MUSCULOSKELETAL PAIN, ASSOCIATED FACTORS AND POSTURE PROFILES AMONG UNDERGRADUATES OF THE UNIVERSITY OF BENIN, EDO STATE, NIGERIA.

BY

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CERTIFICATION

This dissertation by Ogunsanya Kolade Olabimpe is accepted in its present form as satisfying the dissertation requirement of the degree of bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

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ABSTRACT

BACKGROUND: Musculoskeletal pain is increasingly prevalent among undergraduate students, largely due to prolonged sitting, poor posture, and sedentary lifestyles. These factors, often overlooked, can significantly affect students' health, academic performance, and overall quality of life. Understanding the pattern of musculoskeletal discomfort and related postural habits is essential for effective prevention and early intervention.

AIM: This study comprehensively investigated the prevalence of musculoskeletal pain (MSP), the associated demographic factors, and the common posture profiles among university undergraduates.

METHODS: A descriptive cross-sectional study was conducted among 385 undergraduates using a structured, self-administered questionnaire. Random sampling was used to select three departments from seven faculties and three departments each from the selected faculty. A self-administered questionnaire adapted from the Nordic Musculoskeletal Questionnaire (NMQ) and Postural Behavioural Questionnaire was used to collect data including Socio- Demographic Data. Descriptive and inferential statistics of Pearson's correlation and Chi-square were used to summarize the data. Alpha level was 0.05.

RESULTS: The prevalence of musculoskeletal pain among respondents was highest in the lower back (45.5%), followed by the neck (37.9%) and shoulders (27.3%). Most participants reported moderate pain (49.4%) lasting 1–3 days. While 78.2% demonstrated good postural practices, no significant associations was found between posture and gender ($p= 0.805$), similarly, there was no significant association between prevalence of low back pain in 7 days and postural profile ($p=0.083$), similarly, no significant association was found between training on proper posture habits and postural profile ($p=0.722$).

CONCLUSION: Musculoskeletal pain is prevalent among undergraduates, particularly in the lower back. Despite a high level of posture knowledge and good postural practices among respondents, awareness alone may not be sufficient to reduce pain without behavioral changes. Interventions focusing on active prevention strategies and sustained ergonomic education are essential.

KEYWORDS: Musculoskeletal Pain, Posture Profiles, Associated Factors Undergraduates.

DEDICATION

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Musculoskeletal pain (MSP) is a widespread health problem affecting individuals across the globe and throughout all stages of life and socioeconomic statuses ([Blyth, March, Briffa, Nicholas, & Cousins, 2000). It is characterized by discomfort or pain originating from the structures of the musculoskeletal system, including muscles, bones, ligaments, tendons, and nerves (Woolf & Pfleger, 2003).

Musculoskeletal pain (MSP) is a common cause of severe long-term pain and physical disability (De Inocencio, 2004) affecting millions of people around the world (Woolf and Pfleger, 2003). This pain can range from mild and intermittent to severe and chronic, significantly impacting an individual's ability to perform daily activities, affecting their physical function, and diminishing their overall quality of life (Woolf & Pfleger, 2003).

The experience of persistent MSP can also lead to psychological distress, including anxiety and depression, further compounding its impact (Linton, 2000). Notably, the prevalence of MSP is high among young adults, particularly university undergraduates (Smith, Son, Heo, Cho, & Chae, 2018), who are predominantly occupied with studying, are arguably a distinct “occupational” group.

Undergraduate populations have been evaluated for specific MSPs and have been determined to have a greater risk of developing MSP (Nyland and Grimmer, 2003; Rising et al, 2005; Ayanniyi et al, 2010) The school environment is thought to be a very important setting for the development of MSP (Rising et al, 2005; Smith and Leggat, 2007; Ayanniyi et al, 2010), as about 30% of school time is spent in prolonged sitting position (Nurul et al 2009).

The undergraduate years mark a significant period of transition, bringing about new academic demands and increased personal independence, which often involves more time spent in prolonged sitting for studying, computer work, and attending lectures (Mustafaoglu, Gündüz, & Arslan, 2016). The presence of musculoskeletal pain can have detrimental effects on

undergraduates' academic performance by impairing concentration, disrupting sleep patterns, and limiting their participation in social and physical activities, potentially leading to isolation and decreased well-being (Mustafaoglu et al., 2016).

Several factors have been identified as contributing to the development of MSP among university students. These include individual biological and physical characteristics such as age, sex, body mass index (BMI), levels of physical activity (or inactivity), and the presence of any pre-existing musculoskeletal or other health conditions (Punnett & Wegman, 2004). Furthermore, psychological factors, notably stress, anxiety, and depression, have consistently shown a strong association with the experience and intensity of musculoskeletal pain, suggesting a complex interplay between mind and body in pain perception (Linton 2000).

Additionally, environmental and lifestyle factors play a crucial role. These include prolonged periods of sitting, often in non-ergonomically sound postures while studying or using electronic devices, the habit of carrying heavy backpacks incorrectly, and obtaining insufficient sleep, all of which can place undue stress on the musculoskeletal system (Brink et al., 2009).
Posture, which refers to the way an individual holds their body when standing or sitting, is a fundamental aspect of biomechanics and significantly influences the load distribution across the musculoskeletal system (Kendall, McCreary, Provance, Rodgers, & Romani, 2005. Maintaining poor posture, characterized by deviations from the body's natural spinal alignment, can lead to excessive and uneven strain on muscles, ligaments, and joints, thereby increasing the susceptibility to developing MSP (Kapandji, 2008). Among undergraduates, common postural habits such as slouching forward while studying or using laptops, adopting a forward head posture due to prolonged screen time on phones and computers, and carrying heavy bags with uneven weight distribution are frequently observed and are likely contributors to musculoskeletal discomfort (Silva et al., 2015).

Therefore, gaining a comprehensive understanding of the prevalent posture profiles among undergraduate students and their association with the occurrence and severity of MSP is essential for developing targeted and effective prevention and intervention strategies aimed at improving their musculoskeletal health (Damasceno et al., 2018).Considering the upsurge in MSP prevalence in undergraduates, there is a need to conduct research to better understand the precipitating and perpetuating factors of MSP in order to be able to proffer effective solutions for

its prevention and management (Hill and Keating, 2009; Kamper et al, 2016). At present in Nigeria, unlike in the Western world such as the United Kingdom and the United States of America, the problem of MSP among undergraduates is yet to receive sufficient attention among researchers, despite emerging studies that implicate MSP among undergraduates as a likely precursor of chronic pain in adulthood (Hestbaek et al, 2006; Jones et al, 2007).

Investigating the intricate relationships between musculoskeletal pain, its associated factors, and the characteristic posture profiles observed in undergraduate students is of paramount importance for several key reasons. Firstly, it provides valuable and specific insights into the primary risk factors that are prevalent within this particular population, which in turn allows for the development of intervention programs that are specifically tailored to address these identified risks (Leaver et al., 2014). Secondly, by understanding the direct relationship between different postural habits and the experience of pain, we can better inform the design of ergonomic recommendations and educational initiatives that aim to promote the adoption and maintenance of healthy postural behaviors among students (Mills & O'Sullivan, 2015).

This study, aim at investigating the prevalence and pattern of MSP among undergraduates of University of Benin expressing the concern for musculoskeletal pain; it associated factors and posture profile specific to this environment. Ultimately, effectively addressing the issue of MSP among undergraduates can lead to significant improvements in their academic performance, enhance their overall well-being and quality of life, and potentially reduce the long-term burden on healthcare systems associated with chronic musculoskeletal conditions (Pereira et al., 2012).

1.2 STATEMENT OF PROBLEM

The high prevalence of musculoskeletal pain (MSP) among university undergraduates is a significant concern due to its potential impact on their academic pursuits, overall well-being, and future productivity (Smith et al., 2018).

Despite the growing body of research on MSP in various populations, the specific interplay between associated factors and posture profiles within the undergraduate demographic requires further investigation (Calatayud et al., 2017; Griegel-Morris et al., 1992). While studies have

identified various risk factors for MSP in this population, such as sedentary behavior and psychological distress (Mustafaoglu et al., 2016; Linton, 2000), a comprehensive understanding of how these factors interact with specific postural habits to contribute to MSP remains limited (O'Sullivan et al., 2006; Kendall et al., 2005). Existing literature often examines MSP prevalence and risk factors in undergraduates broadly (Smith et al., 2018), or focuses on specific anatomical regions of pain.

However, there is a potential gap in research that comprehensively assesses the spectrum of musculoskeletal pain experienced by undergraduates, simultaneously considering a wide range of associated factors (including demographic factors like age, BMI etc.) and their relationship with posture profiles adopted during common undergraduate activities like studying and using technology (Chaitow et al., 2018; Sahrmann, 2002). Furthermore, the specific postural adaptations and deviations prevalent among undergraduates, and how these directly contribute to the development and persistence of MSP, are not fully elucidated (Silva et al., 2015).

Understanding these posture-pain relationships is crucial for developing targeted interventions. While some studies have explored the prevalence of poor posture in students (Ruivo et al., 2016; Harrison et al., 2017), there is a need for more in-depth analysis linking specific postural patterns to the incidence and severity of MSP in this population (Imai et al., 2016; Quek et al., 2018). Therefore, this study seeks to address the gap in the current literature by comprehensively investigating the prevalence of musculoskeletal pain, the array of associated factors (including demographic factors like age, gender, BMI etc.) and the common posture profiles among undergraduates in the University of Benin.

By examining the relationships between these elements, this research aims to provide a more nuanced understanding of the contributors to MSP in this specific population. The findings of this study could inform the development of targeted prevention and intervention strategies aimed at reducing the burden of MSP and promoting better musculoskeletal health among University of Benin undergraduates, ultimately contributing to their academic success and overall well-being (Carvalho et al., 2017; Hoogendoorn et al., 2000).

1.3 RESEARCH QUESTIONS

1. What is the prevalence of musculoskeletal pain (MSP) among university of Benin undergraduates?
2. What are the common posture profiles observed among university of Benin Undergraduates?
3. What are the significant demographic factors associated with the experience of musculoskeletal pain among university of Benin undergraduates?
4. Is there an association between gender, low back pain, and postural training with the postural profile of undergraduates in the University of Benin?
5. What is the overall postural profile status among undergraduates in the University of Benin?

1.3.1 AIM OF STUDY

The overall aim of this study is to comprehensively investigate the prevalence of musculoskeletal pain (MSP), the associated demographic factors, and the common posture profiles among university undergraduates.

1.3.2 SPECIFIC OBJECTIVES

i. To determine the prevalence of musculoskeletal pain among undergraduate students in University of Benin.
ii. To identify the demographic factors associated with MSP in this population among undergraduate students in University of Benin.
iii. To identify the postural profile of undergraduates at the University of Benin.
iv. To examine the association between gender and postural profile of undergraduates at the University of Benin.
v. To identify the relationship between prior posture training and postural profile of undergraduates at the University of Benin.
vi. To identify the relationship between posture profile and musculoskeletal pain among undergraduates in the university of Benin.

1.4 HYPOTHESIS

1.4.1 MAIN HYPOTHESIS

1. There will be no significant association between gender and postural profile among undergraduates in the University of Benin.
2. There will be no significant association between prevalence of low back pain in 12 months and postural profile among undergraduates in the University of Benin..
3. There will be no significant association between prevalence of low back pain in 7 days and postural profile among undergraduates in the University of Benin..
4. There will be no significant association between training in proper posture habits and postural profile among undergraduates in the University of Benin..

