

**EVALUATING PHYSIOTHERAPISTS' PREFERENCE FOR  
MANUAL THERAPY AGAINST ELECTROTHERAPY AS  
ADJUVANTS IN THE TREATMENT OF LOW BACK PAIN IN  
A TERTIARY HEALTH INSTITUTION**

**BY**

**CHIKA TOJU NWOBU**

**(BMS2005157)**

**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 DEGREE**

**JANUARY, 2025.**

**CERTIFICATION**

This dissertation by NWOBU TOJU CHIKA is accepted in its present form as satisfying dissertation requirement of the degree of the Bachelor of Physiotherapy of the School of Basic Medical Sciences of the University of Benin.

**SUPERVISOR**

**SIGNATURE AND DATE**

**DR. MRS OBASEKI C.O**

.....

**EXTERNAL EXAMINER**

**SIGNATURE AND DATE**

**DR. U.A. OKAFOR**

.....

**APPROVED**

.....

**DR. MRS OBASEKI C.O**

**HEAD OF DEPARTMENT**

**DEPARTMENT OF PHYSIOTHERAPY**

**COLLEGE OF BASIC MEDICAL SCIENCES**

**UNIVERSITY OF BENIN**

## **DEDICATION**

This dissertation is dedicated to God, to my parents, friends and family and to everyone who made this work a reality.

## ABSTRACT

**Background:** Low back pain (LBP) remains a significant global health challenge, impacting individuals across all age groups and socioeconomic strata. Despite advancements in physiotherapeutic interventions, the debate persists on the preference for manual therapy (MT) versus electrotherapy (ET) as adjuvants in managing LBP. This study evaluates the preferences of physiotherapists for MT or ET in the treatment of LBP within a tertiary health institution.

**Aim:** This study aimed to evaluate physiotherapists' intervention preferences for manual therapy or electrotherapy in the treatment of low back pain. In addition, it also seeks to identify the factors that influence their intervention preference and to assess the implication of these intervention preferences on patients' outcome and clinical practice in general

**Method:** Utilizing a purposive sampling technique, data for this study was collected using the self-administered questionnaire adapted from the Pain Attitudes and Belief Scale for Physiotherapy (PABS-PT) questionnaire. 45 physiotherapists (57% female and 42% male) were recruited from seven (7) units completed the questionnaire. Descriptive statistics of mean, frequency and standard deviation were used to summarize the data.

**Result:** 57.8% were female, while 42.2% were male .Most respondents (73.3%) were aged 18–29 years, indicating a young workforce with 91.1% having a Bachelor's degree. 64.4% had less than one year of clinical experience, with only 8.9% practicing for more than 10 years. 55.6% reported frequent use of MT, 46.7% often used ET, while 26.7% always used it. 68.9% consistently utilized exercise therapy alongside MT and ET. 37.8% believed MT was the most effective for LBP, 51.1% considered ET an essential treatment component and majority (55.6%) factored clinical reasoning into their choice of therapy. The main barriers of utilization were, lack of equipment reported 80%., lack of time cited 54.5%, patients with

comorbidities Identified by 66.7% and insufficient training noted by 57.8%. Treatment Approaches for LBP Only 15.6% preferred MT alone, while 13.3% favored ET alone treatment. The majority (55.6%) preferred combining MT and ET for better outcomes.

**Conclusion:** The study highlighted that physiotherapists recognize the benefits of integrating MT and ET to address the multifactorial nature of LBP effectively. However, barriers such as lack of equipment and insufficient training limit optimal utilization.

**Keywords:** Manual therapy, electrotherapy, low back pain.

## 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 Dr Mrs C.O Obaseki for her assistance and guidance during the course of the research study. Despite the busy schedule she devoted her time to listen to me, answer questions, read through my work and also make corrections. May the good Lord reward you in million folds.

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, Prof Dr. Kayode I. Oke., retired Rev. Sister Fawole, Dr Joseph Umunnah, Dr. Obinna Ezeukwu , Dr Saturday Nicolas Oghumu, Mr. R.E. Okhuaesuyi and Dr Mrs. S. Kubenje who imparted knowledge on me during my stay in school. A special thanks to the Head of Department, Mr Taiwo Oyewumi, the directors and also to the 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 appreciate the non-academic staffs, of the Department of Physiotherapy, University of Benin.

I also give a special thanks to my parents, Mr. and Mrs. Nwobu, all my siblings and relatives 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 specially appreciate my friend Okemute Aganbi for is generous supports and to my other friends Prosper, Laju, Vera, Favour, Ben, Bstar, Gertrude, Chioma, Marvelous, Dammy , and my Ekosodi paddies and all members of group 4 and 5 and physiowolfs fc. My special thanks and gratitude to all my classmates and to the physiotherapists that volunteered to participate in my study and to others which the confines of this page will not permit me to state.

# TABLE OF CONTENTS

TITLE PAGE.....	i
CERTIFICATION.....	ii
DEDICATION.....	iii
ABSTRACTS.....	iv
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vii
<b>CHAPTER ONE: INTRODUCTION.....</b>	<b>1</b>
1.1 Background of Study .....	1
1.2 Statement of the Problem .....	3
1.3 Research Question.....	4
1.4 Aim of the Study .....	4
1.4.1 Specific Objectives .....	5
1.5 Hypotheses .....	5
1.6 Scope of study.....	6
1.7 Significance of the Study.. ..	6
1.8 Limitation of study.....	7
1.9 Definition of Terms .....	7
1.10 List of Abbreviations.....	8
<b>CHAPTER TWO: LITERATURE REVIEW.....</b>	<b>9</b>
2.1 Definition .....	9

2.2 Epidemiology .....	9
2.3 Anatomy of the Back .....	12
2.3.1 The Vertebral Column.....	12
2.3.2 Muscles of the Back.....	21
2.4 Pathophysiology of Low back pain.....	24
2.4.1 Etiology of Low back pain.....	25
2.4.2 Spinal Osteoarthritis and Degenerative Joint Disease .....	29
2.5 Clinical Presentations of Low back pain.....	34
2.6 Diagnosis of LBP .....	35
2.6.1 Patient History .....	35
2.6.2 Physical Examination: .....	35
2.6.3 Radiographic Examination.....	36
2.7 Management of Low back pain.....	39
2.7.1 Management of Low back pain using Electrotherapy .....	39
2.8 Prevention of Low back pain.....	41
2.9 Outcome Measures .....	42
2.9.1 The Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT).....	42
2.10 Summary of Literature Review .....	43

CHAPTER THREE: MATERIALS AND METHODOLOGY .....	45
3.1 Participants .....	45
3.1.1 Participant Selection.....	45
3.1.2 Inclusion Criteria .....	45
3.1.3 Exclusion Criteria.....	45
3.2 Materials .....	45
3.2.1 Apparatus/Instruments .....	45
3.3 Methods. ....	46
3.3.1 Research Design.....	46
3.3.2 Sampling Technique / Sample Size.....	46
3.3.3 Procedure for Data Collection .....	48
3.3.4 Data Analysis .....	48
CHAPTER FOUR: RESULTS.....	49
4.1 Socio Demographic variable of the respondent.....	49
4.2 Descriptive statistics on the utilization of treatment modalities.....	52
4.3 Descriptive statistics on preference and belief.....	54
4.4 Descriptive statistics on barrier faced when using manual therapy or electrotherapy.....	56
4.5 Treatment approach for low back pain .....	58
CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION.....	60
5.1 Discussion.....	60
5.2 Conclusion .....	66

5.3 Recommendations .....	67
References.....	68
APPENDIX I.....	72
APPENDIX II.....	75
APPENDIX III.....	81

## LIST OF TABLES

<b>Table No.</b>	<b>Title</b>	<b>Pages</b>
Table 1	Sociodemographic variable of the respondents.....	50
Table 2	Descriptive statistics on the utilization of treatment modalities.....	53
Table 3	Descriptive statistics on Preference and Beliefs .....	55
Table 4	Descriptive statistics on barriers faced when using manual therapy or electrotherapy .....	57
Table 5	Treatment approach for low back pain .....	59

## LIST OF FIGURES

<b>Fig No.</b>	<b>Title</b>	<b>Pages</b>
Figure 1:	Superior view of the 2nd lumbar vertebrae, representing a typical vertebra.....	15
Figure 2:	Lateral view of the 2nd lumbar vertebrae, showing the lateral features of a typical vertebrae.....	16
Figure 3:	Lateral view of the vertebral column, showing the four spinal curvatures.....	19
Figure 4:	An image of a sagittal section of the spine and its associated ligaments.....	25
Figure 5:	A diagram depicting a normal and degenerated disc accompanied by inflammation, and nerve and blood growth in the disc.....	29
Figure 6:	Measurement of Cobb angle .....	37
Figure 7:	Bar chart showing the gender distribution of respondents.....	51
Figure 8:	Bar chart showing the age distribution of respondents.....	51

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of Study

Low back pain is a common symptom that encompasses various types of pain, such as nociceptive, neuropathic, or nociplastic pain. It can affect individuals of all ages, from children to the elderly (Lancet. 2018). Low back pain is described as pain and discomfort below the 12th costal margin and above the inferior gluteal fold, with or without radiating symptoms to the lower limbs. (World Health Organization, 2013).

The pathoanatomical etiology of LBP remains unclear, and it is estimated that most people would experience at least one episode of LBP during their lifetime (Lele et al 2023).

LBP is usually self-limiting, studies indicate that over 60% of individuals with LBP experience recurrent episodes one year after onset, leading to chronic and persistent pain (Itz et al 2015). Between 1990 and 2015, the number of people with disabilities caused by LBP increased by 54% worldwide, with the fastest growth observed in low-income and middle-income countries (Ann et al 2014). There are multiple causes of LBP, encompassing mechanical factors like muscle strains, compressed nerves, herniated discs, and degenerative changes. Inflammatory conditions, infections, and tumors are non-mechanical contributors. Referred pain from internal organs like kidneys and gallbladder can contribute to LBP (Pangarkar et al 2019)

There are several contributing factors to LBP including ergonomic, sociodemographic, and psychosocial factors. Job-related factors like prolonged sitting, heavy lifting, poor posture, and bending contribute to LBP. Psychological elements such as depression and anxiety, along with

obesity, physical inactivity, smoking, aging, and being female, are among multiple factors associated with LBP development (Jia et al 2022).

Although the prevalence of low back pain is quite abundant; yet its management still remains a point of debate (Koes et. al, 2015). No single approach proves its superiority over the others from wide range of therapeutic approaches already prevalent among professionals. The management of low back pain might need a Physiotherapist to use a variety of therapeutic maneuvers (Hing et. al, 2019)

As a non-invasive non-pharmacological therapy, manual therapy (MT) is widely used in the treatment of LBP due to its recognized safety and effectiveness (George et al., 2017). MT encompasses massage, bone setting, chiropractic manipulation, and joint mobilization, among others. Many clinical guidelines recommend MT for managing acute LBP (Oliveira et al., 2018). Clinical trials have shown that MT can not only alleviate pain but also foster enhanced connectivity between brain regions responsible for pain perception and motor processing. (Isenburg, 2021, Rubinstein 2019, Dayanir, 2020). Mobilizations of the spine including spinal manipulation are widely used for management of low back pain, and their effectiveness has been established in randomized controlled trials (Basharat et al., 2013). Mobilization procedures only use low velocity passive accessory movements either within or at the boundary of available ROM. Although, the analysis through cross comparison between the several manipulative procedures was not always well explained and thoroughly understood ,however, vast majority of the manual physiotherapists come to agreement that manipulative procedures involve a thrust constituting high velocity to a joint well beyond its limited range of movement (ROM) (Stephen et al., 2021) and this procedures show higher efficacy in the treatment of low back pain which is evident through minimization of a disk bulge, creation of degree of freedom of movement in

formed adhesions around an injured disc, inhibition of conduction of pain carrying messages of the Zygapophyseal joints and also to realignment of internally displaced disc fragmentations (Stephen et al, 2021).

On the other hand, Electrotherapy also still remains as a commonly used treatment in clinical practice based settings (Watson et al., 2016) and as a technique predominantly used by physiotherapists to restore muscle function, reduce edema, tissue healing and to relieve pain.

Common Electrotherapy modalities including Electrical muscle stimulation (EMS), low level laser, superficial hot and cold therapy (Thermal therapy), Transcutaneous Electrical Nerve Stimulation (TENS), therapeutic ultrasound and particularly shortwave diathermy and interferential therapy, as the solution element in the treatment of low back pain, with the use of hand therapy (Rafia et al., 2022). Therefore this study intends to explore through a survey, the contributing factors of manual therapy versus electrotherapy in the context of practicing physiotherapist preference experience.

## **1.2 Statement of the Problem**

Low back pain is a leading cause of disability worldwide, and effective management is critical in tertiary health institutions where complex cases are often treated. Despite extensive research on the effectiveness of various physiotherapeutic interventions for low back pain, there remains a significant debate among physiotherapists regarding the optimal treatment approach. In a tertiary health institution, the preference for manual therapy or electrotherapy among physiotherapists plays a crucial role in shaping treatment protocols and patient outcomes. Several studies have been done on the comparison and physiotherapist preference of manual therapy or electrotherapy in low back pain management. (Akhtar et al., 2014 & Plank et al., 2021). The prevalence of low back pain poses a significant challenge to healthcare systems, with diverse therapeutic

approaches available to manage this condition most especially manual and electrotherapy. Despite both methods being widely used, there is a paucity of research on why physiotherapists prefer one approach over the other and how these preferences influence patient care and patient outcomes. However, the factors that influence these clinical decisions are not well understood, leading to variability in treatment approaches. This lack of standardization in treatment intervention can lead to inconsistent treatment protocols and varied patient outcomes.

### **1.3 Research questions**

This study would therefore aim to answer the following questions;

1. How effective do physiotherapists believe manual therapy to be in managing low back pain?
2. How effective do physiotherapists believe electrotherapy to be in managing low back pain?
3. What factors influence their decision to choose electrotherapy for the treatment of low back pain?
4. What factors influence your decision to choose manual therapy for the treatment of low back pain?
5. What barriers limit the use of manual therapy for low back pain management?
6. What barriers limit the use of electrotherapy for low back pain management?

### **1.4 Aim of the Study**

This study aimed to evaluate physiotherapists' intervention preferences for manual therapy or electrotherapy in the treatment of low back pain. In addition, it also seeks to identify the factors

that influence their intervention preference and to assess the implication of these intervention preferences on patients' outcome and clinical practice in general.

### **1.4.1 Specific Objectives**

. The specific objectives of this study are to;

1. Determine the underlying reasons for physiotherapists' intervention preferences for manual therapy or electrotherapy and to determine how these preferences impact on patients' outcomes and clinical effectiveness.
2. Explore the rationale behind these intervention preferences in order to promote more uniform and effective treatment strategies.
3. Bridge the gap of non-existent standardized treatment protocol for low back treatment by evaluating the factors that drive physiotherapists' intervention preferences for manual therapy or electrotherapy and assessing the subsequent impact on clinical outcomes.
4. Analyze the factors that influence these intervention preferences.

