British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-190, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Opto-Electronic Devices Induced Musculoskeletal Disorder Among Students of Abia State University Uturu

Cissan Adanma Sylvanus
Physics Department, Abia State University, Nigeria
cissan.sylva@gmail.com

Sylvanus Onyenkachi Isaac
Mechanical Engineering Department, Abia State University, Nigeria

Armstrong Udochukwu Ananoba
Physics DepartmentAbia State University, Nigeria

DOI: https://doi.org/10.37745/bjmas.2022.0075 Published: 27th December, 2022

Sylvanus C.A., Isaac S.O., Ananoba A.U. (2022) Opto-Electronic Devices Induced Musculoskeletal Disorder Among Students of Abia State University Uturu, *British Journal of Multidisciplinary and Advanced Studies*: Engineering and Technology, 3(2),153-190

ABSTRACT: *Musculoskeletal pain comprises of over 200 disorders affecting muscles, joints, bones, and soft tissues which is prevalent among laptop users including students. The regular interaction of students with laptop computer interface is associated to the complex complaints relating to hand, shoulder, joints and bones. The Nigerian population aged over 50 is projected to rise by 32% between 2009 and 2030; this implies an increase in musculoskeletal disorder trend. This dissertation seeks to investigate the presence of musculoskeletal pain among the undergraduate and postgraduate laptop users of university of Abia State University, evaluate the intensity of the pain, and examine its effect on the students. The research design is a descriptive cross-sectional study conducted among 100 undergraduates from three different academic majors and 100 postgraduate students with age groups 17-40years. The data regarding details, impact, socio-demographic features, visual symptoms and sleep disorders of musculoskeletal disorders, body region of pain, and intensity of pain and laptop posture of participants were collected and analyzed using SPSS software. 193 out of 200 administered questionnaires were amenable to data analysis representing a response rate of 96.5%. The prevalence rate of MSD is 29.53% with neck pain (20.7%) as the most reported MSD complaints. The least reported body region of pain was the elbow (1.6%). The prevalence of MSD is slightly higher among the postgraduate students (15.54%) and highest among the male students aged between 26- 30 (21.54%). The intensity of the pain is high among the males than the females especially among postgraduate students; the major effect of MSD on the students as reported was absenteeism. These results indicate a low prevalence of musculoskeletal pain among students of Abia State University when compared with prevalence rates in the reviewed literature.*

KEYWORDS: Opto-eletronic device, musculoskeletal complaint, musculoskeletal pain, undergraduates, postgraduates, laptop users, desktop users, neck pain, shoulder pain, upper back

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

INTRODUCTION

Different people experience different pain at one time or the other in their lives which when not properly treated or diagnosed can persist thereby resulting to musculoskeletal disorder or its associated diseases. Internationally, musculoskeletal disorder has been identified to be the most common cause of pain in the human body (Darwish and Alzuhair 2013; European and joint health strategies Project 2000). Musculoskeletal pain or disorder is a health disorder that affects both muscles and the skeleton; it is an acute chronic health conditions that affects the nerves, tendons, and skeletal structure of the body thereby compromising their functions (Arthritis research 2014, 2017, 2018; Korhan and Onsorodi 2011; Adisesh, 2001). According to Regge et al., (2012), Sirajudeen et al., (2018), Parsons et al., (2011), Vaghela & Parekh (2018), musculoskeletal pain deals with health issues affecting the musculoskeletal system such as the tendons, muscles, joints, peripheral nerves, ligaments and supporting blood vessels. Another researcher referred to musculoskeletal pain as the disorders of the musculoskeletal system due to its exposure to different risk factors in the work place (Obembe et al., 2013). Work related musculoskeletal disorder develops over time and can be episodic or chronic in duration sometimes caused by injury sustained in a work related accident. Musculoskeletal disorder can progress from mild to severe disorder which are seldom life threatening but reduces the quality of life of a large properties of the adults (Brewer et al., 2006).

In Nigeria, there is an increase in usage of laptop computers due to its portability and affordability. The potential risk factors for the increase in incidence of musculoskeletal complaints among college students might be increased use of computers.Musculoskeletal disorder can be classified into different types depending on the location of the pain; these include upper limb disorder (disorders of finger region, neck region and shoulder region), lower limb disorder (disorders of hip region to toes). The lower limb disorder seems to be the most common type of musculoskeletal disorder (Darwish and Alzuhair 2013; Mohandoss et al., 2014; Mohanty 2017; HSE 2012).

Over the past century, musculoskeletal pains have become a worldwide concern especially with the forth come of new technologies (Alhari et al., 2016). Recent studies show that an increase in the usage of laptop computers makes upper extremity musculoskeletal disorder to prevail (Sirajudeen et al., 2018; Obembe et al., 2013; Prakash et al., 2014; Sirajudeen et al., 2018; Korhan and Onsorodi 2011; Korhan 2014).

Prakash et al., (2014) reported that 50% of 1544 students of an American university had musculoskeletal disorder relating to computer usage. According to NHS (2018) and Arthritis Research UK (2017 and 2018), musculoskeletal disorder is the most common in United kingdom with millions of people being limited by the fatigue, pains, stiffness, caused by this health conditions. They added that currently, it is the largest cause of disability adjusted life years in Great Britain. Parsons et al., (2011) projected the UK population aged over 50 to rise by 32%

between 2008 and 2030, which implies a continuous trend in musculoskeletal disorder. Their report shows that musculoskeletal conditions accounted for 12.1% of all general practitioner consultants in 2007, in the years 1981 – 1992 general practitioner morbidity surveys around 4-5% of patients were referred to the hospital for a musculoskeletal condition.

As identified by Mohanty et al., (2017), musculoskeletal disorder is a vital public challenge in both the developed and developing countries with huge impact on the quality of life and ample economic burden in costs, productivity and lost wages. They stated that musculoskeletal disorder contributes about 37% of global disease burden leading to substantial disability.

Aim and Objectives of Research

The aim of this study is to investigate the development and effect of musculoskeletal pain among the undergraduate and postgraduate laptop users in Abia State University Uturu.
The objective of this research is to:

- Critically review existing literature to get a theoretical background of the musculoskeletal disorder.
- Investigate the incidence of musculoskeletal pain within the student population.
- Develop a questionnaire that will examine the risk factors associated with musculoskeletal pain.
- Examine the impact of musculoskeletal pain among the student population and possible solutions.

Justification

Musculoskeletal disorders have become a global concern due to its economic burden especially with the emergence of new technologies. In Nigeria, there is an increase in usage of laptop computers due to its portability and affordability. The potential risk factors for the increase in incidence of musculoskeletal complaints among college students might be increased use of computers physical disabilities are due to musculoskeletal conditions, 50% of the population report musculoskeletal pain for at least 1 week in the last months, and Musculoskeletal conditions are the 8th leading cause of disease burden across Europe (Obembe et al., 2013). It's been the subject of many studies that the use of portable computers (laptop) as the main work tool has drastically increased due to its portability, light weight and convenience, thereby leading to an increase in the frequent complaint of musculoskeletal disorder among the users of laptop (Malisnka and Bugajska, 2010). Hence, the need for the investigation into the status of musculoskeletal pain among the students that use laptops in Abia State University Uturu and the ergonomic risk factors responsible for this global health challenge which has greatly affected academic performance.

Ethical Issues and Risk Assessment

The required risk assessment and ethics approval clearance forms have been duly completed. Senior colleagues reviewed them before the collection of primary data. This was done to ensure strict adherence to research ethics, assess all the risk that may be associated with this study and

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

also identify important mitigation measures in place. In this research, physical risk hazard was assessed since the research survey involves human beings. To reduce this risk, orderliness in student's clusters was ensured, brief explanation of the research and its importance were made, informed consent of the students were sought, the students were assured of strict confidentiality of their responses, Inclusion and exclusion criteria were made known to the students.

LITERATURE REVIEW

Musculoskeletal Pain Among Computer Users

In recent times, computer has become a very important tool in every works of life. Without some aid of computers, life is almost unimaginable for most people. Virtually most workers, students and artisans depend on one form of computer or the other which provides a convenient and compact way to telecommute and work from their comfort zones (Prakash et al., 2014). However, the design of laptop has compromised posture for portability; users of laptop may experience difficulties in keeping to a healthy posture during its usage and may experience musculoskeletal discomforts or other health issues after prolong use. The vital characteristics which make laptops to be dominantly used are its portability, relatively light in weight and compact input devices (Blehm et al., 2005). These features have created popularities of laptop and led to overwhelming concerns among the laptop users. According to NHS (2018), musculoskeletal disorder is a huge concern not only to individuals, their families, friends and caregivers but also to the society at large. Several studies on musculoskeletal disorder indifferent perspectives have been made but this section of research will focus on studies of musculoskeletal conditions among computer users.

The prevalence of specific MSP in Nigeria has been documented. The 12-month prevalence of low back pain among staff in a rural hospital and office workers in an urban centre in Nigeria was reported to be 46% (8) and 38% respectively. Gureje et al., 2007 reported the prevalence of spinal pain to be 16.4% (95% confidence interval, 14.5%-18-5%) in a probability sample of 2143 from 21 states of Nigeria. Community-based studies on the prevalence and pattern of MSP in Nigeria are few.

Computer-related musculoskeletal disorders among users of computer from various sectors of the economy have been investigated and reported across the globe. These include computer users in commerce and industry, government or public sectors, education, agriculture, oil and gas, health sectors etc (Moom et al., 2015; Darvish and Alzuhair 2013; Mohanty et al., 2017; Vanerd et al., 2006; Obembe et al., 2013; Andrew et al., 2012; Malinska and Bugaska 2010; Chavda et. al., 2013, Sirajudeen et al., 2018; Reggie et.al., 2012; Charavarthy et al., 2012; Korhan and Onsorodi 2011; Ayanniyi et al., 2016). The world wide prevalence rate of work related musculoskeletal disorder is within the range of 15-25% of all computer users (Mohanty et al., 2017). Studies of MSD done in Saudi Arabia and Western countries show that a high prevalence of musculoskeletal disorder occurs among computer users and professionals. A prevalence rate of 57%- 70% has been reported in Nigeria, 50%-76% has been reported in India while in Saudi Arabia; about 52.7% of computer

users were reported to have been affected by this disorder (Obambe et al., 2013; Sirajudeen et al., 2018; Prakash et al., 2014; Mohanty et al, 2017).

Risk factors associated with musculoskeletal disorder include Work related or ergonomics risk factors and individual risk factors. So this section is reviewed in terms of the different risk factors such as:

- Work load and poor working condition: The indoor usage of laptop has over the years resulted to musculoskeletal pain and eye strains (Blehm et al., 2005). A study among university students who are laptop users indicates that neck complaints was the most common work related disorder with prevalence rate of about 53.5%; this was linked to the long duration of keyboard use (Sirajudeen et al., 2018). The regular interaction of students with computer interface is associated with the complex complaints relating to hand, shoulder, joints etc (Obembe et al., 2013). Similar findings have been reported (Mohandoss et al., 2014; Occupational Safety and Health 2009; Moom et al., 2015; Mohanty et al., 2017).
- Rest Breaks: The pain experienced by computer users around the hip region was majorly observed among those who use portable computers (laptops). Insufficient breaks while using the laptop was said to be the cause of this pain (Sirajudeen et al., 2018, Brewers et al., 2006; Mohanty et al., 2017). The importance of frequent and short breaks while using the laptop cannot be overemphasized; as this will help to restore the ability to continue works and relieve the laptop users of issues caused by continuous usage such as blurred vision, fatique, poor blood circulation and inflammation of musculoskeletal structures (Ayanniyi et al., 2016, Sirajudeen et al., 2018, Brewer et al., 2006). However, other reports by Hemalatha et al., 2017; Korhan and Onsorodi 2011; Mohamad and Gheena 2016, indicated that the incidence of musculoskeletal pain in the body regions such as elbow, hip, ankles, and feet were the least commonly affected.
- Gender: according to reports from different researchers, women are more prone to have musculoskeletal disorder than men and this was attributed to the physiological differences between them; since naturally, men have stronger muscles than women. In women, the part of the body that has been found to be mostly affected by musculoskeletal pain is the hand, other than physiological differences the reason for this was assumed to be their more engagement in household activities such as washing, carrying babies, sweeping, cooking, carrying of bags whenever they go to the market, cleaning etc (Mohanty et al.,2017; Onsorodi 2011; Saureessig et al., 2015; Ayanniyi et al., 2016; Hemalatha et al., 2017; Malinska and Bugajska 2010; Occupational safety and health 2009; Parsons et al., 2011; Prakash et al., 2011; Woolf and Pfleger 2003).
- Work load: Sauressig et al., 2015 identified the fact that work load and duration of computer use can contribute to the development of musculoskeletal pain. Prevalence of musculoskeletal was more among workers who worked longer hours (say 8hours and above per day than those who worked lesser hours (Van erd et al., 2006; Onsorodi 2011; Mohandoss et al., 2014; Malinska and Bugajska 2010; Evanoff et al., 2014; Ayanniyi et al., 2016).
- Posture and work station: most workers assume a particular posture while working due to the nature of their jobs. In a study of musculoskeletal pain among hospital workers, it was observed that the most commonly adopted posture was standing-this is peculiar to the nurses as against those

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

in the administration unit of the hospital. It was reported that the lower back was the anatomical region of the body mostly affected by musculoskeletal disorder followed by the neck, shoulder, upper back, hips and hand (Ayanniyi et al., 2016). Similar patterns of Musculoskeletal disorder report indicating high prevalence of low back pain and low rates of elbow and knee disorders among computer users have been identified by other researchers (Benard et al., 1997; Hemalatha et al., 2017; Daneshmandi et al., 2017).