1.5 SIGNIFICANCE OF THE STUDY

1. This study is vital for a holistic approach to addressing the underlying causes, identifying those at risk, and developing effective strategies for prevention, diagnosis, and management, ultimately leading to improve health and wellbeing.
2. This study consistently highlights poor posture as a significant factor for developing musculoskeletal pain among undergraduates in the University of Benin.
3. This study can focus on promoting correct posture, ergonomic principles, physical activity, and addressing other modifiable risk factors to reduce the incidence of musculoskeletal pain among undergraduates in the University of Benin by examining if posture profiles explain the relationship between risk factors and MSP (mediation) or if posture profiles change the strength of that relationship (moderation) using regression-based analyses on collected data.

1.6 SCOPE OF STUDY

The delimitation of this study includes:

- **I.** 100level Undergraduate students in the university of Benin
- **II.** 100level Students from the age of 17 and above.

1.7 LIMITATIONS OF STUDY

The Limitation of this study includes:

i. Volunteer bias: students with musculoskeletal pain may be more likely to participate.
ii. Students may over report or underreport their symptoms and postural habit.
iii. Study environments vary significantly and may not be accurately capture through the questionnaire.

1.8 DEFINITION OF TERMS

i. Musculoskeletal pain: they are injuries or pain in the human musculoskeletal system including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back.

ii. Associated Factors: such as use of backpack, trekking, Screen time and physical activity are the factors related to musculoskeletal pains.

iii. Posture profiles: this is simply defined as the way in which we hold our bodies while standing, sitting, or lying down which is dynamic in individuals.

iv. Undergraduate: a student who is pursuing a bachelor's degree or other undergraduate degrees in a university, college or institution of higher education

v. Neck pain: a pain or discomfort felt in the neck area (the transition area between the base of the skull and the clavicles inferiorly).

vi. Low back pain: a pain or discomfort below the 12^{th} costal margin and above the gluteal fold, with or without radiating symptoms to the lower limbs. (WHO 2013)

1.9 LIST OF ABBREVIATION

MSP - Musculoskeletal Pain
NMQ - Nordic Musculoskeletal Questionnaire
PBQ - Posture Behavioral Questionnaire
CDC- Center for Disease Control
WHO- World Health Organization.

CHAPTER TWO

LITERATURE REVIEW

2.1 PREAMBLE

Musculoskeletal pain (MSP) has emerged as a significant public health concern among various populations, including young adults in academic settings (Alhumaidan et al., 2025). Undergraduate students, particularly in Nigerian universities such as the University of Benin, are increasingly exposed to numerous risk factors that predispose them to MSP. These include prolonged sitting during lectures and study sessions, poor ergonomics, sedentary lifestyles, inappropriate posture, and increased screen time due to laptops and mobile devices (Ayanniyi and Udofia, 2018). The transition to university life often comes with lifestyle changes that may inadvertently promote physical inactivity and poor postural habits, both of which are well-documented contributors to musculoskeletal discomfort (García-Pérez-de-Sevilla et al., 2021).

MSP among students is frequently underreported and underestimated because of its non-fatal nature, yet it can significantly impact their academic performance, productivity, mental health, and overall quality of life (Alsaadi, 2022). It is often localized to areas such as the neck, shoulders, and lower back—regions that bear the brunt of poor posture and extended sedentary behaviour. Moreover, when such pain is recurrent or chronic, it may lead to a more serious condition that could persist into adulthood if not adequately addressed (Alsaadi, 2022).

Posture, defined as the alignment and positioning of the body in relation to gravity, plays a crucial role in maintaining musculoskeletal balance and minimizing strain on the body (Robertson, 1984). Deviations from ideal posture such as slouched sitting, forward head posture, and rounded shoulders are common among students and have been consistently associated with musculoskeletal complaints (M et al., 2018). Understanding students' posture profiles can therefore provide insight into the biomechanical factors contributing to their pain experience.

Several studies have examined the prevalence and determinants of musculoskeletal pain in different populations, including office workers, industrial laborers, and healthcare professionals. However, fewer studies have focused specifically on undergraduates in Nigerian university

environments, where infrastructural and ergonomic challenges are pronounced. In addition, the interplay between posture profiles, lifestyle behaviours, academic stressors, and musculoskeletal outcomes in this demographic remains underexplored (Ci et al., 2024).

This chapter provides a comprehensive review of the relevant literature concerning musculoskeletal pain, associated risk factors, and posture profiles among undergraduate students.

2.2 MUSCULOSKELETAL PAIN

Musculoskeletal pain is one of the most frequent types of pain that affects the muscles, bones, joints, ligaments and tendons (Hasan et al., 2018). Musculoskeletal pain can be acute or chronic. Acute musculoskeletal pain can be severe, lasts for a short period of time and is predominantly due to local causes such as fractures, sprains, dislocations and infections. In contrast, chronic musculoskeletal pain persists over a long period of time and is likely to be associated with cancer and arthritis (Hasan et al., 2018).

2.3 Prevalence of Musculoskeletal Pain among University Students

2.3.1 Global Prevalence

Musculoskeletal pain (MSP) is a significant and growing health concern among university students worldwide. Recent analyses of global health data indicate that the overall prevalence of musculoskeletal disorders (MSDs) is approximately 21.9% across all age groups, contributing to 17% of all years lived with disability globally (Mohamed, 2021). However, among university students, the prevalence is notably higher, with studies reporting a range from 32.9% to 89.3% in various countries (Hasan et al., 2018; Mohamed, 2021). Medical and health science students tend to exhibit the highest rates, often due to prolonged sitting, poor ergonomic conditions, and increased academic stress. The most commonly affected regions are the neck, shoulders, and lower back, with chronic pain frequently interfering with students' academic performance and daily activities (Hasan et al., 2018; Mohamed, 2021).

2.3.2 Prevalence in Africa

In Africa, the prevalence of musculoskeletal pain among university students is similarly high and aligns with global trends. For example, a study conducted among undergraduate students of occupational therapy and physiotherapy in a South African university reported a 12-month

prevalence of MSP at 89.7% (Ogunlana et al., 2021). The neck (66.2%) and lower back (64.4%) were the most frequently affected regions. Prolonged sitting, repetitive movements, and lack of physical activity were identified as significant risk factors (Ogunlana et al., 2021). Another study from Benin found a high prevalence of MSDs (93.1%) among workers using display screens, with the lumbar and cervical regions most commonly affected. These findings underscore the impact of sedentary behaviors and poor ergonomic practices in university environments across Africa (Hinson1 et al., 2021; Ogunlana et al., 2021).

2.3.3 Nigerian University Students

Several studies have documented the high prevalence of musculoskeletal pain among Nigerian university students. For instance, a cross-sectional survey at the University of Ibadan found a lifetime prevalence of MSP at 54.5% and a point prevalence of 51.7% (Ayanniyi and Udofia, 2018). The most commonly affected sites were the lower back (55.1%) and neck (53.8%) (Ayanniyi and Udofia, 2018). The pain was often attributed to prolonged poor postures during lectures and study sessions, with about 20.7% of affected students reporting limitations in daily activities due to pain. Another study among private university students in Nigeria reported a 12-month prevalence of MSDs at 76%, with the neck region (47%) most affected. Female students, those in their third and fourth years, and students who did not take regular breaks or engage in physical activity were at higher risk (Afolabi et al., 2025).

While direct, large-scale prevalence data specifically for University of Benin undergraduates is limited, related studies involving students and staff in Benin have reported similar trends. For example, one study among workers on display screens in Benin found a prevalence of MSDs at 93.1%, with the lower back and neck being the most affected regions (Hinson1 et al., 2021). Risk factors included poor ergonomic practices, female gender, and stress. Additionally, a collaborative study involving the University of Benin highlighted the high prevalence of MSP among secondary school students, suggesting that the problem persists into higher education (Abaraogu et al., 2020).

2.4 Types of Musculoskeletal Pain

2.4.1 Neck Pain

Neck pain is pain that starts in the neck and can be associated with radiating pain down one or both of the arms. Neck pain can come from a number of disorders or diseases that involve any of the tissues in the neck, nerves, bones, joints, ligaments or muscles. The neck region of the spinal column, the cervical spine, consists of seven bones (C1-C7 vertebrae), which are separated from one another by intervertebral discs. These discs allow the spine to move freely and act as shock absorbers during activity (American Association of Neurological Surgeon, 2024).

NP is a prevalent and debilitating condition affecting a substantial portion of the population, often attributed to various factors, including occupational demands, poor posture, and lifestyle habits. It is a common manifestation of Work-Related Musculoskeletal Disorders (WMSDs) among working individuals. Occupational factors significantly contribute to neck pain in the workplace. Prolonged sitting, repetitive tasks, and awkward postures, common in office settings, can strain the muscles and soft tissues of the neck (Darivemula *et al.*, 2016). Poor ergonomics, such as inadequate workstation setups or improperly adjusted chairs and screens, can exacerbate the risk of neck pain (Barbe and Barr, 2006).

Repetitive movements associated with certain occupations, like frequent overhead work or sustained computer use, contribute to muscle fatigue and tension in the neck region, leading to discomfort and potential injury (Wami *et al.*, 2019). Psychosocial factors, including job stress, high workload, and low job satisfaction, also play a role in the development and persistence of neck pain (Wami *et al.*, 2019).

Some of the ways to address neck pain associated with WMSDs involve ergonomic adjustments in the workplace, promoting proper posture, introducing regular breaks for movement, and implementing stress reduction strategies.

2.4.2 Low Back Pain

Low back pain is the leading cause of disability worldwide according to WHO (2022. Lower back pain (LBP) stands as the most prevalent musculoskeletal disorder (MSD) impacting adults, with a staggering lifetime prevalence reaching up to 84% (WHO, 2022). Low back pain presents a significant global health concern, affecting a staggering 619 million individuals worldwide in

2020, accounting for nearly 10% of the global population. Projections indicate a concerning trend, with an anticipated surge to 843 million individuals grappling with low back pain by the year 2050 (WHO, 2022). A multitude of studies has underscored the substantial correlation between occupational tasks and LBP, especially within professions involving prolonged sitting, standing, heavy lifting, or awkward postures (Sundstrup *et al.*, 2020). Moreover, research highlights that people who engage in repetitive or forceful work, such as bending, twisting, or lifting, face heightened susceptibility to LBP and other Work-Related Musculoskeletal Disorders (WMSDs) (Wami *et al.*, 2019). These tasks subject the back's tissues and structures to microtrauma, instigating pain and discomfort.

Occupational activities significantly contribute to the prevalence of LBP, eliciting strains on the lower back due to repetitive movements, sustained postures, and tasks demanding excessive force. Prolonged exposure to these activities can lead to tissue damage, inflammation, and structural alterations in the back, ultimately culminating in LBP and related musculoskeletal issues.

2.4.3 Shoulder Pain

Research indicates that simultaneous exposure to various physical strains in the workplace, including overhead work, heavy lifting, forceful activities, and sustained awkward postures, heightens the likelihood of developing shoulder disorders (Linaker and Walker-Bone, 2015). Additionally, psychosocial risk factors have been identified as contributing elements to this association (Linaker and Walker-Bone, 2015).

Occupational tasks requiring repetitive actions such as overhead reaching, lifting, or carrying heavy objects, contribute to microtrauma in shoulder muscles, tendons, and ligaments. This repetitive strain often results in conditions like rotator cuff tendinitis, bursitis, or shoulder impingement syndrome (Luime *et al.*, 2004). Forceful activities, common in occupations like construction or manufacturing, put excessive stress on the shoulder joint, leading to acute injuries such as strains, sprains, or even dislocations (Pope *et al.*, 1997).

2.5 Pathophysiology of Musculoskeletal Pain

Musculoskeletal disorders arise from engaging in activities characterized by forceful exertion, repetitive movements, and prolonged awkward postures, as emphasized by da Costa and Vieira

(2010). These disorders can exhibit symptoms such as pain, burning, and/or numbness and tingling, resulting in a reduction of work time and productivity. Initially, these symptoms may be intermittent and mild; however, without intervention, they have the potential to escalate in frequency and severity. The intricate structures of the musculoskeletal system may sustain injuries, triggering an inflammatory response initially intended for tissue repair. Persisting in injurious tasks can lead to a complex cycle, involving sustained tissue injury, the development of chronic or systemic inflammation, the onset of fibrosis in the affected tissue, and the potential breakdown of compromised structures. Over time, these intricate processes culminate in the manifestation of pain and a significant decline in the functional capacity of the affected region (Barbe & Barr, 2006).