### **1.5 Hypotheses**

- i. There is no significant difference in intervention preference for manual therapy or electrotherapy among physiotherapists for the treatment of low back pain
- ii. There is no significant difference in the patient outcome between manual therapy and electrotherapy

## **1.6 Scope of the study**

This study is delimited to:

- i. Physiotherapists at all designations, as well as intern physiotherapists within the University of Benin Teaching Hospital, Edo state, Nigeria.
- ii. Physiotherapists at all designations, as well as intern physiotherapists who had used either manual or electrotherapy for the management of low back pain

## **1.7 Significance of the Study**

- i This study will contribute to the understanding of physiotherapists' intervention preferences and the clinical reasoning behind them, hence contributing to the development of a more standardized treatment protocols
- ii The outcome of this study may help optimize treatment strategies for low back pain, potentially leading to better pain management, functional improvement, and overall patient satisfaction
- iii The study would help highlight the need for targeted professional development and continuing education programs to address gaps in knowledge or skills related to manual therapy and electrotherapy
- iv It would add significantly to the body of knowledge in the field of physiotherapy and medicine generally and specifically in the field of orthopedic, manipulative therapy and electrotherapy.
- v It would prompt further studies

## 1.8 Limitations of the Study

- i. The study was conducted in a single tertiary health institution, which may not fully represent the preferences and practices of physiotherapists across different regions, healthcare settings, or countries
- ii. The study faced challenges in recruiting participants and ensuring their honest participation due to time constraints and perceived judgment.
- iii. The research may not evaluate the long-term effectiveness of manual therapy versus electrotherapy, which is critical for understanding the sustainability of treatment benefits.
- iv. Factors such as institutional policies, patient load, and availability of other therapeutic options may influence physiotherapists' preferences but remain unaccounted for.
- v. A workforce dominated by younger or less experienced physiotherapists could bias the findings, as their preferences might differ from those with more experience.

## 1.9 Definition of Terms

- i. **Low back pain:** pain and discomfort below the 12th costal margin and above the inferior gluteal fold, with or without radiating symptoms to the lower limbs. (WHO 2013).
- ii. **Manual therapy:** a clinical approach utilizing skilled, specific hands-on techniques, including but not limited to manipulation/mobilization, used by the physical therapist to diagnose and treat soft tissues and joint structures for the purpose of modulating pain; increasing range of motion; reducing or eliminating soft tissue inflammation; inducing relaxation; improving contractile and non-contractile tissue extensibility; and improving pulmonary function."(APTA 1997)
- iii. **Electrotherapy:** the use of electrical energy as a medical treatment. Electrotherapy modalities include a wide range of treatments using electrical devices to reduce pain,

improve circulation, repair tissues, strengthen muscles, and promote bone growth, leading to improvements in physical functioning." (CSP 2010).

- iv. **Adjuvant:** is any substance or treatment that enhances the efficacy or effect of another therapeutic agent or treatment.
- v. **Preference:** the act, fact, or principle of giving advantages to some over others (Merriam Webster Dictionary).

### 1.10 List of Abbreviations

- MT                      Manual Therapy
- LBP                     Low back pain
- ET                        Electrotherapy

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Definition

Low back pain is a very common condition, affecting approximately 38.9% of the global population (Hoy et al, 2012). Low back pain is defined as pain below the 12th costal margin and above the inferior gluteal fold, with or without radiating symptoms to the lower limbs (WHO, 2013). Depending on the duration of the pain, low back pain can be classified into acute (pain lasting for less than 6 weeks), subacute (pain lasting between 7 and 12 weeks) and chronic low back pain, (more than 3 months), (Koes et al, 2010). Low back pain is a symptom rather than a disease. Like other symptoms, such as headache and dizziness, it can have many causes. The most common form of low back pain is low back pain. The term is used when the pathoanatomical cause of the pain cannot be determined (Chris & Rachelle et al, 2016).

#### 2.2 Epidemiology

Low back pain (LBP) is a major public health concern globally transcending ages, occupations, and socioeconomic backgrounds, becoming a primary cause of disability and work absenteeism worldwide, leading to significant economic challenges and reduced productivity with up to 84% of adults experiencing it at least once in their lives. (J Hosp Manag et al 2020).LBP ranks second only to the common cold as a reason for physician visits and are the fifth leading cause of hospital admissions. Studies suggest that women are at a higher risk of experiencing different clinical pain conditions, including LBP. (Chen S,et al .2019). Low back pain ranked among the top 10 contributors to Disability-Adjusted Life Years (DALY) in the 2019 Global Burden of

Disease (GBD) Study, resulting in significant healthcare costs each year. (GBD 2019 Diseases and Injuries Collaborators)

In 2020, LBP affected 619 million people globally and it is estimated that the number of cases will increase to 843 million cases by 2050, driven largely by population expansion and ageing. (WHO, 2023).

Although acute LBP is usually self-limiting, studies indicate that over 60% of individuals with LBP experience recurrent episodes one year after onset, leading to chronic and persistent pain (Itz CJ et al 2013) Between 1990 and 2015, the number of people with disabilities caused by LBP increased by 54% worldwide,( Hartvigsen J et al 2018) with the fastest growth observed in low-income and middle-income countries. (Hoy D et al 2014)

The prevalence of LBP is globally estimated to be 7.5% based on age-standardization, with a lifetime prevalence ranging from 70% to 85%..(Kahere & Wu A, et al.2022). A systematic analysis of 65 epidemiological studies conducted in Africa revealed that the pooled lifetime, annual, and point prevalence of LBP on the continent were 47%, 57%, and 39%, respectively (Morris et al 2018)

In Nigeria, a review showed that the 12-month prevalence of LBP was between 32.5% and 73.53%.(Bello B, Bello Adebayo H. et al 2023).

In a study carried out by Airenakho et al 2023 in south-south Nigeria, LBP frequency was 20.2%, notably higher than other reported rates in previous studies. (Eromon et al 2020, Ogbue .et al 2017)

Variations were observed, with a family practice clinic in Ibadan reporting a frequency of 46.4%. (Ogunbode et al 2013).

The global occupational prevalence of LBP as reported by Punnett et al (2015,) is 37%. The mean age of the study patients was 59.5 years, and LBP was more prevalent among individuals aged 51–60 years. This aligns with the 2019 GBD estimate, which indicated a higher occurrence of LBP cases between the ages of 50–55 years. (GBD 2019 Diseases and Injuries Collaborators). Similar findings were observed in the research conducted by Katembo et al.in Tanzania and Eromon et al. in Nigeria. Previous studies by Eyichukwu et al and Ogugua et al and Omoke et al and Amaraegbulam et al noted a peak age incidence of LBP in the 31–40-year and 42–50-year age groups, respectively.

Conversely, Edomwonyi et al and Ogbue et al reported the highest incidence of LBP in the 61–70-year-old age group. The impact of LBP on social and occupational activities is significant for individuals under 60 years old, who are actively engaged in work and daily activities.(Waddell et al 2001)

Previous studies have shown diverse patterns of sex distribution in LBP, likely influenced by socioeconomic factors, study demographics, occupations, and research methods. In this study, LBP was more prevalent among females (61.4%) than males (38.6%), consistent with some previous research,( Eromon et al 2020, Eyichukwu et al 2012) .

However, contrasting findings of male predominance have also been reported (Ogunbode et al,2013, Katembo et al 2021). The suggested reason for this is that men often engage in occupations involving intense physical exertion and whole-body vibration, in contrast to women (Punnett et al 2023) . In rural agricultural settings, economic conditions drive women to engage in physically demanding tasks, either to support men or due to entrenched sociocultural norms designating them as primary family provider (Birabi et al 2012) ..

## 2.3 Anatomy of the Back

The back is the posterior part of the trunk, it lies between the neck inferiorly and superiorly to the buttocks (Moore et al, 2013). The back includes the following structures;

- i. The skin and subcutaneous tissue**
- ii. Muscles:** these comprise of two layers
  - A superficial layer, which is primarily concerned with positioning and movement of the upper limbs, and
  - Deeper layers, also called the true muscles of the back, which are more concerned with maintaining the body posture.
- iii. The vertebral column:** this comprises of the vertebral bodies, the intervertebral discs and the associated ligaments
- iv. The ribs** (located in the thoracic region)
- v. Spinal cord and the associated meninges**
- vi. And various segmental nerves and blood vessels.** (Moore et al, 2013; Modes & Fahrioglu, 2020)

### 2.3.1 The Vertebral Column

The vertebral column (spine) is made up of the vertebrae and the intervertebral discs. It extends from the cranium to the apex of the coccyx. The vertebral column consists of 33 vertebrae, is approximately 71 to 75cm long in adults and the intervertebral discs form one quarter of its length. The vertebral column serves the following function;

- i. It protects the spinal cord and the spinal nerves

- ii. It supports the weight and physical structures of the body (above the level of the pelvis)
- iii. It provides an axis for the movement of the body, and a base for the head.
- iv. It is important for the posture and locomotion of the body. (Valovska, 2011; Moore et al, 2013; DeSai et al, 2020)

### **2.3.1.1. The Vertebrae**

The vertebrae and the intervertebral discs make up the vertebral column. There are 33 vertebrae in the vertebral column of an adult. These vertebrae are arranged in five regions;

- i. The cervical region, made up of the first 7 vertebrae
- ii. The thoracic region made up of 12 vertebrae
- iii. The lumbar region, made up of 5 vertebrae
- iv. The sacral region made up of 5 vertebrae
- v. And the coccygeal region, which is made up of the inferior 4 vertebrae.

Significant motion occurs only between the first 25 vertebrae (cervical to lumbar region), the sacral region fuses to form a rigid sacrum and the coccygeal region fuses to form the coccyx. The junction between the lumbar vertebrae and the sacrum is described as the lumbosacral region. (Valovska, 2011; Moore et al, 2013)

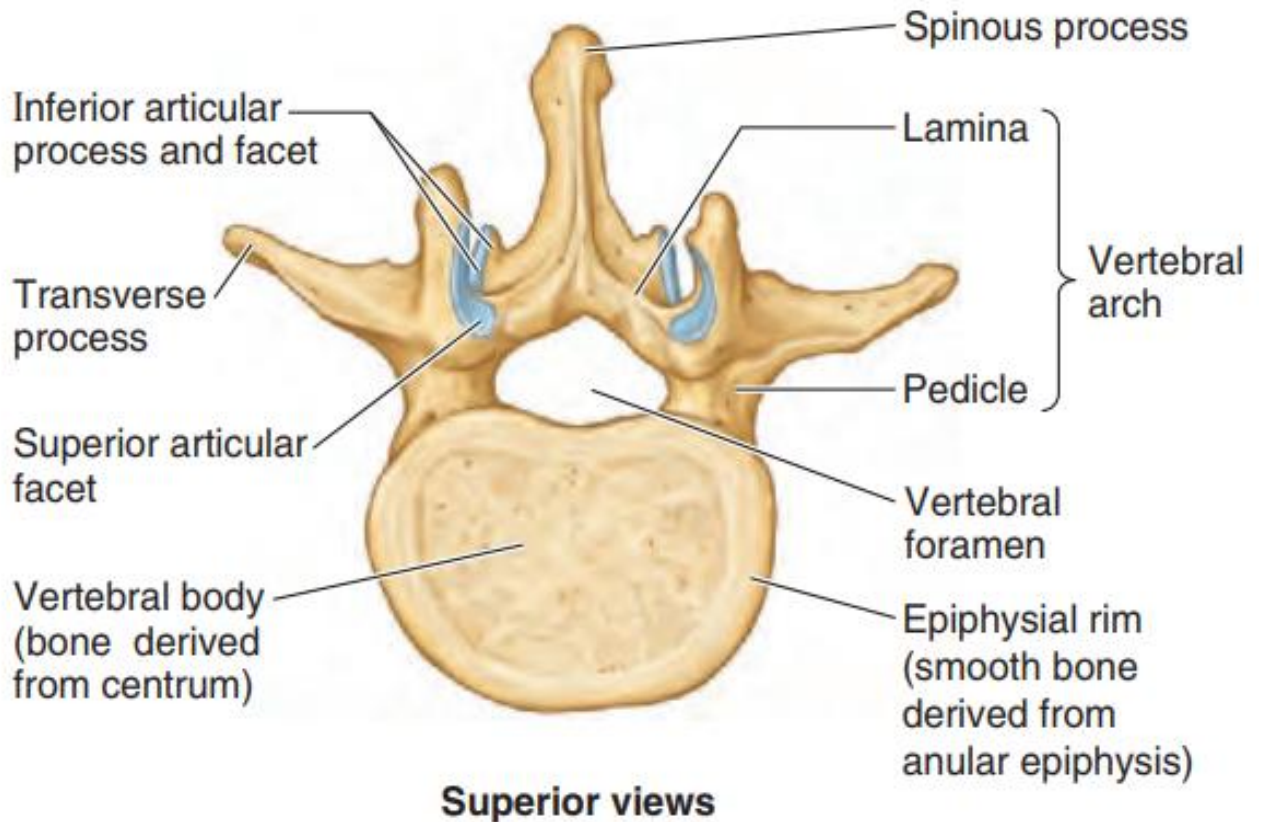
The vertebrae gradually increase in size down the vertebral column up to the sacral region, from where it gradually decreases towards the apex of the coccyx. The vertebrae are largest just immediate to the superior part of the sacrum, where weight is transferred to the pelvic girdle at the sacroiliac joints. The reason for the gradual variation in size of the vertebrae down the vertebral column is due to the fact the amount of body weight born by each vertebrae gradually

increases down the vertebral column. (Moore et al, 2013). Each vertebra is separated from the other superiorly and inferiorly by the intervertebral disc. The intervertebral discs are cartilaginous structures that consist of an outer avascular layer (annulus fibrosus) surrounding a soft nucleus pulposus (Valovska, 2011; DeSai et al, 2020). Zygapophyseal joints also exist between the cervical, thoracic, lumbar and first sacral vertebrae, these joints allow for more flexibility in these regions of the vertebral column. (Moore et al, 2013)

The size and characteristics of each vertebra vary from one vertebrae to another and also from one region of the vertebral column to another. However, all the vertebrae still possess a similar basic structure. The structure of a typical vertebrae consists of

- i. A vertebral body
- ii. A vertebral arch and
- iii. 7 spinous processes.

