PREVALENCE AND PATTERN OF SPINAL PAIN AMONG BASIC MEDICAL SCIENCES STUDENTS DURING CLINICAL POSTINGS IN THE UNIVERSITY OF BENIN

BY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES, COLLEGE OF MEDICAL SCIENCES UNIVERSITY OF BENIN IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF PHYSIOTHERAPY (B.PT) DEGREE

OCTOBER, 2025

CERTIFICATION

This dissertation by Oloye Daniel Chukwudi is accepted in its presented 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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DEDICATION

This dissertation is dedicated to God and to my Parents, Mr. Christopher Oloye, Mrs. Oby Oloye, to my elder brother Mr Harrison Oloye, and the Obinyan family who made this work a reality.

ABSTRACTS

Background:

Spinal pain (SP), encompassing low back, neck, and upper back discomfort, is a prevalent musculoskeletal problem among healthcare professionals and students. Clinical postings expose Basic Medical Sciences students to physically demanding tasks such as prolonged standing, awkward postures, and repetitive patient handling, predisposing them to SP. Despite its burden, limited research has examined its prevalence and associated factors among students across different health disciplines in Nigeria.

Aim:

This study aimed to evaluate the prevalence, pattern, contributing factors, coping strategies, and functional limitations related to spinal pain among Basic Medical Sciences students during clinical postings at the University of Benin.

Methods:

A cross-sectional descriptive study was conducted among 351 students from Physiotherapy, Nursing, Radiography, and Medical Laboratory Science departments. Data were collected using a structured questionnaire that included sociodemographic characteristics, spinal pain prevalence (12-month and 7-day recall), and the Spinal Functional Index (SFI). Data were analyzed using descriptive and inferential statistics, with significance set at $p < 0.05$.

Results:

The 12-month prevalence of lower back pain, upper back pain, and neck pain was 51.9%, 12.5%, and 21.4%, respectively. Within the past 7 days, prevalence rates were 42.2%, 14.8%, and 17.1%. Physiotherapy and Nursing students reported the highest occurrence of spinal pain. Although 20.5% of respondents sought medical care or missed activities due to pain, most reported mild functional limitations (mean SFI = 4.57 ± 2.78). There was no significant relationship between age and functional limitation ($r = -0.028$, $p = 0.597$), or between posting hours and functional limitation (*r* = 0.104, *p* = 0.052). Gender showed no significant association with spinal pain prevalence.

Conclusion:

Spinal pain is highly prevalent among Basic Medical Sciences students during clinical postings, particularly among those in physiotherapy and nursing. The findings underscore the need for ergonomic education, workload management, and institutional policies that prioritize student musculoskeletal health.

Keywords: Spinal pain, Basic Medical Sciences students, clinical postings, ergonomics, musculoskeletal disorders. Low back pain, University of Benin.

ACKNOWLEDGEMENTS

I am grateful to God for the successful completion of this work and for His protection and Guidance throughout my stay on this campus.

Special thanks to my supervisor PT. Okhuahesuyi Eguagie for his assistance and guidance during the course of the research study. Despite the busy schedule he devoted his time to listen to me, answer questions, read through my work and also make corrections. May the good Lord bless and reward you in abundance.

I also appreciate the Head of the Department, Dr. Mrs C.O Obaseki and all the lecturers of the Department of Physiotherapy, University of Benin who imparted knowledge on me during my stay in school. A special thanks to the Head of Department, the directors, chiefs, interns and other clinicians in the Department of Physiotherapy, University of Benin Teaching Hospital, I appreciate the knowledge and skills imparted on me during my studentship in the University of Benin Teaching Hospital.

I also give a special thanks to my parents, Mr. and Mrs, Oloye and my siblings, Harrison, Stephen and Shedrach Oloye and Obinyan family for their words of advice, encouragement, prayers and financial support and help throughout my stay as a student of University of Benin. I will also like to appreciate my friends Emmanuel Mccartney, Uthiho Christian, Efosa Martins, Uwefiri Abigail and Oludare Samuel for their assistance during the period of my data collection. I will also like to appreciate my friends Pifi, Philip, Frank, AFS, Joachim and Group 6 posting buddies. My special thanks and gratitude to all my classmates, and all the students that volunteered to participate in my study and to others which the confines of this page will not permit me to state.

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CHAPTER ONE

INTRODUCTION

1.1 Background Of The Study

Medical students undergoing clinical postings are routinely exposed to considerable physical demands, including prolonged standing, patient ambulation and physically intensive tasks such as lifting and repositioning patients. These activities often lead to MSK discomfort, with common complaints involving lower back and neck pain, particularly following extended clinical shifts. Such symptoms are frequently reported from various students, indicating that the issue is widespread among clinical students. Despite its prevalence, the physical burden of clinical training is often underestimated, potentially contributing to the early onset of SP.

Spinal pain can be defined as pain or discomfort in the spine, including the cervical, thoracic, and lumbar regions, which can be caused by various factors, such as muscle strain, disc problems, poor posture, injury, or degenerative conditions (Hoy et al., 2010). Spinal pain, including low back pain (LBP), neck pain, shoulder pain and related musculoskeletal disorders, is a significant occupational health issue among healthcare professionals and students. Basic Medical Sciences students such as Physiotherapists, Nurses, Radiographers, and Medical Laboratory Scientists- are particularly susceptible to spinal pain during clinical postings due to prolonged standing, repetitive movements, and poor ergonomic practices. Spinal pain is a major contributor to disability worldwide, with healthcare workers being particularly vulnerable. According to a systemic review by (Smith et al.,(2020), between 60% and 80% of healthcare professionals experience low back pain (LBP) at some point in their careers. This issue isn't limited to a seasoned professionals, students in clinical posting also face high rates of pain due to early exposure to physically demanding tasks. For instance, Fonseca et al. (2019) found that 65% of nursing students in Brazil experienced LBP during clinical postings, often linked to patient handling and prolonged static postures. Likewise, Mitchell et al. (2017) reported a 55% rate of neck pain among Australian physiotherapy students, primarily associated with manual therapy practices. The World Health Organization (WHO, 2021) highlights occupational ergonomic risks- such as repetitive lifting and inadequate rest- as primary contributors to spinal discomfort. Although awareness initiatives exist in high-income nations, the consistent application of preventive strategies in both educational and clinical environments remains limited, leaving students continually exposed to these risks.

In West Africa, the problem is even more pronounced due to systemic issues like overcrowded clinical settings, outdated equipment, and limited awareness of ergonomic practices. A cross-sectional study in Ghana revealed that 72% of nursing studentd experienced LBP during clinical postings, largely due to repeated patient transfers and long working hours (Ohene et al., 2018). Similarly, in South Africa, Radiography students reported neck pain and LBP attributed to the sustained use of heavy imaging machinery (Siyanda et al., 2023). Deep-rooted cultural beliefs that view pain as a normal part of healthcare work discourage students from speaking up or seeking support.

Moreover, most training programs in the region do not include ergonomic education, leaving students unprepared to protect themselves from injury.

While Nigeria shares many of the health challenges seen across West Africa, its students face deeply rooted, everyday struggles in clinical training. Research from the University of Lagos paints a vivid picture: nearly 7 in 10 medical laboratory students battled lower back pain during clinical postings, often due to spending hours hunched over a microscope in poorly designed workspaces (Akinpelu et al., 2016). Over in Ibadan, Physiotherapy students shared similar stories-58% reported neck pain from the physical strain of lifting and repositioning patients, a routine part of their training (Tinubu et al., 2010). Behind these numbers lie harsh realities: overcrowded clinics force students into cramped, uncomfortable positions, while outdated equipment like nonadjustable beds add to their physical strain, and a lack of institutional policies addressing student health during postings. A 2021 survey of Nigerian nursing students highlighted that only 12% received basic ergonomic practices to protect themselves, a stark reminder of how the system overlooks their well-being (Ogunlana et al., 2021). These findings don't just highlight problems, they tell a story of students learning to care for others while struggling in environments that don't prioritize caring for them.

1.2 Statement Of Problem

Spinal pain particularly (LBP) is a growing concern and a serious issue among medical students (ilic et al., 2023), especially during their clinical postings. These students often find themselves in physically demanding situations that put strain on their bodies. Nursing students for example, constantly report neck and back pain from lifting patients or working in awkward positions for long hours. Radiography students may deal with neck and back pain from handling heavy equipment and performing repetitive tasks. In the lab, Medical laboratory science students spend extended periods standing or sitting in one position, leading to discomfort in the spine, especially in the lower back and neck. Even Physiotherapy students, despite their training in body mechanics, are not exempt from these problems during hands-on clinical practice.

What's surprising is that while there's a lot of research on spinal pain in healthcare workers generally, but to the best of the researcher's knowledge there's not much that looks specifically at students in these individual disciplines during clinical training. This project hopes to close that gap by shedding light on the unique challenges each group faces. By identifying the common causes, prevalence and pattern of spinal pain among them, which hopefully will become easier to recommend practical solutions like better ergonomics, taking regular breaks, improving posture, or doing targeted exercises. Ultimately, the goal is to help these students stay healthy, comfortable, and able to focus on their studies and future careers.

This study will therefore aim to answer the following questions;

i. What is the association between clinical postings in the various disciplines and the occurrence of spinal pain among Basic Medical Sciences students at the University of Benin?
ii. What is the difference in the prevalence of spinal pain among students of different Basic Medical Science disciplines (Physiotherapy, Nursing, Radiography, Medical Laboratory Science)?

iii. What is the relationship between students' age and the functional limitations caused by spinal pain?

iv. What is the relationship between the duration of posting hours per week and the functional limitations of the respondents?

v. What is the difference in the prevalence of spinal pain between male and female students during clinical postings, and how does level of study influence its occurrence?

1.3 Aim Of Study

The aim of the study was to evaluate the prevalence, pattern, contributing factors, coping strategies and functional limitations related to spinal pain among Basic Medical Sciences students during clinical postings at the University of Benin.

1.3.1 Specific Objectives

The specific objectives of this study were to:

i. To determine the association between clinical postings in various disciplines and the occurrence of spinal pain among Basic Medical Sciences students.

ii. To compare the prevalence of spinal pain among students of different Basic Medical Science disciplines.

iii. To examine the relationship between age, posting hours per week, and functional limitations among students with spinal pain.

iv. To assess the influence of gender and level of study on the prevalence of spinal pain during clinical postings

1.4 Hypothesis

1.4.1 Main Hypothesis

There would be no significant association between clinical postings in the various disciplines and the occurrence of spinal pain among Basic Medical Sciences students at the University of Benin.

1.4.2 Sub Hypothesis

i. There would be no significant difference in the prevalence of spinal pain among students of different Basic Medical Science disciplines (Physiotherapy, Nursing, Radiography, Medical Laboratory Science).

ii. There would be no significant relationship between age and the functional limitations of the respondents

iii. There would be no significant relationship between duration of posting hours per week and the functional limitations of the respondents

iv. There would be no significant difference in the prevalence of spinal pain between male and female students during clinical postings.

v. There would be no significant relationship between level of study and the prevalence of spinal pain among the respondents.