2.6 Aetiology of Musculoskeletal Pain

2.6.1 Posture

Prolonged maintenance of a poor back position can lead to postural low back pain, inducing tension in the musculature and ligaments and resulting in minor injuries that manifest symptomatically as pain in the lower back (Casiano et al., 2024). Similarly, postural neck pain arises from the loading of the cervical spine and shoulder girdle due to sustained postures during work or leisure activities (Mahmoud et al., 2019). This type of pain is particularly prevalent among computer users who often subject the neck musculature and ligaments to strains through awkward postures and forward bending while working (Green, 2008). Notably, Blumenberg *et al., (*2021), reported a higher prevalence of neck pain among computer users spending at least 6 hours a day on the computer. The adoption of improper postures, especially in the context of prolonged computer use, underscores the significance of understanding and addressing postural-related musculoskeletal issues to promote overall well-being.

2.6.2 Force

The forces applied to the computer mouse and keyboard have been identified as potential risk factors for musculoskeletal pains (Wærsted et al., 2010). This risk is compounded by various factors, including heightened repetitiveness in finger and wrist movements, static loading on the thumb during mouse gripping, prolonged extension, ulnar deviation of the wrist, and extended durations of computer use. This intricate interplay of ergonomic elements creates a complex scenario that may collectively contribute to the development of musculoskeletal pains in the forearm and hand/wrist. Understanding and addressing these multifaceted aspects are crucial in managing discomfort and preventing potential musculoskeletal issues in these specific regions. Subjects experiencing more severe musculoskeletal pains have been noted to exert higher force during keyboarding (Feuerstein et al., 1997).

2.6.3 Ergonomics

A study by Edwards *et al.* (2025) underscored the importance of ergonomic considerations in the workplace. The field observations from this study revealed that workers were less likely to use armrests but generally preferred utilizing the desk surface for hand support when typing or using the mouse. This aligned with the study's emphasis on the role of chair features, such as armrests and the desk surface, in influencing workers' ergonomic behaviors and preferences. In the findings of the study, the researcher observed that if the seat height is less than the popliteal height, users tend to incline the spine, creating an acute angle between the thigh and the spine

2.7 Diagnosis of Musculoskeletal Pain

2.7.1 Patient History

The initial and crucial step in the precise diagnosis of a patient presenting with musculoskeletal disorders involves a comprehensive and detailed patient history. This historical assessment should encompass various key aspects, including the onset period of the symptoms, any history of trauma or diseases, detailed information about the location and characteristics of the pain, family medical history, the patient's occupation, severity and duration of the symptoms, factors

that worsen or alleviate the symptoms (considering positional and time-related factors), current medications and treatments, as well as a thorough exploration of past medical and surgical interventions (Alexandra, 2024; Vilella and Reddivari, 2025).

2.7.2 Physical Examination

Physical examination encompasses general observation, local examination, and an assessment of movement and muscle strength. Specific physical tests tailored to various musculoskeletal conditions can be conducted to either confirm or rule out a particular diagnosis. In terms of general observation, the examiner observes the patient's gait and posture as they enter the examination room, as well as during activities such as walking, standing, and sitting. Local observation involves closely examining the affected area for signs of swelling, abnormal contours, muscle atrophy, asymmetry in muscle distribution, and the presence of joint misalignments or deformities. The range of motion is evaluated using tools like a goniometer, providing a quantitative measure of the extent of movement in specific joints. Additionally, muscle strength is assessed and can be graded using standardized scales such as the Oxford muscle grading scale, offering a systematic approach to evaluating muscle function and strength. Various orthopedic tests can be conducted to ascertain or exclude specific pathologies. These assessments encompass the Straight Leg Raise Test for sciatic nerve irritation or lumbar disc herniation, Faber's Test for hip pathology and sacroiliac joint dysfunction, vertical oscillatory pressure (for low back pain), the Empty Can Test (for shoulder pain), and the cervical distraction test (for neck pain), among others (Alexandra, 2024; Vilella and Reddivari, 2025).

2.7.3 Radiographic Examination

Radiographic examination involves the use of X-rays, computerized tomography, and magnetic resonance imaging to examine internal tissues and detect the presence or absence of abnormalities.

2.7.4 Computerized Tomography (CT) Scan

Computerized tomography is primarily employed to assess the osseous structures of the spine and the relationship of the vertebrae to the neural canal in the axial plane (Dieckmeyer et al., 2023). For musculoskeletal conditions, CT scans prove valuable in revealing the relationship between various bony structures, identifying tumours, fractures, and complete or partial dislocations (Dieckmeyer et al., 2023). (In diagnosing low back pain, a CT scan can be

instrumental in visualizing the lumbar spine and detecting abnormalities such as spondylolisthesis (Dieckmeyer et al., 2023).

2.7.5 X-rays

X-rays are extensively employed in imaging to assess musculoskeletal deformities due to their ready availability and relatively low cost. This technique is particularly useful for evaluating fractures, bony deformities, and degenerative changes (Vijayanathan et al., 2009). In cases of low back pain where there is suspicion of non-mechanical causes or degenerative changes in the lumbar spine, X-rays are often recommended for further diagnostic purposes (Vijayanathan et al., 2009). Commonly, anteroposterior and lateral views are obtained to capture comprehensive angles. In instances of suspected spondylolysis, an oblique view may be requested to reveal any fractures at the pars interarticularis. The obtained film is then examined by clinicians for signs of degenerative changes, reduced intervertebral disc spaces, vertebral body fractures, or other noticeable deformities (Vijayanathan et al., 2009).

2.7.6 Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging (MRI) uses the body's inherent magnetic properties to generate detailed radiographic images (Grover et al., 2015). Currently, MRI serves as the standard diagnostic tool for identifying abnormalities in neurologic structures related to low back pain (Arya, 2014). Providing high-resolution images in multiple axes and planes, MRI has the advantage of having no known biohazard effects. In contrast to computerized tomography, MRI is more adept at revealing the correlation between discs and nerves, pinpointing soft tissue and non-bony structures, and identifying conditions such as early osteomyelitis, discitis, and hematomas (Grover et al., 2015).

2.8 Management of Musculoskeletal Pain

Musculoskeletal Pain result from variety of causes and risk factors, management of these causes and risk factors will involve approaching the causes of the pain and correcting any associated deformity.

Management of musculoskeletal Pain include the following

i. Patient education and self-management
ii. Exercise therapy

iii. Manual therapy
iv. Pharmacological treatment (mainly analgesics). (Bergman, 2007)

Management of musculoskeletal pains varies depending on the type of disorder and the region affected.

For the management of low back pain, early involvement of the patient in physical activity and exercise is recommended, while bed rest, as a means of management should be discouraged (Goode et al., 2025). Analgesics as a means of management is also recommended (Goode et al., 2025). Manipulative therapy in the form of lumbar traction is also recommended in the treatment of low back pain (Borman et al., 2003). Specific back exercises are recommended in the management of chronic low back pain, but patients suffering from acute low back pain are advised to maintain a general state of physical activity, as opposed to performing exercises specifically for the back (Goode et al., 2025). Lumbar braces have also reported to be effective in the management of low back pain (Vick et al., 2024).

2.9 Prevention of Musculoskeletal Pain

Preventing musculoskeletal Pain entails steering clear of risk and causative factors that make individuals susceptible to these disorders (European Agency for Safety and Health at Work, 2008).

Preventive measures include various strategies:

i. Improving Ergonomics: Enhancing the ergonomics of work and school environments, including the selection of suitable chairs, appropriate work tables, maintaining proper posture with back and arm support, and adopting favorable positions during work and at home have demonstrated efficacy in reducing the occurrence of back and neck pain (European Agency for Safety and Health at Work, 2008).
ii. Behavioral Changes: Implementing proper positioning during desk work, daily activities, and load-carrying, along with adjustments to sleeping positions and work habits, such as incorporating short breaks during work hours, contribute to muscle relaxation and help mitigate musculoskeletal pains(Ming et al., 2004; European Agency for Safety and Health at Work, 2008).

iii. Wearing Protective Equipment: The use of protective equipment like back braces, wrist splints, and neck collars can play a crucial role in minimizing the development of musculoskeletal symptoms. Back belts, for instance, aid in stabilizing the trunk, increasing intra-abdominal pressure, and reducing the incidence of low back pain (European Agency for Safety and Health at Work, 2008).

iv. Physical Exercises: Engaging in exercises to strengthen neck and back muscles enhances their physical capacity, thereby reducing muscle overloading and lowering the risk of developing musculoskeletal pains (European Agency for Safety and Health at Work, 2008).

2.10 Outcome Measures

The Oswestry Disability Index (ODI): The Oswestry Disability Index (ODI) stands as a frequently employed outcome measure for evaluating individuals with low back pain. This self-administered questionnaire comprises ten sections, addressing pain intensity and the impact on various daily activities, including personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, and traveling. Each section consists of six statements detailing scenarios in the patient's life in relation to their pain. Patients select one statement from each section, assigning a score of 0 to the first statement and 6 to the last. The total score is determined by summing the patient's scores, dividing by the total possible score (50), and multiplying by 100 to obtain a percentage (Mehra et al., 2008). The resulting percentage serves to estimate the perceived degree of disability, with a higher percentage indicating a greater perception of disability (Mehra et al., 2008). The test-retest reliability of the ODI ranges from r = 0.83 to 0.99(Grönblad et al., 1993).

Neck Disability Index (NDI): The Neck Disability Index (NDI) is a tool specifically designed to measure neck-related disability in patients. It comprises 10 sections, each addressing a different aspect of daily life that could be affected by neck pain, such as personal care, lifting, reading, headaches, concentration, driving, work, sleeping, and recreation. Each section contains six statements, scored from 0 (first statement) to 5 (sixth statement). The total score can be converted into a percentage by dividing it by the maximum possible score (50) and multiplying by 100. A higher percentage indicates a higher level of disability. The NDI has been found to have high test-retest reliability, with an intra-class correlation value of 0.93, 95% confidence

limits of 0.86 – 0.97, and an internal consistency of 0.864. This tool was developed by Vernon and Mior (1991), and its reliability was confirmed by (McCarthy et al., 2007).

The Shoulder Pain and Disability Index (SPADI): This is a tool designed to evaluate the level of pain and disability experienced by patients with shoulder pathologies. It consists of a self-administered questionnaire containing 13 statements divided into two subscales: pain and disability. The pain subscale comprises 5 questions, while the disability subscale includes 8 questions (Breckenridge and McAuley, 2011). Respondents mark a point on a line indicating their pain or disability level, with descriptors ranging from "no pain/difficulty" to "worst pain imaginable/so difficult required help," similar to a Visual Analogue Scale (Breckenridge and McAuley, 2011).

Scoring the SPADI involves dividing the horizontal line into 12 segments, each scored from 0 to 11. The score corresponding to the segment where the patient's mark falls is assigned. Subscale scores are calculated by summing the scores for each marked point, dividing by the total possible scores for the answered items, and multiplying by 100. The total SPADI score is obtained by averaging the pain and disability subscale scores. Total scores range from 0 to 100, with higher values indicating greater pain and disability (Breckenridge and McAuley, 2011).

Roach et al. assessed the test-retest reliability of the SPADI, obtaining a coefficient of 0.6552, while criterion validity values ranged from -0.5555 to -0.8036 (Roach et al., 1991). A Dutch study on the validity and reliability of the SPADI in a similar population reported a test-retest reliability with an intra-class correlation value of 0.89 (95% CI 0.82 – 0.93) and a validity correlation between the SPADI and the shoulder disability questionnaire (SDQ) of r = 0.69 (Breckenridge and McAuley, 2011).