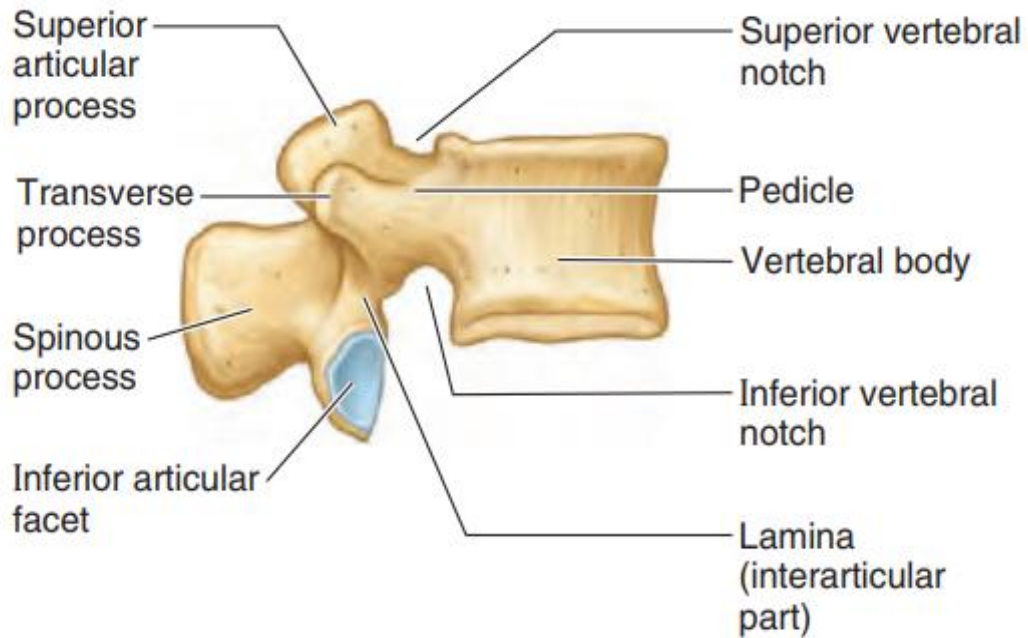
**The vertebral body** is the anterior part of the vertebrae, it is the massive and roughly cylindrical part of the vertebrae. It serves to strengthen the vertebral column and support the weight of the body. It consists of two layers of bones, a thin external layer of compact bone, surrounding a vascular inner layer of cancellous bone. The trabeculae have spaces that are occupied by red marrow, this makes the vertebrae to be one of the major hematopoietic tissues in the adult individual. The superior and inferior ends of each vertebra are covered by hyaline cartilages, in the living organism, these cartilages are, however, dried up post-mortem (Moore et al, 2013)



**Figure 1** Superior view of the 2nd lumbar vertebrae, representing a typical vertebra

Image source: Moore, Clinically Oriented Anatomy. 7<sup>th</sup> Edition. Pg. 442.

**The vertebral arch** lies posteriorly to the vertebral body. It consists of two pedicles and laminae (right and left). The vertebral arch along with the posterior portion of the vertebral body forms the vertebral foramen. The vertebral foramens of all the vertebrae form a central canal in the vertebral column, referred to as the vertebral canal. The vertebral canal contains the spinal cord, its meninges, the spinal nerve roots and the associated blood vessels. (Moore et al, 2013). From a lateral view, lying superiorly and inferiorly to each pedicle of the vertebral arch, is the superior and inferior vertebral notches



**Figure 2** Lateral view of the 2nd lumbar vertebrae, showing the lateral features of a typical vertebrae

Image source: Moore, Clinically Oriented Anatomy. 7<sup>th</sup> Edition. Pg. 442.

The superior and inferior vertebral notches of adjacent vertebrae, along with the connecting intervertebral disc form the intervertebral foramina, from which the spinal nerves emerge from the vertebral column. (Valovska, 2011; Moore et al, 2013).

In a typical vertebra, there are seven spinal processes arising from the vertebral arch:

- i. One median spinous process, which projects posteriorly from the junction of the laminae.
- ii. Two transverse processes, that project posterolaterally from the junction of the lamina and the pedicle, and

- iii. Four articular processes (2 superior and 2 inferior), arising from the junction of the lamina and the pedicle. These articular processes are also described as zygapophyses

The transverse and spinous processes serve to provide attachment for the deep muscles of the back, while the articular process along with articular processes from adjacent vertebrae, form the zygapophyseal joints, these joints determine the types of movements that are permitted 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).

### **2.3.1.2 Joints of the Vertebral Column**

The vertebral column comprises of several joints which include;

- i. Joints of the vertebral bodies, formed by the intervertebral discs
- ii. Joints of the vertebral arches, formed between the inferior and superior articular processes of adjacent vertebrae.
- iii. The craniovertebral joints, the atlanto-occipital and the atlanto-axial joints
- iv. The uncovertebral joints (between each cervical vertebral body and the one immediately below it)
- v. The costovertebral joints (between the vertebral columns and the ribs)
- vi. The sacroiliac joints (Valovska, 2011; Moore et al, 2013)

### **2.3.1.3 Movement of the Vertebral Column**

Movement across the vertebral column occurs at the nuclei pulposi of each intervertebral disc and the zygapophyseal joints. The range of movement across the vertebral column is permitted by the elasticity and flexibility of the intervertebral discs between each vertebra. The movement

of the vertebral column is produced mainly by the muscles of the back, assisted by gravity and also by the anterior abdominal muscles. The range of motion varies across the different regions of the vertebra, and is limited by;

- i. The adjoining ligaments of the vertebral column (the ligamentum flava, the posterior and anterior longitudinal ligaments).
- ii. The shape and orientation of the zygapophyseal joints
- iii. Resistance provided by the back muscles and surrounding tissues
- iv. The rib cage. (Moore et al, 2013)

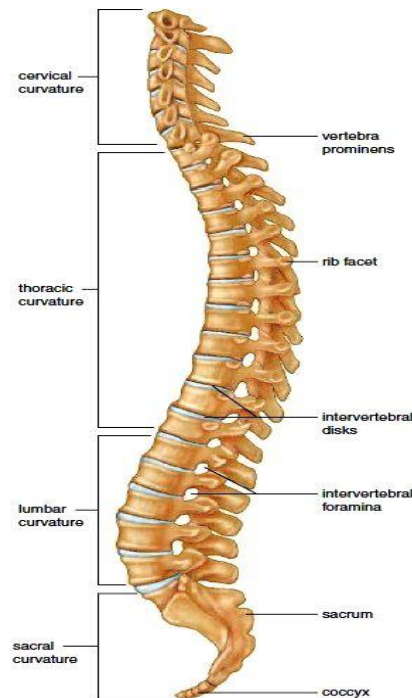
The range of movement of the vertebral column is wider at the lumbar and the cervical regions than the remaining three regions of the vertebral column. Possible movement that can occur along the vertebral column are;

- i. Flexion (greatest in the cervical region)
- ii. Extension (greatest in the lumbar region)
- iii. Rotation (Moore et al, 2013)

#### **2.3.1.4 Curvatures of the Vertebral Column**

The vertebral column in an adult individual, when viewed laterally has four curvatures, in the cervical, thoracic, lumbar and sacral regions. Kyphosis, a curvature where the vertebral column is convex posteriorly and concave anteriorly, occurs in the thoracic and sacral region. Lordosis, a curvature in which the vertebral column is concave posteriorly and convex anteriorly, occurs in the cervical and lumbar region. The curvature of the vertebral column along with the flexibility and elasticity of the intervertebral discs, allows for greater degree of movement than would be allowed by the intervertebral disc alone. While the intervertebral disc provides a passive

flexibility, due to the resistance of the zygapophyseal joints, the spinal curvatures provides a dynamic flexibility due to the resistance provided by the antagonist muscle groups to the movement of the curvature (thoracic kyphosis is restricted by the long extensors of the back and lumbar lordosis is restricted by the abdominal flexors). (Valovska, 2011; Moore et al, 2013)



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

Image source: [www.pinterest.at](http://www.pinterest.at)

The spinal curvatures can be increased by carrying additional weights anterior to the normal gravitational axis of the body, when such weights are carried for a long duration it often results in aching of the muscles that are antagonistic to the movement of the curvature. (Moore et al, 2013).

### 2.3.1.5 Vasculature of the Vertebral Column

The major **arterial supply** to the vertebral column is provided by the

- i. vertebral and ascending vertebral arteries and
- ii. the segmental arteries of the trunk. These include the posterior intercostal arteries (in the thoracic region), the subcostal & lumbar arteries and the iliocostal, lateral and medial sacral arteries.

The anterolateral surfaces of the vertebrae are supplied by the periosteal and equatorial branches of these arteries, while the spinal branches enter the intervertebral foramina and divide into larger branches (radicular medullary arteries) and smaller anterior and posterior vertebral canal branches. The anterior vertebral canal branches supply the vertebral bodies, while the posterior branches supply the vertebral arches. Nutrient arteries to the vertebral bodies arise as branches from the anterior vertebral canal arteries, these arteries supply the red marrow of the central vertebral body. The radicular medullary arteries supply the posterior and anterior roots of the spinal nerves along with their meninges (Moore et al, 2013).

The **venous drainage** of the vertebral column is provided by venous plexuses on the inside and outside of the vertebral canal. These plexuses, the internal and external vertebral venous plexuses are formed from the spinal veins, they communicate through the intervertebral foramina. The vertebral bodies are drained by the basivertebral veins, which drain into the anterior internal and external vertebral plexuses. Blood from the vertebral venous plexuses and also from the spinal cord are drained by the intervertebral veins into the vertebral veins of the neck and the segmental veins of the trunk, the lumbar, sacral and intercostal veins (Moore et al, 2013).

### **2.3.1.6 Nerve Supply of the Vertebral Column**

The nerve supply to the vertebral column is provided by the recurrent meningeal branches of the spinal nerves. These nerves originate from the mixed spinal nerve, just before it bifurcates into the anterior and posterior rami, or in some variations they may originate from the anterior rami. Branches outside the vertebral canal supply the anterolateral aspect of the vertebral bodies and of the intervertebral discs and the anterior longitudinal ligament. Within the spinal canal, branches supply the periosteum of the posterior aspect of the vertebra, ligament flava, annuli fibrosis of the posterolateral aspect of the intervertebral disc, the posterior longitudinal ligament, spinal dura mater and the vasculature within the vertebral canal. The zygapophyseal joint is however supplied by the articular branches of the medial branches of the posterior rami. The nerve supply to the periosteum are mainly nociceptors, while the annuli fibrosis and the ligaments are supplied by both nociceptors and proprioceptors. (Moore et al, 2013).

### **2.3.2 Muscles of the Back**

There are two major groups of muscles in the back.

- i. The extrinsic back muscles and
- ii. The intrinsic back muscles

The extrinsic back muscles include superficial and intermediate muscle groups and they both of these muscle groups serve to initiate and control respiratory movement and also movement of the limbs (Moore et al, 2013). However, Henson et al (2020), categorized muscles of the back into three groups with the superficial and intermediate muscle groups categorized separately along with the intrinsic muscle groups. The intrinsic muscle groups are attached to the vertebral

column and are involved in controlling the movement of the vertebral column along with helping to maintain body posture (Moore et al, 2013; Henson et al, 2020)

### **2.3.2.1 Extrinsic Muscles of the Back**

There are two groups of extrinsic muscles of the back, the superficial and intermediate muscles.

The superficial muscle groups include the trapezius, latissimus dorsi, rhomboids and levator scapulae. These muscles connect the vertebral column to the upper appendicular skeleton (the pectoral girdle and the humerus). They act to initiate and control movement of the upper limbs. Nerve supply to this group of muscles is from the anterior rami of the cervical nerves, except for the trapezius which receives its innervation from the spinal accessory nerve (cranial nerve XI). (Moore et al, 2013, Modes & Fahrioglu, 2020)

The intermediate extrinsic back muscles are the serratus posterior muscles (superior and inferior muscle), they are responsible for respiratory movement. The serratus posterior superior lies deep to the rhomboids, while the serratus posterior inferior lies deep to the latissimus dorsi. Both muscles are innervated by the intercostal nerves (Moore et al, 2013, Modes & Fahrioglu, 2020)

### **2.3.2.2 Intrinsic Muscles of the Back**

The intrinsic muscles of the back are the muscles that control the movement of the vertebral column and act to maintain the posture of the body. These muscles extend from the pelvis to the cranium, they are covered by the deep fascia and are innervated by the posterior rami of the spinal nerves. (Moore et al, 2013; Modes & Fahrioglu, 2020)

There are three layers of the intrinsic back muscles:

- i. The superficial layer (the splenius capitis and splenius cervicis)

- ii. The intermediate layer (the erector spinae muscles – the iliocostalis, longissimus and the spinalis muscles)
- iii. The deep layer (the transversospinalis muscles – the semispinalis, multifidus and rotatores muscles) (Moore et al, 2013; Henson et al, 2020)

The muscles of the superficial layer, the splenius capitis and splenius cervicis, act to cover the deep neck muscles and maintain the position of the neck. The intermediate layer, the erector spinae muscles act to extend the vertebral column. The muscles of the deep layer, the transversospinalis muscles occupy the depression between the transverse and spinous processes of the vertebrae (Moore et al, 2013)

The transversospinalis muscles serve to collectively extend the back, the semispinalis muscle extends the head, the cervical and the thoracic region of the vertebral column, it also acts unilaterally on one side to rotate the contralateral side of these regions. The multifidus muscle serves to stabilize the vertebrae while it moves, the rotatores also stabilizes the vertebrae and assists with extension and rotatory movement (Moore et al, 2013; Modes & Fahrioglu, 2020)

### **2.3.2.3 Blood Supply and Innervation of the Back Muscles**

The arterial blood supply of all the muscle groups of the back are provided by the deep cervical, posterior intercostal, subcostal or lumbar vertebral arteries (Henson et al, 2020)

The nerve supply for muscles of the back originate from the ventral and dorsal rami of the spinal nerves;

- i. The anterior rami of the spinal nerves innervate the extrinsic muscles
- ii. The splenius capitis muscle is innervated by lateral branches of the C2 – C3 dorsal rami
- iii. The lateral branches of the lower cervical dorsal rami supply the splenius cervicis muscle

- iv. The erector spinae muscles are innervated dorsal rami of the spinal nerves. The lateral branches of the dorsal rami innervate the iliocostalis muscle and the longissimus muscle is innervated by the intermediate branches.
- v. The transversospinalis muscles supplied by the primary branches of the C1 – L5 dorsal rami. (Moore et al, 2013; Eovaldi & Varacallo, 2019; Henson et al, 2020)

## **2.4 Pathophysiology of Low back pain**

Low back pain is complex and affects both the mind and the body and thus needs a multi-disciplinary approach grounded in the bio psychosocial mode (Waddell,et al 1987)