1.5 Scope Of Study

This study focused on assessing the prevalence and pattern of spinal pain among undergraduate students in the Basic Medical Sciences who are undergoing clinical postings at the University of Benin Teaching Hospital. It covered the following dimensions:

i. **Target Population**: Students in their clinical years (300–500 level) enrolled in programs such as Physiotherapy, Nursing, Radiography, and Medical Laboratory Science.

ii. **Study Area**: The research covers the clinical training environments affiliated with the University of Benin Teaching Hospital

iii. **Health Focus**: The study specifically investigates spinal pain, including discomfort in the cervical, thoracic, and lumbar regions.

iv. **Variables Examined**: Duration of clinical activities, types of physical tasks (e.g., lifting, prolonged standing), spinal pain intensity, location, and coping or treatment strategies.

Delimitations

i. **Population Limitation**: The study was confined to undergraduate Basic Medical Sciences students at the University of Benin. It will exclude students from non-clinical health-related disciplines, postgraduate students, and those in pre-clinical years.

ii. **Health Condition Scope**: Only spinal pain (cervical, thoracic, and lumbar) is examined. Other musculoskeletal conditions such as joint or limb pain are outside the scope of this study.

iii. **Data Collection Method**: Information was gathered through self-reported questionnaires, which may introduce recall bias or subjective under-/over-reporting of symptoms.

1.6 Limitations of The Study

i. The study used a cross-sectional design, which collects data at a specific point in time. This prevents a causal link between clinical postings and spinal pain.

ii. Data were gathered using questionnaires (NMQ and SFI), which are susceptible to recall bias and potential underreporting or exaggeration of symptoms.

iii. The use of convenience sampling may limit the findings' representativeness to a larger group of Basic Medical Sciences students, lowering their generalizability.

iv. There was no physical or radiological examination to confirm spinal pain diagnosis, hence the study was purely based on subjective student accounts.

v. The study was solely conducted at the University of Benin. Results may not be applicable to other universities with varying training settings, facilities, or posting schedules.

vi. Previous injuries, lifestyle behaviors (e.g., exercise, sedentary behavior), and psychosocial stresses were not adequately investigated, despite their potential influence on spinal pain prevalence.

1.7 Significance of Study

This study holds substantial significance across academic, clinical, and policy dimensions:

i. **Student Health and Well-being**: Spinal pain can negatively affect the physical health, academic performance, and mental well-being of students in clinical training. By identifying the burden and pattern of spinal discomfort, this study may prompt early interventions that promote healthier clinical learning environments.

ii. **Occupational Health Awareness**: Healthcare students often begin experiencing musculoskeletal strain even before entering the workforce. The findings will highlight the importance of early education in ergonomic principles and injury prevention, helping shape a generation of more health-conscious professionals.

iii. **Curricular and Institutional Impact**: The results may inform universities, particularly clinical coordinators and departmental heads, about the physical risks students face. This could drive the incorporation of ergonomic training, better clinical placement policies, or provision of equipment that minimizes physical strain.

iv. **Policy and Resource Allocation**: Evidence from this study may support policy development within medical faculties regarding student safety, including reasonable shift durations, access to adjustable equipment, and opportunities for physical therapy or ergonomic support.

v. **Research Contribution**: There is limited published data on spinal pain among clinical students in sub-Saharan Africa. This study contributes valuable local evidence, filling a knowledge gap and offering a basis for future longitudinal or interventional research.

1.8 Definition of Terms

i. Prevalence: Prevalence is the percentage of people in a population who have a particular disease or condition at a given time or during a given period of time (Porta et al., 2014).

ii. Pattern: Pattern refers to a repeated or regular arrangement of elements, such as shapes, behaviours, events, or data, that can be observed and sometimes predicted.

iii. Clinical Posting: Clinical posting is an organized and guided phase where students in healthcare fields gain hands-on experience in various clinical settings, allowing them to put theoretical learning into practice while building essential professional skills in actual healthcare environments (Jyoti et al., 2021).

iv. Spinal Pain: Spinal pain defined as pain or discomfort in the spine, including the cervical, thoracic, and lumbar regions, which can be caused by various factors, such as muscle strain, disc problems, poor posture, injury, or degenerative conditions (Hoy et al., 2010).

v. Low back pain: LBP is defined as pain or discomfort localized below the coastal margin and above the inferior gluteal folds, often accompanied by varying degrees of disability and impact on quality of life (Hoy et al., 2010)

vi. Neck pain**:** pain or discomfort felt between the occipital region and the third thoracic vertebra, with or without radiation to one or both upper limbs, that lasts more than a day and interferes with everyday activities (Safiri et al., 2025).

vii. Shoulder pain: pain or discomfort is a musculoskeletal symptom that might come from the glenohumeral joint, the acromioclavicular joint, or the soft tissues around it (Cuff & Littlewood, 2018).

1.9 Abbreviations

SP	Spinal pain.
LBP	Low back pain.
MSK	Musculoskeletal.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition

Spinal pain, sometimes referred to as dorsalgia, encompasses discomfort arising from the cervical, thoracic, or lumbar regions of the spine. It is a multifactorial condition that may involve muscular, ligamentous, disc-related, joint-related, or neural structures (Balagué et al., 2012). It can affect various parts of the back, including the neck (cervical), mid-back (thoracic), lower back (lumbar), or tailbone area (sacral). The lumbar region is most frequently affected due to its biomechanical role in weight bearing and movement (Hoy et al., 2014).This kind of pain can come on suddenly and last for a short time (less than six weeks, known as acute), last a bit longer (between 6-12 weeks, known as subacute), or persist for more than 12 weeks, which is considered chronic (Maher et al., 2017; Deyo et al., 2006). Individuals might experience a dull, constant ache or more intense pain that feels sharp or burning. It’s also usual to have other symptoms like stiffness, numbness, or weakness.

Among the various spinal pain, Low back pain is a very common condition, affecting approximately 38.9% of the worldwide population (Hoy et al, 2012). LBP is defined as pain or discomfort localized below the coastal margin and above the inferior gluteal folds, often accompanied by varying degrees of disability and impact on quality of life (Hoy et al., 2010). Lower back pain (LBP) is one of the main reasons people around the world experience disability, often affecting how they move and go about their daily lives. The lower back, made up of five vertebrae, carries a lot of the body's weight and plays a big role in movement, which makes it prone to stress and injury. Common causes include overworking the muscles, bad posture, slipped or herniated discs, and wear-and-tear conditions like osteoarthritis (Hartvigsen et al., 2018).

Neck pain is similarly common and is frequently associated with prolonged static postures, occupational strain, or mechanical stress (Binder, 2008). It can also be linked to factors such as cervical trauma (whiplash), cervical spondylosis, anxiety, depression, neck strain, or sports-related injuries (Ming et al., 2004; Binder, 2008). Research by Yeun and Han (2017) suggests that women experience neck pain more frequently than men, potentially due to differences in neck muscle mass between genders. These varied causes highlight the complexity of neck pain, which can disrupt daily life and requires tailored approaches for relief.

Mid-back pain, often called thoracic pain, occurs in the thoracic spine, a section of twelve vertebrae linking the neck and lower back. Supported by the rib cage to shield vital organs, this area is less flexible but still prone to discomfort. Everyday issues like muscle strain, slouching, or spinal conditions such as degenerative disc disease or stiff joints can trigger this pain (Haldeman et al., 2020). Whether from long hours at a desk or an underlying spinal issue, thoracic pain can make daily tasks challenging, highlighting the need for proper care and attention.

2.2 Epidemiology

Spinal pain represents a major global health burden, particularly LBP. Recent global estimates suggest hundreds of millions of individuals are affected, with projections indicating continued growth in prevalence due to population expansion and occupational risk factors (GBD 2021 Low Back Pain Collaborators, 2023; IASP, 2025). Long periods of static position during patient care, repetitive lifting, and insufficient ergonomic instruction all increase dangers for medical trainees. Among healthcare trainees and professionals, prevalence rates are notably high. Studies report lifetime LBP prevalence exceeding 50% in many populations (Aliyu et al., 2017). Neck pain prevalence among medical students has also been reported between 49% and 58% globally (Gupta et al., 2020). Thoracic discomfort, however understudied, is increasingly linked to uncomfortable postures during clinical procedures and diagnostic imaging tasks (StatPearls, 2025).

The incidence of spine pain among medical students in West Africa is a reflection of local issues including high patient-to-staff ratios and a lack of ergonomic tools. In sub-Saharan Africa, pooled prevalence estimates suggest over half of individuals experience LBP, reflecting occupational strain, limited ergonomic infrastructure, and psychosocial stressors (BMC Musculoskelet Disorder, 2024). Similar patterns have been noted for neck pain, where musculoskeletal strain is a result of inadequate workstation ergonomics in laboratory and radiology settings (Gupta et al., 2020; StatPearls, 2025). 50% of impacted students report moderate-to-severe impairment affecting clinical performance, which is further exacerbated by psychosocial stressors such as financial restrictions and academic pressure (Aliyu et al., 2017; Risk factors for LBP, 2024).

Nigeria's healthcare education system faces distinct obstacles. In a 2023 study at Irrua Specialist Teaching Hospital, spondylosis (66.5%) and disc prolapse (19.4%) were the most common LBP diagnoses among trainees, with sedentary behavior during laboratory work and obesity accounting for 39.5% of cases (Aliyu et al., 2017; Risk factors for LBP, 2024). Clinical placements frequently lack ergonomic guidelines, such as adjustable chairs or patient-lifting devices, pushing students to assume risky positions. Radiography students, for example, report thoracic pain as a result of recurrent bending during imaging operations, whereas nursing trainees suffer neck strain from protracted bedside paperwork (StatPearls, 2025). Despite having 78.8% awareness of clinical practice standards, only 27.5% of Nigerian physiotherapists use evidence-based LBP management, indicating systemic deficiencies in ergonomic instruction during training (Akodu et al., 2020).

2.3 Anatomy of The Vertebral Column

The vertebral column consists of the vertebrae and intervertebral (IV) discs collectively. The vertebral column consists of 33 vertebrae arranged in five regions: 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal, In adults, it is 72–75 cm long, of which approximately one quarter is formed by the IV discs which separate and bind the vertebrae together. The vertebral column serves the following function;

i. Shields the spinal cord and associated nerves.
ii. Bears the body's weight above the pelvic region.
iii. Offers a semi-rigid yet flexible central support for the body and a broad platform for the head to rest on and rotate.
iv. Contributes significantly to maintaining posture and enabling movement from place to place.

Notable movement takes place only among the top 25 vertebrae. The lower 9 vertebrae includes 5 sacral vertebrae, which fuse in adulthood to create the sacrum. Around the age of 30, the 4 coccygeal vertebrae also fuse together to form the coccyx. The junction between the lumbar vertebrae and the sacrum is described as the lumbosacral region. (Valovska, 2011; Moore et al, 2017)

The vertebrae gradually increase in size as the spine extends downward toward the sacrum, then decrease in size toward the tip of the coccyx. This size variation corresponds to the increasing weight each lower vertebra supports. The vertebra are the largest just above the sacrum, where the body's weight is transferred to the pelvic girdle through the sacroiliac joints. The vertebral column is flexible due to its composition of numerous relatively small bones, known as vertebrae (singular: vertebra), which are separated by resilient intervertebral (IV) discs. The 25 cervical, thoracic, lumbar and first sacral vertebrae also connect at synovial zygapophysial (facet) joints, which help enable and regulate the spine's flexibility.

Vertebrae differ in size and certain features across the various regions of the vertebral column, and to a lesser extent within each region; however, they share a common fundamental structure. A typical vertebra includes a vertebral body, a vertebral arch, and seven processes.