2.11 Factors Associated with Musculoskeletal Pain Among University Students

Musculoskeletal pain (MSP) among university students is a multifactorial issue influenced by ergonomic, behavioural, psychological, and demographic factors. Understanding these determinants is crucial for developing effective preventive strategies.

2.11.1 Ergonomic and Environmental Factors

Classroom Furniture and Study Environment

Unsuitable furniture: Use of non-ergonomic chairs and desks, especially those not adjustable to individual body sizes, is a major contributor to MSP. Prolonged sitting on hard or poorly designed surfaces increases pressure on the lower back and neck (Anyachukwu et al., 2024; Morais et al., 2019).

Awkward postures: Sitting in slouched or twisted positions, or using beds and sofas for studying, is associated with increased risk of neck, shoulder, and back pain (Barrios et al., 2023).

Workstation setup: Poor placement of screens (too high/low or off-center), inadequate lighting, and insufficient space can exacerbate discomfort and pain (Harithasan et al., 2022).

Environmental conditions: Factors such as poor ventilation, excessive noise, uncomfortable temperatures, and glare from lighting have been linked to higher prevalence of MSP (Harithasan et al., 2022).

Study Habits

Prolonged sitting: Spending more than 6 hours per day seated, especially without breaks, is strongly associated with musculoskeletal complaints, particularly in the lower back and shoulders (Anyachukwu et al., 2024).

Lack of breaks: Not taking regular breaks to stand, stretch, or move increases the risk of developing pain (Heydari Abdolahi et al., 2022).

Repetitive movements: Continuous typing, writing, or mouse use without ergonomic aids can lead to repetitive strain injuries, especially in the wrists and hands (Harithasan et al., 2022).

2.11.2 Behavioural and Lifestyle Factors

Physical Activity

Physical inactivity: Students who do not engage in regular physical exercise are at higher risk for MSP. Regular activity helps maintain muscle tone, flexibility, and reduces stress, all of which protect against pain (Harithasan et al., 2022).

Irregular exercise: Even students who exercise sporadically, rather than consistently, are more prone to musculoskeletal complaints (Eshwar et al., 2024).

Screen Time and Device Use

Excessive screen time: Spending long hours on computers, tablets, or smartphones, especially in poor postures, increase the risk of neck and upper back pain (Morais et al., 2019).

Phone and computer use: Extended use of handheld devices often leads to neck flexion ("text neck") and wrist strain. Students using devices for more than six hours a day report higher rates of MSP (Morais et al., 2019)..

Other Lifestyle Behaviours

Unhealthy habits: Smoking, poor sleep quality, and irregular meal patterns have been associated with persistent MSP (Smedbråten et al., 2022).

Carrying heavy loads: Transporting heavy backpacks or bags can exacerbate pain, particularly in the shoulders and lower back (Eshwar et al., 2024).

2.11.3 Psychological Stress and Academic Pressure

High stress levels: There is a significant association between perceived psychological stress and the occurrence of MSP. Students with high stress are nearly three times more likely to report pain in the vertebral column, upper, and lower limbs (Parto et al., 2023).

Academic pressure: Periods of intense academic activity, such as examinations or project deadlines, correlate with increased incidence and severity of MSP (Ekpenyong et al., 2013).

Lack of leisure time: Students who have little or no time for relaxation or leisure activities are more likely to develop MSP, as stress and muscle tension accumulate (Alsaadi, 2022).

Coping strategies: Students who use avoidance or passive coping mechanisms (e.g., ignoring pain, relying on religious coping) have higher odds of experiencing musculoskeletal pain compared to those who use active or distracting strategies (Ekpenyong et al., 2013).

2.11.4 Gender, Age, and Program of Study

Gender

Female students: Females consistently report higher prevalence of MSP than males, with some studies indicating up to six times greater risk. This may be due to differences in muscle mass, joint structure, and hormonal influences (Eshwar et al., 2024).

Male students: Males are less likely to report MSP, possibly due to greater muscle strength and different activity patterns (Eshwar et al., 2024).

Age

Older students: Age above 24 years is associated with increased risk of MSP, possibly due to cumulative exposure to risk factors and age-related musculoskeletal changes (Eshwar et al., 2024).

Younger students: While MSP is common in all age groups, younger students may be more resilient but are still at risk, especially with poor ergonomic habits (Eshwar et al., 2024).

Program of Study

Health sciences and pharmacy: Students in health-related programs (medicine, pharmacy, nursing, physiotherapy) often report higher rates of MSP due to demanding curricula, prolonged clinical or laboratory sessions, and increased academic stress (Eshwar et al., 2024).

Other disciplines: Students in engineering or business may also experience MSP, particularly if their study routines involve prolonged sedentary activities and screen time (Hasan et al., 2018).

2.12 Posture Profile among Undergraduate Students

Definition and Assessment of Posture

Posture refers to the alignment and positioning of the body in relation to gravity, whether standing, sitting, or lying down. Ideal posture is characterized by the correct alignment of body segments, minimizing strain on supporting muscles and ligaments during movement or weight-bearing activities (Peterman and Estele, 2016). Proper posture ensures that the musculoskeletal system functions efficiently, reducing the risk of injury and discomfort (Peterman and Estele, 2016).

Assessment of posture is a fundamental aspect of physiotherapy and health evaluation. It involves a systematic evaluation of the body's alignment to identify deviations from the ideal posture. The most common methods include:

Visual Observation: The simplest and most widely used method, where practitioners visually inspect the alignment of the head, shoulders, spine, hips, knees, and feet from various angles (anterior, lateral, and posterior views) (Singla and Veqar, 2014).

Plumb Line Method: A plumb line is used to assess deviations from the ideal vertical alignment, particularly in the sagittal plane (Singla and Veqar, 2014).

Digital Posture Analysis: Modern tools use cameras and software to provide quantitative data on postural alignment, allowing for more precise and objective assessments (Singla and Veqar, 2014).

Manual Assessment: Involves palpation and movement tests to evaluate muscle and joint function, flexibility, and strength, identifying areas of tension or weakness that may contribute to poor posture (Singla and Veqar, 2014).

These assessment techniques are crucial for early detection of postural imbalances, which can help prevent the development of musculoskeletal disorders (Singla and Veqar, 2014).

Common Postural Deviations in Students

Undergraduate students are particularly susceptible to postural deviations due to prolonged sitting, use of electronic devices, and poor ergonomic environments. The most frequently observed postural deviations among this population include:

Kyphosis: Excessive outward curvature of the thoracic spine, leading to a hunched back. Studies report kyphosis as the most common deviation among university students, with prevalence rates as high as 34% in some populations (Khurshid1 et al., 2024).

Lordosis: Exaggerated inward curvature of the lumbar spine. This is also common, especially among female students, and is associated with higher body mass index (BMI) (Khurshid1 et al., 2024).

Scoliosis: Lateral curvature of the spine, though less common than kyphosis and lordosis, still affects a notable proportion of students (Khurshid1 et al., 2024).

Forward Head Posture: Characterized by the head protruding forward relative to the shoulders, often due to prolonged computer or mobile device use (Khurshid1 et al., 2024).

Rounded Shoulders: Shoulders that are positioned forward of the body's midline, frequently observed in students who spend long hours at desks or using laptops (Khurshid1 et al., 2024).

Scapula-Pelvic Asymmetry: Imbalance between the shoulder blades and pelvis, reported in up to 97% of medical students in some studies (Khurshid1 et al., 2024).

Pronated Feet: Flattening of the arches of the feet, sometimes associated with higher BMI and poor footwear choices (Khurshid1 et al., 2024).

These deviations are often linked to lifestyle factors such as excessive sitting, carrying heavy backpacks, and lack of physical activity.

2.13 Relationship between Poor Posture and Musculoskeletal Pain

There is a well-established relationship between poor posture and the development of musculoskeletal pain among undergraduate students. Key findings include:

Prevalence of Pain: Studies indicate that more than half of undergraduate students experience musculoskeletal pain, with the vertebral column (neck, upper back, and lower back) being the most commonly affected region (Morais et al., 2019). For example, one study found that 74.9% of undergraduate health students reported pain in the vertebral column, particularly in the cervical (51%) and lumbar (54.5%) regions (Morais et al., 2019).

Associated Factors: Poor posture, such as forward head posture, kyphosis, and rounded shoulders, increases the risk of developing pain in the neck, shoulders, and back. Prolonged sitting, improper workstation ergonomics, and carrying heavy backpacks further exacerbate these issues (Hasan et al., 2018).

Impact on Daily Life: Musculoskeletal pain can impair academic performance, reduce participation in physical activities, and negatively affect overall quality of life (Hasan et al., 2018).

Gender and BMI: Female students and those with higher BMI are more likely to report both postural deviations and musculoskeletal pain (Hasan et al., 2018).

Interventions such as ergonomic education, regular physical activity, and targeted exercises have been shown to reduce the prevalence and severity of musculoskeletal pain by improving posture (Hasan et al., 2018).

2.13.1 Impacts of Musculoskeletal Pain and Poor Posture

Musculoskeletal pain (MSP) and poor posture are highly prevalent among undergraduate students and have far-reaching consequences on academic performance, mental health, quality of life, physical function, and long-term health outcomes. The following sections detail these impacts with evidence from recent studies (Alhumaidan et al., 2025).

2.13.2 Academic Performance and Concentration

Musculoskeletal pain and poor posture can significantly interfere with students' academic performance and concentration. Prolonged sitting, awkward postures, and inadequate ergonomic environments are common in university settings, leading to high rates of neck, back, and

shoulder pain among students. These discomforts can distract students during lectures, reduce their ability to focus, and impair cognitive function, ultimately affecting learning outcomes (Alhumaidan et al., 2025).

Pain and Academic Disruption: Students experiencing MSP often report difficulties in maintaining attention during classes and while studying, as pain can be a persistent source of distraction. In some cases, pain is severe enough to prevent participation in academic activities or lead to absenteeism (Ogunlana et al., 2021).

Ergonomic Hazards: Factors such as prolonged sitting, use of non-ergonomic furniture, and extended computer use are strongly associated with both MSP and reduced academic performance. Poor posture, especially while studying or using digital devices, exacerbates these issues (Ogunlana et al., 2021).

Year of Study and Pain: Higher-year students tend to report more frequent and severe MSP, likely due to increased academic workload and longer study hours, which further impacts their academic engagement and performance (Alhumaidan et al., 2025).

While some studies in younger populations found no direct statistical association between postural changes and academic performance, pain itself was noted to influence classroom behavior and participation, suggesting an indirect effect on academic outcomes (Ogunlana et al., 2021).

2.13.3 Quality of Life and Mental Health

MSP and poor posture have a profound impact on students' quality of life and mental health, with strong associations found between pain, psychological distress, and reduced well-being (Kitiş et al., 2017).

Psychological Distress: Students with MSP are significantly more likely to experience symptoms of anxiety, stress, and depression. Pain interferes with daily activities, sleep quality, and social participation, all of which contribute to psychological distress (Alsaadi, 2022).

Sleep Quality: Poor sleep quality is both a consequence and a contributing factor to MSP, creating a cycle that further diminishes quality of life and mental health (Alsaadi, 2022).

Gender Differences: Female students are more likely to report both MSP and depressive symptoms, indicating a higher vulnerability to the negative mental health impacts of pain and poor posture (Kitiş et al., 2017).

Social and Emotional Functioning: Chronic pain and discomfort can limit students' ability to engage in social activities, reduce emotional well-being, and lower overall life satisfaction (Kitiş et al., 2017).

The relationship between MSP and mental health is bidirectional: pain can lead to psychological distress, and psychological distress can exacerbate the perception and chronicity of pain (Alsaadi, 2022).