Despite the importance of psycho-social factors, however, prospective studies have shown that these factors predict only 1–3% of future first-time LBP occurrence (Mannion,et al 1996). There is no comparable evidence that psycho-social factors initiate LBP, but instead they act to augment the experience of pain (Adams et al 2006). Evidence for biomechanical and physiological factors as a causative agent of LBP however, remain well established in the literature (Adams et al 2006, Panjabi et al 2006, Allegri et al 2016). Therefore, to begin exploring what generates the pain in LBP, these factors must first be outlined. In short, low LBP begins due to spinal injury or micro-trauma that help further the degeneration of the spine, joints and associated structures. These injuries can either produce serious spinal injury, or much more commonly a type of sub-failure injury, which is defined as trauma done to the spine that is just below the threshold to produce major injury. Specifically, these can originate from three sources:

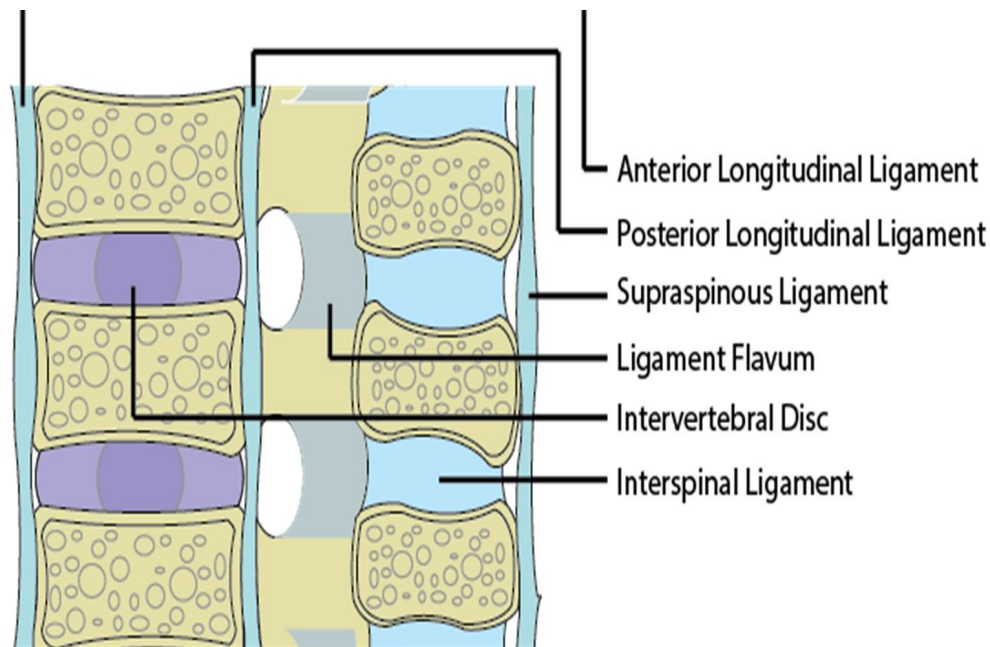
- (1) Muscle or ligament strain,
- (2) Intervertebral disc degeneration, or
- (3) Degenerative joints.

These structural changes can cause the following types of pain: myofascial pain, facet joint pain, sacroiliac joint pain, discogenic pain and spinal stenosis.(Abdullah et al 2022)

## 2.4.1 Etiology of Low back pain

### 2.4.1.1 The Ligamentous Concept

The initiating source of pain from the back is due to abnormal forces acting on the body as a whole and more specifically the intervertebral discs, ligaments and facet joints. The major structural components that passively stabilize the spine and maintain alignment are the soft tissue ligamentous structures. These include ligaments, joint capsules and intervertebral discs. Damage to these structures predisposes one to LBP (Panjabi et al 2006).



**Figure 4.** An image of a sagittal section of the spine and its associated ligaments.

Damage to the ligaments from trauma or cumulative microtrauma can weaken the spine's structural capabilities, leading to spinal misalignment. Trauma can occur from events such as a

car accident or from repetitive movements in activities such as golfing, gymnastics and cricket (Senington et al 2020). Micro-trauma can also occur from poor postural habits while sitting at an office desk (Panjabi et al 2006). . Abnormal mechanical stresses acting on normal ligaments can itself induce pain if it pinches a nerve. The ligament itself is innervated by neurons that can initiate a painful sensation if disturbed by mechanical or chemical irritation (Li, W.Gong et al 2008). A misaligned spine can impose high and continuous axial load on the vertebrae, disc and facet joints. Prolonged abnormal stress on ligaments, due to misalignment, initiates degenerative and inflammatory responses that lead to pain.

#### **2.4.1.2 Myofascia and Spinal Muscles**

Myo-facial pain begins from trauma or repetitive motion injury (Rubinstein,et al 2008). This type of pain

is characterized by the existence of specific points along the fascia, tendons, or muscles which, if triggered, produces pain (Donnelly et al 2019). The thoracolumbar fascia (TLF) is one structure that plays an important role in stabilizing the spine. Anatomical studies have shown that the TLF functions to transmit external loads efficiently from the spine to the pelvis, legs and arms (Vleeming, et al 1995, Barker, et al 1999). The TLF also contains many mechanoreceptors that signal information on spinal position (Schleip et al 2007) and thus the TLF acts similarly to an external layer of structural support to the spine above the spinal ligaments. Other structures that support the spine are the lumbar multifidus and erector spinae. Previous studies have indicated that muscular structure changes from acute to LBP, showing atrophy, fat infiltration and connective tissue accumulation (Li, W.Gong et al 2008, Hodges, et al 2017). These structural changes are generally explained by compensatory disuse due to changes in movement patterns to safeguard the multifidus from loads (Claus,et al 2018), pain/fear avoidance (Karayannis,et al

2013),or deconditioning (Mannion,et al 2000). It was reported in one study that fat infiltration into the paraspinal muscle was more relevant than disc degeneration in generating LBP in women (Özcan-Ek,si et al 2021). Another study reported that fat infiltration into the multifidus and erector spinae are highly associated with degenerative discs, which is currently the most commonly reported cause of LBP (Özcan-Ek,si et al 2019).These mechanisms serve to reduce the capability of spinal muscles in providing structural support for the spine, contributing to greater stress on the spine.

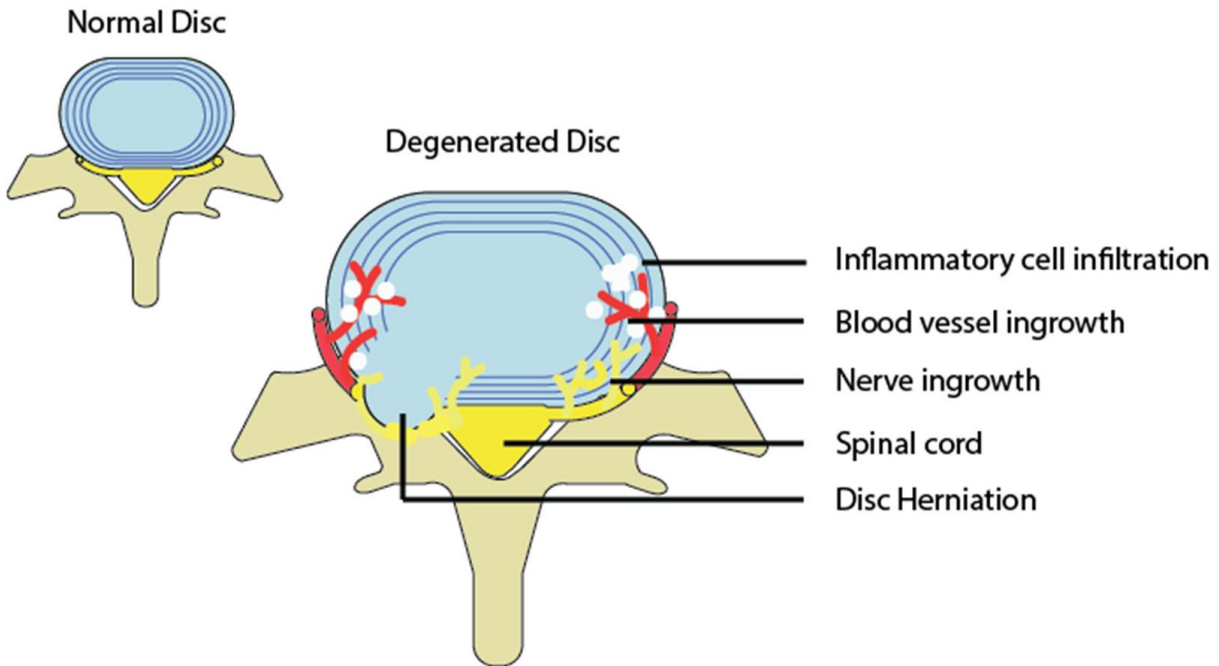
#### **2.4.1.3 Spinal Muscles and Mechanoreceptors**

In addition to the ligaments, spinal muscles also contribute to correct postural alignment of the spine. Once ligament damage and spinal misalignment occur, numerous mechanoreceptors located in the spinal column ligaments ( Kojima,et al 1990, Sekine et al 2001), facet capsules ( Cavanaugh,et al 1997, McLain,et al 1994, Yamashita,et al 1990) and disc annulus (Kojima,et al 1990) carry information to the brain. These mechanoreceptors send tactile sensations and position sense to the brain and there is evidence from animal studies in which the stimulation of ligaments (Solomonow,et al 2000,1998), facets and discs (Indahl,et al 1997) results in spinal muscle activation. Specifically, ligament fatigue (Solomonow,et al 2003), static flexed posture (Solomonow,et al 2003) and cumulative microtrauma.( Williams,et al 2000 )have been shown to modulate this form of spinal muscle activation. Under normal circumstances, the mechanoreceptors generate a complex signal which the brain interprets and responds with a muscle response to stabilize the spine. The damaged spine, however, behaves differently. Since mechanoreceptors are imbedded within the discs, ligaments and facet joints, damage from injury as well as degeneration may also lead to damage of these mechanoreceptors ( Roberts,et al 1995, McLain,et al 1998). Damaged mechanoreceptors may send spontaneous signals to the brain

regarding body position, a phenomenon referred to as ectopic mechano-sensitivity (Malmberg,et al 2002, Michaelis,et al 1995, Roza,et al 2003). Unbalanced stresses caused by spinal muscles have been shown to induce strains to ligaments, overload facet joints (Panjabi et al 2006), initiate inflammation of neural tissues (Cornefjord,et al 2002) and accelerate disc (Solomonow,et al 1999) and facet joint degeneration (Butler,et al 1990). Therefore, the overall effect of abnormal spinal muscles is to contribute to greater stress on the spine

#### **2.4.1.4 Degenerative Discs and the Inflammatory Response**

Intervertebral disc degeneration is an irreversible process characterized by elevated matrix degeneration, nucleus pulposus proteoglycan loss and loss of hydration, destructure of the disc structure and reduced disc height (Sampara,et al 2018, De Geer,et al 2018). Bending loads, which can be produced by ligament damage and misalignment, can lead to disc prolapse and a cascade of cell-mediated degenerative changes. Bending mechanical stress puts extra pressure along the endplates and annulus of the disc (Adams,et al 1996), resulting in a bulge or herniation that protrudes outward. If the herniation or bulge causes mechanical compression or distension of the nerve root, dorsal root ganglion, or smaller nerves surrounding the disc, then this will lead to pain via nociceptive neural signals (Luoma,et al 2000). Further mechanical load can lead to calcification of the end plates, internal disc disruption (Fardon,et al 2001, Solovieva,et al 2002, Videman,et al 1995) and cell-mediated loss of water content and disc height and is associated with a loss of aggrecan and collagen content within the disc(Lowrey,et al 1973).Structural and material changes of the discs induce ingrowth of nerves and blood vessels within the disc (Freemont,et al 1997,2002),which then produces painful nerve signals



**Figure 5.** A diagram depicting a normal and degenerated disc accompanied by inflammation, as well as nerve and blood vessel growth into the disc.

#### **2.4.2 Spinal Osteoarthritis and Degenerative Joint Disease**

Osteoarthritis of the spine is a type of degenerative joint disease that is best characterized as the breakdown of cartilage in the facet joints. Ligament damage induces abnormal stress onto the facet and is a major cause of joint degeneration (Wheaton, et al 2010). Degeneration of the facets can also occur as a result of degenerated discs, which shift compression loads posteriorly onto the facets. Biomechanical studies support the contribution of mechanical stresses to stimulate degeneration of the facet joints (El-Bohy, et al 1987, Yang, et al 1984). Furthermore, evidence from previous work has suggested that facet joint associated pain is caused by mechanical stresses induced by alignment abnormality that leads to degeneration and inflammation of the facet joints (Sims-Williams, et al 1978, Lawrence, et al 1966, Adams, et al 1983). The capsule of facet joints is innervated by nociceptive neurons that can be activated by mechanical and

chemical stimulation (Cavanaugh,et al 1996, Marks,et al 1992, Hirsch,et al 1979, McCall,et al 1979). Direct stimulation of facet joints and ligaments can also stimulate pain (Popert,et al 1956). Pain arising from this location is termed Facet Joint syndrome. In neurophysiologic studies using animal models, thirty mechanosensitive units were identified at the lumbar facet joint and twenty-seven were identified in the muscles and tendons near their insertion into the facet (Yamashita,et al 1990). Goldthwaite et al. reported the compression of nerve roots due to a deformation of the facet joint (Goldthwait,et al 1911). Since then, nerve root compression by a facet joint has been considered to be one of the causes of low LBP and sciatica (Igarashi,et al 2004).

### **2.4.3 Risk Factors for Low back pain**

Approximately one-third of back pain cases may be attributed to occupational ergonomic risk factors (Schaafsma FG,et al 2015,Fingerhut M,et al 2006). Lifestyle risk factors, and excess body mass (Shiri R,et al 2010) increase the risk of transient and chronic LBP as well as health care consultation for LBP. Moreover, overweight/obesity (Shiri R,et al 2017,2014) increase the risk of lumbar radicular pain and hospitalization for sciatica. The role of leisure-time physical activity in LBP and sciatica is still uncertain. Leisure-time physical activity may reduce the risk of chronic LBP (Shiri R,et al 2017) and lumbar radicular pain (Shiri R,et al 2016). Recently, we found that walking or cycling to work reduces the risk of hospitalization for sciatica (Shiri R,et al 2017).