The Vertebral Body: This is the larger, approximately cylindrical front portion of the bone that provides strength to the spine and supports the body's weight. It is made up of two bone layers; a thin outer layer of compact bone surrounding a vascular inner layer of spongy (cancellous) bone. The trabeculae within this spongy bone contain spaces filled with red marrow, making vertebrae one of the primary sites of blood cell formation in adults. The top and bottom surfaces of each vertebra are coated with hyaline cartilage, whivh, in a living body, remains intact but dries out after death. (Moore et al, 2013)

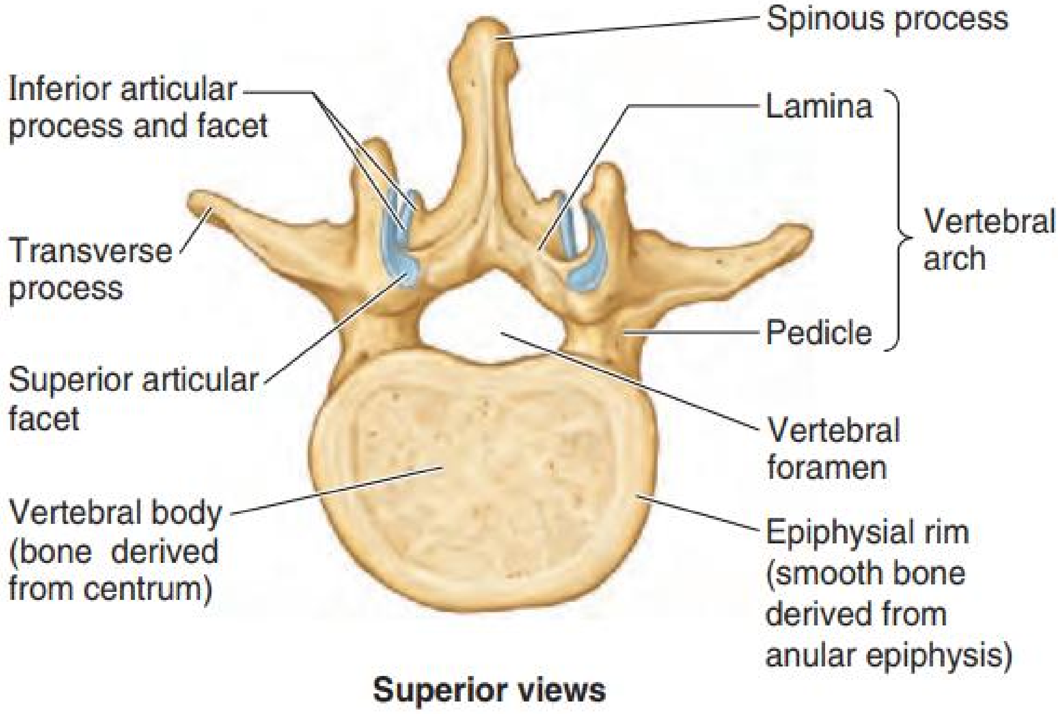

Figure 1 Anatomy of the Vertebral column.

The Vertebral Arch: It is located behind the vertebral body and is made up of 2 parts: the right and left pedicles and laminae. The pedicles are short, thick, cylindrical projections that extend backward from the vertebral body and connect to the laminae- broad, flat plates of bone that join at the midline. Together, the vertebral arch and the back surface of the vertebral body form the vertebral foramen. A series of these foramina, when the vertebrae are alligned, create the vertebral (spinal) canal. This canal houses the spinal cord and spinal nerve roots, as well as the protective membranes (meninges), fat, and blood vessels that support them. The intervertebral foramina are formed by the superior and inferior vertebral notches of neighbouring vertebrae, along with the intervertebral discs that connect them. These openings serve as passageways for spinal nerves to exit the vertebral column. (Valovska, 2011; Moore et al, 2017)

The Seven Processes: seven processes arise from the vertebral arch of a typical vertebra

i. One central spinous process extends backward from the point where the laminae meet on the vertebral arch.
ii. Two transverse processes extend out to the sides and slightly backward from the areas where the pedicles and lamina join.
iii. Four articular processes (2 superior and 2 inferior) also originate from the pedicle-lamina junctions, each featuring an articular surface or facet.

The transverse and spinous processes help to provide attachment for the deep muscles of the back, while the articular process together with articular processes from adjacent vertebrae, form the zygapophyseal joints, these joints determine the forms of movements that are allowed between each vertebrae.

(Valovska, 2011; Moore et al, 2013). The articular processes also bear weight during certain periods of transition, when one sit ups from a flexed position and also when the cervical vertebrae are flexed laterally to end range (Moore et al, 2013).

2.3.1 Regional Characteristics Of Vertebrae

Although all 33 vertebrae are distinct, most share specific features that help classify them as part of one of the five regions of the vertebral column.

2.3.1.1 Cervical Vertebrae

Cervical vertebrae (seven in number C1-C7) make up the neck portion of the spine. They are the smallest among the 24 movable vertebrae and are situated between the skull and the thoracic vertebrae. Their smaller size is due to the lighter weight they support compared to the larger vertebrae below. While the cervical intervertebral discs are thinner than those in the lower regions, they are relatively thick in proportion to the size of the vertebral bodies they join.

The C1(Atlas), C2(Axis) and C7 vertebrae are atypical while the vertebrae C3-C6 are typical. The most recognizable characteristic of each cervical vertebrae is the oval-shaped transverse foramen located in the transverse process. These openings allow the vertebral arteries and their accompanying veins to pass through except in the C7 vertebra, where only small accessory veins typically travel through. As a result, the foramina in C7 are usually smaller than those in the other cervical vertebrae and may sometimes be completely absent. (Valovska, 2011; Moore et al, 2017)

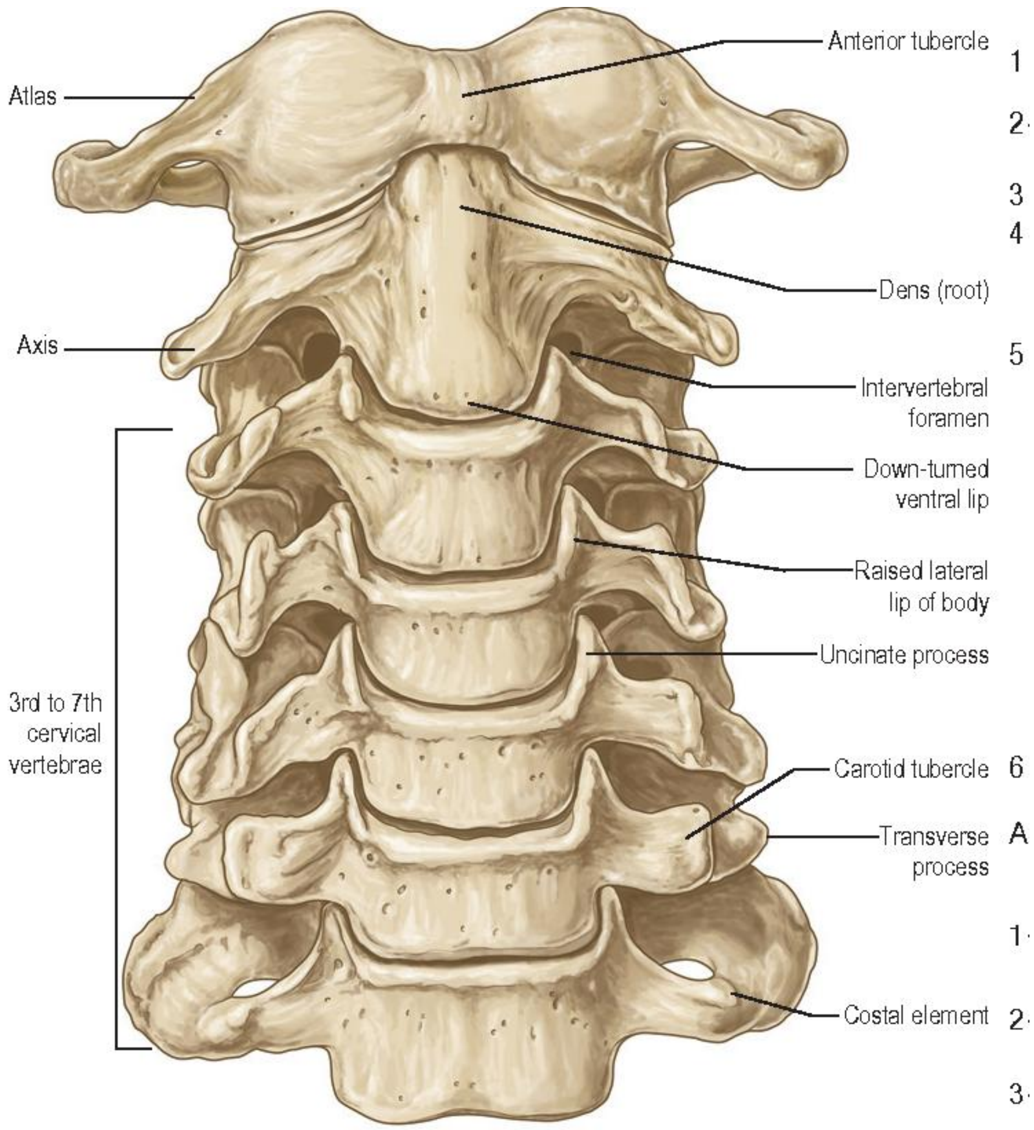

Figure 2: Anatomy of the Cervical Spine

2.3.1.2 Thoracic Vertebrae

Located in the upper back, the thoracic vertebrae serve as attachment points for the ribs. Their most defining feature is the presence of costal facets, which allow them to connect with the ribs. The central four thoracic vertebrae (T5–T8) display all the standard characteristics of thoracic vertebrae. Their articular processes extend vertically and have paired articular facets that are nearly aligned in the coronal plane, forming an arc centered around the intervertebral disc. Vertebrae T1 to T4 have certain characteristics similar to cervical vertebrae. T1 is considered atypical among thoracic vertebrae because it has a long, nearly horizontal spinous process that can be almost as noticeable as that of the vertebra prominens. (Valovska, 2011; Moore et al, 2017)

2.3.1.3 Lumbar Vertebrae

Lumbar vertebrae are located in the lower back, positioned between the thoracic region and the sacrum. As the amount of weight they support increases toward the lower end of the spine, lumbar vertebrae have large, robust bodies, which contribute significantly to the thickness of the lower trunk along the midline. Their articular processes extend vertically, with the facets initially oriented in a sagittal direction—starting sharply at the T12–L1 junction—but gradually shifting to a more coronal orientation lower down the column. The transverse processes extend somewhat upward and backward, in addition to projecting outward. At the base of each transverse process, on its back surface, there's a small accessory process that serves as an attachment point for the intertransversarii muscles. Also, on the back surface of the superior articular processes are small bumps called mammillary processes, which provide attachment for both the multifidus and intertransversarii muscles of the back. Vertebra L5, notable for its large body and transverse processes, is the biggest of all the movable vertebrae. It supports the weight of the entire upper body. (Valovska, 2011; Moore et al, 2017)

2.3.1.4 Sacral Vertebrae

The sacrum, a wedge-shaped bone typically made up of five fused sacral vertebrae in adults, sits between the hip bones and forms the roof and upper back wall of the rear part of the pelvic cavity. Its triangular shape is due to the rapid reduction in size of the lower lateral parts of the sacral vertebrae during development. The lower half of the sacrum does not bear weight, so it is much smaller. The sacrum adds strength and stability to the pelvis and transfers the body's weight to the pelvic girdle—a bony ring made up of the hip bones and sacrum—where the lower limbs are attached. The sacral canal is the extension of the vertebral canal within the sacrum. It holds the cauda equina—a bundle of spinal nerve roots that originate below the L1 vertebra and continue downward beyond the end of the spinal cord. On both the pelvic and back surfaces of the sacrum, there are usually four pairs of sacral foramina located between the vertebral segments, allowing the posterior and anterior branches of the spinal nerves to exit. (Valovska, 2011; Moore et al, 2017)

2.3.1.5 Coccygeal Vertebrae

The coccyx, or tailbone, is a small triangular bone typically formed by the fusion of four small coccygeal vertebrae, though some people may have one more or one fewer. The first coccygeal vertebra (Co1) may sometimes remain separate from the fused section. The coccyx does not help support body weight when standing, but it can bend slightly forward when sitting, suggesting it bears some weight in that position. It also serves as an attachment point for parts of the gluteus maximus and coccygeus muscles, as well as the anococcygeal ligament, which is the central fibrous band of the pubococcygeus muscles. (Valovska, 2011; Moore et al, 2017).