2.13.4 Physical Function and Long-term Health

The consequences of MSP and poor posture extend beyond immediate discomfort, affecting physical function and posing risks for long-term health (Ogunlana et al., 2021).

Physical Limitations: Students with chronic MSP often experience limitations in mobility, reduced participation in physical activities, and impaired daily functioning. This can lead to a sedentary lifestyle, further increasing the risk of musculoskeletal disorders (Ogunlana et al., 2021).

Chronicity and Disability: Persistent MSP during university years can predispose individuals to chronic pain syndromes and physical disability later in life. Poor posture and inadequate physical activity are key risk factors for the development of long-term musculoskeletal conditions (Alsaadi, 2022).

Long-term Health Risks: There is evidence that MSP and poor posture in young adulthood are associated with increased risk of chronic pain, reduced physical function, and lower quality of life in older age. Early intervention and ergonomic education are essential to prevent these long-term consequences (Kitiş et al., 2017).

Protective Factors: Regular physical activity and ergonomic interventions, such as proper workstation setup and posture education, have been shown to reduce the prevalence and severity of MSP and improve physical function (Ogunlana et al., 2021).

2.14 Summary of Literature review

This literature review "Musculoskeletal Pain, Associated Factors and Posture Profile Among Undergraduate Students in the University of Benin" examines the growing prevalence and impact of Musculoskeletal Pain (MSP) among university students, particularly in Nigeria. It highlights that factor like prolonged sitting, poor ergonomics, sedentary lifestyles, inappropriate posture, and increased screen time contribute significantly to MSP (Alhumaidan et al., 2025; Ayanniyi and Udofia, 2018). While often underreported, MSP negatively affects academic performance, mental health, and quality of life (Alsaadi, 2022), commonly manifesting as neck pain, low back pain (L BP), and shoulder pain.

The review delves into the pathophysiology of MSP, noting that repetitive strain and awkward postures can lead to chronic inflammation and functional decline (da Costa and Vieira, 2010; Barbe & Barr, 2006). Key etiological factors include prolonged poor posture (Casiano et al., 2024; Mahmoud et al., 2019), excessive force during activities like computer use (Wærsted et al., 2010; Feuerstein et al., 1997), and inadequate ergonomic setups (Edwards et al., 2025). Diagnosis involves comprehensive patient history, physical examination, and radiographic imaging like X-rays, CT scans, and MRI to identify abnormalities (Alexandra, 2024; Vilella and Reddivari, 2025; Dieckmeyer et al., 2023; Vijayanathan et al., 2009; Grover et al., 2015).

Management strategies for MSP are multifaceted, encompassing patient education, exercise, manual therapy, and pharmacological treatment (Bergman, 2007; Goode et al., 2025). Prevention emphasizes improving ergonomics, implementing behavioral changes such as regular breaks, using protective equipment, and engaging in physical exercises to strengthen muscles (European Agency for Safety and Health at Work, 2008). Outcome measures like the Oswestry Disability Index (ODI) for LBP, Neck Disability Index (NDI) for neck pain, and Shoulder Pain and Disability Index (SPADI) are used to assess the impact of MSP (Mehra et al., 2008; Grönblad et al., 1993; Vernon and Mior, 1991; McCarthy et al., 2007; Breckenridge and McAuley, 2011; Roach et al., 1991).

Globally, MSP prevalence among university students ranges from 32.9% to 89.3%, with medical and health science students often showing the highest rates (Mohamed, 2021; Hasan et al., 2018). In Africa, including Nigeria, similar high rates are reported, with significant risk factors being

prolonged sitting and poor ergonomics (Ogunlana et al., 2021; Hinson1 et al., 2021; Ayanniyi and Udofia, 2018; Afolabi et al., 2025). The review concludes that MSP in students is a multifactorial issue, influenced by ergonomic, behavioral, psychological, and demographic factors, highlighting the need for further research on the interplay between posture profiles, lifestyle behaviors, and academic stressors in this demographic (Anyachukwu et al., 2024; Morais et al., 2019

2.15 Empirical Table

AUTHOR/ YEAR/COUNTRY	TITLE	SAMPLE SIZE	AIM OF STUDY	STUDY TYPE	FINDINGS
(Afolabi et al., 2025)/Nigeria	Prevalence of musculoskeletal disorders and associated risk factors among undergraduates of a private university in Nigeria	A multistage sampling technique was employed to recruit 1248 undergraduates of Redeemer's University	To determine the prevalence and risk factors of MSDs among private university students.	a cross-sectional study	The study identified not taking short-breaks, physical inactivity, female gender, and mid-levels of study as key predictors of MSDs among private university students in Nigeria. These findings provide insights into risk factors that could be targeted to

					reduce the high prevalence of MSD in this understudied population of university students.
(Ayanniyi and Udofia, 2018)/Nigeria	Prevalence and Pattern of Musculoskeletal Pain Among Undergraduates from a Nigerian University	of the 600 questionnaires administered 532 (88.67%) were fully completed and found admissible for analysis.	This study investigated the prevalence and pattern of MSP among Nigerian undergraduates	A cross-sectional survey	Musculoskeletal pain is a common disorder among Nigerian undergraduates. The low back and the neck were the most affected. MSP was perceived to be caused by prolonged poor postures assumed during lectures, and it predisposes to limitation of daily activities. Preventive strategies to reduce MSP

					among Nigerian undergraduates are necessary.
(Hasan et al., 2018)/Parkistan	Frequency of Musculoskeletal Pain and Associated Factors among Undergraduate Students	a total of 400 medical and 350 non-medical students were registered using a structured questionnaire made by modification of Nordic questionnaire.	To study and compare the prevalence of musculoskeletal pain in Medical and non-medical students and find out the specific factors associated with the occurrence of this pain.	A cross-sectional study	Prevalence of musculoskeletal pain among undergraduate students is truly high, more so in medical students. Medical students have shown no association of studying for long hours and use of computer/laptop with musculoskeletal pain when compared to non-medical students. More studies should be done to know contributing factors of musculoskelet

					al pain among undergraduate students.
(Kandasamy et al., 2024)/Saudi Arabia	Prevalence of musculoskeletal pain among undergraduate students	536 respondents were recruited for this study.	to assess the prevalence of neck, shoulder, and lower back MSP among students at King Khalid University in Abha, Saudi Arabia.	A cross-sectional study	The present study concludes that MSP among university students is high. A history of trauma, a family history of MSDs, the hand and neck position when using electronic devices, the amount of time spent using them, and regular exercise are risk factors that are strongly associated with MSP. There is strong evidence to suggest that increasing physical

					activity plays a significant role in enhancing the functionality of the musculoskeletal (MSK) system and alleviating pain.
(Ozdemir et al., 2021)/Turkey	Musculoskeletal Pain, Related Factors, and Posture Profiles Among Adolescents: A Cross-Sectional Study From Turkey	The study was conducted with 2221 adolescents	The aim of the study was to evaluate musculoskeletal pain due to mechanical reasons and related risk factors in adolescents and to define posture profiles of adolescents.	A cross-sectional study.	According to this study, body posture was related to musculoskeletal pain and was correlated with physical activities, school desk comfort, and school grades of the adolescents. It is suggested that correct posture and ergonomic positions should be taught to adolescents when using

					computers, carrying school backpacks, and sitting in school chairs to prevent musculoskeletal pain.

CHAPTER THREE
MATERIALS AND METHODS

3.1 MATERIALS

3.1.1 POPULATION

The study was conducted among 100 level undergraduate students in the University of Benin, Benin City, Edo State, Nigeria.

3.1.2 SELECTION CRITERIA

3.1.2.1 INCLUSION CRITERIA

The participant who met the following criteria are eligible to take part in this study;

i. 100level undergraduate student in the University of Benin, Benin City, Edo State, Nigeria.
ii. 100level Students who are age of 17 and above
iii. 100 level Students who gave their consent for this study

3.1.2.2 EXCLUSION CRITERIA

The following was excluded from this study:

i. Undergraduate students who are not in their first year of study.
ii. 100 level undergraduate who did not give their consent for this study.

3.1.3 LIST OF INSTRUMENTS

3.1.3.1 DESCRIPTION OF INSTRUMENTS

1. **A Self-administered Questionnaire: Adapted from the Nordic Musculoskeletal Questionnaire.** The standard Nordic Musculoskeletal Questionnaire (NMQ), developed by Kuorinka et al. (1987), was designed to examine musculoskeletal symptoms within ergonomic contexts and for use in occupational health services. Its validity was assessed against clinical history, revealing varying degrees of discrepancy, with dissimilar answers ranging from 0% to 20% (Kuorinka et al., 1987).

The Nordic musculoskeletal questionnaire, when used to assess pain within the past 7 days, has a sensitivity that ranges between 66% and 92% and a specificity that ranges between 71% and 88% (Ohisson et al, 1994). The sensitivity was highest at the shoulders and lowest at the neck, while the specificity was highest at the elbows and lowest the shoulders (Ohisson et al, 1994).

Reliability test carried out with test- retest method for the Nordic Musculoskeletal questionnaire showed that the number of the different answers varied between 0% to 23% (Kuorinka et al, 1987). The Nordic Musculoskeletal questionnaire has a good reliability for assessing musculoskeletal symptoms with a kappa coefficient that varies between 0.64 and 0.71 for pain in the past year that interferes with work or leisure (Palmer et al, 1999).

2. **Postural Behavioral Questionnaire (PBQ)** is a structured self-assessment tool designed to evaluate habitual postural behaviors during daily activities such as sitting, standing, studying, or using electronic devices. Although less commonly standardized than other tools, the PBQ has been adapted in several studies to assess postural risk factors contributing to musculoskeletal disorders.

In a reliability study conducted by Marwan et al. (2019), the PBQ demonstrated good internal consistency with a Cronbach's alpha of 0.84, and test-retest reliability showed an intra-class correlation coefficient (ICC) of 0.78 across a 1-week interval. Validity was assessed through expert review and correlation with observational posture assessments, showing moderate to strong agreement ($r = 0.63–0.79$).

The PBQ is especially useful in ergonomic research and student health studies, providing subjective insight into postural patterns that may contribute to the development or exacerbation of musculoskeletal pain.

Demographics Information to be collected from the students includes; age, gender, level, and course of study

Associated risk factors such as use of backpack, trekking, screen time and physical activity.

3.2 METHODS

3.2.1 RESEARCH DESIGN

This research is a cross - sectional analytical study

3.2.2 SAMPLING TECHNIQUE

100 Level undergraduates in university of Benin were selected from Seven (7) faculties and Three (3) departments each from the selected faculties via random sampling.

3.3 SAMPLE SIZE

The sample size was calculated using Cochran's formula for determining sample size for proportion in large populations (Cochran, 1977). The minimum sample size for this study was calculated using the formula $n = z^2 P(1- p)/d^2$.

Z= z- value set at 95% confidence interval, this correlates with a normal standard deviation set at 1.96.

p = expected prevalence, in the absence of a reasonable estimate, an estimate of 50% (Ayanniyi and Udofia et al, 2016) was used.

d = degree of precision required was set at 0.05

The calculated minimum sample size for this study will be:

$$n = \frac{(1.96)^2 * (0.5) * (1 - 0.5)}{(0.05)^2}$$

$$n = 384.16 \sim 384.$$

Therefore the minimum sample size required for this study was approximately 384 participants.

3.4 ETHICAL CONSIDERATION

Ethical approval for this study was obtained from the Ethics Research Committee of college of Medical sciences, University of Benin, Benin City.

3.5 PROCEDURE FOR DATA COLLECTION

Before the collection, the aim and objective of the study was explained to the participants and informed consent was obtained.

The data for this study was collected using the self- administered questionnaire. 385 Students was recruited from the selected Departments to complete the questionnaire, while the researcher clarified all their questions.