There are several risk factors associated with the development of LBP and the occurrence of LBP is multifactorial, involving activities carried out at work and even recreational activities and activities of daily living, which result in overloading or stressing of the musculoskeletal system

(Punnett & Wegman, 2004). Risk factors involve individual, physical and psychosocial factors.  
(Punnett & Wegman, 2004; Nunes & Bush, 2012)

Risk factors for the development of LBP include:

- i. Physical workload factors:** Exposure to the following physical workload factors in the current job include (Kaila-Kangas L, et al 2009): strenuous physical work (lift or carry heavy items, dig, shovel, or pound), manual handling of loads  $\geq 5$  kg  $\geq 2$  times/ minute  $\geq 2$  hours/day, manual handling of loads  $\geq 20$  kg  $\geq 10$  times/day, work with vibrating tools  $\geq 2$  hours/day, work demanding kneeling or squatting for 1 hour/day or longer, work requiring driving a vehicle for  $\geq 4$  hours/day for  $>3$  months/year, work demanding standing or leaning forward without support for 1 hour/day or longer, work requiring sitting for  $\geq 5$  hours/day, and work demanding standing or walking for  $\geq 5$  hours/day
- ii. Anthropometric factors:** this involves physical factors such as weight, height and body mass index. Studies have shown that there is an increased risk of developing LBP among individuals who are obese or overweight compared to individuals who have normal body mass indices (Ming et al, 2004; Nunes & Bush, 2012; Viester et al, 2013). Poussa et al. (2005), reported that abundant changes in anthropometric indices among male children and to a lesser extent among female children in a Finnish population, indicated a significant risk of developing low back pain. Hershkovich et al (2013) also reported similar results with low back pain being associated with higher body mass indices and greater height. Viester et al (2013) also reported that in individuals with high BMI (obesity), there is greater risk for developing LBP, especially in the lower extremities.
- iii. Age:** The process of aging is associated with certain degenerative changes especially at the joints, as the body ages, the intervertebral discs begin to degenerate leading to a

reduction in the space between the vertebral bodies. These degenerative changes result in pain and reduced range of motion at the back and can also result in radiculopathy if peripheral nerves are compressed. (Ming et al, 2004; Nunes & Bush, 2012).

- iv. **Gender:** studies report that there are gender differences in the prevalence of LBP, with higher prevalence reported among women. These differences are associated with factors such as physiological differences, such as hormonal influence and also ergonomic factors. (Nunes & Bush, 2012). Cavallari et al (2016), reported higher prevalence of back, upper and lower extremities symptoms among females compared to males who are exposed to relatively the same kind of work, the largest discrepancy occurred in the prevalence of upper extremity symptoms. Ming et al (2004), reported that women are more predisposed to developing neck, shoulder and back pain because the work place is ergonomically designed to fit the male population more.
- v. **Posture:** maintaining a static posture while working or performing activities of daily living can result in the build of tension and overloading of the muscles associated with maintaining that posture, especially the intrinsic back muscles, this overloading can result in injury to the muscles and development of LBP. (Ming et al, 2004; Nunes & Bush, 2012). Studies have shown increased association between awkward body postures and a high prevalence of LBP (Gangopadhyay et al, 2010; Anita et al, 2014, Chen & Mu, 2018). A study by Chen and Mu (2018) showed that students carrying school bags as heavy as 15% or more of their body weight have higher degree of neck and trunk flexion, along with more significant muscle activation than their peers who carry school bags that are 10% of their body weight or less. Positioning of school bags various levels of the spine has also been associated with development of LBP in different body regions (Grimmer et

al, 2002; Chen & Mu, 2018). Depending on how high a school bag is positioned on the spine, different postures are adopted by the students to compensate for the muscle imbalance that occurs from the awkward positioning and heavy weight of the school bag (Chen & Mu, 2018). Chen and Mu (2018) reported that school bags positioned at the level of the L3 vertebra results in greater discomfort in the waist region while positioning the school bag at the level of the T7 vertebrae results in greater discomfort in the neck, shoulder and back region.

- vi. Psychosocial factors:** such as financial/economic status, satisfaction with work and inter-relationships at the work place. Psychosocial factors are non-biomechanical risk factors that predispose to the development of LBP. A negative perception of one's self, environment and work place can result in physiological and psychological stress which can result in physiological responses such as increase in muscle tension. Psychosocial factors on their own cannot result in injuries but in combination with the physical risk factors can result in occurrence of injuries and LBP. (European Agency for Safety and Health at Work, 2008; Nunes & Bush, 2012)
- vii. Smoking:** smoking has been linked to headaches, trunk pain and pain in the extremities (Zvolensky MJ et al 2010, Smuck M,et al 2020). Despite the increased likelihood of generalized pain, studies have found a strong relationship between spinal pain and smoking ( Smuck M,et al 2020). Current and previous heavy smoking are associated with the amount and intensity of pain sites, that is, heavy smokers have a higher chance of having more pain sites and greater pain intensity than non-smokers (John U,et al 2006). However, research on the association between smoking and pain intensity, function, depression and fear in patients with LBP remains limited, particularly in studies that have

conducted detailed comparisons of disease activity and functional status in smoking and non-smoking patients with LBP. (Qi-Hao Yang et al 2023)

## 2.5 Clinical Presentations of Low back pain

- i. **Pain:** as defined by the International Association for the Study of Pain (IASP, 2020) pain is an unpleasant sensory and emotional experience associated with, or resembling that associated with actual or potential tissue damage. Pain may be experienced as aching, burning, stabbing, sharp or dull, and may vary in intensity from mild to severe. Sometimes the pain may be aggravated by motion or certain postures and may vary depending on the time of the day. (Ming et al, 2004; Beatrice, 2013).
- ii. **Reduced range of motion:** especially in conditions such as scoliosis and hyper-kyphosis. Reduction in range of motion of a joint can occur as a result muscles stiffness, inflammation around the joint, prolonged immobilization and also joint pain. (Kaneguchi et al. 2016).
- iii. **Radiculopathy:** this describes a pain syndrome that is characterized by pain, weakness and numbing sensation along the course of a nerve. It is caused by compression or irritation of the nerve root (Alexander & Varacallo, 2020), which is common in degenerative conditions that affect the spine. Radicular symptoms experienced may differ depending on the level of the lumbar spine where the nerve compression occurs. In L2, L3 and L4 radiculopathy, radiating pain is felt at the anterior aspect of the thigh and may progress to the knee and the medial aspect of the lower leg (Dydyk, Khan and Das, 2021). In L5 radiculopathy radicular symptoms are felt at the lateral leg and into the foot, while S1 radiculopathy will result in radiating symptoms in the posterior leg, into the foot and the perineum (Dydyk, Khan and Das, 2021).

- iv. **Joint stiffness:** joint stiffness can occur as a result of various conditions such as, spondylosis, arthritic conditions or adhesive capsulitis, among others. It results in the loss or reduction of the range of motion that occurs at a joint. All movement at the joint may be lost or limited while in some cases only some types of movements are limited, depending on the severity and cause of the joint stiffness (Solomon et al, 2010).

## **2.6 Diagnosis of LBP**

### **2.6.1 Patient History**

The first step in accurate diagnosis of a patient with LBP is taking a proper and detailed history of the patient. History taken should include 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 (positional and time factors), medications used and treatments received, along with past medical and surgical treatments. (Ming et al, 2004; Porter & Tidy, 2013)

### **2.6.2 Physical Examination:**

Physical examination involves the general observation, local observation and assessment of movement and muscles strength.

General observation involves observing the patient gait and posture upon entry into the examination room, while walking, standing and sitting.

Local observation involves observation of the affected area for swelling, abnormal contours, muscle atrophy, asymmetry of muscles, joint malalignments and deformities.

The range of motion is assessed with the aid of a goniometer. The muscle strength is assessed and can be graded with outcome measures such as the Oxford muscle grading scale.

Certain orthopedic tests can be performed to rule out or confirm certain pathologies, these tests include: Straight leg raise test, Faber's test, vertical oscillatory pressure (for low back pain). Scoliosis can be observed using the Adam's forward bend test (Reamy & Slakey, 2001). Adam's forward bend test is performed by asking the patient to expose his/her back and then bend forward at the waist, to the point where the spine becomes parallel to the horizontal plane, with the palms held together and the arms extended at the elbow. The examiner will then observe the spine along the horizontal plane to detect any asymmetry in the contour of the back (rib hump) which will be indicative of scoliosis (Reamy & Slakey, 2001).

### **2.6.3 Radiographic Examination**

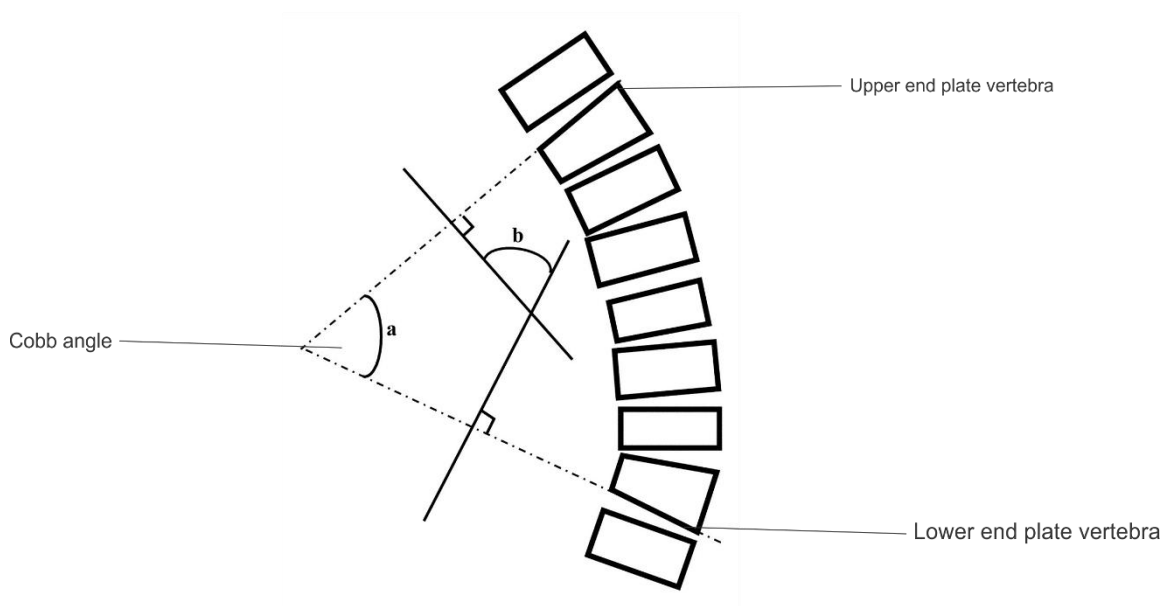
Radiographic examination involves the use of X-rays, Computerized tomography and Magnetic resonance imaging to examine internal tissues and detect the presence or absence of abnormalities.

#### **2.6.3.1 X-rays**

X-rays are the most commonly used imaging techniques for assessing skeletal deformities, as it is readily available and relatively cheap. X-rays can be used to assess fractures, bony deformities and degenerative changes. (Lateef & Patel, 2009). In the assessment of low back pain, if patient history indicates a non-mechanical cause of pain or if degenerative changes are suspected in the lumbar spine, an X-ray is usually recommended for further diagnosis (Lateef & Patel, 2009). The anteroposterior and lateral views are the common angles from which the X-ray is taken. For suspected spondylolysis, an oblique view may be requested which will show any fracture at the pars interarticularis. The film obtained is observed by the clinician for degenerative changes, reduced intervertebral disc, fracture of the vertebral body or any other obvious deformity (Lateef & Patel, 2009).

X-rays are also used in the assessment of scoliotic curves and kyphotic curves. In the frontal plane it is used to measure the Cobb angle of all scoliotic curves along the spine, the thoracic curve, the thoracolumbar scoliotic curve and fractional curves in the lumbosacral junction. While the kyphotic and the lordotic curves can be obtained in the sagittal plane, these curves include the thoracic kyphosis (Cobb angle between the superior endplate of the 4th thoracic vertebra and the inferior end plate of the 12th thoracic vertebra), the thoracolumbar kyphosis (Cobb angle between the superior end plate of the 10th thoracic vertebra and the inferior end plate of the 2nd sacral vertebra) and lumbar lordosis (Cobb angle between the superior end plate of the 1st lumbar vertebra and the superior end plate of the 1st sacral vertebra). (Bess et al, 2016).

Cobb angle is measured by identifying the upper and lower end vertebrae on the anteroposterior x-ray film, a perpendicular line is drawn from both the upper and lower



**Figure 6** Measurement of Cobb angle

Image source: Adapted from <https://pubs.rsna.org>

vertebral endplate lines, the angle between the two vertical lines, at their point of intersection is the Cobb angle of that curve. (Wang et al, 2018)

### **2.6.3.2. Computerized Tomography (CT) Scan**

Computerized tomography is used mainly to assess the osseous structures of the spine, and the relation of the vertebrae to the neural canal in the axial plane. (Arya, 2014). In the assessment of musculoskeletal conditions, CT scan is useful in detecting the relationship of one bony structure to another, to show tumors, fractures and complete or partial dislocations (Arya 2014). In the diagnosis of low back pain, CT scan can be used to view the lumbar spine and detect abnormalities like spondylolisthesis (Arya, 2014). CT scan allows for the detection of complex bony abnormalities associated with the development of scoliosis (Kim et al, 2010)

### **2.6.3.3 Magnetic Resonance Imaging (MRI)**

Magnetic resonance imaging involves the use of the natural magnetic properties of the body to generate detailed radiographic images (Berger, 2002). MRI is currently the standard diagnostic tool for detecting abnormalities in neurologic structures associated with low back pain (Arya, 2014). Magnetic resonance imaging provides multiaxial and multiplanar high resolution of tissues and has the advantage of having no known biohazard effects. Compared to computerized tomography, MRI is better suited at detecting the relationship between discs and nerves and locating soft tissue and non-bony structures as well as detecting conditions such as early osteomyelitis, discitis and hematomas (Arya, 2014). In the diagnosis of neck pain with symptoms including balance and gait problems (indicative of cervical myelopathy), MRI can be used to detect disk herniations or spinal stenosis that may be causative of the symptoms (Pompan, 2011). MRI is also indicated in young and middle-aged patients with shoulder pain, following traumatic injury, reporting with persistent pain and weakness, as there may be a complete rotator cuff tear, detectable by the MRI (Pompan, 2011). MRI is used in the evaluation of patients with scoliosis

presenting with unusual curve patterns or with alarming clinical and neuropathic symptoms (Kim et al, 2010)

## **2.7 Management of Low back pain**

Low back pain result from variety of causes and risk factors, management of these disorders will involve approaching the causes of the disorder and correcting any associated deformity.

Management of low back pain include the following

- i. Electrotherapy therapy
- ii. Manual therapy
- iii. Exercise therapy
- iv. Pharmacological treatment (mainly analgesics). (Babatunde et al, 2017)
- v. Patient education and self-management

### **2.7.1 Management of Low back pain using Electrotherapy**

Electrotherapy, especially transcutaneous electrotherapy (TENS), has been an inexpensive, easily applied and widely used tool in different painful conditions for several decades. The reduction in pain by electrotherapy is suggested to be due to several mechanisms. One of them is the gate-control-theory by Melzack and Wall et al, which proposes the modulation of afferent nociceptive patterns in the superficial dorsal horn of the spinal cord, i.e. the inhibition of small afferent nociceptive fibers by large afferent fibers, and consequently, activation of inhibitory interneurons, thus leading to less nociceptive input to neurons projecting to the brain (Melzack, R.et al 1976). Other suggested explanations for the decrease in pain sensation after TENS are the activation of descending inhibitory pathways in the central nervous system by effects mediated by endogenous

opioids (Vance et al 2014)], or a reduction in the blood level of proinflammatory cytokines such as IL-1, IL-6 and TNF (Do Carmo Almeida et al 2018).