The administrative officers were mostly affected by neck pain, and this can be linked t the fact that their most commonly adopted posture is sitting since they are always working with the computer (Malinska and Bugajska 2010, Ayanniyi et al., 2016; Onsorodi 2011; Woolf and Pfleger 2003; Hemalatha et al., 2017; Saurresig et al., 2015).

According to Ayanniyi et al., 2016, 'No respondents used a docking station and 77% did not have an additional keyboard, over 27% f respondents did not have chairs equipped with five wheels'. That is to say that most people who use laptop as their primary work tool placed their portable laptops on a normal desk or even a small table without any equipment that might improve their working conditions.

- Weight and height: Darwish and Zuhair (2013) observed a significant correlation between musculoskeletal disorders and increasing weight of teachers. Obese teachers were found to have a higher prevalence of musculoskeletal disorder. This has been supported by findings from a number of studies where musculoskeletal disorder has been positively associated with weight. (Erick and Smith 2013; Mohanty et al., 2017; Arthritis Research Uk 2018; Sirajudeen et al., 2018).
- Age: generally, different studies have shown higher prevalence of musculoskeletal disorder for older workers than younger workers and higher values for people who stopped work due to musculoskeletal disease compared to those who continue in work till normal retirement (Zhaltoukhova et al., 2012; Okunribido and Tony 2010; Parsons et al., 2011; Gillespie et al., 2002). Specifically, age contributes majorly to the increased pain intensity in different parts of the body such as lower back, wais, shoulder, neck and hand (Malinska and Bugajska 2010).

METHODOLOGY

Design of Study

The research survey involves three methods of data collection; a questionnaire study, observational study and an interview. Considering the aim of this research and the number of contacts within the study population, a cross sectional descriptive design which is simple, easy to analyze and gives the overall picture of the research problem is adopted. This is characterized by random selection of undergraduate and postgraduate students in the study area and conducted over a three months' time frame from January to march 2019. The vital objective of the selected sample design is to reduce the gap between the values obtained and those prevalent in the study population. This design provides a genuinely reflection of the sample population or sample size with a sufficiently high degree of probability (Cottrell, 2014).

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Study Area

The research survey was conducted in the Abia State University Uturu; a state owned public higher Institution of learning established in 1981 in Eastern Nigeria. The University is located in Uturu at Longitude 5º42'N and Latitude 6º48'E on an average elevation of 450m. It is accessible to three International airports: The Port Harcourt International Airport with a driving time of about two and half hours, Akanu Ibiam International Airport, Enugu with about two hours driving time, and Dr. Sam Mbakwe International Airport, Owerri with about two hours driving time. 1mile. The University is organized into ten faculties with **population** range of 10,000-49,999 inhabitants In addition to Postgraduate school, three different faculties were surveyed-the Humanities, Health Sciences, Engineering and postgraduate.

.

RESULTS FROM UNDERGRADUATE QUESTIONNAIRE SURVEY

Table 4.1 Demographic features of the undergraduate survey.

School	Gender n = 100 (%) Male	female	Age	Weight	Level of study
Humanities	13	17	17-20years = 15 21-25 years = 5 26-30years = 10	40-50kg = 3 50-60kg = 15 61-100kg=12	100 = 10 200 = 12 300 =8
health science	17	23	17-20years = 24 21-25 years = 13 26-30years = 3	40-50kg = 4 50-60kg = 16 61-100kg=20	100 = 10 200 = 15 300 =15
Engineering	18	12	17-20years = 16 21-25 years = 7 26-30years = 7	40-50kg = 2 50-60kg = 11 61-100kg=17	100 = 10 200 = 12 300 = 8

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

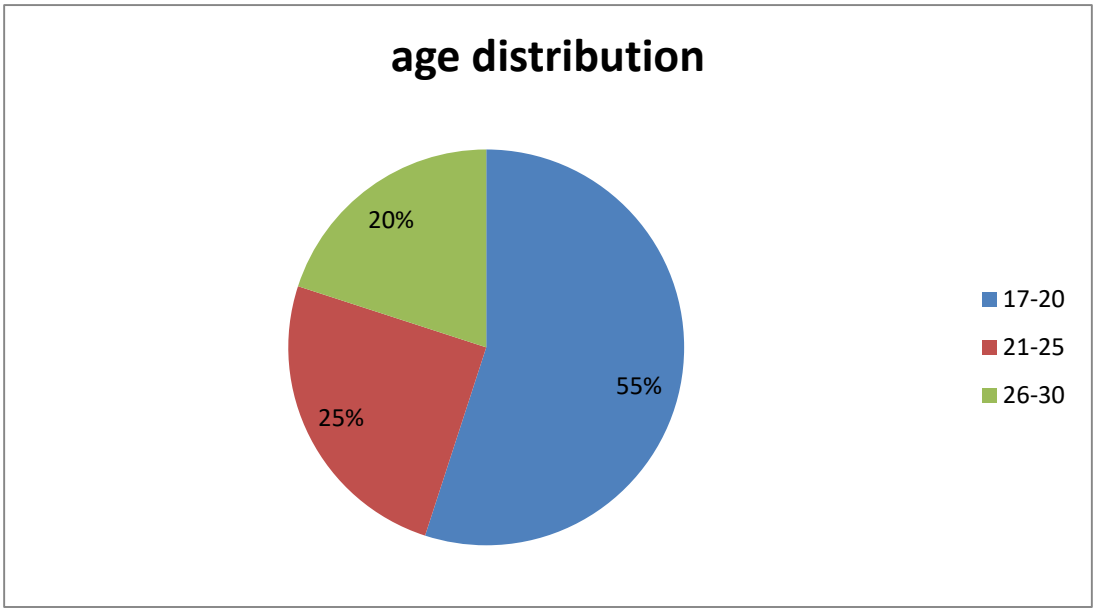


Figure 4.1 Age distribution of undergraduate respondents

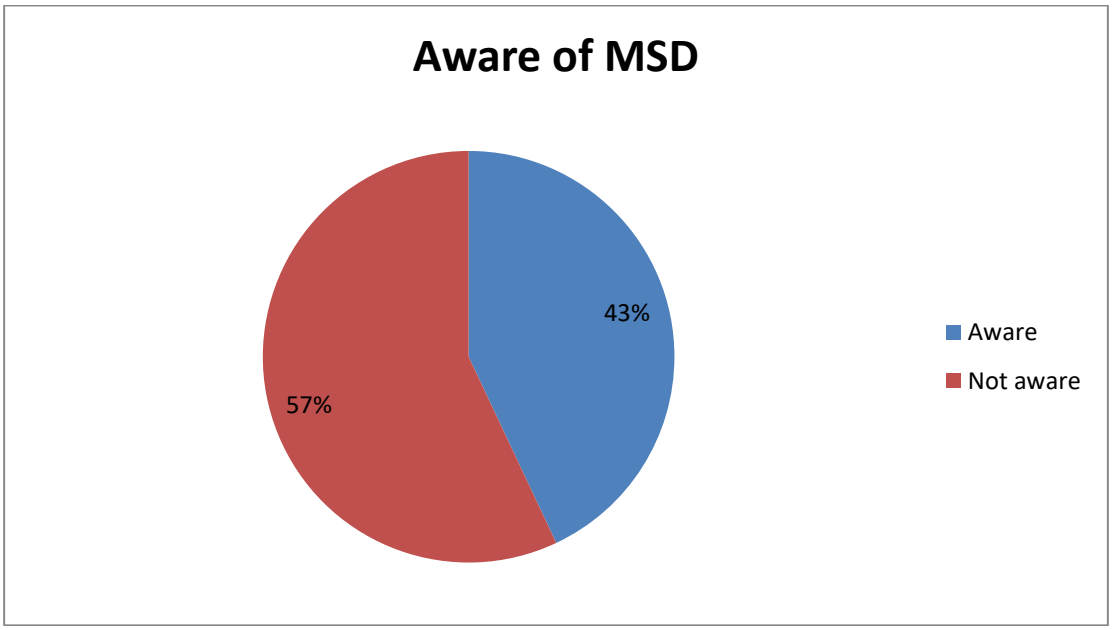


Figure 4.2: Prior knowledge of MSD: 43% of respondents are aware

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Table 4.2 Intensity of Musculoskeletal pain of the undergraduate survey

School	Undergraduate Total = 100	Intensity of pain None	Mild	severe	very severe
Humanities	30	25	2	2	1
Health science	40	33	4	1	2
Engineering	30	27	1	0	2
Total	100	85	7	3	5

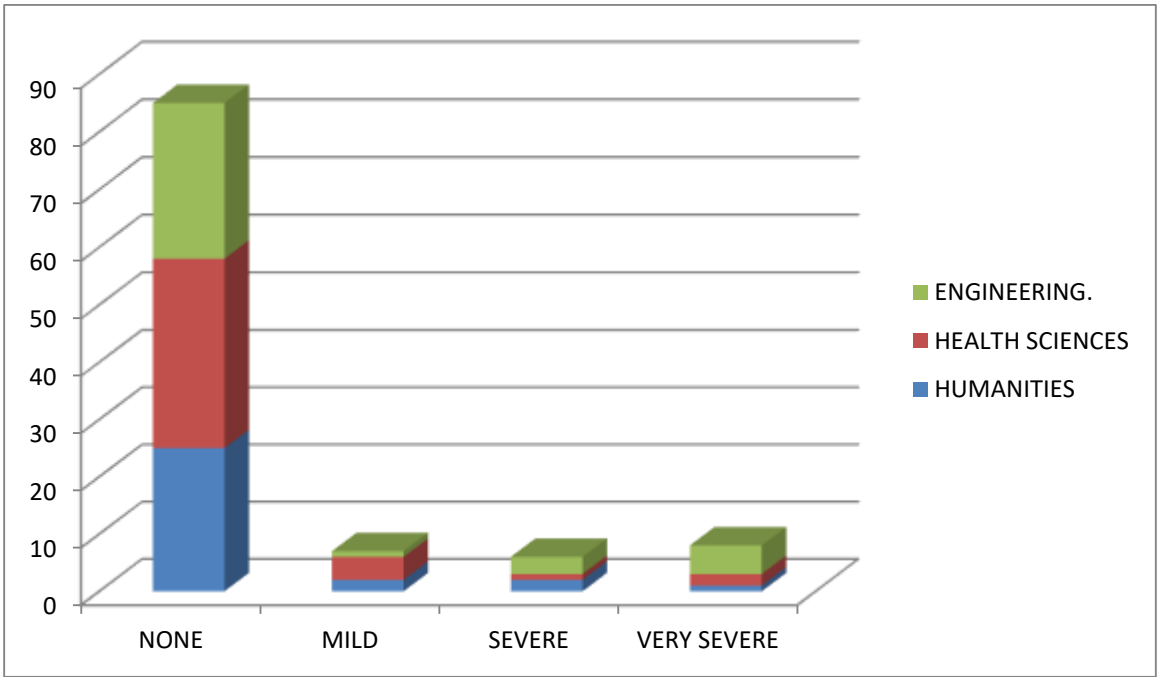


Figure 4.3. Intensity of pain among the undergraduates

The frequency distribution in figure 4,4 shows that the anatomical region mostly affected by MSDs in this undergraduate survey is the neck (26%).

