PREVALENCE, PREVENTION AND COPING STRATEGIES OF WORK RELATED MUSCULOSKELETAL DISORDERS AMONG PHYSIOTHERAPISTS IN SOUTH-SOUTH REGION OF NIGERIA

BY

OGBUKAA GOODNESS CHINYERE

(BMS1602040)

DEPARTMENT OF PHYSIOTHERAPY,

SCHOOL OF BASIC MEDICAL SCIENCES, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN

BENIN CITY

PREVALENCE, PREVENTION AND COPING STRATEGIES OF WORK RELATED MUSCULOSKELETAL DISORDERS AMONG PHYSIOTHERAPISTS IN SOUTH-SOUTH REGION OF NIGERIA

BY

OGBUKAA GOODNESS CHINYERE

(BMS1602040)

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

NOVEMBER, 2022

DEDICATION

This research work is dedicated to God Almighty, my mother Mrs Rose Ogbukaa, my brother Victor Ogbukaa and my late father Mr Vincent Ogbukaa.

ABSTRACT

Background: WMSDs are disorders/injuries sustained from job environment and work performance; they worsen or lasts longer as a result of the work environment.

Aim: The aim of this study was to measure the prevalence and identify the preventive and coping strategies of WMSDs among physiotherapists in the south-south region of Nigeria.

Methods: Simple random sampling technique was used to select hospitals and physiotherapists in these hospitals were the respondents in this study. A questionnaire was used to collect data on the socio-demographic characteristics, prevalence of WMSDs on different regions of the body, risk factors of developing WMSDs, preventive measures and coping strategies of WMSDs among respondents; data obtained was analyzed using SPSS version 26; descriptive and interferential statistics of Chi square was used to determine the association between the prevalence of WMSDs and the socio demographic characteristics of the respondents.

Results: This study showed 86.5% of WMSDs among respondents, working in the same position for a long period as a major risk factors contributing to WMSDs, ergonomic modification as a preventive measure of WMSDs and adjustment of plinths/bed as the major coping strategies adopted by respondents towards WMSDs.

Conclusions and Recommendations: this study showed a high prevalence of WMSDs among respondents, break time should be giving in between working hours for stretching and relaxation, ergonomic modifications like lifts for lifting patients and sliding sheet for patient's repositioning; these can reduce the prevalence of WMSDs.

Keywords: prevalence, prevention, coping strategies, work related musculoskeletal disorders, physiotherapist

ACKNOWLEDGEMENTS

My appreciation first of all goes to Almighty God whose mercies and faithfulness brought me this far. I would like to appreciate my supervisor Prof. Antoninus Obinna Ezeukwu, BMR(PT); MBBS; MSc; PhD a professor of musculoskeletal and rehabilitation medicine, thank you sir for always being there even in your busy and tight schedules giving corrections and instructions on my work, to Dr UAC Okafor thank you sir for your contributions to the success of my work also to my head of department, Prof. Kayode Oke, thank you sir for being a father through my undergraduate programme . My special thanks goes to my dynamic lecturers, Prof. Kayode Oke (head of department), Rev Sis, Dr. Henrietta Fawole (Course Adviser), Dr. Femi Ogundiran, Prof. Antoninus Obinna Ezeukwu (Supervisor), Dr UAC Okafor, Dr. Umunnah and Mr. Nweke, thank you for imparting me in knowledge and character. My appreciation is also extended to the non-academic staff of the department of physiotherapy university of Benin, thank you so much. With no exception to the university of Benin teaching hospital (UBTH) my appreciation goes to the head of physiotherapy department, Mr. Taiwo Oyewumi, the directors, deputy directors, chief physiotherapists, corpers and interns, for the knowledge and skills they imparted in me. To my wonderful family, Mrs Rose Ogbukaa, thank you mummy for always being my support system and more, to my amazing brother, Victor Ogbukaa, you are simply the best and to my Plum, Engr Emmanuel, you are indispensable. My Special thanks goes to Mr/Mrs Precious and Mr/Mrs Anyagara for being part of my support system and family in Benin and to my friends and colleagues that were part of my university journey, Jennifer, Moni, Uwa, Rhema, Rejoice, Stephnie, Chidiogo, Tina, Fayoke, Orezi and Ifeanyi, RCCG Tehillah Sanctuary I love you all; to all the people who participated in my study, without your help this work won't have been a success thank you and God bless you all.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background of study