A study by Rajfur et al. reported an increase in functional abilities using TENS, interferential current stimulation and diadynamic current (Rajfur et al 2017). One explanation for the discrepancy of the results could be, as already stated by Rajfur and colleagues, a possible deeper tissue penetration of the electrical stimulation by using a bigger area instead of small patches, possibly leading to better tissue vascularization and greater reductions in myofascial contraction and blockade by using mid-frequent electrotherapy. Interestingly, Rajfur et al and colleagues not only observed functional amelioration but also a significant pain reduction in all the groups receiving electrotherapy, including low-frequent electrotherapy (i.e., TENS, high-voltage electrical stimulation, diadynamic currents), which contrasts with our data. Nevertheless, patients receiving interferential therapy had the greatest pain relief. The highest functional improvement was also observed in the group receiving mid-frequent interferential therapy, possibly due to the deeper current penetration into the tissue, as stated by the authors

### **2.7.2 Management of low back pain using Manual Therapy**

As a non-invasive non-pharmacological therapy, MT is widely used in the treatment of LBP due to its recognized safety and effectiveness (George SZ et al 2021). MT encompasses massage, bone setting, chiropractic manipulation, joint mobilization, among others. Many clinical guidelines recommend MT for managing acute LBP (Oliveira CB, et al 2018). Clinical trials have shown that MT can not only alleviate pain but also foster enhanced connectivity between brain regions responsible for pain perception and motor processing (Isenburg K, et al 2021, Dal Farra F et al 2021, Rubinstein SM et al 2019, Kumar S et al 2013, Dayanir IO et al 2020). This

phenomenon may be attributed to the manipulation's ability to realign dislocated vertebrae, increase joint space, optimize biomechanical structures, and alleviate nerve root compression and irritation. Additionally, MT has been shown to reduce fear avoidance behaviors by modulating blood oxygen level-dependent signals in the brain circuits of LBP patients. (Ellingsen DM, et al 2018)

Moreover, there is a growing emphasis on investigating the psychological state and quality of life of patients with LBP (Pacheco-da-costa S et al 2020). Yao et al (2022) demonstrated that MT could potentially delay intervertebral disc aging by reducing oxidative stress through the Silent mating type information regulation two homolog-1/forkhead box O1 pathways. This finding holds great significance in improving the physical function of elderly individuals through non-drug and non-invasive MT. It is important to pay attention to LBP in special populations. A retrospective study revealed that pregnant women experiencing LBP are more likely to develop postpartum depression compared to those without such symptoms (Long G et al 2020). Pregnant women often seek MT to alleviate pregnancy-related back pain, which have shown significant benefits in reducing pain, improving mobility, and sleep quality .(Fogarty S et al 2019).However, more high-quality evidence is still required to confirm the reliability of these findings.

## **2.8 Prevention of Low back pain**

The prevention of LBP involves avoiding the risk and causative factors that predispose to the disorders (European Agency for Safety and Health at Work, 2008). Preventive measures include:

- i. Improving the ergonomics of the work or school environment:** studies have shown that improving the ergonomics of the work and home environment, such as the type of chairs used, the type and size of work tables used, sitting with back and arm support and

general positioning while working and at home helps to reduce the occurrence of back pain. (Ming et al, 2004; European Agency for Safety and Health at Work, 2008).

- ii. **Behavioral changes:** this involves proper positioning while sitting at a desk, performing activities of daily living, working or carrying loads. Adjustments can also be made to sleeping positions and work habits, such as taking short breaks in between work hours to promote relaxation of the muscles. (Ming et al, 2004; European Agency for Safety and Health at Work, 2008).
- iii. **Wearing of protective equipment:** protective equipment such as back braces, wrist splints and neck collars can help to minimize the development of LBP. Back belts help to stabilize the trunk and increase intra-abdominal pressure and reduce the incidence of low back pain. (European Agency for Safety and Health at Work, 2008).
- iv. **Physical Exercises:** Strengthening of the back muscles help to increase the physical capacity of these muscles. This helps to reduce the overloading of the muscles hence reducing the development of LBP. (European Agency for Safety and Health at Work, 2008).

## 2.9 Outcome Measures

### 2.9.1 The Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT)

The PABS-PT is a self-administered instrument developed to discriminate between a predominantly biomedical and bio-psychosocial treatment orientation of physiotherapists towards LBP management (Ostelo et al., 2003; Houben et al., 2005b). Characteristic of a biomedical orientation is the belief that pain and disability are the consequence of specific pathology or tissue damage and that treatment is therefore aimed at signs and symptoms of pathology. Indicative for a bio-psychosocial orientation is the belief that pain and disability not

necessarily are signs of tissue damage but can be influenced by psychological and social factors. The developers have stated that the two categories are not opposites of the same scale; the biomedical approach is part of a biopsychosocial view (Ostelo et al., 2003).

Responders indicate on a 6-point Likert scale (1 = totally disagree, 6 = totally agree) their endorsement on each statement. Treatment orientation is measured on two sub-scales, labelled 'biomedical' and 'biopsychosocial'. Sub-scale scores are calculated by a simple summation of the responses to the subscale items. Higher scores on a sub-scale indicate a stronger treatment orientation.

## **2.10 Summary of Literature Review**

Low back pain is defined as pain below the 12th costal margin and above the inferior gluteal fold, with or without radiating symptoms to the lower limbs (WHO, 2013). Depending on the duration of the pain, low back pain can be classified into acute, subacute and chronic low back pain. LBP is a major public health concern globally transcending ages, occupations, and socioeconomic backgrounds, becoming a primary cause of disability and work absenteeism worldwide, leading to significant economic challenges and reduced productivity with up to 84% of adults experiencing it at least once in their lives. The major structural components that passively stabilize the spine and maintain alignment are the soft tissue ligamentous structures. These include ligaments, joint capsules and intervertebral discs. Damage to these structures predisposes one to LBP. There are several risk factors associated with the development of LBP and the occurrence of LBP is multifactorial, involving activities carried out at work and even recreational activities and activities of daily living, which result in overloading or stressing of the spinal structures such as physical workload factors, anthropometric factors, age, posture and smoking and psychosocial factors. LBP early diagnosis is a crucial factor and involves a detailed history of

the patient, physical examination (including orthopedic tests such as straight leg raise test), and radiographic examination (x-ray of the spine is particularly used to diagnose degenerative processes in the spine, detect fractures in the spine and especially in the diagnosis of scoliosis in measuring the cobb angle which is used to measure the progression of the scoliotic curve).LBP can be prevented by improving the ergonomics of the home, school or work environment, postural and behavioral changes, wearing protective equipment and physical exercises. Management of LBP involve pharmaceutical, surgical interventions and therapeutic (manual therapy and electrotherapy).

## **CHAPTER THREE**

### **MATERIALS AND METHODOLOGY**

#### **3.1 Participants**

##### **3.1.1 Participant Selection**

This study was conducted among physiotherapists within the University of Benin Teaching, Benin City, Edo state, Nigeria.

##### **3.1.2 Inclusion Criteria**

- i. Participants must be licensed physiotherapist within the University of Benin Teaching Hospital, Benin City, Edo state, Nigeria.
- ii. Participants must have knowledge of both manual therapy and electrotherapy
- iii. Participants must have used both treatment strategies on patients with low back pain

##### **3.1.3 Exclusion Criteria**

- i. Non clinical physiotherapist or those with limited modality access
- ii. Intern physiotherapist with less than 8 month of clinical experience

#### **3.2 Materials**

##### **3.2.1 Apparatus/Instruments**

- i. **A self-administered questionnaire:** adapted from the Pain Attitudes and Belief Scale for Physiotherapy (PABS-PT) is a self-administered instrument developed to discriminate between a predominantly biomedical and bio-psychosocial treatment orientation of physiotherapists towards LBP management (Ostelo et al., 2003; Houben et al., 2005).

Information collected from the physiotherapists included;

- i. Demographic data of the respondents, including their age, gender, nationality, highest degree obtained, primary field of practice
- ii. Utilization of treatment modalities
- iii. Preferences and beliefs
- iv. Attitudes and barriers
- v. Specific treatment approaches for low back pain
- vi. What experiences or outcomes that have influenced your preference for using electrotherapy or manual therapy for low back pain
- vii. What suggestions they have regarding the use of electrotherapy or manual therapy for managing low back pain in clinical practice

### **3.3 Methods.**

#### **3.3.1 Research Design**

This research used a cross-sectional analytical study design.

#### **3.3.2 Sampling Technique / Sample Size**

Physiotherapists in University of Benin Teaching Hospital, Benin city, Edo state was selected via purposive sampling technique.

The minimum sample size for this study was calculated using the formula

$$n = \frac{N}{1+N(e)^2}$$

Where:

n = sample size

N = population size

e = confidence level

N = 50

e = 5% (0.05)

n = 50

1+50(0.05)<sup>2</sup>

n = 50

1.125

n = 50, hence our sample size is 45 (Slovin's Formula)

Therefore the minimum sample size required for this study was approximately 45 participants.

### **3.3.3 Procedure for Data Collection**

The data for this study was collected using the self-administered questionnaire. 45 physiotherapists were recruited from seven (7) units completed the questionnaire, while the researcher was to clarify any questions.

The questionnaire was administered to physiotherapist at their various units on agreed days within the week and the completed questionnaires was then retrieved on the same day by the researcher

### **3.3.4 Data Analysis**

All data was analyzed using descriptive statistics of mean, frequency and standard deviation. Chi Square was used to determine physiotherapist preference for manual therapy or electrotherapy in the treatment of low back pain. Data was analyzed using Statistical Package for Social Sciences (IBM SPSS) version 29. The level of significance was set at  $p < 0.05$ .

### **3.3.5 Ethical Considerations**

Ethical approval for this study was obtained from the Ethics Research Committee of College of Medical Sciences, University of Benin, Benin City. Letter of introduction to the physiotherapy Head of Department was given by the Department of Physiotherapy, College of Medical Sciences, and University of Benin. Informed consent was endorsed by the participants. Before seeking informed consent, prospective participants was adequately informed of the aims, methods, any possible conflicts of interest, institutional affiliations of the researcher, the anticipated benefits and potential risks of the study and the discomfort it may entail. Having been fully informed of the aim, methods, benefits and the potential risk, prospective participants was served with the right to refuse to participate without reprisal.

## **CHAPTER FOUR**

### **RESULTS**

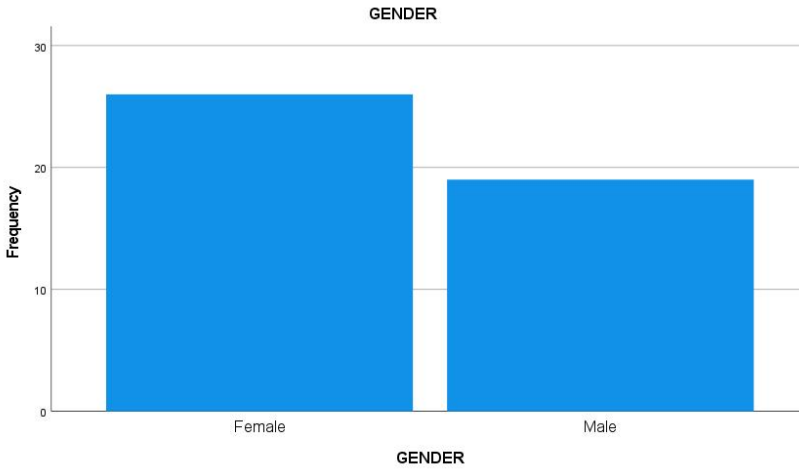
#### **4.1 Sociodemographic Variable of the Respondents**

A total of forty-five participants were recruited for this study, out of 26(57.8%) were females, 19(42.2%) were males. 33(73.3%) of the respondents were between the ages of 18-29years, 7(15.6%) were between the ages of 30-39years. 41(91.1%) had Bsc as the highest degree obtained while 4(8.9%) had Msc as the highest degree obtained. 29(64.4%) of the respondents have been in practice for less than a year, 6(13.3%) have been in practice for 1-5years. 29(64.4%) of the respondents have been using manual therapy in the management of low back pain for less than a year. 29(64.4%) of the respondents have been using electrotherapy in the management of low back pain for less than a year as shown in table 1.

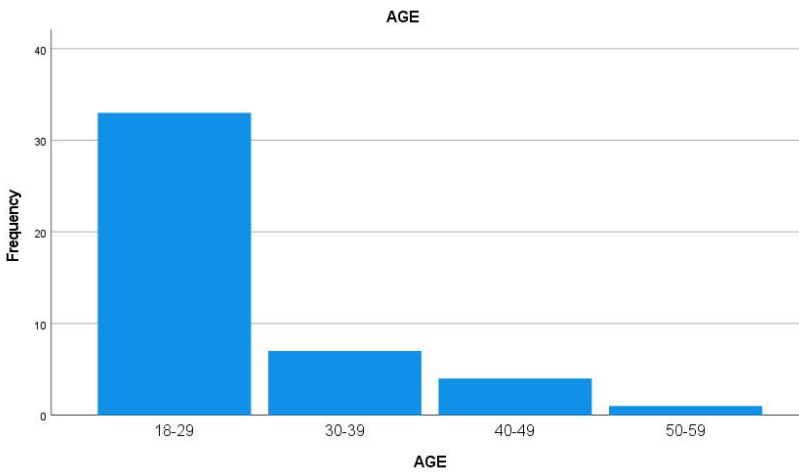
**Table 1: Sociodemographic variable of the respondents**

N=45

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentages</b>
Gender	Female	26	57.8
	Male	19	42.2
Age	18-29	33	73.3
	30-39	7	15.6
	40-49	4	8.9
	50-59	1	2.2
Highest degree obtained	Bsc	41	91.1
	Msc	4	8.9
Years of practice	<1year	29	64.4
	1-5years	6	13.3
	5-10years	6	13.3
	>10years	4	8.9
Duration of using manual therapy in the management of low back pain	<1year	29	64.4
	1-3years	5	11.1
	4-6years	6	13.3
	7years and above	5	11.1
Duration of using electrotherapy in the management of low back pain	<1year	29	64.4
	1-3years	5	11.1
	4-6years	6	13.3
	7years and above	5	11.1



**Fig 7: Bar chart showing the gender distribution of the respondents**



**Fig 8: Bar chart showing the age distribution of the respondents**

## **4.2 Descriptive statistics on the utilization of treatment modalities**

25(55.6%) of the respondents reported that they often use manual therapy in the management of low back pain, 21(46.7%) of the respondents reported that they often use electrotherapy in the management of low back pain while 31(68.9%) always utilize exercise therapy in the management of low back pain.