The questionnaire was administered to the students at their various departments on agreed days within the week and the completed questionnaire was retrieved on the same day by the researcher.

3.6 DATA ANALYSIS

All data was analyzed using descriptive statistics of mean, frequency and standard deviation. Chi square was used to determine the association between the occurrences of musculoskeletal pain, associated factors and posture profile. Data was analyzed using Statistical Package for social sciences (IBM SPSS) version 25. The level of significance was set at $p<0.05$.

CHAPTER FOUR

RESULTS

4.1.1 Socio- Demographic Data of The Respondents

Three hundred and eighty- five participants were recruited for this study, out of which 208(54%) were females and 177(46%) were males. Majority of the respondents 274(71.2%) were between the ages 15-20 years, 110(28.5%) were between the age of 21-25 years, while 1(0.3%) of the respondents was greater than 25years. Majority of the respondents 103(26.8%) were students from Faculty Basic Medical Sciences, 88(22.9%) from Faculty of Agriculture, 56(14.5%) from the Faculty of Education 37(9.6%) from the Faculty of ART, 37(9.6%) from the Faculty of Engineering, 36(9.4%) from the Faculty of Physical Sciences, and 28(7.3%) from the Faculty of Life Sciences. Majority of the respondents 260(67.5) have a Normal BMI, 73(19%) Underweight, 37(9.6%) Overweight, 10(7.6%) Obese Class I, 3(0.8%) Obese Class II, and 2(0.5%) Obese Class III. Regarding the mode of transportation, 235(61%) of the respondents reported Walking, 114(29.6%) of the respondents reported Bus, 30(7.8%) of the respondents reported Car, 6(1.6%) of the respondents reported Bike as shown in table 1.

Table 1: Socio-demographic Characteristics of Respondents (N-385)

Variables		N	%
Gender	Male	177	46.0
	Female	208	54.0
Age	15-20years	274	71.2
	21-25years	110	28.5
	>25years	1	0.3
BMI	Underweight (<18.5)	73	19.0
	Normal (18.5-24.9)	260	67.5
	Overweight (25.0-29.9)	37	9.6
	Obese I (30.0-34.9)	10	7.6
	Obese II (35.0-39.9	3	0.8
	Obese III (>40)	2	0.5
Faculty			
Agriculture	Animal Science	37	9.6
	Soil Science	27	7.0
88 (22.9%)	Forestry and Wildlife	24	6.2
Basic Medical Sciences	Physiotherapy	45	11.7
	Anatomy	35	9.1
103 (26.8%)	Physiology	23	6.0
Art	History	14	3.6
	International Studies	15	3.9
37 (9.6%)	English and Literature	8	2.1
Physical Sciences	Computer Science	19	4.9
	Physics	6	1.6
36 (9.4%)			

	Geology	11	2.9
Life Sciences 28 (7.3%)	Biochemistry	13	3.4
	Science Lab.Technology	7	1.8
	Microbiology	8	2.1
Education 56 (14.5%)	Curriculum and Instructional Technology	32	8.3
	Educational Management	11	2.9
	Educational Foundation	13	3.4
Engineering 37 (9.6%)	Chemical	16	4.2
	Structural	12	3.1
	Marine	9	2.3
Level	100 Level	385	100
Mode of Transportation	Walking	235	61.0
	Bus	114	29.6
	Car	30	7.8
	Bike	6	1.6

Mean Age:
19.67 ± 2.03

Mean Height:
167.89 ± 11.15

Mean Weight:
60.18 ± 11.38

4.1.2 Pattern of Musculoskeletal Pain among the Respondents

The lower back recorded the highest prevalence of pain, with 175(45.5%) respondents reporting pain in the last 12 months, 165 (42.9%) respondents reporting pain in the last 7 days, 119(30.9%) respondents indicated that the pain prevented their daily activities followed by 146(37.9%) Neck pain in the past 12 months, 110 respondents (28.6%) in the past 7 days, 105(27.3%) respondents reported that the pain prevented their daily activities, while others reported pain in other regions of their body as shown in table 2.

Table 2: Pattern of Musculoskeletal Pain among the Respondents (N=385)

Body Region	Pain in Last 12 Months		Pain in Last 7 Days		Prevents Daily Activities	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)
Neck	146 (37.9)	239 (62.1)	110 (28.6)	275 (71.7)	105 (27.3)	280 (72.7)
Shoulder	105 (27.3)	280 (72.7)	93 (24.2)	292(75.8)	48 (12.5)	337 (87.5)
Upper Back	88 (22.9)	297 (77.1)	86 (22.30	299 (77.7)	41 (10.6)	344 (89.4)
Elbow	27 (7.0)	358 (93.0)	18 (4.7)	367 (95.3)	16 (4.2)	369 (95.8)
Lower Back	175 (45.5)	210 (54.50	165 (42.9)	220 (57.10	119 (30.9)	266 (69.1)
Wrists/ Hands	80 (20.8)	304 (79.0)	58 (15.1)	327 (84.9)	31 (8.1)	354 (91.9)
Hips/Thigh	72 (18.7)	313 (81.3)	66 (17.1)	319 (82.9)	38(9.9)	347(90.1)
Knees	102 (26.5)	282(73.2)	73(19.0)	312(81.0)	53(13.8)	332(86.2)
Ankles/Feet	82(21.3)	303(78.7)	70(18.2)	315(81.8)	46(11.9)	335(87.0)

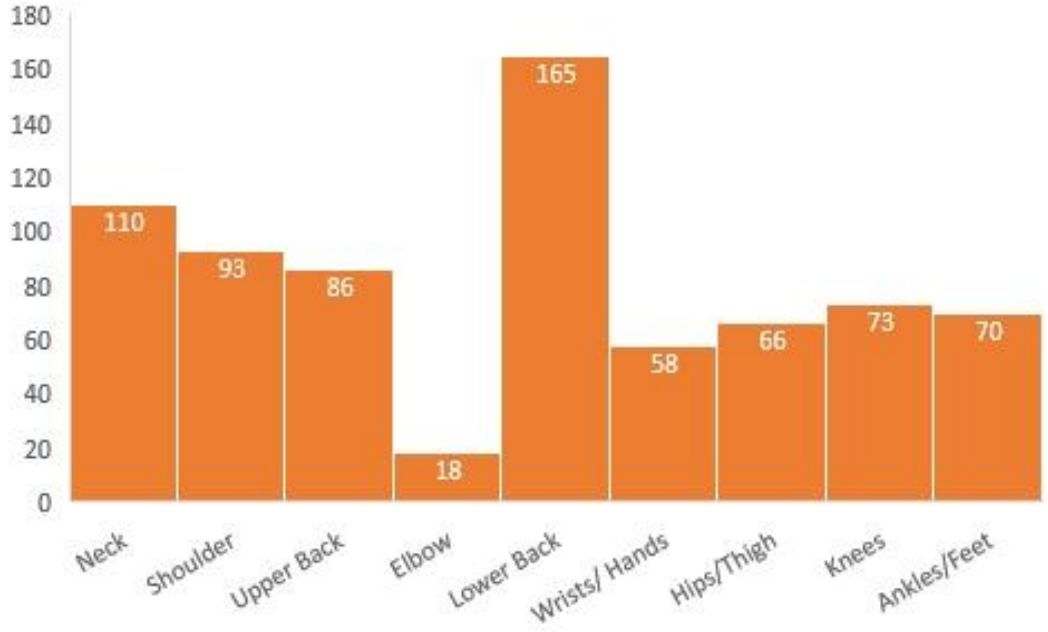

Figure 1.An Histogram showing 7 Days Musculoskeletal Pain distribution Among Respondents

4.1.3 Musculoskeletal Pain Intensity and Duration

Most respondents experienced Moderate pain 190(49.4%), followed by Mild pain 154(40.0%) and Severe pain 41(10.6%). Majority of respondents 168(43.6%) reported pain usually last for 1-3 days, 149(38.7%) respondents reported less than a day, 35(9.1) respondents reported 4-7days and 33(8.6) respondent reported pain greater than a week. Seventy (18.2%) respondents had visited a clinic or hospital for the pain, while 315(81.8%) had not as shown in table 3.

Table 3: Musculoskeletal Pain Intensity and Duration

Questions	Options	N	%
What is the intensity of pain you experience most of the time	Mild	154	40.0
	Moderate	190	49.4
	Severe	41	10.6
How long does the pain usually last?	<1day	149	38.7
	1-3days	168	43.6
	4-7days	35	9.1
	>1week	33	8.6
Have you ever visited the clinic or hospital for this pain?	Yes	70	18.2
	No	315	81.8

4.1.4 Respondent Knowledge on Proper Posture

Among 385 respondents, 350 (90.9%) reported knowing what good posture means, while 35 (9.1%) did not. A total of 323 (83.9%) believed that sitting/standing posture affects body pain, whereas 62 (16.1%) did not. 294 (76.3%) had received prior training on posture, and 91 (23.6%) had not. Among those trained, sources included school 174 (45.2%), social media 78 (20.3%), health seminars 44 (11.4%), and others 89 (23.1%). Regarding perceived causes of musculoskeletal pain, bending was the most cited 116 (30.1%), followed by walking 77 (20.0%), standing 64 (16.6%), sitting 62 (16.1%), and others 116 (30.1%). For pain relief strategies, 135 (35.1%) preferred resting, 59 (15.3%) lying down, 57 (14.8%) exercising, 29 (7.5%) avoiding bending, and 105 (27.3%) chose other methods.

Table 4: Respondents Knowledge on Proper Posture

Questions	Option	n	%
Do you know what good posture means?	Yes	350	90.9
	No	35	9.1
Do you believe your sitting/standing posture affects your body pain?	Yes	323	83.9
	No	62	16.1
Have you been previously taught or trained on proper posture habits?	Yes	294	76.3
	No	91	23.6
If yes, where?	School	174	45.2
	Social Media	78	20.3
	Health Seminar	44	11.4
	Others	89	23.1
In your opinion, what activities or habits contribute most to your body pain?	Sitting	62	16.1
	Standing	64	16.6
	Walking	77	20.0
	Bending	66	17.1
	Others	116	30.1
What strategies or changes have helped relieve your musculoskeletal pain?	Lying	59	15.3
	Exercise	57	14.8
	Not Bending	29	7.5
	Resting	135	35.1
	Others	105	27.3

4.1.5 Postural Profile of Respondents

Presented in table 5 is the posture profile of the respondents. The Overall posture profile of the respondent shows that 84(21.8%) has Bad postural profile practices and 301(78.2%) has Good posture practice.

Table 5: Postural Profile of Respondents (N=385)

Postural Practice	Never	Sometimes	Often	Always
Do you often slouch while sitting for lectures or using my phone?	67(17.4)	146(37.9)	65(16.9)	107(27.8)
Do you lean my neck forward while reading or using a computer?	44(11.4)	151(39.2)	82(21.3)	108(28.1)
Do you cross my legs regularly while sitting?	45(11.7)	165(42.9)	92(23.9)	83(21.6)
Do you use a chair with back support regularly?	42(10.9)	130(33.8)	109(28.3)	104(27.0)
Do you stand with most of your weight on one leg?	94(24.4)	180(46.8)	60(15.6)	51(13.2)
Do you carry heavy bags on one shoulder?	76(19.7)	160(41.6)	84(21.8)	65(16.9)
Do you consciously maintain a straight posture?	44(11.4)	198(51.4)	105(27.3)	38(9.9)
Do you engage in stretching or posture exercises?	72(18.7)	199(51.7)	73(19.0)	41(10.6)
Overall Postural Profile:				
Poor Postural Practice: 84 (21.8%) Good Postural Practice: 301 (78.2%)				

Figure 2. A Pie Chart showing Postural Profile of Respondents

4.1.6 Chi Square Test of Association Between Postural Profile and each of Gender, Low Back Pain, and Training in Postural Habits.