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Table 4.3: Presence, pattern and effect of musculoskeletal pain on the undergraduate

ARIABLE	Total no of Undergraduates (n= 100)	Effect of musculoskeletal pain on the students	TOTAL (n = 100) (%)
Aware of musculoskeletal pain: 1. Yes 2. No	 43(43%) 57 (57%)	Difficult to bend or kneel: 1. Yes 2. No	 2 (2%) 98 (98%)
Presence of musculoskeletal pain: 1Yes 2.No	 27 (27%) 73 (73%)	Affect sleep 1Yes 3. No	 5 (5%) 95 (95%)
Body Region Neck	 26 (26%)	Blurred vision: 1. Yes 2. No	 6 (6%) 94 (945)
Shoulder	7 (7%)	Inability to read especially at night: 1. Yes 2. No	 0 100 (100%)
Upper Back	10 (10%)	Absent from school: 1. Yes 2. No	 11 (11%) 89 (89%)
Lower Back	10 (10%)	Poor academic performance: 1. Yes 2. No	 5 (5%) 95 (95%)
Wrist	2 (2%)	Spent so much money on medication. 1. Yes 2. no	 3 (3%) 97 (97%)
Knee	3 (3%)	Affect social well being 1. yes 2. No	 4 (4%) 96 (96%)
Elbow	1 (1%)		
Waist	3 (3%)	Inability to do exercise and other recreational activities: 1. Yes 2. No	 6 (6%) 94 (94%)
Others	1 (1%)		
Areas of pain: 1. None 2. Single 3. Double 4. Multiple	 73 (73%) 3 (3%) 15(15%) 9(9%)	Inability to stand after sitting for a while 1. Yes 2. No	 0 (0%) 100 (100%)

