of MSD among mechanics in Panteka village. The findings indicate that there is a high prevalence of neck, shoulder, wrist/hand, upper and lower back musculoskeletal discomfort among mechanics at the mechanic village. This is primarily due to their workshop's poor ergonomics and short recovery periods. A significant prevalence rate of musculoskeletal disorders was also found among mechanics with 0–5 years of experience. The results of this study indicate that there is little to no automation in the Panteka Mechanic village, where the majority of the work is done manually. Therefore, the mechanic committee must come to an agreement on measures to enhance working conditions, such as adding mechanical lifting help to Panteka mechanic village. Additionally, mechanics must be educated about the risks associated with MSD.

## LIMITATIONS AND IMPLICATIONS

This study had some limitations. First of all, because the sample was drawn exclusively from one mechanic village, the results of this study cannot be generalized. The second was recollection bias since participants had to think back on events from the previous month and year. The Ministry of Employment and Labour Relations, the Nigeria Labour Congress, and the management of the Nigerian Automobile Mechanics Association should work together to assess the risk posed to the mechanics in this region of the nation in order to implement preventive measures and ensure that workers adhere to safety regulations. This will help to ensure the health and safety of the workers.

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