**Table 2: Descriptive statistics on the utilization of treatment modalities**

<b>Treatment</b>	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>
<b>Modality</b>					
Manual Therapy	-	3(6.7%)	4(8.9%)	25(55.6%)	13(28.9%)
Electrotherapy	1(2.2%)	1(2.2%)	10(22.2%)	21(46.7%)	12(26.7%)
Exercise Therapy	-	-	2(4.4%)	12(26.7%)	31(68.9%)

### **4.3 Descriptive statistics on Preference and Beliefs**

17(37.8%) of the respondents agreed that they believe manual therapy is the most effective treatment for LBP. 23(51.1%) of the respondents agreed that Electrotherapy is an essential part of their treatment approach. 23(51.1%) of the respondents agreed that Patients benefit more from a hands-on approach than electrotherapy. 20(44.4%) of the respondents that they consider patient preference when deciding between manual and electrotherapy. 25(55.6%) of the respondents strongly agreed that they consider clinical reasoning when deciding between manual and electrotherapy. 21(46.7%) of the respondents agreed that Manual therapy leads to faster recovery for their patients. 11(24.4%) of the respondents agreed that they rely on electrotherapy when manual therapy does not yield desired results. 20(44.4%) of the respondents agreed that they have found exercise therapy to complement both manual and electrotherapy effectively as shown in table 3.

**Table 3: Descriptive statistics on Preference and Beliefs**

<b>Statement</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
I believe manual therapy is the most effective treatment for LBP.	-	2(4.4%)	14(31.1%)	17(37.8%)	12(26.7%)
Electrotherapy is an essential part of my treatment approach.	2(4.4%)	1(2.2%)	9(20.0%)	23(51.1%)	10(22.2%)
Patients benefit more from a hands-on approach than electrotherapy.	-	2(4.4%)	9(20.0%)	23(51.1%)	7(15.6%)
I consider patient preference when deciding between manual and electrotherapy.	-	7(15.6%)	13(28.9%)	20(44.4%)	5(11.1%)
I consider clinical reasoning when deciding between manual and electrotherapy	-	2(4.4%)	5(11.1%)	13(28.9%)	25(55.6%)
Manual therapy leads to faster recovery for my patients.	-	-	11(24.4%)	21(46.7%)	13(28.9%)
I rely on electrotherapy when manual therapy does not yield desired results.	3(6.7%)	6(13.3%)	20(44.4%)	11(24.4%)	5(11.1%)
I have found exercise therapy to complement both manual and electrotherapy effectively.	-	1(2.2%)	7(15.6%)	20(44.4%)	17(37.8%)

#### **4.4 Descriptive statistics on barriers faced when using manual therapy or electrotherapy**

36(80.0%) of the respondents reported that lack of equipment is a barrier faced when using manual therapy or electrotherapy. 29(54.5%) reported lack of time, 19(42.2%) reported patient's preferences, 26(57.8%) reported insufficient training, 20(44.4%) reported religious belief of the patients, 24(53.3%) reported physiotherapist religious beliefs. 24(53.3%) reported gender involvement, 23(51.1%) reported patients spouse preferences, 30(66.7%) reported patients with comorbidities as the barriers faced when using manual therapy or electrotherapy in the management of low back pain as shown in table 4.

**Table 4: Descriptive statistics on barriers faced when using manual therapy or electrotherapy**

<b>Barriers</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentages</b>
Lack of equipment	No	9	20.0
	Yes	36	80.0
Lack of time	No	16	35.5
	Yes	29	54.5
Patients preferences	No	26	57.8
	Yes	19	42.2
Insufficient training	No	19	42.2
	Yes	26	57.8
Religious belief of the patients	No	25	55.6
	Yes	20	44.4
Physiotherapist religious beliefs	No	21	46.7
	Yes	24	53.3
Gender involved	No	21	46.7
	Yes	24	53.3
Patients spouse preferences	No	22	48.9
	Yes	23	51.1
Patients with comorbidities	No	15	33.3
	Yes	30	66.7

#### **4.5 Treatment approach for low back pain**

7(15.6%) of the respondents reported that manual therapy is their preferred treatment approach for low back pain, 6(13.3) reported that electrotherapy is their preferred treatment approach while 25(55.6%) reported that the combination of both treatment approach is their preferred treatment approach in the management of low back pain as shown in table 5.

**Table 5: Treatment approach for low back pain**

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentages</b>
Manual therapy	No	38	84.4
	Yes	7	15.6
Electrotherapy	No	39	86.7
	Yes	6	13.3
Combination of manual therapy and electrotherapy	No	20	44.4
	Yes	25	55.6

## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Discussion

The primary aim of this study was to evaluate physiotherapists' preference for manual therapy versus electrotherapy as adjuvants in the treatment of low back pain within the University of Benin Teaching Hospital, Benin City, Edo state. The study revealed a higher proportion of female respondents (57.8%) compared to males (42.2%). This finding aligns with global trends where physiotherapy is often female-dominated due to the profession's perceived nurturing and caregiving nature. Most respondents (73.3%) were within the 18–29 age groups, suggesting a relatively young cohort. This could be reflective of the increasing number of newly graduated physiotherapists entering the workforce. The low representation of older age groups may indicate fewer experienced practitioners participating or limited availability of older professionals in the study area. A majority (91.1%) of participants held a BSc degree, while only 8.9% had an MSc. This highlights the dominance of undergraduate-level qualifications among physiotherapists in this study. It may suggest that postgraduate education is less common in the region or among the sampled population. The lower number of MSc holders could also influence their familiarity with advanced clinical techniques. The majority (64.4%) of respondents had less than one year of clinical experience, while only 8.9% had practiced for over ten years. This finding underscores the predominance of novice practitioners in the sample and raises potential concerns about their clinical decision-making experience. Their preferences for manual or electrotherapy may be influenced by recent academic training rather than extensive practical experience. A significant proportion of respondents (64.4%) had less than one year of experience using both manual therapy and electrotherapy in managing low back pain. This overlap reflects the overall novice status of

the participants. Interestingly, only 11.1% reported using these techniques for over seven years, which may suggest a potential gap in long-term expertise. This lack of prolonged experience could affect their perceived efficacy and preference for either intervention. The study's findings suggest that the respondents' preferences for manual therapy or electrotherapy might be shaped more by academic exposure than by extensive clinical experience. The limited representation of highly experienced practitioners and postgraduate degree holders could introduce a bias toward recently taught practices, which may not necessarily reflect the broader physiotherapy population.

Additionally, the predominance of young and less experienced physiotherapists may indicate a need for further professional development opportunities to enhance their clinical expertise and confidence in decision-making. Programs aimed at promoting evidence-based practice could help bridge any gaps between theoretical knowledge and practical application.

The finding that 68.9% of respondents always utilize exercise therapy suggests its high acceptance and integration into clinical practice. Exercise therapy is well-documented as a cornerstone for managing low back pain due to its benefits in improving mobility, strength, and overall function. The minimal percentage of respondents (4.4%) reporting occasional use of this modality further underscores its importance as a standard intervention. This trend aligns with global clinical guidelines advocating for exercise as a primary modality for low back pain rehabilitation.

Manual therapy, with 55.6% of respondents often using it and 28.9% always using it, indicates a moderate preference for this modality. While manual therapy is effective for pain relief and improving joint mobility, its intermediate utilization may reflect varying beliefs about its long-term benefits compared to exercise therapy. Additionally, the skill-dependent

nature of manual therapy and differences in practitioners' confidence or training may contribute to the variability in its use.

Electrotherapy, though often used by 46.7% of respondents, shows a relatively lower frequency of use compared to manual and exercise therapies, with 22.2% sometimes utilizing it and 2.2% reporting they never use it. This may stem from a growing preference for active rather than passive treatment modalities, as well as mixed evidence regarding the long-term efficacy of electrotherapy for managing low back pain. Practitioners might prioritize modalities that empower patient engagement, such as exercise therapy, over those perceived as adjunctive or less essential.

The majority of respondents (64.5%) either agreed or strongly agreed that manual therapy is the most effective treatment for LBP. This suggests that manual therapy is a widely accepted method for addressing LBP in clinical practice. Research supports this notion, as manual therapy is known to alleviate pain, improve mobility, and promote faster recovery in LBP patients. The high percentage of agreement indicates a strong belief in the effectiveness of manual therapy.

Electrotherapy is considered an essential part of the treatment approach by over half (51.1%) of the respondents, although only 35.5% rely on it when manual therapy does not yield desired results. This suggests that while electrotherapy is valued, it is often used as a secondary or complementary treatment rather than a first-line approach. The utility of electrotherapy likely stems from its ability to manage pain and inflammation, offering a non-invasive alternative.

A substantial portion of respondents (66.7%) agreed that patients benefit more from a hands-on approach than from electrotherapy. This preference for manual therapy likely stems from

the direct interaction between the therapist and the patient, which can lead to improved patient engagement and satisfaction.

A significant portion (55.5%) of respondents stated that they consider patient preferences when deciding between manual and electrotherapy. This finding reflects the growing emphasis on shared decision-making in healthcare, where patient values and expectations are integral to treatment planning.

The overwhelming majority of respondents (84.5%) emphasized the importance of clinical reasoning when choosing between manual and electrotherapy. This underscores the need for evidence-based practice and informed decision-making, where clinicians rely on their expertise, patient-specific factors, and the latest research to guide treatment choices.

The integration of exercise therapy with both manual and electrotherapy was acknowledged by 82.2% of respondents. This indicates that exercise therapy is widely recognized as an effective complementary treatment. Combining exercise with other modalities likely enhances recovery by improving strength, flexibility, and overall function.

A majority of respondents (75.6%) believed that manual therapy leads to faster recovery, which highlights the perceived effectiveness of manual therapy in facilitating quicker rehabilitation. However, the 24.4% of neutral responses suggest that outcomes can vary depending on individual patient characteristics and treatment context.

The findings of this study have important implications for physiotherapy practice. Firstly, treatment decisions should be personalized, taking into account both the patient's preferences and clinical considerations. Secondly, multimodal approaches combining manual therapy, electrotherapy, and exercise therapy appear to offer the best outcomes for LBP management. Lastly, physiotherapists should continue to develop their clinical reasoning skills and stay updated with current evidence to ensure optimal patient care.

Discussion on barriers faced when using manual therapy or electrotherapy in the management of low back pain.

A significant majority (80.0%) of respondents reported that lack of equipment is a barrier when using manual therapy or electrotherapy. This is a common challenge in resource-limited settings, where the availability of appropriate therapeutic devices and tools can directly impact treatment efficacy. Physiotherapists may have to rely on limited resources, leading to compromised patient care or the inability to offer optimal treatment options.

More than half (54.5%) of the respondents identified time constraints as a barrier. Physiotherapists may face tight schedules and heavy caseloads, which limit the time available to conduct thorough manual therapy sessions or to use electrotherapy effectively. Time pressure can hinder the ability to engage with patients, properly apply therapies, and monitor progress.

Patient preferences were cited by 42.2% of respondents as a barrier. In clinical practice, patient beliefs, comfort levels, and prior experiences with different therapies can influence their willingness to accept manual therapy or electrotherapy. Some patients may prefer one modality over the other or resist certain treatment approaches based on personal views or past experiences, complicating the treatment process.

Over half (57.8%) of respondents reported insufficient training as a barrier. This highlights the importance of continuous professional development and specialized training to ensure that physiotherapists are equipped with the knowledge and skills necessary to administer effective treatments. Lack of training can undermine the application of therapeutic modalities, leading to suboptimal care.

Religious beliefs of patients emerged as a barrier for 44.4% of respondents. Cultural and religious views can significantly influence a patient's openness to certain treatment modalities.

For example, some patients may be reluctant to engage in therapies they perceive as incompatible with their faith. This barrier requires physiotherapists to approach treatment plans with sensitivity and respect for individual beliefs.

Interestingly, 53.3% of respondents reported that their own religious beliefs could serve as a barrier. This may reflect personal discomfort or limitations in providing certain treatments that may conflict with a physiotherapist's values. It is essential for healthcare professionals to balance their personal beliefs with their professional duty to provide evidence-based and patient-centered care.

Gender involvement was another significant barrier, with 53.3% of respondents identifying it as an issue. This could relate to cultural norms or patient discomfort with the gender of the treating therapist, particularly in settings where certain treatments require physical contact. Addressing gender-related concerns through patient education and providing options for male or female therapists may help overcome this barrier.

Over half of the respondents (51.1%) noted that patients' spouses' preferences can impact treatment choices. Spouses may influence decisions regarding treatment modalities based on their own beliefs or perceptions, potentially overriding the patient's own preferences. In such cases, it is important to engage both the patient and their family in discussions about the benefits and risks of different treatment options.

Finally, patients with comorbidities were identified as a barrier by 66.7% of respondents. Comorbid conditions, such as diabetes or cardiovascular disease, can complicate the application of both manual therapy and electrotherapy, necessitating careful consideration of patient safety and treatment adaptations. Physiotherapists may need to modify their approach based on the individual health profile of patients, which can limit the use of certain modalities.

Only 15.6% of respondents indicated that manual therapy is their preferred treatment approach for LBP. This relatively low preference could be attributed to several factors, including the nature of manual therapy, which requires more time and physical engagement between the therapist and patient. Additionally, some practitioners may find manual therapy to be less effective for certain LBP conditions or may prefer integrating other modalities to achieve better outcomes.

A similar proportion, 13.3%, reported that electrotherapy is their preferred treatment approach. Electrotherapy is often chosen for its non-invasive nature and its ability to address pain management, muscle stimulation, and inflammation. However, the fact that it ranks lower than the combination approach suggests that some physiotherapists may see it as less effective when used alone, or they may have concerns regarding its suitability for all patients or LBP cases.

The combination of manual therapy and electrotherapy emerged as the preferred treatment approach for 55.6% of the respondents, making it the most popular choice. This finding reflects a common trend in modern physiotherapy practice, where therapists integrate multiple approaches to achieve optimal outcomes. The combination of manual therapy and electrotherapy allows for a more holistic treatment that can address various aspects of LBP, including pain relief, muscle function, and tissue healing. By using both modalities together, physiotherapists may be able to offer a more comprehensive treatment plan tailored to individual patient needs, providing both immediate relief and long-term benefits.

## **5.2 Conclusion**

The preference for a combination of manual therapy and electrotherapy underscores the importance of using multimodal treatment approaches in LBP management. While both manual therapy and electrotherapy offer unique benefits, their integration can provide a more

balanced and effective treatment regimen. It also suggests that physiotherapists recognize the complex nature of LBP, which may require different therapeutic strategies to address various factors contributing to pain and dysfunction.