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

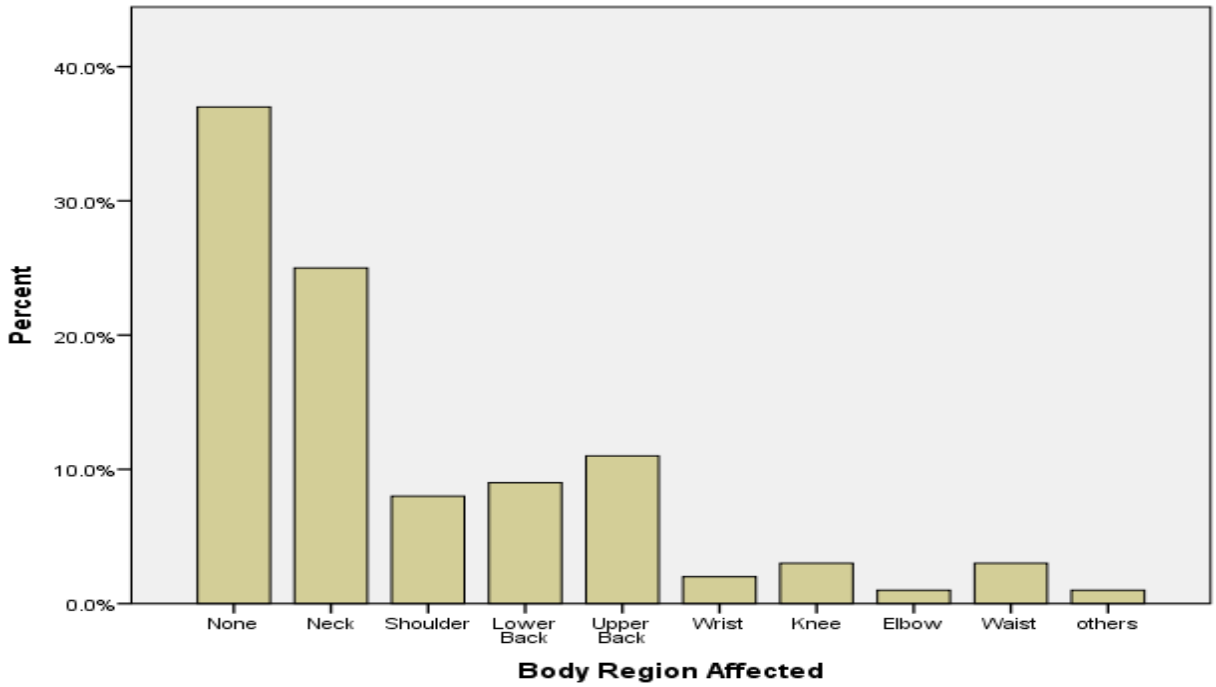


Figure 4.4: Frequency distribution of the affected body region

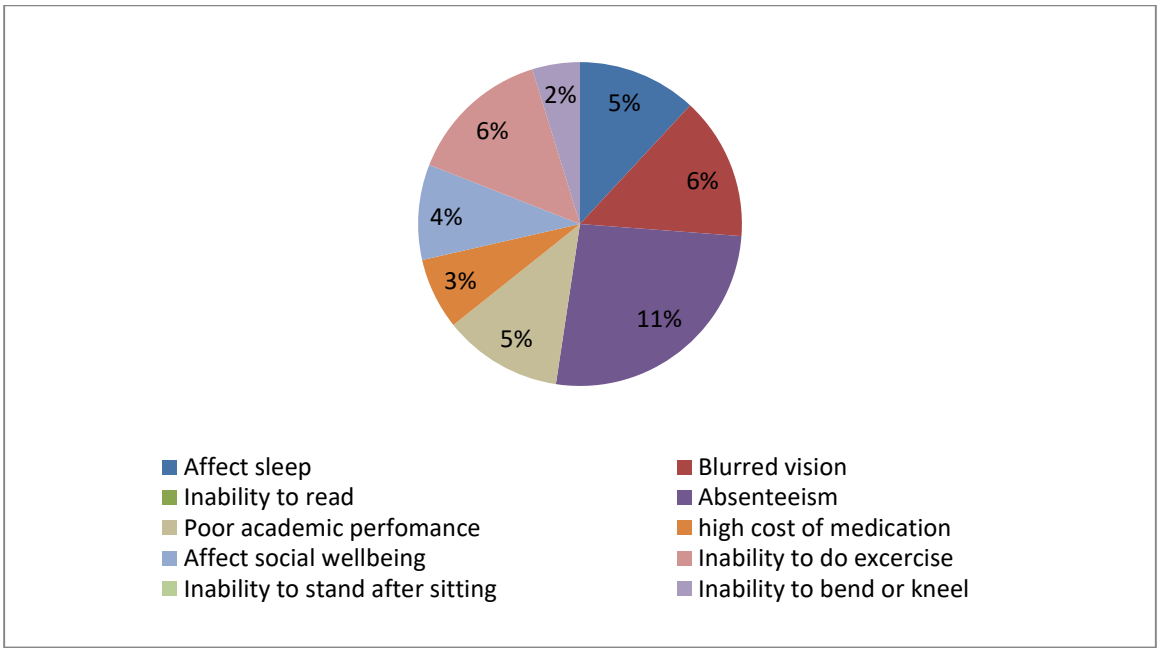


Fig 4.5: Effect of MSD on the respondents

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

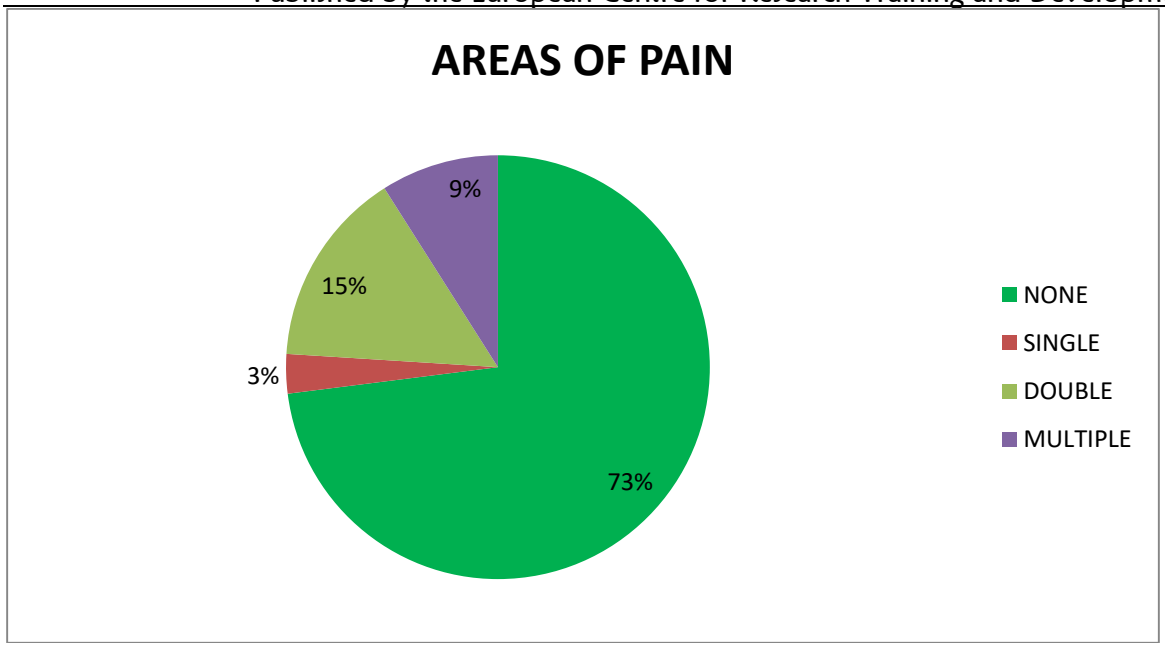


Figure 4.6 Pattern of pain among the respondents

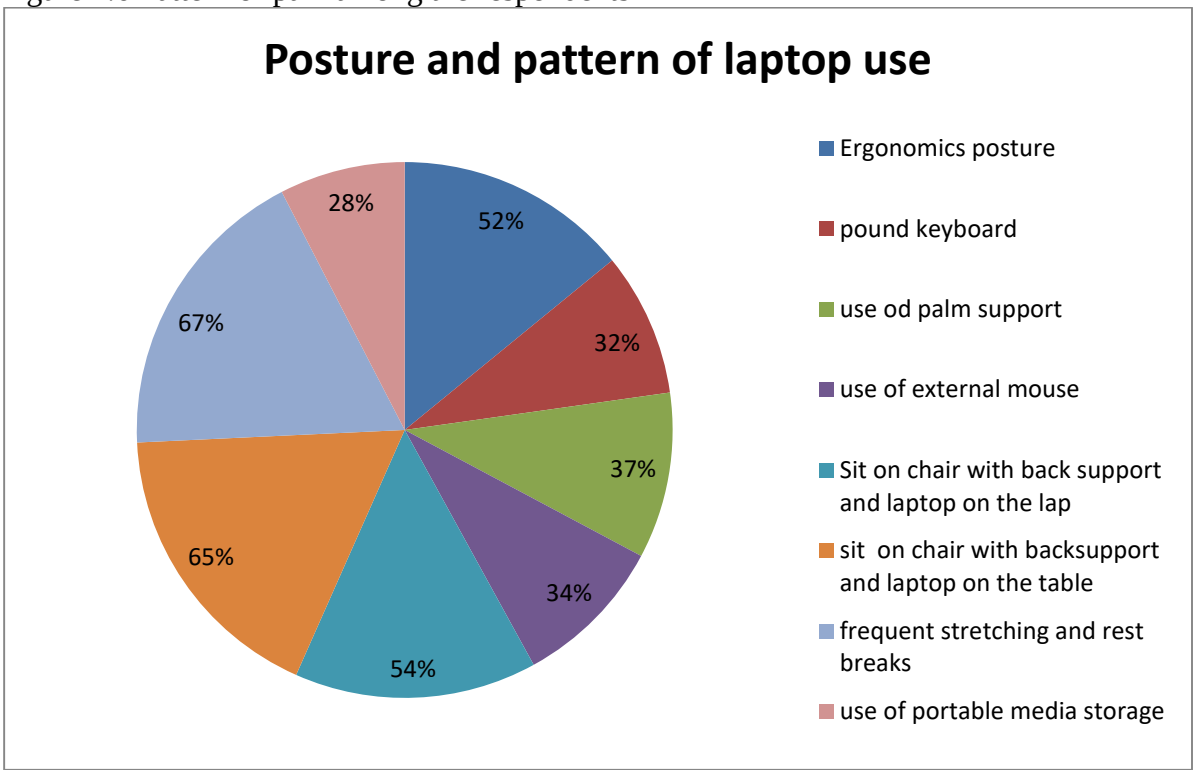


Figure 4.7 Posture and pattern of laptop use

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

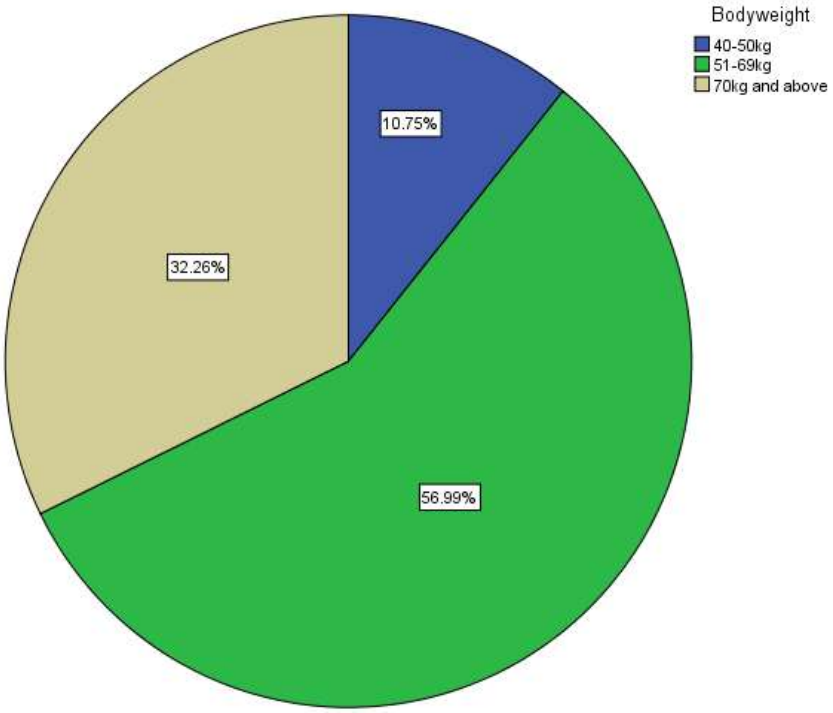


Figure 4.8: Weight distribution of undergraduate respondents

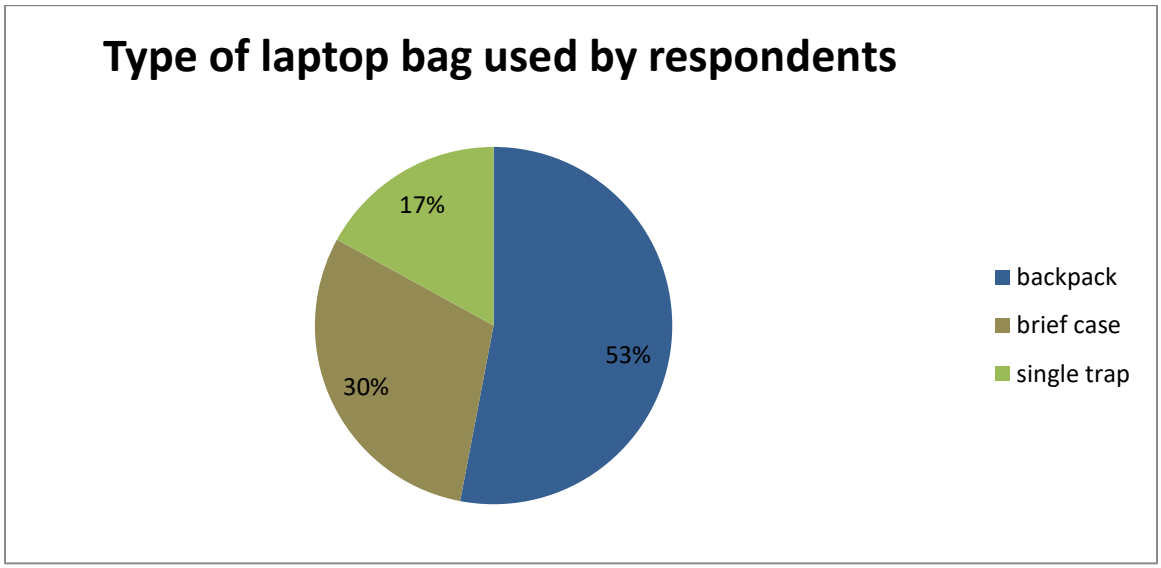


Figure 4.9: Laptop bag used by respondents

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

According to the results of the statistical analysis done using SPSS software as seen in table 4.5-4.12, the Chi-Square test shows there is significant difference between the presence of musculoskeletal pain across the age groups ($p = 0.0035$), presence of pain and vibration experienced by the participants, laptop weight, hours of laptop use per week ($p<0.05$). No significant association between presence of MSDs and weight of the respondents, gender, etc. ($p>0.05$).

Ranks

UNDERGRADUATES	Age of Respondent	N	Mean Rank
	17-20	6	50.91
	21-25	25	38.50
	Less than 30	20	64.38
	Total	100	

Table 4.4. The mean age distribution of the undergraduate students

Correlations

UNDERGRADUATES		Presence of musculoskeletal pain	Weight of Respondent
Presence of musculoskeletal pain	Pearson Correlation	1	.032
	Sig. (2-tailed)		.753
	N	100	100
Weight of Respondent	Pearson Correlation	.032	1
	Sig. (2-tailed)	.753	
	N	100	100

Table 4.5 Chi-square analysis of weight and the presence of musculoskeletal pain

Ranks

UNDERGRADUATES	Days of laptop use	N	Mean Rank
	Every day	45	53.67
	1-3 days	23	38.50
	4-6 days	32	54.67
	Total	100	

Table 4.6: The mean distribution of days of laptop use

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Table 4.7: Chi-square analysis of vibration experienced by respondents and musculoskeletal pain

UNDERGRADUATE			Presence of musculoskeletal pain	Vibration while walking
Spearman's rho	Presence of musculoskeletal pain	Correlation Coefficient	1.000	.534**
		Sig. (2-tailed)	.	.000
		N	100	100
	Vibration while walking	Correlation Coefficient	.534**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

Table 4.8: Correlation between days of laptop use and presence of musculoskeletal pain

Correlations

UNDERGRADUATES		Presence of musculoskeletal pain	Days of laptop use
Presence of musculoskeletal pain	Pearson Correlation	1	.133
	Sig. (2-tailed)		.188
	N	100	100
Days of laptop use	Pearson Correlation	.133	1
	Sig. (2-tailed)	.188	
	N	100	100

Table 4.9.The mean distribution of gender of the respondents

Ranks

	Gender of respondent	N	Mean Rank
Presence of musculoskeletal pain	Male	48	52.72
	Female	52	48.45
	Total	100	

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Table 4.10 The mean distribution of laptop weight of the respondents

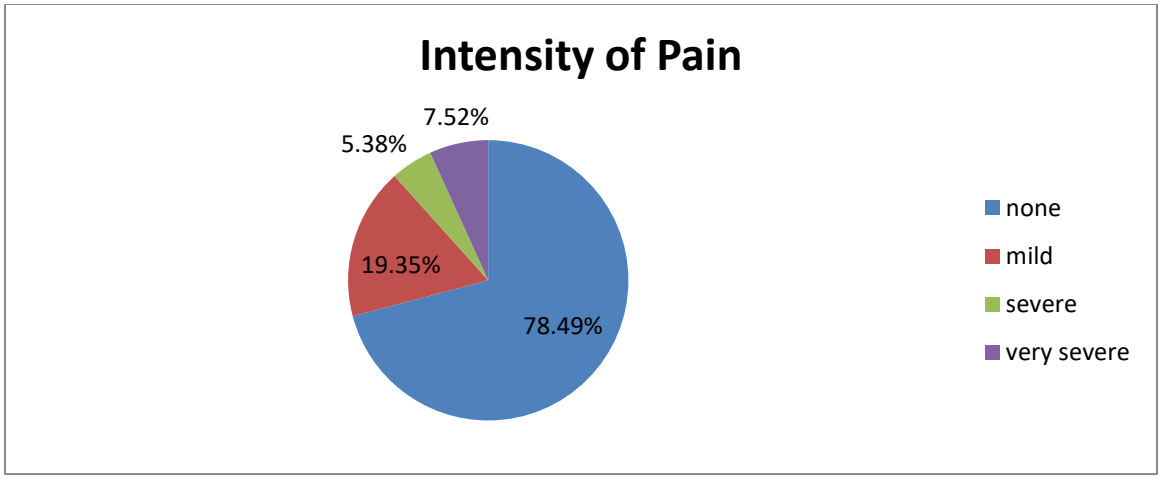
Ranks

	Laptop weight	N	Mean Rank
Presence of musculoskeletal pain	Light	55	50.91
	Moderate	35	38.50
	Heavy	10	90.25
	Total	100	

Table 4.11 Chi-square analysis of hours of use and presence of musculoskeletal pain

UNDERGRADUATES		Presence of musculoskeletal pain	HOURS OF USE PER WEEK
Presence of musculoskeletal pain	Pearson Correlation	1	.202*
	Sig. (2-tailed)		.044
	N	100	100
HOURS OF USE PER WEEK	Pearson Correlation	.202*	1
	Sig. (2-tailed)	.044	
	N	100	100

RESULTS FROM POSTGRADUATE QUESTIONAIRE SURVEY



7Figure 4.10 Intensity of pain (Postgraduate resp ondents)