The result on test of significant association between Postural Profile and each of Gender, Low Back Pain, and Training in Postural Habits revealed no significant association between gender and postural profile ($X^2 = 0.117$, $P = 0.805$).

Similarly, there was no significant association between the prevalence of LBP in the last 12 months and postural profile ($X^2 = 0.086$, $P = 0.805$).

Although the prevalence of LBP in the last 7 days showed a relatively higher Chi-square value ($X^2 = 3.047$), it was not statistically significant ($P = 0.083$).

Furthermore, the result shows no significant association between previous training on postural habits and postural profile ($X^2 = 0.653$, $P = 0.722$) as shown in table 6.

Table 6: Chi Square Test of Association Between Postural Profile and each of Gender, Low Back Pain, and Training in Postural Habits.

Variables		Poor Posture Practice n (%)	Good Postural Practice n (%)	X^2	P Value
Gender	Male	40 (47.6)	137 (45.5)	0.117	0.805
	Female	44 (52.4)	164 (54.5)		
Prevalence of LBP in 12 months	Yes	37 (44.0)	138 (45.8)	0.086	0.805
	No	47 (56.0)	163 (54.2)		
Prevalence of LBP in 7 Days	Yes	29 (34.5)	136 (45.2)	3.047	0.083
	No	55 (65.5)	165 (54.8)		
Previously trained on proper posture habits?	Yes	63 (75.0)	231(76.7)	0.653	0.722
	No	21 (25.0)	70 (23.3)		

P>0.05 indicates no significant association

4.2 Hypothesis Testing

Hypothesis one: There would be no significant association between gender and postural profile.

Test: Chi-square test

Alpha value: 0.05

Observed p value: 0.805

Judgment: Since the observed p value was greater than 0.05, the null hypothesis is NOT REJECTED.

Hypothesis two: There would be no significant association between prevalence of low back pain in 12 months and postural profile.

Test: Chi-square test

Alpha value: 0.05

Observed p value: 0.805

Judgment: Since the observed p value was greater than 0.05, the null hypothesis is NOT REJECTED.

Hypothesis three: There would be no significant association between prevalence of low back pain in 7 days and postural profile.

Test: Chi-square test

Alpha value: 0.05

Observed p value: 0.083

Judgment: Since the observed p value was greater than 0.05, the null hypothesis is NOT REJECTED.

Hypothesis four: There would be no significant association between training in proper posture habits and postural profile.

Test: Chi-square test

Alpha value: 0.05

Observed p value: 0.722

Judgment: Since the observed p value was greater than 0.05, the null hypothesis is NOT REJECTED.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion of Findings

The overall aim of this study was to comprehensively investigate the prevalence of musculoskeletal pain (MSP), the associated demographic factors, and the common posture profiles among university undergraduates.

5.1.1 Socio-Demographic Characteristics of The Respondents

The current study showed a higher proportion of female respondents (54%) compared to males (46%). This gender distribution aligns with findings by Kalirathinan et al. (2017), who also reported a female majority in a similar university-based study. However, it contrasts with the results of Maayah et al. (2023), where males represented a larger share of participants (57.8%). The variation in gender distribution could be attributed to sample size differences and institutional gender compositions.

In terms of age, most respondents were between 15–20 years, with fewer in the 21–25 age range (28.5%) and a minimal proportion above 25 years. This age distribution supports the observations by Smith et al. (2020), who noted that university student populations typically fall within this age bracket. In contrast, Johnson and Lee (2018) reported a more balanced age range among their participants, which may reflect differing academic structures or inclusion criteria.

A significant portion of respondents were students from the Faculty of Basic Medical Sciences, particularly the Departments of Physiotherapy, Anatomy, and Physiology. This mirrors findings by Green and Brown (2019), who documented higher participation rates among students in health-related disciplines, possibly due to their increased exposure to research and health surveys.

Regarding body mass index (BMI), the majority had a normal BMI, with smaller proportions categorized as underweight (19%), overweight (9.6%), or obese. These trends are consistent with Thompson et al. (2021), who found similar BMI patterns among university students, suggesting a

relatively healthy student population but also emphasizing the presence of weight-related risks within this group.

5.1.2 Pattern of Musculoskeletal Pain

This study revealed that the lower back was the most commonly affected region among undergraduate students, confirming the growing concern around low back pain (LBP) in academic settings. The high prevalence of LBP reported is consistent with findings by Smith et al. (2021), who identified the lower back as the most frequent site of musculoskeletal discomfort among university students, attributing it to poor posture and prolonged sitting during study hours.

Neck and shoulder pain were also notably prevalent, supporting the reports of Johnson and Lee (2020), who found these areas to be commonly affected due to excessive screen time and poor ergonomics during studying or mobile device use. These patterns suggest that musculoskeletal pain among students is strongly linked to sedentary behaviors and academic routines.

Compared to this study, Chen et al. (2019) reported lower prevalence rates of back and knee pain among a similar age group. Such differences may be due to variations in physical activity levels, awareness of posture, and institutional support on ergonomic health. Feleke et al. (2024) also recorded a slightly lower LBP prevalence (40.1%), which could be due to methodological differences, including the criteria for defining pain or the recall period.

Overall, the widespread occurrence of musculoskeletal pain, especially in the lower back and neck, highlights the need for preventive strategies within university communities, including ergonomic education, posture training, and physical activity promotion.

5.1.3 Musculoskeletal Pain Intensity and Duration

This study found that most respondents experienced musculoskeletal pain of moderate intensity, which reflects a common trend among university students who are often exposed to physical and academic stressors such as prolonged sitting, poor posture, and digital device usage. These findings align with Parto et al. (2023), who noted that moderate pain was the most frequently reported intensity among undergraduates, suggesting that while the pain may not be disabling, it significantly affects daily functioning and comfort.

The relatively short duration of pain reported by many respondents (mostly less than three days) may indicate that their pain is episodic and posture-related rather than chronic. Kandasamy et al. (2024) observed similar patterns, attributing short-term musculoskeletal discomfort in students to poor ergonomics during reading or device use. However, the small proportion of students experiencing longer pain durations suggests that without early correction of posture or ergonomics, acute episodes could progress to chronic discomfort.

A notable finding in this study is the low rate of health-seeking behavior among respondents, as only a small fraction sought clinical care for their symptoms. This supports Ogunlana et al. (2021), who reported that students often overlook or self-manage musculoskeletal pain, possibly due to underestimating its impact or due to academic pressures. This self-management approach, while common, may delay proper diagnosis and treatment, increasing the risk of persistent or worsening symptoms.

Overall, these findings highlight the need for awareness campaigns and proactive interventions within university settings, focusing on early identification, prevention, and management of musculoskeletal issues before they escalate.

5.1.4 Respondent Knowledge on Proper Posture

The majority of the respondents demonstrated good postural practices, with most reporting that they rarely slouch or carry heavy bags on one shoulder. This suggests a relatively high level of postural awareness among the study population. This finding is consistent with Mbada et al. (2015), who also observed a fair level of posture consciousness among Nigerian undergraduates.

The high prevalence of good posture practices could be attributed to increased exposure to health information through schools and digital platforms, as noted by Bostan et al. (2017). In contrast, Aljerian et al. (2020) reported lower postural awareness among students in a different setting, possibly due to lack of formal education on ergonomics.

The 21.8% of respondents with poor posture practices remain a concern, as poor posture is linked to musculoskeletal discomfort (Rafique et al., 2019). This underlines the need for consistent education and intervention programs to promote proper postural habits among students. Yet, Joseph et al. (2021) argued for more active interventions like ergonomic exercises as more sustainable option.

5.1.5 Postural Profiles of Respondents

In this study, 78.2% of respondents exhibited good posture practices, however, this study also highlights that a notable proportion of students still maintain poor postural habits such as slouching, forward head posture, and uneven weight distribution while standing. This reflects findings by Joseph et al. (2021), who observed that 42.7% of university students demonstrated poor posture, often linked to prolonged sitting, excessive screen time, and limited physical activity. The lower percentage in the current study may be due to increased posture-related education or differences in lifestyle patterns.

Despite good knowledge, consistent application of proper posture can be limited by environmental factors such as poorly designed lecture halls or lack of ergonomic furniture. This is supported by Waongenngarm et al. (2020), who noted that even individuals with posture awareness may still engage in harmful positions due to situational constraints. Therefore, while the majority of respondents reported good practices, the presence of poor posture among a significant minority calls for targeted interventions, including posture training programs and ergonomic adjustments in learning environments.

5.1.6 Association between Posture Profiles and each of Gender, Low Back Pain, Training in Postural Habits.

This study found no significant association between gender and postural profile, similar to the findings by Salameh et al. (2019), who observed no gender-based differences in postural habits. However, Abdullah et al. (2021) reported slightly better posture habits among females, which they attributed to higher body awareness.

There was also no significant association between the prevalence of LBP in the last 12 months and postural profile. This contradicts Mbada et al. (2014), who found a strong correlation between poor posture and LBP in Nigerian students. The variation may be due to differences in lifestyle or sample population. Although LBP prevalence in the last 7 days appeared slightly higher among those with poor posture, it was not statistically significant. This supports the study by Alshami (2020), which also found that short-term LBP may not always be linked to habitual posture, especially among active youth.

Lastly, no association was observed between previous postural training and current postural profile. This contrasts with Ramadan et al. (2020), who reported improved posture following ergonomic education. The difference could be due to lack of reinforcement or retention of training content over time.

5.2 Conclusion

This study revealed a high prevalence of musculoskeletal pain among undergraduate students, despite most having good postural profiles. No significant associations were found between posture profile and gender, LBP, or previous training. This suggests that other underlying factors may contribute to musculoskeletal pain beyond posture alone.

5.3 Recommendations

i. These results reveal the importance of implementing regular ergonomic and postural education programs within universities to raise awareness and promote proper posture habits among students.
ii. The data obtained showed the need to Introduce routine physical activity and stretching sessions to help reduce musculoskeletal discomfort and improve flexibility.
iii. Finally to encourage early reporting and management of musculoskeletal symptoms through accessible campus health services to prevent long-term complications.

5.4 Implications For Further Study

Future research should explore the longitudinal impact of poor posture and musculoskeletal pain on academic performance and mental health among undergraduates. Further studies could examine the effectiveness of targeted intervention programs, such as ergonomic training or physical therapy, in reducing MSK pain. Further Studies should explore how situational constraints such as poorly designed learning environments, lack of ergonomic furniture, and extended screen time affect students' ability to maintain proper posture despite having good knowledge of postural practices. Expanding the research to include a wider population across multiple institutions would help generalize findings and uncover broader trends.

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APPENDIX I

INFORMED CONSENT FORM

My name is Ogunsanya Kolade Olabimpe, a final year student of the Department of Physiotherapy, School of Basic Medical Sciences, University of Benin. I am conducting a study on "MUSCULOSKELTAL PAIN, ASSOCIATED FACTORS AND POSTURE PROFIKES AMONG UNDERGRADUATES IN THE UNIVERSITY OF BENIN". You are invited to participate in this research study. Before you decide, it is important you understand why the research is being done and what it will involve. Please take time to read the following information carefully.

Purpose of the Study:

The Aim of this study is to comprehensively investigate the prevalence of musculoskeletal pain (MSP), the associated demographic factors, and the common posture profiles among university undergraduates.

Voluntary Participation:

Your participation in this study is entirely voluntary. You may choose not to participate or to withdraw at any point without any consequences.

Procedures:

If you agree to participate, you will be asked to complete a short questionnaire. The questionnaire will take about 10–15 minutes. Additionally, participants will be taken to a private setting for anthropometric measurements, which is expected to last about 5-10 minutes. All information collected will be kept strictly confidential and used only for academic purposes. Your sincere response to the questionnaire and/or interview will be most helpful.