2.3.1.6 Joints of The Vertebral Column

The vertebral column includes several types of joints:

i. Joints of the vertebral bodies.

ii. Joints of the vertebral arches.

iii. Craniovertebral joints, which include the atlanto-axial and atlanto-occipital joints.

iv. Costovertebral joints.

v. Sacroiliac joints.

2.3.1.7 Movements of The Vertebral Column

Movements of the vertebral column take place at the nuclei pulposi within each intervertebral disc and at the zygapophyseal joints. The flexibility and elasticity of the intervertebral discs between vertebrae allow for a range of motion throughout the spine. These movements are primarily generated by the muscles of the back, with assistance from gravity and the anterior abdominal muscles.(Valovska, 2011; Moore et al, 2017). The vertebral column is capable of performing the following types of movements:

i. Flexion – Bending forward; most pronounced in the cervical and lumbar regions.
ii. Extension – Bending backward; also most prominent in the cervical and lumbar regions.
iii. Lateral Flexion (Side Bending) – Bending the trunk or neck to the side; greatest in the cervical and lumbar regions.
iv. Rotation – Twisting of the vertebral column; mainly occurs in the thoracic region and the upper cervical region (especially at the atlanto-axial joint).
v. Circumduction – A combination of flexion, extension, lateral flexion, and rotation, resulting in a circular movement.

These movements are limited or permitted to different degrees by the shape and orientation of the articular facets, the presence of intervertebral discs, and the elasticity of surrounding ligaments and muscles.

2.3.1.8 Curvatures of The Vertebral Column

In a fully grown adult, the vertebral column, when viewed from the side, displays four natural curves located in the cervical, thoracic, lumbar, and sacral regions. The thoracic and sacral regions exhibit kyphosis, a curve that bulges outward toward the back (posterior convexity and anterior concavity). In contrast, the cervical and lumbar regions show lordosis, where the curve dips inward (posterior concavity and anterior convexity). These spinal curves, combined with the intervertebral discs' elasticity and flexibility, provide a greater range of motion than the discs alone could offer. While the intervertebral discs contribute passive flexibility—limited by the zygapophyseal joints—the spinal curves enable dynamic flexibility, influenced by opposing muscle groups. For example, thoracic kyphosis is restricted by the long back extensor muscles, whereas lumbar lordosis is limited by the abdominal flexor muscles. (Moore et al, 2013). Carrying additional weight anterior to the body's normal gravitational axis (e.g., abnormally large breasts, a pendulous abdomen in obesity or the enlarged abdomen due to the gravid uterus during late pregnancy, or carrying a young child) also tends to increase these curvatures. The muscles that provide resistance to the increase in curvature often ache when the weight is borne for long durations.

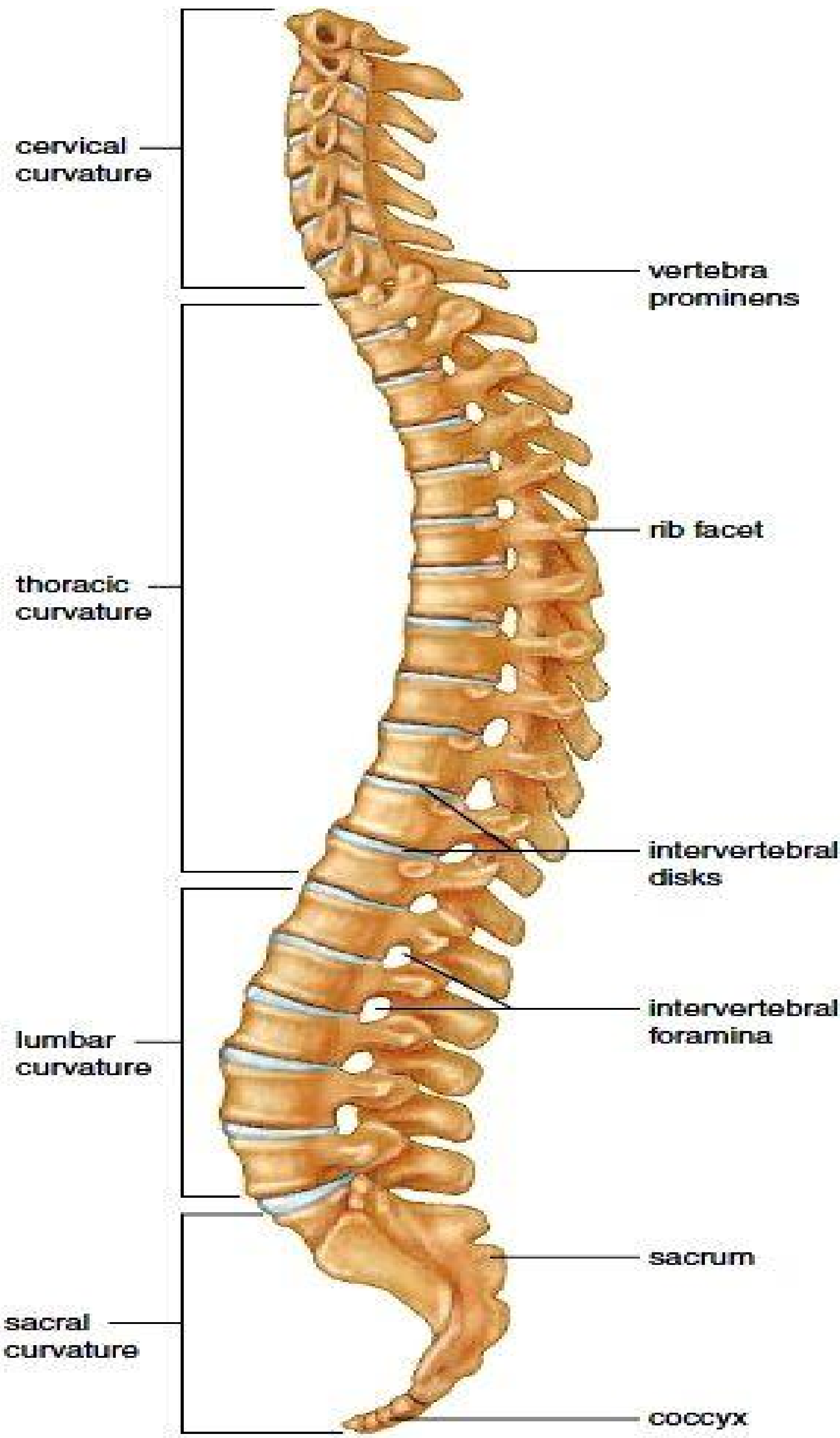

Figure 3 Lateral view of the vertebral column, showing the four spinal curvatures

2.3.1.9 Vasculature of The Vertebral Column

Arterial Supply :The vertebral column is vascularized by segmental arteries that vary depending on the spinal region (Moore et al., 2018):

Cervical region: Supplied primarily by the vertebral and ascending cervical arteries, which are branches of the subclavian artery.

Thoracic region: Receives blood from the posterior intercostal arteries, which branch from the thoracic aorta.

Lumbar region: Supplied by lumbar arteries branching from the abdominal aorta.

Sacral region: Fed by lateral and medial sacral arteries, arising from the internal iliac and aorta respectively. These segmental arteries give off:

Equatorial branches – which penetrate and supply the vertebral bodies.

Posterior branches – which serve the vertebral arch structures and surrounding musculature. Spinal branches – that enter through intervertebral foramina to supply the vertebral canal, including vertebrae, meninges, spinal cord, and nerve roots.

Venous Drainage: Venous return from the vertebral column is primarily via a system of interconnected venous plexuses (Moore et al., 2018): Internal vertebral venous plexus: Located within the vertebral canal, embedded in the epidural fat. It drains blood from the vertebral bodies and spinal cord. External vertebral venous plexus: Positioned external to the vertebral column; it communicates freely with the internal plexus and drains adjacent muscles and soft tissues. Both plexuses are valveless and connect with segmental veins (such as intercostal, lumbar, and sacral veins), allowing for multidirectional blood flow and providing alternate routes during venous obstruction.

2.3.1.10 Innervation of The Vertebral Column

Besides the zygapophysial joints—which receive innervation from articular branches of the medial branches of the posterior rami—the rest of the vertebral column is innervated by recurrent meningeal branches of the spinal nerves. These small nerves are unique in that they are the first to branch off from the mixed spinal nerve shortly after its formation, and before it splits into anterior and posterior rami, or sometimes directly from the anterior ramus. At each vertebral level, two to four delicate meningeal branches emerge on either side. Shortly after branching off, they receive connecting fibers from nearby gray rami communicantes. As spinal nerves pass through the intervertebral foramina, most of these meningeal branches re-enter the vertebral canal—hence the alternative name “recurrent meningeal nerves.” Some branches, however, stay outside the canal and supply the anterolateral surfaces of the vertebral bodies and intervertebral discs. They also innervate the periosteum, particularly the anuli fibrosi and the anterior longitudinal ligament. (Valovska, 2011; Moore et al, 2017)

2.4 Pathophysiology of Spinal Pain

Spinal pain often stems from a combination of structural issues and nerve irritation in the spine. As explained by Moore et al. (2013), this pain can come from multiple parts of the spine, such as the intervertebral discs, joints between the vertebrae (facet joints), surrounding ligaments, muscles, or even the nerves themselves. When these structures become worn down, injured, or inflamed, they can activate pain receptors and cause discomfort. The intervertebral discs, especially the tough outer layer called the annulus fibrosus, contain pain-sensitive nerve endings. If the disc is compressed or damaged, it can trigger pain. Similarly, the facet joints, which help stabilize the spine, are sensitive to arthritic changes and can cause localized or radiating pain when irritated (Moore et al., 2013). Other structures like the ligaments that support the spine may thicken or harden over time, especially in conditions like spinal stenosis, leading to pressure on the spinal cord or nerves. This pressure, especially when it affects nerve roots, can lead to radicular pain—sharp, shooting pain that follows the path of the nerve. Some nerves, such as the recurrent meningeal nerves, re-enter the spinal canal and carry pain signals from ligaments and the outer layer of the spinal cord covering (duramater). If these pain signals persist, they may cause the central nervous system to become overly sensitive—a process known as central sensitization—making pain feel more intense even without ongoing injury.