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

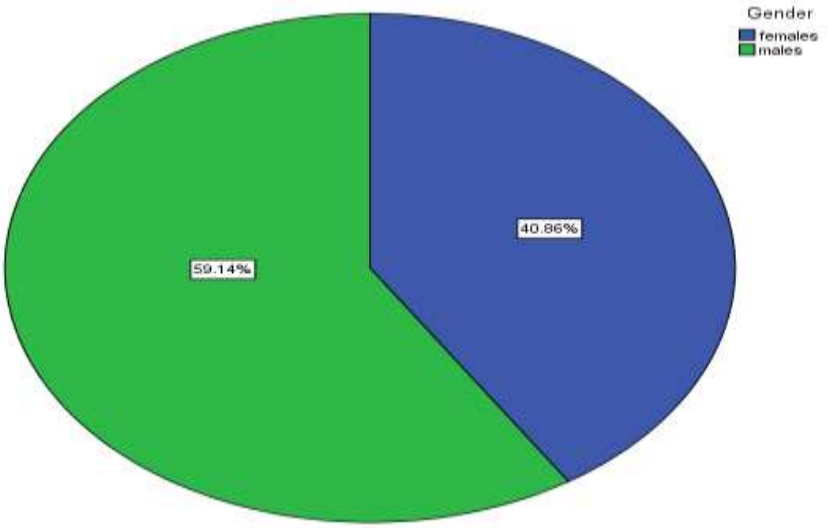


Figure 4.11: Gender distribution of Postgraduate respondents

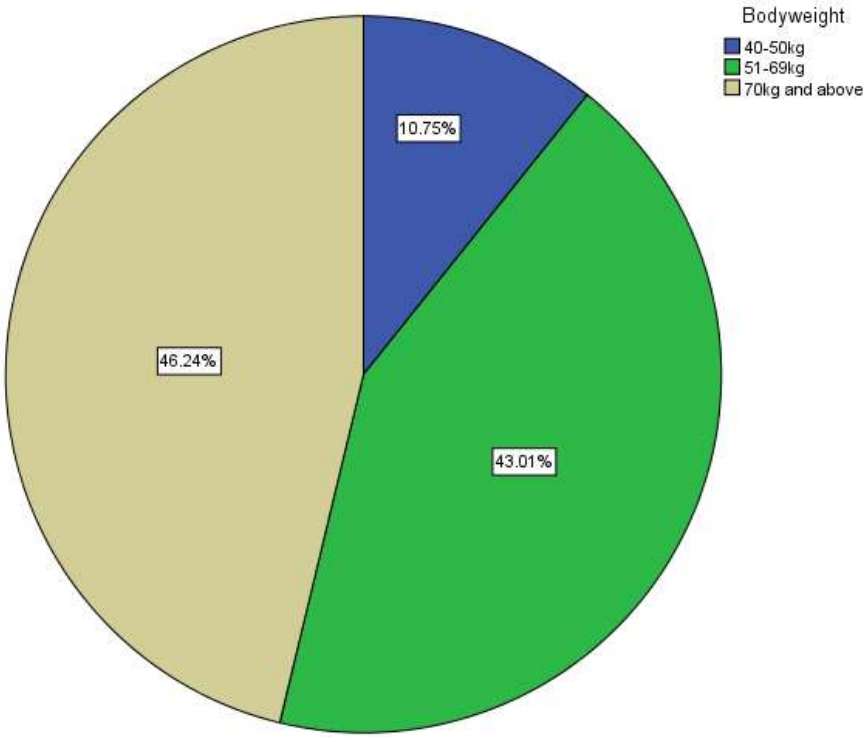


Figure 4.12: Weight distribution of Postgraduate respondents

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

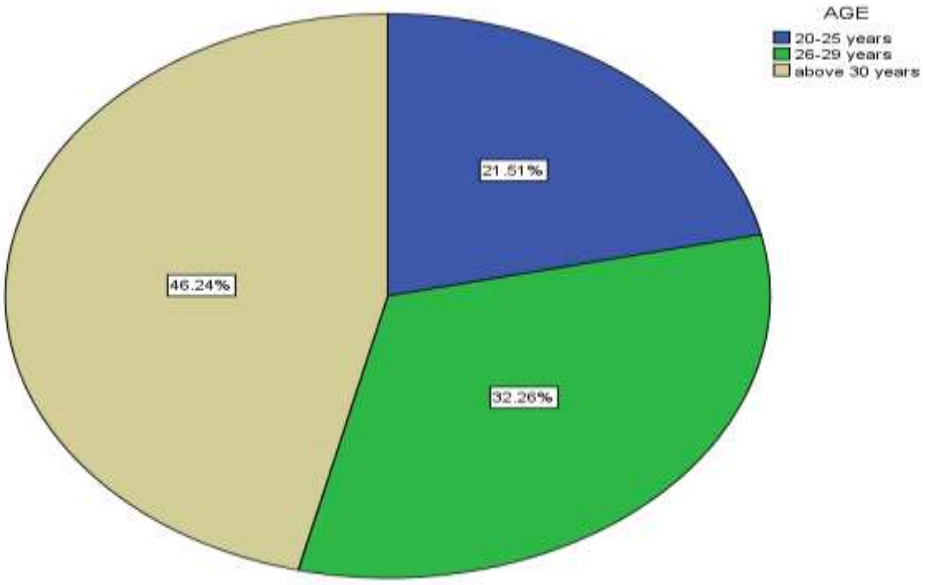


Figure 4.13: Age distribution of Postgraduate respondents

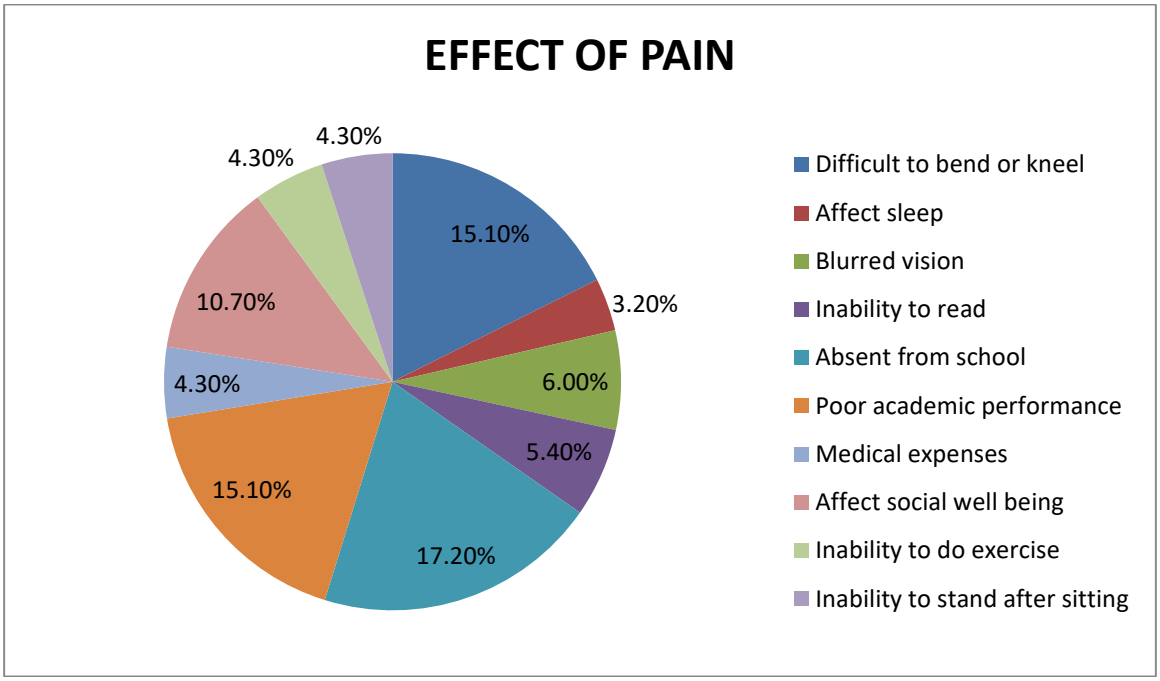


Figure 4.14: Effect of pain on the Postgraduate respondents

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

VARIABLE	Total no of undergraduates (n= 100)	Effect of musculoskeletal pain on the students	TOTAL (n = 100) (%)
Aware of musculoskeletal pain: 3. Yes 4. No	 60(64.5%) 33 (35.48%)	Difficult to bend or kneel: 4. Yes 5. No	 14 (15.1%) 91 (97.84%)
Presence of musculoskeletal pain: 1Yes 2.No 3.Not sure	 30 (32.25%) 56 (60.22%) 7(7.53%)	Affect sleep 1Yes 6. No	 3(3.2%) 90 (96.7%)
Body Region Neck	 15 (16.13%)	Blurred vision: 3. Yes 4. No	 4 (6%) 89 (945)
Shoulder	8 (8.6%)	Inability to read especially at night: 3. Yes 4. No	 5 (5.4%) 88 (94.6%)
Upper Back	7 (7.5%)	Absent from school: 3. Yes 4. No	 **16 (17.2%)** 77 (82.8%)
Lower Back	**28 (30.11%)**	Poor academic performance: 3. Yes 4. No	 2 (2.15%) 91 (97.85%)
Wrist	9 (9.68%)	Spent so much money on medication. 3. Yes 4. no	 4(4.3%) 89 (95.7%)
Knee	10 (11.98%)	Affect social well being	
Elbow	2 (2.15%)	3. yes 4. No	2 (2.15%) 91 (97.85%)
Waist	11 (12.2%)	Inability to do exercise and other recreational activities:	
Others	2 (2.15%)	3. Yes 4. No	4(4.3%) 89 (95.7%)
Areas of pain: None Single double multiple	 63 (78.5%) 0 (0%) 10 (10.75%) 20 (21.5%)	Inability to stand after sitting for a while 3. Yes 4. No	 4(4.3%) 89 (95.7%)

Table 4.12: Presence, pattern and effect of musculoskeletal pain on postgraduate survey

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

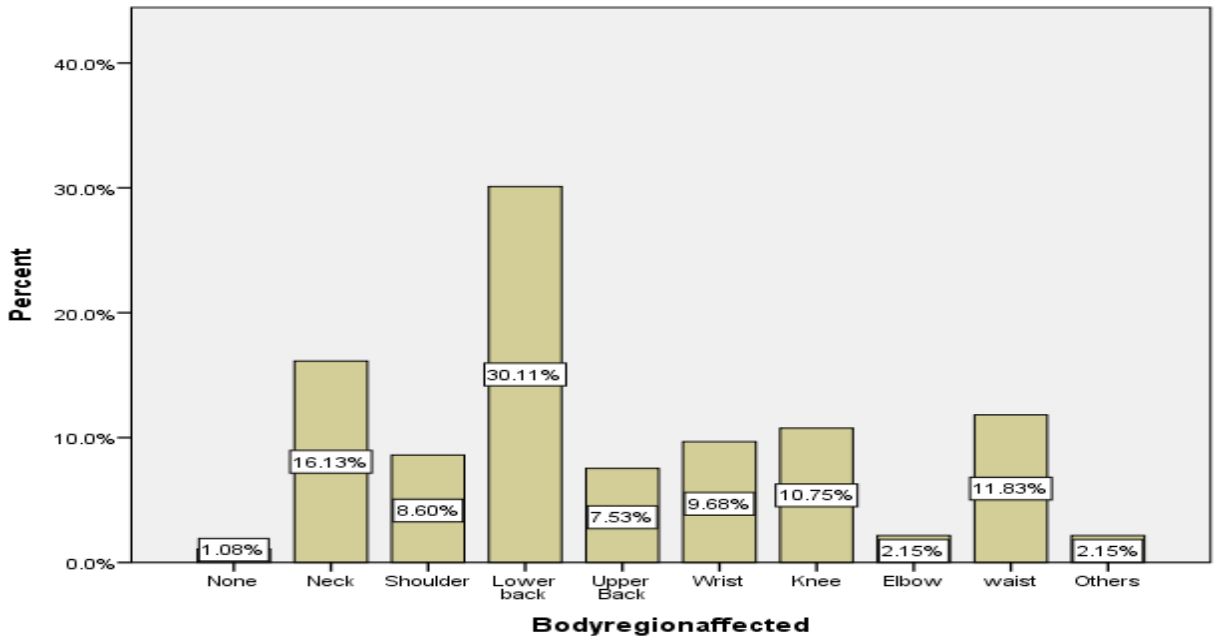


Figure 4.15 Frequency distribution of the affected body region (Postgraduate survey)

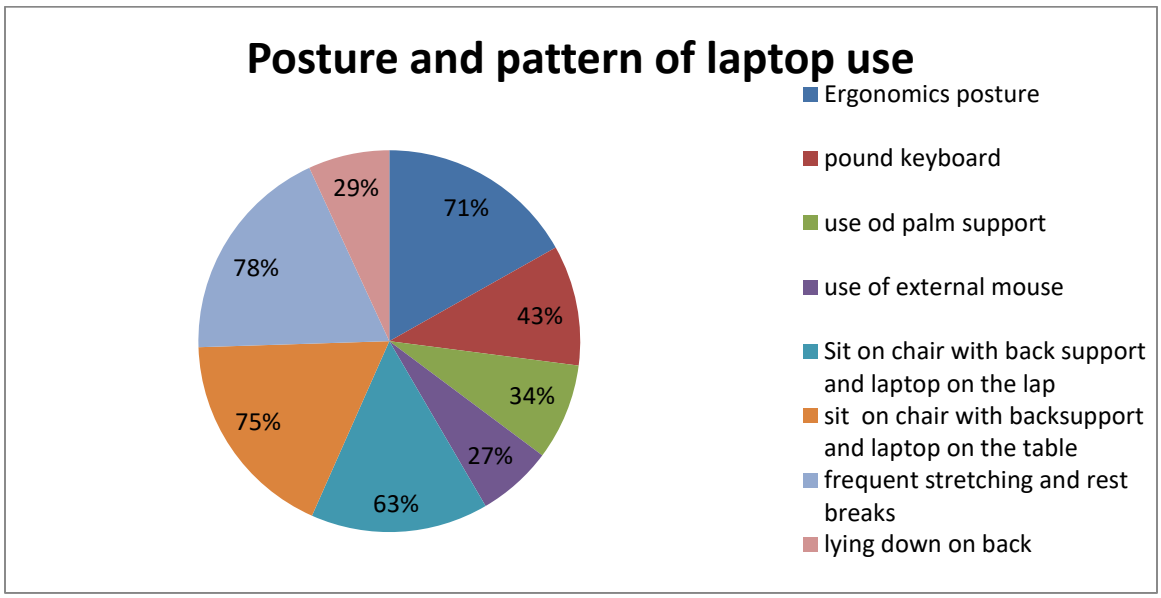


Figure 4.16: Posture and pattern of laptop use (Postgraduate Survey)

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

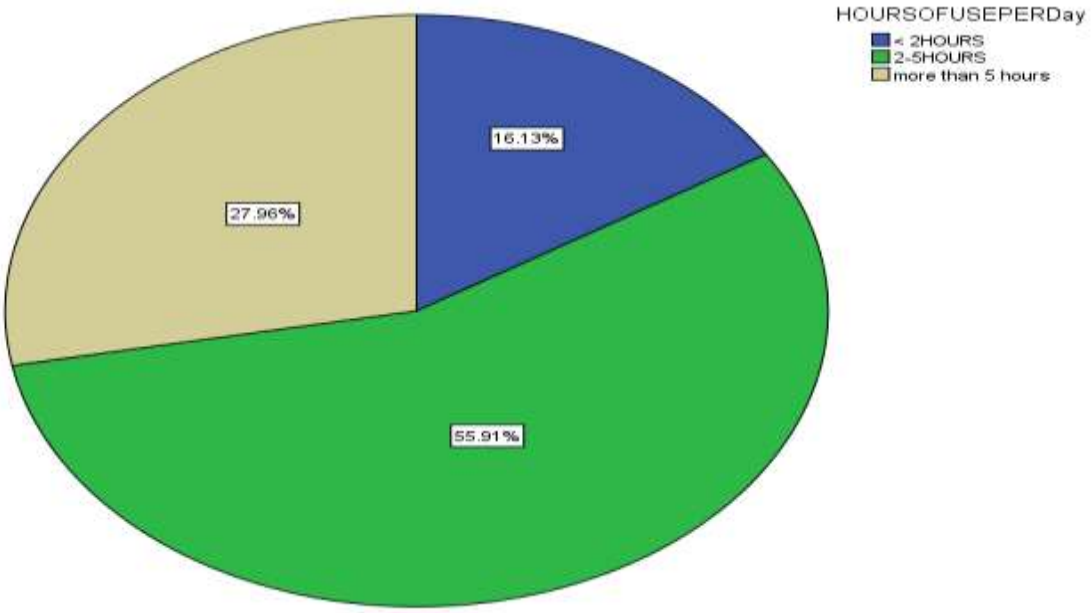


Figure 4.17: Hours of laptop use per day (Postgraduate survey)

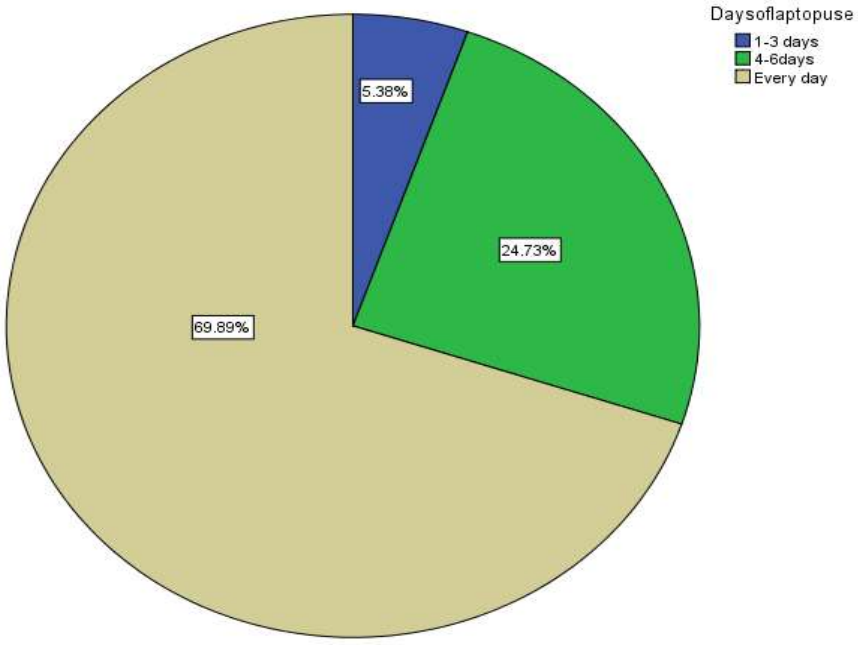


Figure 4.18 Days of laptop use per week (Postgraduate survey)

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

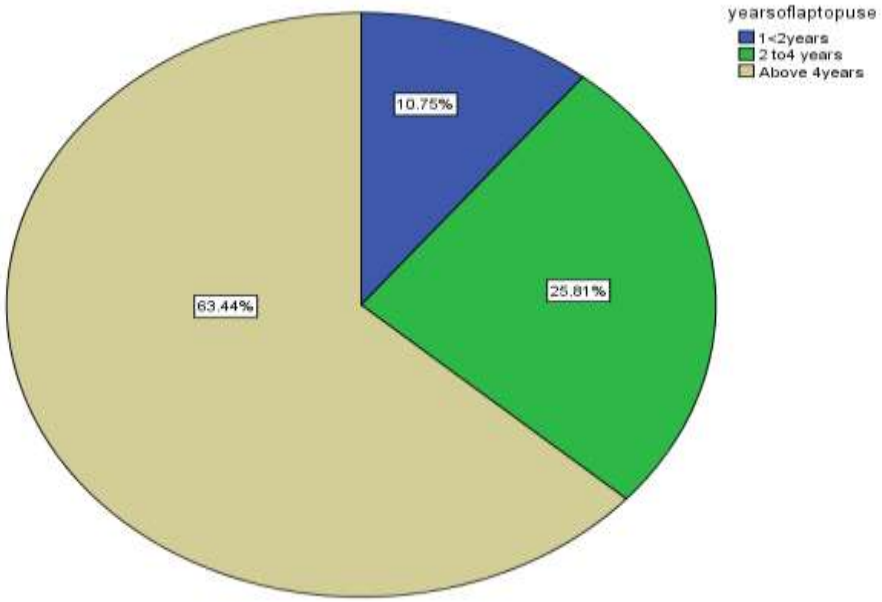


Figure 4.19: Years of laptop use (Postgraduate survey)