Incorporating both manual therapy and electrotherapy allows for a personalized treatment approach, enhancing the likelihood of positive patient outcomes. These results highlight the growing trend toward evidence-based, combined interventions in physiotherapy practice for LBP.

### **5.3 Recommendations**

Based on the this research findings, physiotherapists should be encourage to adopt the combination of manual and electrotherapy as a treatment approach for management of LBP and establishment of training programs that emphasize the integration of both techniques. Workshops, continuing education courses and practical demonstration should be organized to equip physiotherapists with the skills required for effective combined treatment

## REFERENCES

- Adegoke, O.A., Odole, A. & Adeyinka, A. (2015) 'Adolescent low back pain among secondary school students in Ibadan, Nigeria', *African Health Sciences*, 15(2), pp. 429–437.
- Anita, A.R., Yazdani, A., Hayati, K.S. & Adon, M.Y. (2014) 'Association between awkward posture and musculoskeletal disorders (MSD) among assembly line workers in an automotive industry', *Malaysian Journal of Medicine and Health Sciences*, 10(1), pp. 23–28.
- Australian Institute of Health and Welfare (2019) *Musculoskeletal conditions and comorbidity in Australia*, Arthritis Series, 25, pp. 1–22.
- Babatunde, O., Jordan, J., Van der Windt, D., Hill, J., Foster, N. & Protheroe, J. (2017) 'Effective treatment options for musculoskeletal pain in primary care: A systematic overview of current evidence', *PLoS One*, 12(6).
- Beatrice, D. (2013) Background Paper 6.24: Low Back Pain. *Priority Medicines for Europe and the World "A Public Health Approach to Innovation"*, pp. 1–26.
- Been, E. & Kalichman, L. (2014) 'Lumbar lordosis', *The Spine Journal*, 14, pp. 87–97.
- Bello, B. & Adebayo, H.B. (2017) 'A systematic review on the prevalence of low back pain in Nigeria', *Middle East Journal of Rehabilitation and Health*, 4(2).
- Berven, S., Deviren, V., Demir-Deviren, S., Hu, S. & Bradford, D. (2003) 'Studies in the modified Scoliosis Research Society outcomes instrument in adults: Validation, reliability, and discriminatory capacity', *Spine*, 28(18), pp. 2164–2168.

- Bettany-Saltikov, J., Turnbull, D., Ng, S. & Webb, R. (2017) 'Management of spinal deformities and evidence of treatment effectiveness', *The Open Orthopaedics Journal*, 11, pp. 1521–1547.
- Binder, A. (2008) 'Neck pain', *Biomedical Journal of Clinical Evidence*, 8(1103), pp. 1–34.
- Cavallari, J., Ahuja, M., Dugan, A., Meyer, J., Simcox, N., Wakai, S. & Garza, J. (2016) 'Differences in the prevalence of LBP among female and male custodians', *American Journal of Industrial Medicine*, 59(10), pp. 841–852.
- Chen, Y. & Mu, Y. (2018) 'Effects of backpack load and position on body strains in male school children while walking', *PLOS One*, 13(3). Available at: <https://doi.org/>
- Cote, P., Kreitz, B., Cassidy, D., Dzus, A. & Martel, J. (1998) 'A study of the diagnostic accuracy and reliability of the scoliometer and Adams forward bend test', *Spine*, 23(7), pp. 796–803.
- Drzal-Grabiec, J., Snela, S., Rachwal, M., Podgorska, J. & Rykala, J. (2015) 'Effects of carrying a backpack in an asymmetrical manner on the asymmetries of the trunk and parameters defining lateral flexion of the spine', *Human Factors*, 57(2), pp. 218–226.
- Edmonston, S., Chan, H., Ngai, G., Linda, M., Warren, R., Williams, J., Glennon, S. & Netto, K. (2007) 'Postural neck pain: An investigation of habitual sitting posture', *Journal of Musculoskeletal Research*, perception of 'good' posture and cervicothoracic kinaesthesia. *Manual Therapy*, 12. 362 – 371.
- Farzan, M., Lelia, V., Sima, R. & Zahra, A. (2017) 'Risk factors associated with musculoskeletal disorders of the neck and shoulder in the personnel of Kerman University of Medical Sciences', *Electronic Physician*, 9(5), pp. 4341–4348.

- Grimmer, K., Dansie, B., Milanese, S., Pirunsan, U. & Trott, P. (2002) 'Adolescent standing postural response to backpack loads: A randomized controlled experimental study', *BMC Musculoskeletal Disorders*, 3(10).
- Hartvigsen, J., Hancock, M.J., Kongsted, A., et al. (2018) 'What low back pain is and why we need to pay attention', *The Lancet*, 391(10137), pp. 2356–2367. doi:10.1016/S0140-6736(18)30480-X.
- Helliwell, P.S. & Taylor, W.J. (2004) 'Repetitive strain injury', *Postgraduate Medical Journal*, 80, pp. 438–443.
- Hershkovich, O., Friedlander, A., Gordon, B., Arzi, H., Derazne, E., Tzur, D., Shamis, A. & Afek, A. (2013) 'Associations of body mass index and body height with low back pain in 829,791 adolescents', *American Journal of Epidemiology*, 178(4), pp. 603–609.
- Hoy, D., Bain, C., Williams, G., March, L., Brooks, P., Blyth, F., Woolf, A., Vos, T. & Buchbinder, R. (2012) 'A systematic review of the global prevalence of low back pain', *Arthritis and Rheumatism*, 64(6), pp. 2028–2037.
- Hoy, D., March, L., Woolf, A., et al. (2014) 'The global burden of neck pain: estimates from the global burden of disease 2010 study', *Annals of the Rheumatic Diseases*, 73(7), pp. 1309–1315. doi:10.1136/annrheumdis-2013-204431.
- Ismaila, S.O. (2017) 'Safe backpack weight limit for secondary school students in Ibadan, Southwestern Nigeria', *Alexandria Engineering Journal*, pp. 1–8.
- Jia, N., Zhang, M., Zhang, H., et al. (2022) 'Prevalence and risk factors analysis for low back pain among occupational groups in key industries of China', *BMC Public Health*, 22, p. 1493. doi:10.1186/s12889-022-13730-8.

- Knezevic, N.N., Candido, K.D., Vlaeyen, J.W.S., et al. (2021) ‘Low back pain’, *The Lancet*, 398(10294), pp. 78–92. doi:10.1016/S0140-6736(21)00733-9.
- Koes, B., Tudler, M., Lin, C., Macedo, L., McAuley, J. & Maher, C. (2010) ‘An updated overview of clinical guidelines for the management of low back pain in primary care’, *European Spine Journal*, 19, pp. 2075–2094.
- Mbada, C.E., Oguntoyinbo, O.E., Fasuyi, F.O., Idowu, O.A., Odole, A.C., Ayanniyi, O., Johnson, O., Orimolade, E., Oladiran, A. & Fatoye, F. (2020). Cross-cultural adaptation and psychometric evaluation of the Yoruba version of Oswestry disability index. *Plos One*, 15(1), pp. 1–8.
- Morris, L.D., Daniels, K.J., Ganguli, B. & Louw, Q.A. (2018). An update on the prevalence of low back pain in Africa: a systematic review and meta-analyses. *BMC Musculoskeletal Disorders*, 19(196).
- Pangarkar, S.S., Kang, D.G., Sandbrink, F., et al. (2019) ‘VA/DoD clinical practice guideline: diagnosis and treatment of low back pain’, *Journal of General Internal Medicine*, 34, pp. 2620–2629. doi:10.1007/s11606-019-05086-4.

# **APPENDICES**

## **APPENDIX I**

### **INFORMED CONSENT FORM**

**TITLE OF STUDY: EVALUATING PHYSIOTHERAPISTS' PREFERENCE AS ADJUVANT FOR MANUAL THERAPY AGAINST ELECTROTHERAPY IN THE TREATMENT OF LOWBACK PAIN IN A TERTIARY HEALTH INSTITUTION**

**INVESTIGATOR: MR. CHIKA TOJU NWOBU**

**SUPERVISOR: DR. (MRS.) C. O. OBASEKI**

**FINANCIAL SPONSORSHIP:** This research project is self-sponsored

**PURPOSE OF THE RESEARCH:** This study aims to evaluate physiotherapists' intervention preferences for manual therapy or electrotherapy in the treatment of low back pain. In addition, it also seeks to identify the factors that influence their intervention preference and to assess the implication of these intervention preferences on patients' outcome and clinical practice in general.

#### **PROCEDURES AND PROTOCOL INVOLVED IN THE STUDY:**

You are politely approached to respond to a self-administered questionnaire, your body mass index will be taken and your core muscles will be assessed. This questionnaire would be only used for research purpose and will assess the level of disability.

#### **COMPENSATION:**

There will be no financial compensation for participating in this study.

**VOLUNTARY PARTICIPATION:**

Please note that your participation in this research is entirely voluntary. No form of discrimination will be meted to you, should you decide not to participate in this study. You are entirely free to change your decision and stop participating even if you consented earlier.

**SIDE EFFECTS:**

There is no anticipated adverse effect associated with participating in this study.

**BENEFITS:**

The benefit of this study is to highlight the need for targeted professional development and continuing education programs to address gaps in knowledge or skills related to manual therapy and electrotherapy.

**CONFIDENTIALITY:**

All information and data obtained in the course of this study will be treated confidentially. The names of the participants will not be written on the questionnaire, and all information collected will be encoded in a file in my personal computer. Thereafter the questionnaires and reports gotten will be shelved and locked in my personal document cabinet.

**CONTACT INFORMATION**

MR. CHIKA TOJU NWOBU

Email: [chikanwobu.cn@gmail.com](mailto:chikanwobu.cn@gmail.com)

Tel: 08148183060

**Ethics and Research Committee**

University of Benin Teaching Hospital, Benin City.

Email: ubthresearchethics@gmail.com

**INFORMED CONSENT (CERTIFICATE OF CONSENT)**

I have read the above information (or it has been read to me). I had the opportunity to ask questions about it and the questions were answered to my satisfaction.

(A) I consent voluntarily to take part as a participant in this study. [  ]

(B) I do not consent to participate in this study. [  ]

Signature of participant/Date: -----

## APPENDIX II

### Questionnaire on Low Back Pain Management

---

#### Section 1: Demographic Information

1. Age:

- 18–29
- 30–39
- 40–49
- 50–59
- 60 and above

2. Gender:

- Male
- Female

3. Professional cadres

- Intern
- NYSC
- Principal PT
- Chief PT
- Director

4. Highest Degree Obtained:

- Bachelor's Degree
- Master's Degree

- Doctorate
- Other (Please specify): \_\_\_\_\_

5. Years of Practice

- less than 1yrs
- 1-5
- 5-10
- 10 and above

6. How long have you been using manual therapy in the management of low back pain?

- Less than 1 year
- 1-3 years
- 4-6 years
- 7 years or more

7. How long have you been using electrotherapy in the management of low back pain?

- Less than 1 year
- 1-3 years
- 4-6 years
- 7 years or more

**Section 2: Utilization of Treatment Modalities**

7. How often do you use the following treatment modalities for low back pain?

(Please select one for each modality)

Treatment Modality	Never	Rarely	Sometimes	Often	Always
Manual Therapy					
Electrotherapy					
Exercise Therapy					

**Section 3: Preferences and Beliefs (Based on PABS-PT)**

8. Please indicate your agreement with the following statements about treatment preferences for low back pain.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I believe manual therapy is the most effective treatment for LBP.					
Electrotherapy is an essential part of my treatment approach.					

<p>Patients benefit more from a hands-on approach than electrotherapy.</p>					
<p>I consider patient preference when deciding between manual and electrotherapy.</p>					
<p>I consider clinical reasoning when deciding between manual and electrotherapy</p>					
<p>Manual therapy leads to faster recovery for my patients.</p>					
<p>I rely on electrotherapy when manual therapy does not yield desired results.</p>					

I have found exercise therapy to complement both manual and electrotherapy effectively.					
---	--	--	--	--	--

**Section 4: Attitudes and Barriers**

9. What barriers, if any, do you face when using manual therapy or electrotherapy in your practice?

(Select all that apply)

- Lack of equipment
- Lack of time
- Patient preference
- Insufficient training
- Religious believe of the patient
- Physiotherapist religious belief
- Gender involved
- Patient spouse preference
- Patient with co-morbidities

Other (Please specify): \_\_\_\_\_

**Section 5: Treatment Approaches for Low Back Pain**

10. Which specific treatment approach do you prefer for managing low back pain?

(Please select one option)


- [ ] Manual Therapy
- [ ] Electrotherapy
- [ ] Combination of both
- [ ] Other (Please specify): \_\_\_\_\_

11. Outside of manual therapy and electrotherapy, which physiotherapy modality do you prefer using the most for managing low back pain, and why do you feel it has the best outcome for your patients?

# APPENDIX III

**HEALTH RESEARCH ETHICS COMMITTEE (HREC)**  
**UNIVERSITY OF BENIN TEACHING HOSPITAL**  
P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR Prof. Darlington E. Obaseki  
E-mail: dorobaseki@gmail.com  
DIRECTOR OF ADMINISTRATION Jim Uwadie, Esq  
CHAIRMAN Prof. (Mrs.) Antoinette N. Ofili

 **HREC OFFICE:**  
Committee email: ubthresearchethics@gmail.com  
**Registration Number:**  
NHREC-UBTH-HREC/24/12/2022B

**PROTOCOL NUMBER:** ADM/E 22/A/VOL. VII/14865432033

**PROPOSAL TITLE:** "EVALUATING PHYSIOTHERAPISTS' FOR MANUAL THERAPY VERSUS ELECTROTHERAPY AS ADJUVANTS IN THE TREATMENT OF LOW BACK PAIN IN A TERTIARY HEALTH INSTITUTION"

**PRINCIPAL INVESTIGATOR(S):** CHIKA TOJU NWOBU

**DEPARTMENT/INSTITUTION:** DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

**DATE CONSIDERED:** NOVEMBER 25<sup>TH</sup>, 2024

**DECISION OF THE COMMITTEE:** APPROVED

*THIS APPROVAL DATES 25/11/2024 TO 24/11/2025. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY*

**REMARK:**

**CHAIRMAN:** PROF. (MRS) A.N. OFILI

**SIGNATURE & DATE:** *Ofili, 25/11/2024*

**SUPERVISOR (S):** DR. (MRS.) C.O OBASEKI

**DECLARATION BY INVESTIGATOR(S):**

**PROTOCOL NUMBER** (please quote in all enquiries)

Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

**Signature & Date.....**

 **ubthresearchethics@gmail.com** **Registration Number: NHREC/24/01/2020**