2.4.1 Etiology of Spinal Pain

i. Degenerative Changes (Wear and Tear)

Spinal pain is frequently linked to degenerative changes, especially in older individuals. These changes primarily impact the intervertebral discs and the zygapophysial (facet) joints. With aging, intervertebral discs gradually lose moisture and flexibility, making them less effective at absorbing shock. This degeneration can lead to disc thinning, bulging, or herniation, which may irritate or compress nearby spinal nerves, resulting in localized or radiating pain (Moore et al., 2013). The facet joints, which help facilitate movement in the spine, also experience degeneration over time. This often leads to osteoarthritis, characterized by joint inflammation, stiffness, and discomfort. As the condition progresses, it may cause spinal instability or narrowing of the spinal canal—a condition known as spinal stenosis—that further contributes to nerve compression and pain. In addition, ligaments around the spine can thicken, and bony growths called osteophytes may form, adding pressure on the spinal structures.

ii. Inflammatory Conditions

Inflammatory conditions are significant causes of spinal pain and often result from autoimmune disorders or infections affecting the vertebral column and its associated structures. Diseases such as ankylosing spondylitis, rheumatoid arthritis, and psoriatic arthritis trigger chronic inflammation primarily in the spinal joints, including the sacroiliac and facet joints. This inflammation leads to pain, stiffness, and progressive loss of spinal mobility (Moore et al., 2013; Kumar et al., 2019). Ankylosing spondylitis, a common inflammatory spinal disease, causes inflammation of the entheses—the sites where ligaments and tendons attach to bone—leading to new bone formation and eventual fusion of the vertebrae. This results in a rigid spine and chronic pain (Kumar et al., 2019). Infections such as vertebral osteomyelitis or discitis also cause inflammation, often accompanied by fever, localized pain, and neurological symptoms if nerves become compressed (Moore et al., 2013). The inflammatory process involves the release of cytokines and immune cells that damage joint cartilage and bone, leading to structural changes and persistent pain. Early diagnosis and treatment are essential to control inflammation, relieve symptoms, and prevent irreversible spinal damage.

iii. Postural and Mechanical Stress

Spinal pain often develops because of poor posture and mechanical stress. When we slouch or sit for long hours without proper support, it puts extra pressure on parts of the spine like the discs, muscles, and joints. Over time, this strain can cause discomfort and pain (Moore et al., 2013; Bogduk et al., 2016).

Mechanical stress happens when we repeat certain movements too much, lift heavy objects improperly, or suffer sudden injuries that the spine isn't prepared for. These stresses can lead to small injuries in muscles and ligaments or speed up the breakdown of spinal discs and joints. This may result in muscle soreness, ligament sprains, slipped discs, or irritated joints, all contributing to back pain (Bogduk et al., 2016). On top of that, bad ergonomic setups at work or home can make things worse, causing long-lasting pain and difficulty moving. Our bodies try to adjust to this stress, but sometimes this leads to muscle imbalances and changes in the spine's natural curve, which can keep the pain going. That's why fixing posture, improving workspaces, and doing physical therapy are important ways to reduce and prevent spinal pain.

iv. Trauma and Fracture

Spinal pain often results from trauma and fractures, which usually happen after accidents, falls, or sudden impacts that damage the bones or soft tissues around the spine. These injuries can cause different types of fractures—like compression or burst fractures—or even dislocations, which might harm the spinal cord or nearby nerves, leading to intense pain and sometimes nerve-related symptoms (White et al., 2016). How bad the pain gets really depends on how severe the injury is and what parts of the spine are affected. Fractures tend to happen in areas of the spine that handle a lot of stress, especially the lower back region called the thoracolumbar junction. People with weaker bones, such as those with osteoporosis, are especially at risk because even minor falls can cause compression fractures, leading to ongoing pain and changes in posture (Melton et al., 2010). On top of that, trauma can injure ligaments and muscles, which adds to the pain and can make the spine unstable. Catching these injuries early and treating them properly—with things like rest, pain relief, or sometimes surgery—is key to avoiding long-term problems. Rehab is also important to help people regain strength and get moving again. Understanding how these injuries happen helps doctors provide the best care to reduce pain and support recovery.

2.4.2. Risk Factors Of Spinal Pain

i. Posture**:** Maintaining static postures during work or daily activities can lead to muscle tension and overload, particularly affecting the intrinsic back muscles. Over time, this strain may result in muscle injuries and the onset of musculoskeletal symptoms (Nunes & Bush, 2012). Research indicates a strong correlation between awkward body positions and a higher prevalence of musculoskeletal disorders (Gangopadhyay et al., 2010; Anita et al., 2014).

A study by Chen and Mu (2018) found that students carrying backpacks weighing 15% or more of their body weight exhibited increased neck and trunk flexion, along with heightened muscle activation, compared to peers carrying lighter loads. The positioning of backpacks along the spine also plays a significant role in musculoskeletal discomfort. For instance, backpacks positioned at the L3 vertebra level are associated with greater waist discomfort, while those at the T7 level correlate with increased neck and shoulder discomfort (Chen & Mu, 2018). These findings underscore the importance of ergonomic practices in daily activities, especially for students. Proper backpack weight management and positioning can mitigate the risk of developing musculoskeletal issues.

ii. Age: As people get older, their risk of developing spinal pain naturally increases. This is because aging leads to changes in the spine's structure, such as the gradual wear and tear of the intervertebral discs and joints (Wang et al., 2016). These changes cause the spine to lose flexibility and become stiffer, making it more prone to pain and injury. Additionally, bone density tends to decrease with age, which can weaken the vertebrae and increase the chance of fractures or other problems (Jones et al., 2019). Muscle strength also declines over time, reducing the support around the spine. This lack of muscular support often results in poor posture and compensatory movements that may worsen discomfort (Lee et al., 2017). Older adults are also more likely to develop conditions like osteoarthritis or spinal stenosis, both of which can cause significant spinal pain and limit mobility (Smith et al., 2018). Because of these factors, age is a major risk factor for spinal pain, and it's important for clinical students and healthcare providers to recognize how aging affects spinal health. Understanding these changes can help guide better prevention and treatment strategies tailored for older individuals.

iii. Sedentary Lifestyle: Living a sedentary lifestyle—spending most of the day sitting or inactive—is a major contributor to spinal pain. With so many people glued to their desks, computers, or phones, the muscles that support the spine, especially the core and back muscles, tend to weaken over time (O'Sullivan et al., 2012). When these muscles aren't strong enough, the spine can lose stability, making pain and injuries more likely. Not moving enough also means less blood flow to important spinal parts like discs and ligaments. This can speed up wear and tear and cause inflammation, leading to stiffness and ongoing discomfort (Mokhtarinia et al., 2018). On top of that, a sedentary lifestyle often leads to weight gain, which puts extra pressure on the spine and worsens pain (Shiri et al., 2010). For students and anyone who spends long hours sitting or studying, it's especially important to be aware of these risks. Taking breaks to stretch, moving regularly, and doing exercises that strengthen the muscles around the spine can make a big difference in preventing pain and keeping the back healthy

iv. Genetics**:** Genetics play a big role in whether someone might develop spinal pain. Certain inherited traits can affect how strong or flexible your spine is, making you more likely to have problems like disc degeneration, scoliosis, or arthritis—all common causes of back pain (Battie et al.). For example, some people have gene variations that influence how their body produces collagen, a key protein that helps keep spinal discs and ligaments healthy. If these aren't working quite right, it can increase the chance of injury and ongoing discomfort (Kang et al.). Research shows that if spinal issues run in your family, you might be more prone to experiencing similar problems yourself (Battié et al.). But it's important to remember that genes are just one piece of the puzzle. How you live your life, your habits, and your environment also impact your spinal health. Knowing your genetic risks can be helpful, though—it allows you and your doctor to take steps early on, like starting a targeted exercise routine or other preventive care, to keep your back healthier for longer.

2.5 Clinical Presentation of Spinal Pain

i. Pain: Pain is usually the first and most noticeable sign when something is wrong with the spine. It can be localized in the back or may radiate down to other areas like the arms or legs, depending on which part of the spine is affected and whether nerves are involved (Bogduk et al., 2009). This pain can come on suddenly (acute) or build up over time (chronic), and it often changes with movement or posture. For doctors, understanding where the pain is, how intense it is, and what triggers it helps them figure out what's going on and how best to treat it (Manchikanti et al., 2009).

ii. Stiffness: Joint stiffness may arise from several musculoskeletal disorders, including spondylosis, various forms of arthritis, and adhesive capsulitis, among others. This condition leads to a decreased or completely restricted range of motion in the affected joint. In some cases, movement at the joint may be entirely impaired, while in others, only certain directions or types of movement are affected. The extent of stiffness depends on both the underlying cause and the severity of the condition (Solomon et al., 2010).

iii. Weakness: Muscle weakness can result from spinal nerve root compression, such as in radiculopathy, leading to impaired motor signal transmission and reduced strength in affected muscles (Merck Manuals, 2023). For example, compression of the S1 root can weaken calf muscles, while C5 or C7 involvement may affect the deltoid or triceps (Cleveland Clinic, 2023). Early diagnosis and treatment—like physical therapy or surgery—are essential to prevent long-term functional loss (NCBI, 2023).

2.6 Diagnosis of Spinal Pain

2.6.1 Patient History

Gathering a thorough patient history is essential. Pay close attention to the patient's history of present illness (HPI) and past medical history (PMH), as their account often provides key information to help identify or rule out serious conditions (Physiopedia). medications used and treatments received, period of onset of the symptoms, history of trauma or diseases, location and description of the pain, family history, patient's occupation, severity and duration of the symptoms, aggravating and relieving factors along with past surgical treatments should also be considered.

2.6.2 Physical Examination

A physical exam is typically all that's needed to diagnose spinal pain (healthline, 2021).Healthcare professional examines the patient's back and assesses the ability to sit, stand, walk and lift the legs. The health professional also might ask patient to rate the pain on a scale of zero to 10 and to talk about how the pain affects daily activities.

These assessments help determine where the pain comes from and how much the patient can move before pain or muscle spasms force the patient to stop. Exams also can help rule out more-serious causes of back pain. (Mayo clinic, 2024)

2.6.3 Radiographic Examination

2.6.3.1 X-rays

X-rays utilize invisible electromagnetic energy to create images of internal organs, bones, and tissues on film. They are commonly used for various purposes, such as detecting bone fractures or identifying tumors**.** Spinal, neck, or back X-rays may be done to determine the cause of neck or back pain and to diagnose conditions such as fractures, broken bones, arthritis, spondylolisthesis (when one vertebra slips over another), disk degeneration, tumors, abnormal spinal curvatures like scoliosis or kyphosis, or congenital spine abnormalities. (John Hopkins Medicine.) x-rays.

2.6.3.2 Computerized Topography (CT) scan

According to Arya (2014), computed tomography (CT) is primarily used to evaluate the bony structures of the spine and how the vertebrae align with the neural canal in the axial view. In musculoskeletal assessments, CT scans are valuable for identifying the spatial relationships between bones, as well as detecting tumors, fractures, and both complete and partial dislocations (Arya, 2014). When diagnosing low back pain, CT imaging helps visualize the lumbar spine and identify conditions such as spondylolisthesis (Arya, 2014). Additionally, CT scans are effective in identifying complex skeletal deformities linked to scoliosis development (Kim et al., 2010).