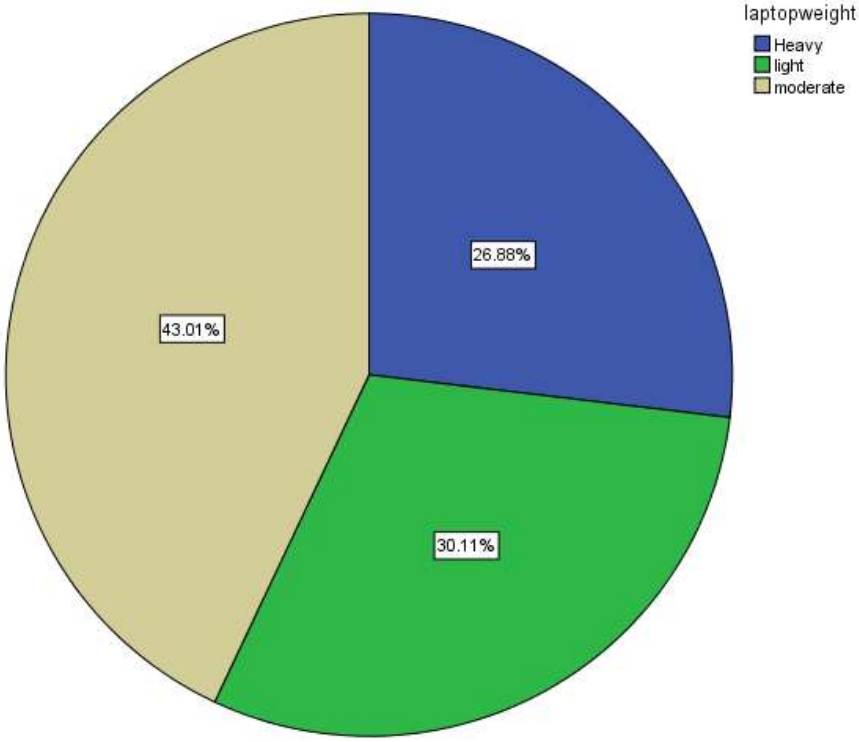


Figure 4.20: Frequency distribution of laptop weight (Postgraduate survey)

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

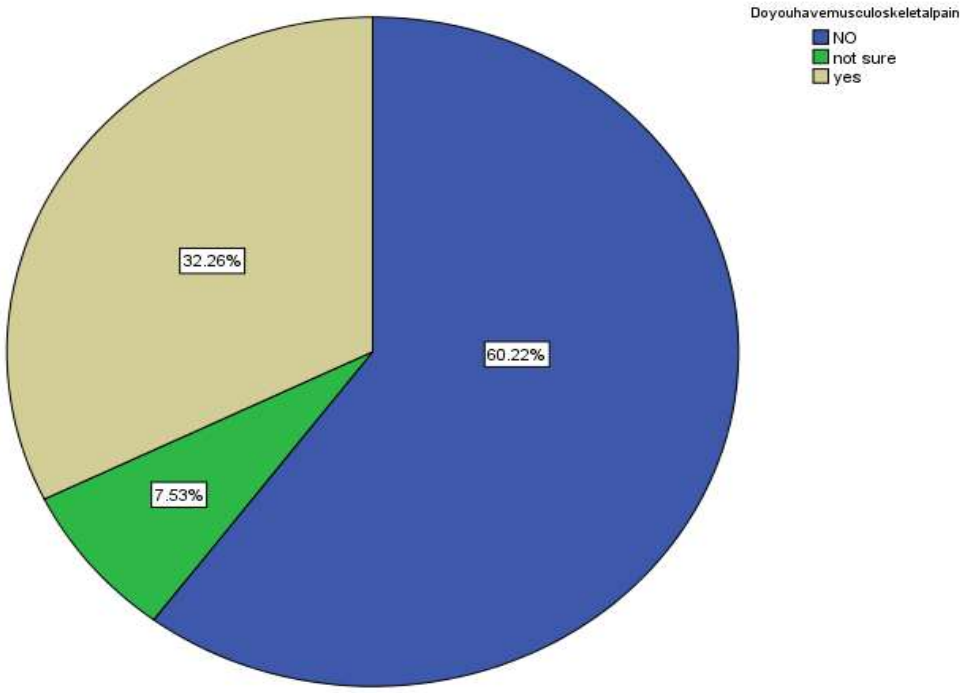


Figure 4.21: Presence of musculoskeletal pain (Postgraduate survey)

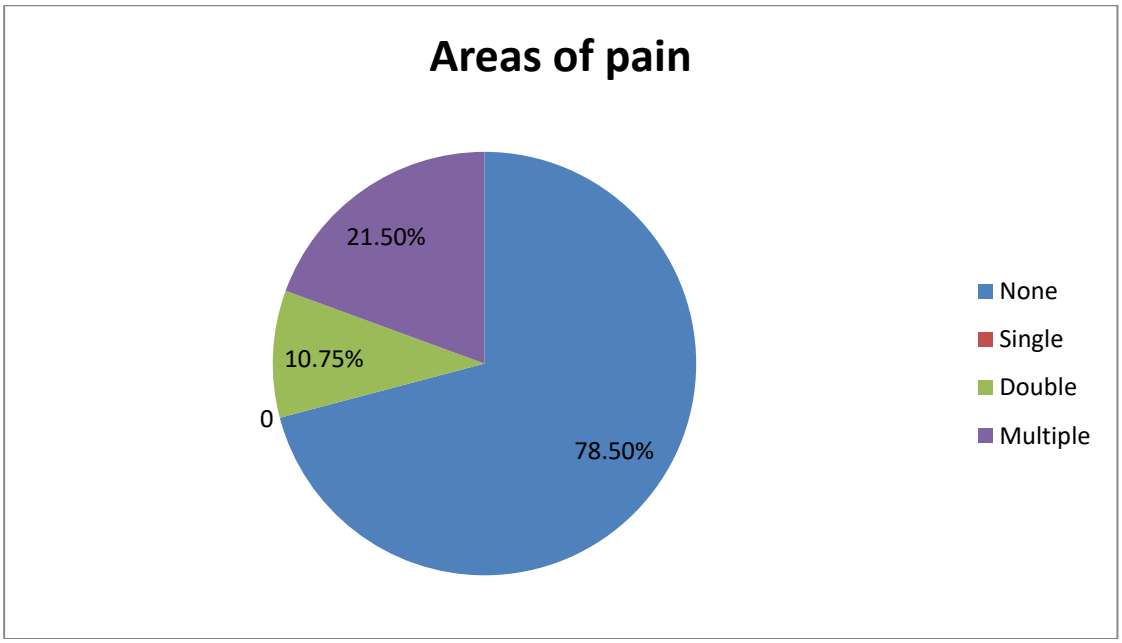


Figure 4.22 Areas of pain among the Postgraduates

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

The results in tables 4.13-4.20 indicate that at 95% degree of confidence, 12.8 to 30.1% of the participants have musculoskeletal pain. The Kruskal Wallis test performed with SPSS software shows there is a significant difference in the prevalence of musculoskeletal pain among the different age groups with p = 1.3694E-9, Chi square test performed with the same software also yielded a negative correlation between presence of pain and laptop weight (P = 1.2856E-7), but no significant difference was found between musculoskeletal pain and days of laptop use (p = 0.254), gender (p = 0.310), body weight (p = 0.871), vibration while walking (P = 0.201), and hours of laptop use (p = 0.211).

Table 4.13 the mean distribution of age the respondents

Ranks

School	age of respondent	N	Mean Rank
Postgraduate	18-25	30	61.23
	26-29	50	34.00
	30 and above	13	64.15
	Total	93	

Table 4.14 The mean distribution of laptop weight

School	laptop weight	N	Mean Rank
postgraduate	light	28	63.18
	moderate	40	34.00
	heavy	25	49.68
	Total	93	

Table 4.15 Chi-square analysis of vibration experienced by respondents and musculoskeletal pain

POSTGRADUATES			Presence of musculoskeletal pain	Vibration while walking
Spearman's rho	Presence of musculoskeletal pain	Correlation Coefficient	1.000	.534**
		Sig. (2-tailed)	.	.000
		N	100	100
	Vibration while walking	Correlation Coefficient	.534**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

Table 4.16 Chi-square analysis of days of laptop use and presence of musculoskeletal pain

POSTGRADUATES		Presence of musculoskeletal pain	Days of laptop use
Presence of musculoskeletal pain	Pearson Correlation	1	.133
	Sig. (2-tailed)		.188
	N	100	100
Days of laptop use	Pearson Correlation	.133	1
	Sig. (2-tailed)	.188	
	N	100	100

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Table 4.17 1Mean distribution of days of laptop use

Ranks

POSTGRADUATES	Days of laptop use	N	Mean Rank
Presence of musculoskeletal pain	Every day	45	53.67
	1-3 days	23	38.50
	4-6 days	32	54.67
	Total	100	

Table 4.18: The mean distribution of gender of the respondents

POSTGRADUATES	Gender of respondent	N	Mean Rank
Presence of musculoskeletal pain	Male	48	52.72
	Female	52	48.45
	Total	100	

Table 4.19: Chi-square analysis hours of use per week and presence of musculoskeletal pain.

POSTGRADUATES		Presence of musculoskeletal pain	HOURS OF USE PER WEEK
Presence of musculoskeletal pain	Pearson Correlation	1	.202*
	Sig. (2-tailed)		.044
	N	100	100
HOURS OF USE PER WEEK	Pearson Correlation	.202*	1
	Sig. (2-tailed)	.044	
	N	100	100

Table 4.20: Chi-square analysis of body weight and presence of musculoskeletal pain

POSTGRADUATES		Do you have musculoskeletal pain	Body weight
Do you have musculoskeletal pain	Pearson Correlation	1	-.087
	Sig. (2-tailed)		.406
	N	93	93
Body weight	Pearson Correlation	-.087	1
	Sig. (2-tailed)	.406	
	N	93	93

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

COMBINED RESULTS FROM QUESTIONNAIRE STUDY

VARIABLE	Total (n= 193)	Effect of musculoskeletal pain on the students	TOTAL (n = 193)
Aware of musculoskeletal pain: 5. Yes 6. No	 103(53.4%) 90 (46.63%)	Difficult to bend/kneel Yes No	 **16 (8.29%)** **177 (91.70%)**
Presence of musculoskeletal pain: 1Yes 2.No	 57 (29.53%) 136 (70.47%)	Affect sleep 1Yes 2No	 8(4.15%) 185 (95.85%)
Body Region		Impaired vision: Yes No	 9 (4.66%) 184 (95.33%)
Neck	40 (20.7%)		
Shoulder	15 (7.8%)	Inability to read especially at night: Yes No	 5 (2.59%) 188 (97.4%)
Upper Back	17(8.8%)	Absent from school: Yes No	 **27 (13.99%)** **166 (86%)**
Lower Back	38 (19.7%)	Poor academic performance: Yes No	 7 (3.63.1%) 186 (96.37)
Wrist	11(5.7%)	Spent so much money on medication. Yes no	 7(3.6%) 186 (96.37)
Knee	15 (7.8%)	Affect social well being yes No	 6(4.3%) 187 (96.89%)
Elbow	3 (1.6%)		
Waist	21 (10.9%)	Inability to do exercise and other recreational activities: Yes No	 **12(6.9%)** **181 (93.78%)**
Others	3 (1.6%)		
Areas of pain: 1None 2 Single 3 Double 4 multiple	 136 (70.47%) 3 (1.55%) 25 (12.95 %) 29 (15.03%)	Inability to stand after sitting for a while Yes No	 4(4.3%) 189 (97.92%)

Table 4.21: Combined result on the presence, pattern and effect of musculoskeletal pain