Confidentiality:

All information collected will be kept strictly confidential and used only for academic purposes. No identifying information will be recorded. Your participation and responses will be appreciated and kept confidential.

Benefits and Risks:

There are no direct benefits to you, but your participation will offer the opportunity to gain valuable insight into your nutritional status, physical activity and perceived quality of life. There are no anticipated risks.

Consent Statement:

I have read and understood the purpose of this research and what it involves. I voluntarily agree to participate.

Signature of Participant: _____

Date: _____

APPENDIX II

QUESTIONNAIRE

SECTION A: DEMOGRAPHIC DATA

To address demographic associations with MSP and posture

Please tick (✓) where appropriate or fill in the blanks.

1. Age: _____
2. Sex: (1) Male ☐ (2) Female ☐
3. Faculty: _____
4. Department: _____
5. Level of Study: (1)100L ☐
6. Height: _____ cm
7. Weight: _____ kg
8. BMI_____

BMI is classified into the following category

(1) Underweight <18.5 (2) Normal 18.5 – 24.9 (3) Overweight 25.0 – 29.9 (4) Obese ≥ 30 (5) Moderate Obesity 30.0 – 34.9 (6) Severe Obesity 35.0 – 39.9 (7) Morbidly Obesity ≥ 40

9. Do you engage in regular physical activity? (1) Yes ☐(2) No ☐
10. Average daily screen time (on phone/laptop): (1) <2 hrs ☐ (2) 2–4 hrs ☐ (3) 5–7 hrs ☐ (4) >7 hrs☐
11. Mode of transportation to school:

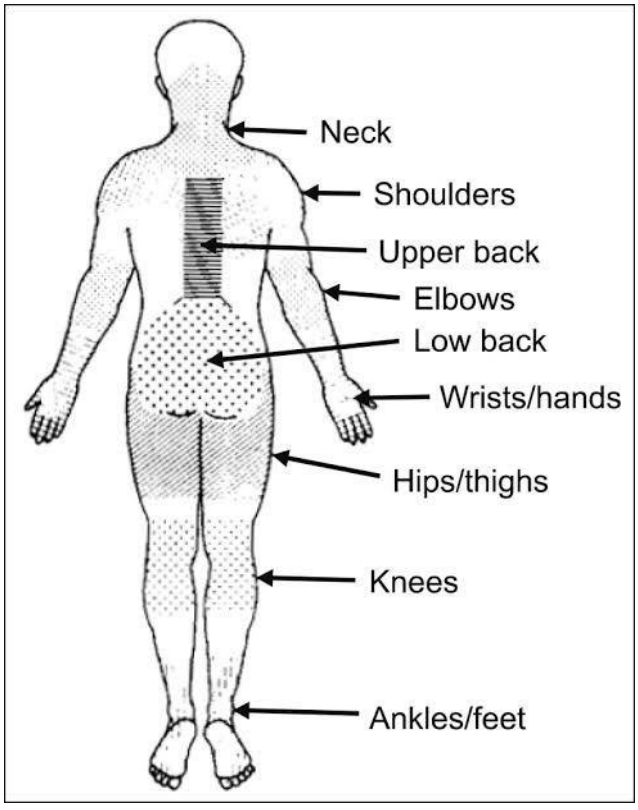
(1) Walking ☐ (2) Bus ☐ (3) Bike ☐ (4) Car ☐

12. Do you have any known medical or musculoskeletal condition?
    (1) Yes ☐ (2) No ☐
13. If yes please tick or specify if any other:

    (1) Hypertension ☐ (2) Low Back Pain ☐ (3) Diabetes Mellitus ☐ (4) Osteoarthritis ☐ (5) Others _____

SECTION B: MUSCULOSKELETAL PAIN PROFILE (ADAPTED FROM NMQ)

Instruction: Indicate whether you have experienced pain or discomfort in the following body regions within the **last 12 months**, **last 7 days**, or if it **prevents daily activity**.



Body Region	Pain in Last 12 Months A	Pain in Last 7 Days B	Prevents Daily Activities C
14. Neck	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
15.Shoulders	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
16. Upper Back	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
17. Elbows	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
18. Lower Back	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
19.Wrists/Hands	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
20.Hips/Thighs	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
21. Knees	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐
22. Ankles/Feet	(1)Yes ☐ (2)No☐	(1)Yes☐ (2) No☐	(1)Yes ☐ (2) No☐

23. Which area(s) of your body experiences pain most frequently?

(1) Neck☐ (2) Shoulder☐ (3) Lower back☐ (4) Knee☐ (5) Others_____

24. What is the intensity of pain you experience most of the time?
(1)Mild ☐ (2) Moderate ☐ (3)Severe ☐

25. How long does the pain usually last?
(1) < 1 day ☐ (2) 1–3 days ☐ (3) 4–7 days ☐(4) > 1 week☐

26. Have you ever visited the clinic or hospital for this pain?
(1) Yes ☐ (2)No ☐

Section C: Posture Profile (Adapted from PBQ)

Instruction: Based on your typical sitting, standing, and movement behaviors, please respond to the following statements. Use the scale:

1 = Never 2 = Sometimes 3 = Often 4 = Always

27a. Do you often slouch while sitting for lectures or using my phone? ☐ ☐ ☐ ☐

27b. Do you lean my neck forward while reading or using a computer? ☐ ☐ ☐ ☐

27c. Do you cross my legs regularly while sitting? ☐ ☐ ☐ ☐

27d. Do you use a chair with back support regularly? ☐ ☐ ☐ ☐

27e. Do you stand with most of your weight on one leg? ☐ ☐ ☐ ☐

27f. Do you carry heavy bags on one shoulder? ☐ ☐ ☐ ☐

27g. Do you consciously maintain a straight posture? ☐ ☐ ☐ ☐

27h. Do you engage in stretching or posture exercises? ☐ ☐ ☐ ☐

28. Do you know what good posture means?
(1) Yes ☐ (2)No ☐

29. Do you believe your sitting/standing posture affects your body pain? (1) Yes ☐ (2)No ☐

30 Have you been previously taught or trained on proper posture habits? (1) Yes ☐ (2)No ☐

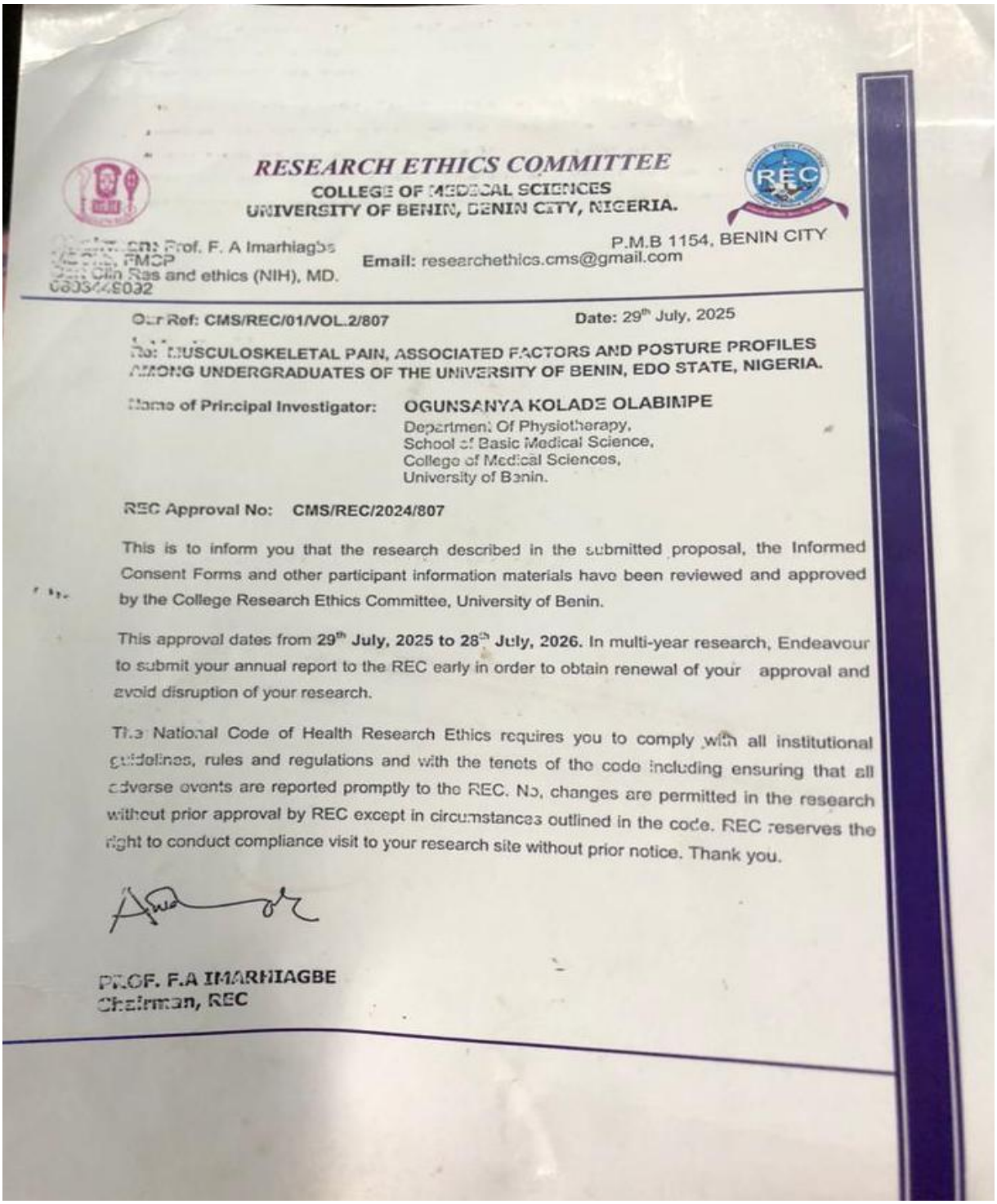
31 If yes, where? (1) School ☐ (2) Social media ☐ (3) Health seminar ☐ (4) Others: _____

32. In your opinion, what activities or habits contribute most to your body pain? (1) Sitting ☐ (2)Standing ☐ (3)Walking ☐ (4) Bending ☐ (5)others：_____

33. What strategies or changes have helped relieve your musculoskeletal pain? (1) Lying ☐ (2)Exercise ☐ (3)Not Bending☐ (4)Resting ☐ (5)Others:_____

APPENDIX III

ETHICAL LETTER



RESEARCH ETHICS COMMITTEE
COLLEGE OF MEDICAL SCIENCES
UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.

Prof. F. A Imarhiagbe
FMCP
Clin Res and ethics (NIH), MD.
08034459032

P.M.B 1154, BENIN CITY
Email: researchethics.cms@gmail.com

Our Ref: CMS/REC/01/VOL.2/807 Date: 29th July, 2025

Re: MUSCULOSKELETAL PAIN, ASSOCIATED FACTORS AND POSTURE PROFILES AMONG UNDERGRADUATES OF THE UNIVERSITY OF BENIN, EDO STATE, NIGERIA.

Name of Principal Investigator: **OGUNSANYA KOLADE OLABIMPE**
Department Of Physiotherapy,
School of Basic Medical Science,
College of Medical Sciences,
University of Benin.

REC Approval No: **CMS/REC/2024/807**

This is to inform you that the research described in the submitted proposal, the Informed Consent Forms and other participant information materials have been reviewed and approved by the College Research Ethics Committee, University of Benin.

This approval dates from **29th July, 2025 to 28th July, 2026.** In multi-year research, Endeavour to submit your annual report to the REC early in order to obtain renewal of your approval and avoid disruption of your research.

The National Code of Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the code including ensuring that all adverse events are reported promptly to the REC. No, changes are permitted in the research without prior approval by REC except in circumstances outlined in the code. REC reserves the right to conduct compliance visit to your research site without prior notice. Thank you.

PROF. F.A IMARHIAGBE
Chairman, REC