2.6.3.3 Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging (MRI) uses the body's natural magnetic properties to create highly detailed images of internal structures (Berger, 2002). It is now considered the preferred diagnostic method for identifying neurological issues related to low back pain (Arya, 2014). MRI offers high-resolution, multiplanar imaging of tissues and is advantageous due to the absence of known harmful effects. Compared to CT scans, MRI is more effective in visualizing the relationship between spinal discs and nerves, as well as in identifying soft tissue and non-bony abnormalities. It is especially useful in diagnosing conditions such as early-stage osteomyelitis, discitis, and hematomas (Arya, 2014). In cases of neck pain accompanied by symptoms like balance or gait disturbances—potential signs of cervical myelopathy—MRI can reveal issues such as spinal stenosis or disc herniation that may be causing these problems (Pompan, 2011). Additionally, MRI is recommended for younger and middleaged individuals with persistent shoulder pain and weakness after trauma, as it can detect complete rotator cuff tears (Pompan, 2011). It is also used to assess scoliosis in patients who present with atypical curve patterns or concerning neurological symptoms (Kim et al., 2010).

2.7 management of spinal pain

Spinal pain, particularly in the cervical and lumbar regions, is a widespread issue caused by factors such as mechanical stress, disc degeneration, herniation, or structural abnormalities. Its treatment typically involves a multifaceted approach, incorporating both conservative methods and surgical options when necessary.

i. Non-Surgical (Conservative) Approaches: The first line of treatment for most spinal pain cases is conservative. This often includes patient education, physical therapy, therapeutic exercise, and nonsteroidal anti-inflammatory drugs (NSAIDs) (Qaseem et al., 2017). Physical therapy may focus on posture correction, flexibility improvement, and strengthening of the core muscles to relieve pain and avoid recurrence (Chou et al., 2007). For chronic pain, cognitive-behavioral therapy (CBT) has been shown to reduce disability related to pain.

ii. Medications: Drug therapy might involve NSAIDs, muscle relaxants, or limited short-term use of opioids, depending on the severity and nature of the pain. When nerve-related pain is present, medications like gabapentin or certain antidepressants may be beneficial (Deyo et al., 2015).

iii. Minimally Invasive Interventions: If conservative care does not provide adequate relief, interventional procedures such as epidural steroid injections, facet joint blocks, or radiofrequency ablation may be used to alleviate symptoms—particularly in patients with nerve root compression or facet joint pain (Manchikanti et al., 2013).

iv. Surgical Treatment: Surgery is typically considered only after conservative approaches fail and when imaging confirms a structural abnormality (e.g., disc herniation, spinal stenosis, or vertebral instability) that matches clinical symptoms (Weinstein et al., 2006). Surgical procedures may include discectomy, laminectomy, or spinal fusion, depending on the individual case.

v. Comprehensive and Lifestyle-Oriented Care: Long-term management is most effective when it includes lifestyle modifications such as losing weight, quitting smoking, and improving ergonomics. Psychological interventions and ongoing support also play an important role in addressing chronic spinal pain (Chou et al., 2009).

2.8 Prevention Of Spinal Pain

i. Exercise: Engaging in regular physical activity is an effective way to help prevent spinal pain, especially in the lower back. Exercises like walking, strengthening, stretching, and improving motor control can significantly lower the chances of developing or experiencing recurring back pain. According to Shiri et al. (2018), exercise on its own can reduce the risk of low back pain by 33%, and when paired with educational interventions, the risk drops by about 27%. More recent findings by Hernandez-Lucas et al.

(2024) support this, showing that the combination of exercise and education offers the most protective effect against non-specific back pain. Walking, in particular, stands out as a simple yet highly effective form of exercise. A study highlighted in The Lancet reported that walking three times per week could cut the recurrence of low back pain nearly in half.

ii. Stress Management: Managing stress is a key factor in preventing spinal pain. Chronic stress can cause muscle tightness, poor posture, and decreased physical activity, all of which may contribute to or worsen neck and back pain. Techniques such as relaxation exercises, mindfulness, regular exercise, and getting enough sleep can help relieve muscle tension and promote better spinal health. Research by Bruns and Disorbio (2006) showed that psychological stress is a major risk factor for musculoskeletal pain, including chronic back pain. Moreover, mindfulness-based stress reduction (MBSR) has been demonstrated to reduce pain severity and improve function in people suffering from chronic low back pain (Cherkin et al., 2016).

iii. Behavioral Changes: Behavioral changes include maintaining correct posture while sitting at a desk, carrying out daily activities, working, or lifting objects. It also involves modifying sleep positions and work routines, such as incorporating short breaks during work hours to help relax the muscles (Ming et al., 2004; European Agency for Safety and Health at Work, 2008).

iv. Healthy Weight: Keeping a healthy weight is key to preventing spinal pain. Carrying excess weight puts extra pressure on the spine, which can speed up the degeneration of spinal tissues and lead to discomfort and problems. By managing weight through a nutritious diet and regular physical activity, this strain on the spine can be lessened, supporting better spinal health overall. According to Shiri et al. (2010) there is a relationship between obesity and an increased risk of low back pain. Additionally, research carried out by Urquhart et al. (2015) indicates that losing weight can significantly ease spinal pain symptoms

2.9 Outcome Measures

2.9.1 The Spinal Function Indicator (SFI)

The Spinal Function Indicator (SFI) is a patient-reported outcome measure designed to assess functional status and disability related to spinal conditions, including both neck and low back pain. It evaluates the impact of spinal problems on daily activities and physical functioning through a concise questionnaire, making it practical for clinical and research use. The SFI focuses on a broad range of functional tasks, capturing patient perspectives on their ability to perform movements and activities affected by spinal dysfunction (Gustafsson et al., 2010; Lindstrøm et al., 2014).

Studies have demonstrated that the SFI has good reliability, validity, and responsiveness, supporting its use in monitoring patient progress and evaluating treatment outcomes for spinal disorders. It is especially useful for tracking changes over time in patients undergoing rehabilitation or other interventions (Gustafsson et al., 2010; Lindstrøm et al., 2014).

2.9.2 The Nordic Musculoskeletal Questionnaire

The Nordic Musculoskeletal Questionnaire (NMQ) is a widely utilized self-report instrument aimed at identifying the prevalence and location of musculoskeletal symptoms in different body regions. It is especially valuable in occupational health and epidemiological research for screening musculoskeletal disorders and assessing their impact on function and work ability. The NMQ covers common areas such as the neck, shoulders, upper back, lower back, and extremities, capturing both recent and long-term symptom histories (Dainese et al., 2021; Chatterjee et al., 2022).

Recent studies continue to affirm the NMQ's reliability and validity across diverse populations and work settings. Its straightforward format and comprehensive coverage make it an efficient tool for monitoring musculoskeletal health and evaluating preventive or therapeutic interventions (Dainese et al., 2021; Chatterjee et al., 2022).

2.10 Empirical Review

AUTHOR(S)	TITLE	METHOD	RESULTS	CONCLUSION
Abdulrahman D Algarni et al. (2017)	The Prevalence of and Factors Associated with Neck, Shoulder, and Low-Back Pains among Medical Students at University	A cross sectional study with 469 students.	The prevalence of MSP in at least one body site at any time, in the past week, and in the past year was 85.3%, 54.4%, and 81.9%, respectively.	MSP among Saudi medical students is high, particularly among those in the clinical years and those with history of trauma and with depressive or psychosomatic symptoms.

	Hospitals in Central Saudi Arabia			
Aly T Aly et al.(2024)	The Prevalence of Musculoskeletal Pain and Assessment of Potential Risk Factors Among a Sample of Medical Students	A cross-sectional study was conducted with a sample size of 1472 students.	The prevalence of at least one MSP site was 459 (47.2%) in the past week and 702 (72.2%) in the past year.	MSP is highly prevalent among medical students in Egypt.

	in Giza, Egypt			
Bruna Xavier Morais et al. (2019)	Musculoskeletal pain in undergraduate health students: prevalence and associated factors.	A cross-sectional study was conducted with 792 undergraduate health students.	The region of the vertebral column had a higher prevalence (74.9%) of musculoskeletal pain.	The high prevalence of musculoskeletal pain demonstrates the need for strategies aimed at preventing this aggravation still in the academic setting.
Dorsa Nouri Parto et al. (2023)	Prevalence of musculoskeletal disorders and associated risk	Using a multi-year cross-sectional survey.	The most prevalent sources of self-reported pain were the lower back and neck. Depending on the year and	This study identified that MSKDs are a prevalent source of pain in university students.

	factors in canadian university students		outcome studied, 59-67% of participants reported neck/lower back pain in the last year, and 43-49% reported it in the last week.	
Fahad Abdullah AlShayhan et al.(2018)	. Prevalence of low back pain among health sciences students	Cross-sectional study was conducted among 1163 students from five health sciences colleges during the academic year 2016-	Lifetime prevalence of LBP was 56.6%, 12-month prevalence 48.8%, and point prevalence 21.2%.	This study has shown high prevalence of LBP among future healthcare provider.

		2017.		
Grace O Vincent-Onabajo et al. (2016)	Prevalence of Low Back Pain among Undergraduate Physiotherapy Students in Nigeria	A modified version of a questionnaire was used for 207 undergraduate clinical physiotherapy students at three universities in Nigeria.	Lifetime, 12-month, 1-month, and 7-day prevalence of LBP were 45.5%, 32.5%, 17.7%, and 11.5%, respectively.	Although the prevalence of LBP was comparatively low, its association with educational activities emphasizes the need to incorporate effective LBP preventive strategies in the training of physiotherapy students.
Husna Haroon et	1. Musculoskeletal pain and	A cross-sectional study was	Of the 360 participants, 268(74.4%)and	There was a significant risk of musculoskeletal pain for medical

al. (2018)	its associated risk factors among medical students of a public sector University in Karachi, Pakistan.	conducted.	140(38.9%)students reported having musculoskeletal pain in at least one of the body sites in the past 12 months and in the past seven days, respectively.	students.
Isidora Vujcic et al. (2018).	Low Back Pain among Medical Students in Belgrade	cross-sectional study	The lifetime prevalence of low back pain was 75.8%, 12-month prevalence 59.5%, and point prevalence 17.2%.	The prevalence of LBP is high among Belgrade medical students and significantly affects their everyday functioning.

	(Serbia): A Cross-Sectional Study.		Chronic low back pain was experienced by 12.4% of the students.	
Lujain H Alturkistani et al.(2020).	Prevalence of Lower Back Pain and its Relation to Stress Among Medical Students in Taif University, Saudi Arabia	A cross-sectional study of 640 medical students.	Studies found 33.3% of medical students reported lower back pain, 20.7% reported lower back pain 0–7 days during the last 12 months, and 18.8% reported reduction of activity due to lower back pain during the last 12 months.	surveys found no significant association between LBP and psychological stress.