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

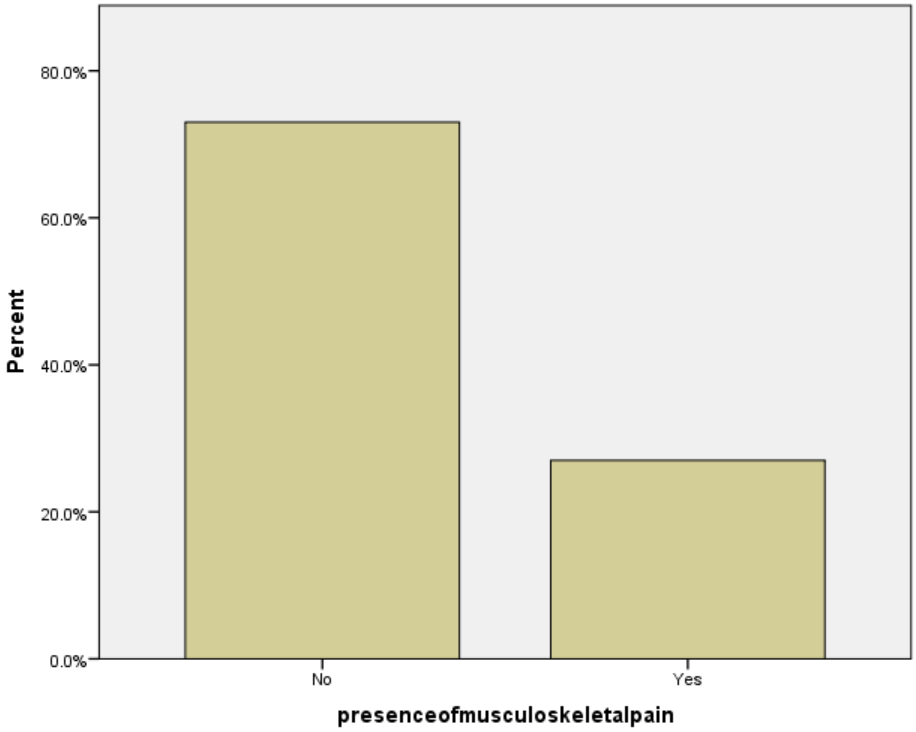


Figure 4.23 Frequency distribution of presence of pain among the participants

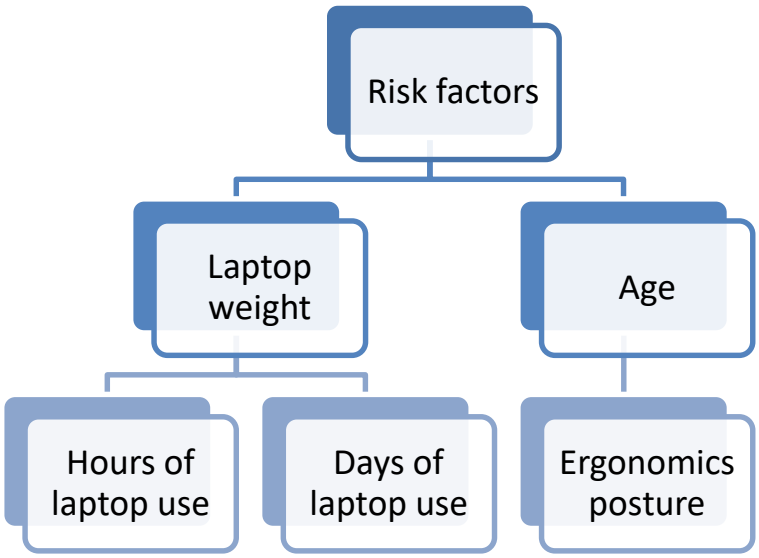


Figure 4.44 Hierarchy of identified risk factors

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

Variable	Total (n = 193)	Percentage %
Do you have laptop: yes	193	100
No	0	0
Do you maintain ergonomics posture Yes	118	61.14
No	75	38.86
Type of carrier bags: briefcase	58	30.05
Backpack	108	55.95
Single trap bag	27	13.99
Years of use: 1 year <2years	43	22.27
2 years <4years	74	38.34
4 years and above	70	36.27
Hours of use per day: less than 2hrs	43	22.28
2 to 5hrs	104	53.89
More than 5hrs	39	20.20
Days of use per week: Every day	110	56.99
1-3days	28	14.51
4-6days	55	28.49
Weight of laptop: Light	84	43.52
Moderate	89	46.11
heavy	20	10.36
Use of external Mouse: Yes	59	30.57
No	134	69.43
Use of Palm support: Yes	69	35.75
No	124	62.25
is laying down on back your posture Yes	68	35.23
No	120	62.18
Not sure	5	2.59
Pound keyboards: Yes	59	30.57
No	134	69.43
Sit on stool/chair with laptop on the lap: Yes		
No	113	58.55
	80	41.45
Sit on chair with back support and laptop on the table: Yes	135	69.94
No	58	30.05
Frequent stretching while using laptop: Yes	140	72.53
No	53	27.46

Table 4.22: posture and pattern of Laptop use

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

SCHOOL	Gender n = 193 (%) Male	female	Age	Weight	Presence of pain in gender
Undergraduate	37 (37%)	63 (63%)	17-25years = 73 25-30 years = 27 Above 30years = 0	40-50kg = 9 51-70kg = 42 >70kg = 49	Males 10 (10%) Females 17 (17%)
Postgraduates	57 (61.29%)	36 (38.7%)	17-25years = 35 25-30 years = 45 Above 30years = 13	40-50kg = 10 51-70kg = 53 >70kg = 30	Males 20 (21.5%) Females 10(10.75%)
TOTAL	94 (48.7%)	99 (51.3%)	17-25years = 108 25-30 years = 72 Above 30years = 13	40-50kg =19 51-70kg = 95 >70kg = 79	Males 30 (15.54%) Females 27(13.99%)

Table 4.23 Combined results on demographic features of the participants

School	Intensity of pain None	Mild	severe	very severe
Postgraduate	63	10	8	12
Undergraduate	73	14	7	6
% (n = 193)	70.47	12.44	7.77	9.33

Table 4.24 Combined result of the intensity of musculoskeletal pain

COMBINED RESULTS FROM OBSERVATIONAL STUDY

Variable	Undergraduate n = 25	Postgraduate n = 25	Total n = 50
Presence of pain	3	5	8
Maintained ergonomics posture	16	19	35
Maintained speed while typing	22	22	44
Used external keyboard	8	17	25
Used palm support	5	14	19
Gender: Male	10	17	27
Female	15	8	23
Pressed keyboard gently	12	17	29

Table 4.25 Pattern of laptop use from observational study

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, 3(2),153-, 2022
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

COMBINED RESULTS FROM INTERVIEW

Variable	Undergraduate n = 25	Postgraduate n = 25	Total n = 50
Presence of pain	5	6	11
Body region: neck	3	1	4
Shoulder	1	0	1
Lower back	1	2	3
Knee	0	2	2
waist	0	1	1
Maintain ergonomics posture	6	10	16
Maintain speed while typing	15	17	32
Used external keyboard	6	12	18
Used palm support	3	8	11
Gender: Male	10	17	27
Female	15	8	23
Pressed keyboard gently	18	22	40

Table 4.26 Pattern of laptop use from Interview study

DISCUSSION OF RESULTS

Studies of musculoskeletal pain associated with the use of laptop among university students (Sirajudeen et al., 2018; Chavda et al., 2013; Prakash et al., 2014; Obembe et al., 2013; Alhariri et al., 2016), none with students from different academic majors as subjects. In this present study, the entire study population comprised of undergraduate (51.8%) and postgraduate (48.1%) students from three different academic majors. Out of the 200 questionnaire administered, a response rate of 96.5% was obtained, 48.7% were males and 51.2% were females unlike other studies where males outnumbered females (Mohandos et al., 2014; Mohanty et al., 2017; Obembe et al., 2013), this could be due to the nature of the faculties studied like in health sciences where a good number of them are females (nursing department). Considering the study objectives, results obtained reveals that 53.5% of the participants are aware of musculoskeletal disorder prior to this study and this has been scarcely reported in literature. Other studies reported age range 18-45 years with mean age range between 20 and 29.34 years. From the cumulative result of this study, it was seen that the subject population is within age range 17-40 years with mean age 29 $\pm$ 14 years, the modal age occurred between 17-25years.

The prevalence rate of musculoskeletal pain in the present study was shown to be 29.5% which is far less than the range (40% to 71.5%) reported in the reviewed literatures. This could be attributed to the youngest subject population age range involved in this study and the fact that more than half

of the participants are aware of this disease before now; so they adhered to the principles of safe ergonomics practices while using laptop as seen in the questionnaire 118 (64.77%), observation 35 (70%) and interview results 16 (32%) obtained. Other reasons could be that majority of the participants 53.89% use laptops daily for just 2-5hrs, 140 (72.53%) breaks and stretches frequently while using laptop. Long hours of laptop use without rest break increases the risk of MSDs associated with the hand and arm (Obembe et al., 2013). Out of the 57 participants affected by musculoskeletal pain, 30(15.54%) were males and 27(13.99%) were females from different schools of study. The identified areas of pain include single (0%), double (12.95%) and multiple (15.03%); the pattern of musculoskeletal disorder shows that 40 (20.7%) participants reported neck pain while 38(19.7%) and 21(10.9%) reported lower back pain and waist pain respectively. The result of neck pain as the most prevalent musculoskeletal pain as supported by other studies among university students (Sirajudeen et al., 2018; Prakash et al., 2014; Alhariri et al., 2016) could be due to the fact that a good number of the participants 114 (59.1%) sit on a chair with laptop on their laps during laptop usage, 108 (59..95%) use back pack to transport their laptops, and only 20 (10.36%) use heavy weight laptops. The least reported region of pain was the elbow 3(1.6%) which could be due to the use of palm support and external mouse by participants 128 (66.32%). None use of external mouse while using laptops can lead to MSDs of upper limb and spine due to the fixed nature of its monitor and keyboard does not allow the user to adjust the relative position between keyboard and monitor for optimum angle (Chavda et al., 2013; Korhan and Onsorodi 2011; Sirajudeen et al., 2013).

This study identified knee MSDs 15(7.8%) to be mostly associated with the postgraduate students and this could be due to 57(61.29%) of the participants are males with an average weight of 84 ± 17 kg; high body mass index can increase the force across the weight bearing joints-spine and lower extremities (Sirajudeen et al., 2018). This account for the high prevalent of lower back pain 28(30.1%) and waist pain 16(17.2%) among the participants from the school of Postgraduates. Statistically, SPSS software was used to determine the correlation between presence of musculoskeletal pain (dependent variable) and the independent variables. Six independent variables had positive correlation ($p>0.05$) and five had negative correlation ($p<0.05$) at 0.5 level. This shows that there is an association between presence of pain and the following variables; days of laptop use ($p = 0.00023$), hours of laptop use ($p=.0.0012$, laptop weight ($p= 0.01$), age of respondents ($p = 00035$) and ergonomics posture ($p = 0.0014$). Hence, they are the problem factors found to be significant predictors of musculoskeletal disorder in this study and is similar to the findings of other researchers (Alhariri et al., 2016; Korhan and Onsorodi 2011; Chavda et al., 2013). This can be attributed to the high prevalence rate 30(32.25%) reported by the subjects from the postgraduate school.

The most reported impact of MSDs on the respondents was absenteeism from school 27(13.99%), followed by inability to bend or kneel 19(15.1%), poor academic performance 14(7.25) and inability to exercise 12(6.9%); the least impact being inability to stand after sitting for a while

British Journal of Multidisciplinary and Advanced Studies:
Engineering and Technology, *3(2),153-*, *2022*
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Published by the European Centre for Research Training and Development UK

which affects just 4(2.07%) of the respondents in the population study. When reviewing the literature there is minimal research reported on the impact of MSDs on the subjects.

Considering the intensity of the pain caused by MSDs in this study, 12.44% of the respondents experienced mild pain, 7.77% experienced severe pain and 9.33% experienced severest pain which is most prevalent in school of postgraduates. This could be due to the high body mass index in postgraduate population study when compared to the body mass index of respondents from the undergraduate sample population. The significant difference in age distribution among the two groups surveyed could also be a contributory factor as supported by other studies on MSDs associated with laptop use among students (Obemebe et al., 2013; Alhariri et al., 2016 Chavda et al., 2013).
According to the results from the interview and observational study which involved a total population of 50 participants each, less than half of the total population is affected by MSDs caused by laptop use even though 31% of the entire population pound keyboards while typing. This could account for the 5.7% prevalent rate of MSDs in the wrist region reported generally in this study.

CONCLUSION AND RECOMMENDATION

In this study, results analyzed highlight important issues related to MSDs among students of Abia State University Uturu who are laptop users. Neck pain, lower back pain and waist pain were the most prevalent musculoskeletal pain in this study. The use of backpack to transport laptops by majority of the students is the reason for the fewer number of students affected by MSD at the shoulder region. About nine of the participants reported sleep disorder and blurred vision as their symptoms of musculoskeletal disorder. More than half of the undergraduate students who participated in this study were unaware of this disease; hence less than half knew about the ergonomics principle of using laptop even though a good number of the undergraduates from the school of Health sciences and postgraduate students seem to have a good knowledge of MSD when compared to other schools surveyed. Some students who are aware of MSD and ergonomics fail to practice ergonomics posture while using laptops. From the results of this study, the risk factors associated with MSD in order of importance include laptop weight, age, ergonomics posture, hours of laptop use per day and days of laptop use.

The use of laptops by students in tertiary institutions is inevitable with the wide growth of information and communication technology for teaching, learning, assessment and evaluation; Hence the need to increase awareness of ergonomics and MSD. This can be done by constantly sensitizing the student community on the ergonomics safe practices regarding laptop use thereby reducing the risk of developing musculoskeletal pain and other health issues. More so, the student community should be encouraged to cultivate the culture of reporting any pain that has persisted for more than one month for immediate diagnosis to avoid chronic musculoskeletal pain which can diminish the occupational health of the future work force in Nigeria and across the globe.

REFERENCES

Adisesh, A. 2001. Musculoskeletal disorder: theory issues in ergonomics science, 2 142-152

Agency for Clinical Innovation 2012. Musculoskeletal network: Osteoarthritis chronic care program model of care.