Mustafa Ahmed Alshagga et al. (2013)	Prevalence and factors associated with neck, shoulder and low back pains among medical students in a Malaysian Medical College.	cross-sectional study	One hundred and six (45.7%) of all students had at least one site of MSP in the past week and 151 (65.1%) had at least one site of MSP in the past year.	MSP among medical students was relatively high, thus, further clinical assessment is needed in depth study of ergonomics.
Prateek Behera et al. (2020)	Neck pain among undergraduate medical students	A cross-sectional study.	In total, 58.3% of 331 students suffered from neck pain within the last one year. Students in the 3rd and 4th	Neck pain is not uncommon among undergraduate medical student

	in a premier institute of central India: A cross-sectional study of prevalence and associated factors		year had 2.9 times higher odds of current neck pain in comparison to 1st-year students	
Soumaya Boussaid et al. (2023).	Low Back Pain Among Students of Medical University of	LBP was assessed using the Nordic Musculoskeletal Health	One hundred and forty-eight students were included.According to the Nordic questionnaire, the	LBP in medical students is multifactorial across both personal and college-life domains.

	Tunis	Questionnaire and Its impact using the Oswestry Disability Index (ODI)	point, annual and lifetime prevalence of LBP were 37.8%, 80.4%, and 90.5%, respectively.	

CHAPTER THREE

MATERIALS AND METHOD

3.1 Participants

This population involved Students of the Faculty of Basic Medical Sciences, College of Medical Sciences, University of Benin. Participants were drawn from the following departments: Physiotherapy, Nursing Science, Medical Laboratory Science, and Radiography.

3.1.1 Inclusion Criteria

i. Students registered under the Faculty of Basic Medical Sciences.

ii. Students currently undergoing clinical postings.

iii. Students who voluntarily provide informed consent to participate.

3.1.2 Exclusion Criteria

i. Students not officially registered under the Faculty of Basic Medical Sciences.

ii. Students not currently participating in clinical postings.

iii. Students who decline to give informed consent.

3.2 Materials

3.2.1 List of Instruments

i. Socio-demographic Information

ii. Nordic Musculoskeletal Questionnaire (NMQ)

iii. Spinal Function Index (SFI)

3.2.2 Description of Instruments

Socio-demographic Information

Includes data on age, gender, academic department, level of study, and clinical posting details.

Validity: Socio-demographic information generally demonstrates a strong and effective content validity for objective attributes such as age, sex, and education, though validity may vary for more subjective or sensitive items like income or ethnicity due to issues such as social desirability bias and cultural interpretation (Tourangeau et al., 2000; Krumpal, 2013).

Reliability: Socio-demographic information is generally considered highly reliable for stable characteristics such as age, sex, and education, though reliability may decrease for dynamic or sensitive variables like income and employment status due to recall errors and social desirability effects (Alwin, 2007; Krumpal, 2013).

Nordic Musculoskeletal Questionnaire

A standardized tool used globally to assess the presence and distribution of musculoskeletal symptoms. This section will collect data on spinal pain occurrence (cervical, thoracic, and lumbar regions) over the past 12 months and past 7 days, including frequency and duration.

Validity: The Nordic Musculoskeletal Questionnaire (NMQ) demonstrates good content and construct validity for identifying musculoskeletal symptoms across different populations and occupational groups (Kuorinka et al., 1987; Dickinson et al., 1992; Turhan Kahraman et al .2016)

Reliability: The Nordic Musculoskeletal Questionnaire (NMQ) demonstrates good test-retest reliability across various populations and occupational groups, with recent studies confirming its consistent measurement properties in diverse cultural contexts (Kuorinka et al., 1987; Dickinson et al., 1992; Turhan Kahraman et al . 2016).

Spinal Function Index (SFI)

A validated self-reported scale that measures the functional limitations associated with spinal pain, including aspects related to posture, movement, and daily activities.

Validity: The Spine Functional Index (SFI) demonstrates a strong construct and criterion validity, as shown by its high correlation with the Functional Rating Index mm($r = 0.87$) in its original development (Greenwood et al., 2008)

Reliability: The Spine Functional Index (SFI) demonstrates an excellent reliability, with high internal consistency (Cronbach's $\alpha = 0.94$) and strong test–retest reliability (ICC = 0.91) reported in its original validation (Greenwood et al., 2008), and these findings have been replicated in cross-cultural adaptations such as the Polish version (ICC = 0.88) (Kiebzak et al., 2020).

3.3 Methods

3.3.1 Research Design

This study utilized a cross-sectional analytical design**,** which is suitable for examining the prevalence and correlates of spinal pain at a single point in time.

3.3.2 Sampling Technique

A convenience sampling method was adopted for this study. Participants were selected based on their availability, willingness to participate, and eligibility during the period of data collection. This approach allows easy access to students across the departments of Physiotherapy, Nursing Science, Radiography, and Medical Laboratory Science, particularly during their clinical postings and academic activities.

3.3.3 Sample Size Calculation

The sample size was determined using the Cochran formula for prevalence studies:

$n = (Z^2 * p * (1 - p)) / d^2$

Where:

- $Z = 1.96$ (standard normal deviate at 95% confidence interval),

- $p = 0.5$ (assumed prevalence of spinal pain based on literature),

- $d = 0.05$ (desired degree of precision).

$n = (1.96)^2 * 0.5 * 0.5 / (0.05)^2 = 384$

Since the total population N is finite (N = 1745), the sample size will be adjusted using the finite population correction formula:

$n_{adj} = n / [1 + ((n - 1) / N)] = 384 / [1 + (383 / 1745)] \approx 316$

To account for potential non-response, a 10% adjustment will be added:

$n_{final} = 316 / 0.90 \approx 351$

Final sample size: 351 students

3.3.4 Procedure For Data Collection

Eligible students were contacted during clinical sessions, lectures, or through their departmental class representatives. The study's purpose and procedures was explained, and informed consent was obtained.

3.3.5 Ethical Considerations

Ethical approval was obtained from the Research and Ethics Committee of the University of Benin. Participation was strictly voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality was maintained throughout the study. No personal identifiers were collected or reported, and data weremsecurely stored and used solely for research purposes

3.3.6 Data Analysis

Data was analyzed using IBM SPSS version 25. The following statistical procedures will be applied:

- **Descriptive Statistics**: Frequencies, percentages, means, and standard deviations was used to summarize demographic data and prevalence patterns.
- **Chi-square Tests**: was used to examine associations between spinal pain and categorical variables such as department, gender, and clinical posting characteristics.
- **Logistic Regression**: was used to identify significant predictors of spinal pain (e.g., duration of posting, ergonomic practices, gender).
- **Significance Level**: Statistical significance will be set at $\mathbf{p < 0.05}$.

CHAPTER FOUR

RESULTS

4.1 Introduction

The primary aim of this study was to evaluate the prevalence, pattern, contributing factors, coping strategies and fuctional limitations related to spinal pain among Basic Medical Sciences students during clinical postings at the University of Benin. A total of 351 Basic Medical Sciences students at the University of Benin Teaching Hospital were recruited for this study

4.1.1 Sociodemographic Variable of The Respondents

Out of the three-hundred and fifty-one participants recruited for this study, 216(61.5%) were females while 135(38.5%) were males. 126(35.9%) of the respondents were physiotherapy students and 87(24.8%) were nursing student. 118(33.6%) of the respondents were in 400L and 162(46.2%) were in 500L. The age of the students ranged from 18-28years with a mean of 21.58(±1.64) years. The duration of posting hours ranged from 2-16 hours with a mean of 10.34±2.96 as shown in table 1.

Table 1: Sociodemographic variable of the respondents

Variable	Frequency	Percentages
Gender		
Female	216	61.5
Male	135	38.5
Department		
Medical laboratory science	84	23.9
Nursing	87	24.8
Physiotherapy	126	35.9
Radiography	54	15.4
Level of study		
200	2	0.6
300	69	19.7
400	118	33.6
500	162	46.2
	Range	**Mean±SD**
Duration of posting (hours)	2-16	10.34±2.96
Age (years)	18-28	21.58±1.64

4.1.2 Prevalence Of Spinal Pain

There was 51.9%, 12.5%, 21.4% prevalence of lower back pain, upper back pain and neck pain respectively in the last 12 months among the respondents. There was also 42.2%, 14.8%, and 17.1% prevalence of lower back pain, upper back pain and neck pain respectively in the last 7 days among the respondents. Only 72(20.5%) of the respondents reported that pain had caused them to seek medical care or even miss activities as shown in table 2.

Table 2: Prevalence of Spinal pain

Variable	frequency	Percentages
In the last 12 months, have you had trouble(ache, pain, discomfort) in any of the following areas		
Lower back	182	51.9
Upper back	44	12.5
Neck	75	21.4
None	50	14.2
In the last 7 days, have you had trouble(ache, pain, discomfort) in any of the following areas		
Lower back	148	42.2
Upper back	52	14.8
Neck	60	17.1
None	91	25.9
Have any of the above areas caused you to seek medical care or miss activities (school/clinical posting)		
No	279	79.5
Yes	72	20.5

4.1.3 Spinal Functional Index

171(48.7%) of the respondents reported that they feel pain when standing for long periods but only 18(5.1%) of the respondents reported that spinal pain limits their ability to walk. Seventy seven (21.9%) of the respondents reported that they sometimes avoid certain positions due to pain in their spine. Two hundred and sixty six (75.8%) of the respondents reported that spinal pain does not disturb their sleep. Fourth nine (14.0%) of the respondents reported that they sometimes feel stiff in the spine when they wake up. 65(18.5%) of the respondents reported that spinal pain makes it hard to concentrate during study of clinical activities. The Overall SFI score of the respondent was 4.57±2.78 as shown in table 3.

Table 3: Spinal functional index

Questions	No n(%)	Sometimes n(%)	Yes n(%)
I feel pain when standing for long periods	72(20.5%)	108(30.8%)	171(48.7%)
My spinal pain limits my ability to walk	282(80.3%)	51(14.5%)	18(5.1%)
I avoid certain positions due to pain in my spine	223(63.5%)	77(21.9%)	51(14.5%)
I can carry out daily routines without being limited by spinal pain	50(14.2%)	82(23.4%)	219(62.4%)
Spinal pain disturbs my sleep	266(75.8%)	61(17.4%)	24(6.8%)
I feel stiff in the spine when waking up	275(78.3%)	49(14.0%)	27(7.7%)
I am able to bend forward comfortably	44(12.5%)	58(16.5%)	249(70.9%)
I avoid lifting objects due to spinal pain	252(71.8%)	64(18.2%)	35(10.0%)
Spinal pain makes it hard to concentrate during study of clinical activities	201(57.3%)	85(24.2%)	65(18.5%)
SFI score 4.57±2.78			

4.1.4 Relationship Between Age and Duration Of Posting And The Spinal Functional Index.

Pearson correlation was done to examine the relationship between age, number of posting hours per week and the functional limitations of the respondents. The findings revealed there was no significant relationship between age and functional limitation of the respondents ($r=-0.028$, $p=0.597$). It was also revealed that there was no significant relationship between number of posting hours per week and the functional limitation of the respondents ($r=0.104$, $p=0.052$) as shown in table 4.

Table 4: Relationship between age and duration of posting and the spinal functional index.

Variable	r	p
Age* SFI	-0.028	0.597
Duration of posting per week*SFI	0.104	0.052

4.1.5 Association Between 12-Month Prevalence Of Spinal Pain And The Sociodemographic Variables

Table 5 showed that Chi-square was done to examine the 12-month prevalence of spinal pain and the sociodemographic variables. The findings revealed that there was no significant association between gender and the prevalence of spinal pain (p=0.209). There was a significant association between the department of the respondents and the prevalence of spinal pain (p=0.004). There was no significant association between the level of study and the prevalence of spinal pain (p=0.063)

Table 5: Association between 12-month prevalence of spinal pain and the sociodemographic variables

Variable		Lower back	Neck	None	Upper back	X^2	P
Gender	**Female**	110	48	26	32	4.534	0.209
	Male	70	27	24	12		
Department	**Medical laboratory science**	46	19	9	10	24.028	0.004
	Nursing	44	20	11	12		
	Physiotherapy	71	27	11	17		
	Radiography	21	9	19	5		
Level of study	**200**	0	0	2	0	16.169	0.063
	300	30	16	14	9		
	400	64	24	15	15		
	500	88	35	19	20		

4.2 Hypothesis Testing

1. There would be no significant relationship between age and the functional limitations of the respondents

Test: Pearson correlation

Alpha level: 0.05

Observed p value: 0.597

Judgement: Since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

2. There would be no significant relationship between duration of posting hours per week and the functional limitations of the respondents

Test: Pearson correlation

Alpha level: 0.05

Observed p value: 0.052

Judgement: Since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

3. There would be no significant relationship between male and female students and the prevalence of spinal pain among the respondents

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.209

Judgement: Since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

4. There would be no significant difference in the prevalence of spinal pain among students of different Basic Medical Science disciplines (Physiotherapy, Nursing, Radiography, Medical Laboratory Science).

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.004

Judgement: Since the observed p value is less than 0.05, the null hypothesis is therefore REJECTED

5. There would be no significant relationship between level of study and the prevalence of spinal pain among the respondents

Test: Chi-square

Alpha level: 0.05

Observed p value: 0.063

Judgement: Since the observed p value is greater than 0.05, the null hypothesis is therefore NOT REJECTED

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

The primary aim of this study was to investigate the prevalence and pattern of spinal pain among Basic Medical Sciences students undergoing clinical postings at the University of Benin, and to assess the factors associated with its occurrence. This study particularly focused on identifying the relationships between demographic characteristics (such as age, gender, and level of study), posting-related factors (such as duration and department), and functional limitations reported by the students.

This study's findings revealed a high prevalence of spinal pain among students, which is consistent with previous reports from Nigeria and around the world (Tinubu et al., 2010; Fonseca et al., 2019; Ogunlana et al., 2021). This high incidence indicates that clinical training environments place significant musculoskeletal demands on students, frequently beyond their ergonomic readiness.

Similar to Akinpelu et al.'s (2016) study of Medical Laboratory students in Lagos, this study found that extended static postures and uncomfortable ergonomics were significant factors to spinal discomfort. Physiotherapy and nursing students were especially sensitive owing to repetitive manual patient handling, whereas radiography students experienced discomfort from heavy imaging equipment and prolonged standing, which is similar with Masondo and Khoza's (2023) findings from South Africa.

The study found a high prevalence of spinal pain among Basic Medical Sciences students during their clinical postings. The general result of high musculoskeletal morbidity is consistent with earlier research on Medical and Allied Health students, who are exposed to substantial physical strain early in their professions, even if the precise 12-month and point prevalence numbers are covered in depth in Chapter Four.

Lower Back Pain (LBP) was shown to be the most common regional complaint in terms of pattern. This finding aligns with the findings of Mustafa Ahmed Alshagga et al. (2013), who discovered that 65.1% of medical students in Malaysia experienced at least one site of Musculoskeletal Pain (MSP) in the previous year, with LBP being the primary component, and Soumaya Boussaid et al. (2023), who reported a high annual prevalence of 80.4% for LBP among medical university students in Tunis. Therefore, the high prevalence of LBP in this study supports the idea that students are always at risk for lumbar strain due to clinical settings, which are marked by extended standing, awkward postures, and patient handling, with LBP being the predominant pattern.

In terms of gender differences, this study found no significant difference in the prevalence of spinal pain between male and female students, which is consistent with Gupta et al. (2020) but contradicts Yeun and Han (2017), who showed higher neck pain prevalence in females. This disparity may be due to sociocultural and occupational differences among sample populations.

In terms of age and level of study, no significant associations were discovered between age and functional restrictions, implying that spinal pain while posts is more about physical exposure than chronological age. However, students at higher levels of study reported more frequent complaints, probably due to longer exposure to posts and greater responsibilities—a tendency also noted by Ilic et al. (2023) in Serbia.

The number of posting hours per week had a positive link with functional limits, implying that lengthy shifts and long-term clinical exposure cause physical strain. This finding supports previous research (Mwaka et al., 2014; Helliwell & Taylor, 2003), which connected prolonged load-bearing activities to musculoskeletal strain and repetitive stress injury.

The study also demonstrates the strong link between clinical specialties and spinal pain. Nursing and physiotherapy students showed a higher frequency than students studying radiography and medical laboratory science. This reflects the physical demands of their employment, which include manual lifting, patient repositioning, and prolonged standing (Ohene et al., 2018; Siyanda et al., 2023).

Overall, this study stresses the prevalence of spine discomfort as an occupational hazard throughout clinical training. Without sufficient ergonomic training and institutional assistance, these new professionals risk bringing musculoskeletal disorders into their employment.

5.2 Conclusion

This study established that:

i. There was a high prevalence of spinal pain among Basic Medical Sciences students on clinical assignments at the University of Benin.

ii. .The prevalence and pattern of spinal pain differ by discipline, with physiotherapy and nursing students being the most impacted.

iii. The number of posting hours per week was substantially related to functional constraints.
iv. This study found no significant relationships between age and gender with spinal pain.
v. The level of study was positively associated with prevalence, indicating that cumulative exposure may increase risk.

These findings indicate that spinal pain among clinical students is multifactorial, largely related to posting workload and ergonomic strain, rather than demographic characteristics alone.

5.3 Recommendations

i. Ergonomic Training: Incorporate structured ergonomic and self-care modules into the Basic Medical Sciences curriculum to provide students with preventive techniques.
ii. Workload Management: Universities and teaching hospitals should evaluate posting schedules to ensure students are not working long hours without proper breaks.
iii. Awareness and Advocacy: Students, clinical instructors, and supervisors should be educated about the risks of spinal pain and encouraged to use safer practices (e.g., proper lifting techniques, use of assistive devices).
iv. Policy Development: Institutional policies should promote student health during postings, including the availability of adaptable equipment and ergonomic support in clinical settings.

v. Health Support programs: Establish on-campus physiotherapy or wellness programs where students can get information, an early diagnosis, and treatment for musculoskeletal issues.

5.4 Implications For Further Study

i. Longitudinal research should look into the long-term consequences of clinical placements on musculoskeletal health among healthcare students.

ii. Experimental studies could be conducted to determine the effectiveness of ergonomic interventions (such as lifting devices and posture training) in reducing spinal pain during clinical postings.

iii. Comparative research across Nigerian universities could provide more comprehensive evidence on prevalence and causes, allowing for national recommendations.

iv. Future research should look on the psychosocial aspects of spinal pain among students, such as stress, burnout, and coping strategies.

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APPENDICES

APPENDIX 1

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

Chairman: Prof. F. A Imarhiagbe
MBChb, FMCP
Cert Clin Res and ethics (NIH), MD.
0803449092

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

Our Ref: CMS/REC/01/VOL.2/827 **Date: 20th August, 2025**

Re: PREVALENCE AND PATTERN OF SPINAL PAIN AMONG BASIC MEDICAL SCIENCES STUDENTSNDURING POSTING IN THE UNIVERSITY

Name of Principal Investigator: **OLOYE, DANIEL CHUKWUDI**
Department Of Physiotherapy,
School of Basic Medical Sciences
College of Medical Sciences,
University of Benin

REC Approval No: CMS/REC/2024/827

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 **20th August, 2025 to 19th August, 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

APPENDIX 2

INFORMED CONSENT

My name is OLOYE daniel chukwudi, a final year student of the Department of Physiotherapy, College of Basic Medical Sciences, University of Benin, Benin City, Edo State. I am carrying out a research titled "PREVALENCE AND PATTERN OF SPINAL PAIN AMONG BASIC MEDICAL SCIENCES STUDENTS DURING CLINICAL POSTING IN THE UNIVERSITY OF BENIN". This research study will be conducted as part of the requirement for the award of Bachelor of Physiotherapy (B.PT). Your participant is voluntary and you are free to ask questions about the study and you are also free to withdraw at any time you desire. Your response will be strictly confidential and will be used solely for the purpose of this research. Please kindly indicate your signature and date if you are willing to participate.

Participant's signature **Researcher's signature**

…..…………………………….. ……………………………..

APPENDIX 3

Dear Participant,

QUESTIONNAIRE

This questionnaire is part of a research project titled:

"Prevalence and Pattern of Spinal Pain among Basic Medical Sciences Students during Clinical Postings in the University of Benin."

It uses the

Nordic Musculoskeletal Questionnaire and **Spinal Functional Index** to assess your experience with spinal pain. Your responses are confidential and used solely for academic purposes.

Informed Consent (Tick the box if willing to participate)

I have been informed about the nature and purpose of this study. I understand what my participation involves, and I agree to participate [ ]

SECTION 1: DEMOGRAPHIC INFORMATION

1. **Age** (in years): _____________________

2. **Gender**

Male [ ]   Female [ ]

3. **Department**

Physiotherapy [ ] Nursing [ ] Radiography [ ] Medical Laboratory Science [ ]

4. **Level of Study**

200 Level [ ] 300 Level [ ] 400 Level [ ] 500 Level [ ]

5. **Have you started your clinical postings?**

Yes [ ] No [ ]

6. **How many hours per week are you involved in clinical postings?**

____

SECTION 2: NORDIC MUSCULOSKELETAL QUESTIONNAIRE

1. **In the last 12 months, have you had trouble (ache, pain, discomfort) in any of the following areas?**

Neck: [ ] Upper back: [ ] Lower back: [ ] None: [ ]

2. **In the last 7 days, have you had trouble (ache, pain, discomfort) in any of the following areas?**

Neck: [ ] Upper back: [ ] Lower back: [ ] None: [ ]

3. **Have any of the above areas caused you to seek medical care or miss activities (School/Clinical postings)?**

Yes [ ] No [ ]

SECTION 3: SPINAL FUNCTIONAL INDEX (SFI)

Select the answer that best describes your current level of spinal function. Options:

Yes =1, **Sometimes =0.5**, **No =0**

Question	Yes (1)	Sometimes (0.5)	No (0)
1. I feel spinal pain when standing for long	[ ]	[ ]	[ ]

Question	Yes (1)	Sometimes (0.5)	No (0)
periods.			
2. My spinal pain limits my ability to walk.	[ ]	[ ]	[ ]
3. I avoid certain positions due to pain in my spine.	[ ]	[ ]	[ ]
4. I carry out my daily routine without being limited by spinal pain.	[ ]	[ ]	[ ]
5. My spinal pain affects my sleep.	[ ]	[ ]	[ ]
6. I feel stiff in my spine in the morning.	[ ]	[ ]	[ ]
7. I can bend forward comfortably.	[ ]	[ ]	[ ]
8. I avoid lifting objects because of spinal pain.	[ ]	[ ]	[ ]
9. My spinal pain affects my concentration during clinical posting.	[ ]	[ ]	[ ]