Alhariri, S., Ahmed, A.S., Kalas, A., Chaudhry, H., Tukur, K.M., Sendhil, V. and Muttappallymyalil, J., 2016. Self-reported musculoskeletal disorders and their associated factors among university students in Ajman, UAE.*Gulf Medical Journal*, *5*(S2), pp.S61-S70.

Akesson, K., Dreinhöfer, K. E., Woolf, A.D., 2003. Improved education in musculoskeletal conditions is necessary for all doctors. Bulletin for World Health Organization 87 pp.677-683

American Academy of Orthopaedic Surgeons 2006. 'Children and musculoskeletal health' (Accessed Februay 27th 2019).

Arthritis Research UK 2014. Clinical assessments of musculoskeletal system: a guide for medical students and healthcare professionals. *ISBN 978 1 901815 17 7*

Arthritis Research UK 2017. State of the Musculoskeletal health.

Arthritis Research UK 2018. State of the musculoskeletal health.

Ayanniyi, O., Nudamaj, O.S., Mbada C.E., 2017. Pattern of work-related musculoskeletal disorders among Nigerian Hospital workers. Journal of environmental and occupational Science. 1(5) pp19-24

Bailey, S., 2011. Academic writing handbook. A handbook for international students. ISBN 0-20383165-9 Master e-book ISBN 3(2) pp 22-45.

Brewer, S., Van Eerd, D., Amick Iii, B.C., Irvin, E., Daum, K.M., Gerr, F., Moore, J.S.,Cullen, K., Rempel, D., 2006. Workplace interventions to prevent musculoskeletal and visual symptoms and disorders among computer users: a systematic review. *Journal of occupational rehabilitation*, *16*(3), p.317.

Björn Lindgren (1998) The economic impact of musculoskeletal disorders, Acta OrthopaedicaScandinavica, 69:sup281, 58-60, DOI: 10.1080/17453674.1998.11744795

Briggs A. M., Towler. S. C. B, Speerin R., March L. M., 2014. Models of care for musculoskeletal health in Australia:now more than ever to drive evidence into health policy and practice. Australian Health Review.

Chakravarthy, G.N., 2012. Prevalence of neck pain among desktop and laptop computer users in university staff and students. *International Journal of Current Research & Review*, 4(9), pp.6-11.

Chavda, E., Parmar S., Parmar M., 2013. Current practice of laptop computer and health related problems. A survey on ergonomics. *International Journal of medical science & public health*, *2*(4), pp.1024-1026.

Children and musculoskeletal health. American Academy of Surgeons. (Accessed March 7th 2019)

Clinical assessment of musculoskeletal system; a guide for medical students and healthcare professionals. *Arthritis research UK ISBN 978 1 901815 17 7*

Cotrell, S., 2014. Dissertation and project writing s step by step guide. Palgrave Macmillan, 106-109. ISBN: 978-1-137-36426-5

Crawford, J.O., 2013. The Nordic Musculoskeletal Questionnaire. *Journal of occupational medicine*, 57 pp 300-301

Darwish, M., Alzuhair, S. Z., 2013. Musculoskeletal pain disorders among secondary school Saudi female teachers. Journal of pain research and treatment.

Erick, P. N., Smith D.R., 2013. Musculoskeletal disorder risk factors in the teaching profession: a critical review. OA Musculoskeletal Medicine; 1(3) p29.

Erick, P. N., Smith, D.R., 2011. A systematic review of musculoskeletal disorders among school teachers. BMC Musculoskeletal Disorders 12(260) pp 1471-2474.

Ergonomics plus. Five essential pillars of musculoskeletal disorder prevention.. www.ergo-plus.com. (Accessed March 3rd 2019).

Ergonomics tips for Laptop users, http://ehs.ucsc.edu/programs/ergo/ (Accessed on 15/12/2018).

European League against Rheumatism: European action towards better musculoskeletal health research (Accessed 20/04/2019).

Fang, H.L., 2011. An Investigation into the Solutions for Work-related Musculoskeletal Disorders in the Hairdressing Industry.

Global Alliance for Chronic Diseases. Researchers' statement on multimorbidity. https://www.gacd.org/research/publications-andreferences/gacd-researchers-statement-on-multimorbidity (Accessed February 27, 2019).

Gureje O, Akinpelu AO, Uwakwe R, Udofia O, Wakil A: Comorbidity and impact of chronic spinal pain in Nigeria. Spine; 2007; 32 (17): E495-500

Hemalatha K., Bharanidharan G., Anusha T., 2017. Prevalence of musculoskeletal disorder among agricultural workers in rural area of Tamil Nadu: A cross sectional study. *HECS International Journal of Community Health and Medical Research* 3(3)

Hinge Health. Musculoskeletal disorders: an overlooked opportunity for employers

Kay. P., (2018): Physiotherapy for musculoskeletal health and wellbeing. National Institute for health Research

Korhan, O., Onsorodi A.H., 2011. The impact of laptop and desktop computer workstations on human productivity.

Korhan O., 2012. Computer use and work-related musculoskeletal disorders: Literature review. *Research and Reviews in Bio Science* 6 (1) pp1-15

Linton, S. J., Nicholas, M., MacDonald, S. 2011. Development of a Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire. Spine, 36, PP1891–1895. doi: 10.1097/BRS.0b013e3181f8f775

Macdonald. W. Oakman., J. 2013. Musculoskeletal disorders at work: Using evidence to guide Practice. *Journal of health and safety research and practice*, 5(2), pp.7-12.

Malińska, M. and Bugajska, J., 2010. The influence of occupational and non-occupational factors on the prevalence of musculoskeletal complaints in users of portable computers. *International Journal of Occupational Safety and Ergonomics*, *16*(3), pp.337-343.

Mohammad, Q. and Geena, S. 2016. Awarenes of musculoskeletal disorder among dental students in Chennai. *International journal of current research*, 8(12), 43868-43873.

Mohanty, P., Singh, A. and Pattnaik, M., 2017. Risk factors responsible for musculoskeletal pain among computer operators. *EC Orthopaedics*, *6*, pp.15-31

Moom, R.K., Singh, L.P., Moom, N., 2015. Prevalence of Musculoskeletal Disorder among Computer Bank Office Employees in Punjab (India): A Case Study. Journal of *Procedia Manufacturing* 3(2015) pp6624 – 6631

NHS England – Improving Outcomes in Musculoskeletal Conditions, Accessed February 28th, 2019. https://www.england.nhs.uk/ourwork/ltc-op-eolc/ltc-eolc/our-work-on-long-term-conditions/si-areas/musculoskeletal/

Niu, S., 2010. Ergonomics and occupational safety and health: An ILO perspective. Applied ergonomics, 41(6), pp.744-753

Obembe, A.O., Johnson, O.E., Tanimowo, T.O., Onigbinde, A.T. and Emechete, A.A., 2013. Musculoskeletal pain among undergraduate laptop users in a Nigerian University. *Journal of back and musculoskeletal rehabilitation*, *26*(4), pp.389-395.

Occupational Safety and Health council Hong Kong 2009. Final report on: Use of notebook computers and related ergonomics and occupational safety and health problems.

Okunribido, O., Wynn, T., 2010. Ageing and work-related musculoskeletal disorders: A review of the recent literature. *Health and Safety Executive Research Report RR799. Buxton: Health and Safety Executive*.

Parsons, S., Ingram, M., Clarke-Cornwell, A. and Symmons, D., 2011. A Heavy Burden: the occurrence and impact of musculoskeletal conditions in the United Kingdom today

Prakash, J.S., Singh, V., Deane, A. and Bhatty, S., 2014. Musculo skeletal Disorders associated with Computer Usage among Healthcare College Students: A preliminary report.

ReReggie, A.S., Sakthimurugan, L., Periasamy, S., bin AbdHalim, M.S. and Kalyana C., Girish N., 20prevalence of neck pain among desktop and laptop computer users in university staff and students. *International journal of current research and review 4(9).*

Rumar, R., 2011. Research methodology: A step by Step guide for beginners.

SarkerA.H, Islam M.S, Haque M.M, Parveen T.N 2016. Prevalence of Musculoskeletal Disorders among farmers. *MOJ OrthopRheumatol* 4(1): 00125. DOI: 10.15406/mojor.2016.04.00125

Sirajudeen M. S., Muttsamy., Algathani M., Waly M., Jilani A. K., 2018. Computer –related Health problems among university students in majmaah. *International journal of current research and review* 16(3) pp 337-343.

UCSC Ergonomics: http://ehs.uscs.edu/program/ergo. (Accessed on february10th 2019).

Vaghela, N. P. and Parekh, S. K., 2018. Prevalence of the musculoskeletal disorder among school teachers. *National Journal of Physiology, Pharmacy and Pharmacology*, *8*(2), pp.197-201.

Walsh, N.E., Brooks, P., Hazes J.M., Walsh, R.M., Dreinhöfer, K., Woolf, A.D., Akesson, k., Lidgren, L., 2008. Standards of Care for Acute and Chronic Musculoskeletal Pain: The

Bone and Joint Decade (2000 –2010). *American Academy of Physical Medicine and Rehabilitation* 89 p1830

Woods, V., Buckle P., 2002. Work, inequality and Musculokeletal health. Health and Safety Executives. European institute of health and medical sciences, University of Surrey Guildford. Surrey GU27TE

Woolf, A.D., Pfleger, B., 2003. Burden of major musculoskeletal conditions Bulletin of the World Health Organization 81pp646-656.

Zheltoukhova, K., Dea, L.O., Bevan, S., 2012. Taking the Strain: the impact of Musculoskeletal disorders on work and home life.

APPENDIX

QUESTIONNAIRE FOR THE IDENTIFICATION OF MUSCULOSKELETAL PAIN AMONG STUDENTS IN ABIA STATE UNIVERSITY UTURU

This is a postgraduate research that aims to investigate the incidence of musculoskeletal pain among the undergraduate and postgraduate students of the university who have used laptop regularly for at least one year. This questionnaire is the data collection instrument that will help to achieve the set objectives of this research. The informed consent of the school ethics approval panel for taught programs has been obtained. The anonymity and strict confidentiality of the information given in this questionnaire is assured.

EXCLUSION CRITERIA: students with record of recent fracture, dislocations, or neurological emotion, pregnant students ARE EXCLUDED.

SECTION 1: QUESTIONNAIRE IDENTIFYING THE DETAILS, IMPACT, SOCIO-DEMOGRAPHIC FEATURES, VISUAL SYMPTOMS AND SLEEP DISORDERS OF MUSCULOSKELETAL DISORDER

AGE……; GENDER……; HEIGHT……; BODY WEIGHT……kg; DISCIPLINE……

HINT: Musculoskeletal disorder is an unhealthy condition of pertinent symptom such as pain, numbness, tingling, aching, stiffness, or burning sensation that has lasted for one week and above with at least moderate pain on average over the past one year.

1. What is the level of your study currently?
a) 1st year
b) 2nd year
c) 3rd year
d) Postgraduate
2. Have you any knowledge of musculoskeletal disorder before now?
a) Yes

b) No
3. Which gender do you think is mostly affected with musculoskeletal disorder?
a) Male
b) Female
c) Not sure
4. Which factor do you think lead most to the musculoskeletal disorder in students?
a) Workload
b) Poor posture/repetitive motion
c) Obesity/lack of exercise
d) smoking/alcohol intake
5. Why do you think musculoskeletal disorder occur mostly among students:
a) Work related factors
b) Personal factors
6. Do you think emotional stress in students can lead to MSDs?
a) Yes
b) No
c) Not sure
7. Do you think the aged students have more probability to develop MSDs compared to young students?
a) Yes
b) No
c) Not sure
8. With your current knowledge about this disorder, what is a common Musculoskeletal Disorder syndrome?
a) Carpal Tunnel Syndrome
b) Hepatitis B
c) AIDS
d) Muscle dystrophy
9. What are the most common MSDs that develop in students?
a) Back pain
b) Carpal Tunnel Syndrome
c) Osteoarthritis.
d) Cervical spondylosis
10. What is the most common co-morbidity in MSDs that occurred?
a) Overweight/Obesity
b) Chronic pain
c) Diabetes mellitus
11. Do you know before now that overweight individuals have a higher risk of some MSDs, specifically lower back?
a) No

b) Yes
12. Do you know about the idle laptop tips to avoid back and neck pain?
a) Yes
b) No/ Never heard before
13. What do you think are the probable precautious to avoid MSDs caused by using laptop?
i) Suitable body posture during laptop usage ii) Reduced body weight
iii) Regular physical activity iv) rest breaks while using the laptop
a) i, ii and iv
b) i and iii
c)ii and iv
d) All of the above
14) Do you use laptop?
a) Yes
b) No
15) How long have you been using your laptop?
a) 1 year <2years
b) 2 years <4years
c) 4 years and above
16) How many hours per day do use the laptop?
a): Less than 2 hours
b): 2 to 5 hours
c): More than 5 hours
17) What is the weight of your laptop?
a): Light
b): Moderate
c): Heavy
18) Do you experience any vibration while walking or typing with laptop?
a): Low (or no)
b): Medium
c): High
19) How many days do you use laptop in a week?
a) Every day
b) 1-3days
c) 4-6 days
20) Do you have musculoskeletal pain?
a) Yes
b) No
c) Not sure