The Musculoskeletal System is responsible for the body's structure and movement; bones, tendons, ligaments, cartilage, muscle tissue make up the human body. Muscles are connected to bones by tendon tissue, and when they contract, they cause movement around a joint (kerkman et al.2018). Musculoskeletal disorders (MSDs) are injuries or diseases that affect the muscles, nerves, tendons, joints, cartilage, and spinal discs; Work-related musculoskeletal disorders (WMSDs) are situations in which the job environment and work performance play a substantial role in the development of the condition; the disorder is made worse or lasts longer as a result of the work environment (Bernard 1997). Despite having expert knowledge of musculoskeletal injuries and injury prevention strategies due to training and ongoing professional development, physiotherapists still report a high incidence of work-related injuries during their professional practice (Nordin et al. 2011). Repetitive movement, awkward postures and high force are the three key risk factors related with WMSDs also transferring dependent patients, supporting patients in locomotion, giving manual resistance, assisting with mat activities, and moving large and bulky equipment are all things that physical therapists do on a regular basis exposing them to WMSDs (Borket al.1996). The risks factors of WMSDs can be classified into three namely: Physical factors - such as prolonged or awkward postures, repetitive movements, forceful exertions, hand-arm vibration, all-body vibration, mechanical compression, and cold; Psycho social factors - such as work pace, autonomy, monotony, work/rest cycle, task demands, social support from colleagues and management, and job uncertainty; Individual factors - such as age,

gender, professional activities, sport activities, domestic activities, recreational activities, and job uncertainty; (Nunes et al 2012). The prevalence of WMSDs was shown to be 68% in the United Kingdom, 55% in Australia, and 85% in Turkey among clinical physiotherapists and the most prevalent WMSDs was low back pain (Mondal 2019). A study in Nigeria looked into the prevalence and work factors of WMSDs among physiotherapists and found that 91.3% of Nigerian physiotherapists had WMSDs during the course of a year; WMSDs were found to be more common among female physiotherapists and the low back (69.8%) was found to be the most commonly affected body part followed by the neck (34.1%) (Adegoke et al. 2008). Physiotherapists employ a variety of coping methods to help decrease strain on their body while working such as altering the patient's position and adjusting the plinth/bed height also WMSDs has had a variety of effects on physiotherapists, with some adjusting their treatment practices and exploring various therapy options, while others have quit the field entirely (Cromie et al. 2000).

Hence, the purpose of this study is to find out the prevalence and preventive measures in work-related musculoskeletal disorders (WMSDs) among physiotherapists in the south-south region of Nigeria, as well as the coping strategies adopted by these physiotherapists to adjust to these WMSDs; this will help reduce the occurrence of WMSDs among physiotherapists and improve their knowledge on the prevention and coping strategies of WMSDs.

1.2 Statement of problem

Researcher being an undergraduate physiotherapy student and intend to practice in this profession has met physiotherapists who complain of pain and discomfort especially at the lower back and neck which persists after treatment sessions with patients, this pain in return limits their

activities of daily living. In developed nations, studies have been conducted extensively on WMSDs, with some of the studies focused on a specific body region. A study in Nigeria by (Adegoke et al 2008) on work related musculoskeletal disorders among physiotherapist showed a high prevalence of work related musculoskeletal disorders among physiotherapists in Nigeria but to the best knowledge of the researcher, no work has been done regarding the prevalence, prevention and coping strategies of WMSDs among physiotherapists in the south-south region of Nigeria, Hence the need for this study.

1.3 Research Questions

I. What is the prevalence of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria?

I. What are the major risk factors contributing to the development of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria?

II. Can the prevention of these risk factors prevent the development of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria?

III. What are the coping strategies adopted by physiotherapists in the south-south region of Nigeria who already developed work related musculoskeletal disorders?

1.4 Aims of study

To measure the prevalence, identify the preventive and coping strategies of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

1.4.1 Specific objectives

I. To measure the prevalence of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

II. To identify the major risk factors that contribute to the development of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

III. To identify preventive measures to prevent work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

IV. To identify coping strategies of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

1.5 Research Hypotheses

1.5.1 Main hypothesis

There will be no significant prevalence, preventive and coping strategies of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria

1.5.2 Sub hypothesis

I. There will be no significant prevalence of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria

II. There will be no significant difference between the risk factors contributing to the development of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria

III. Prevention of these risk factors will not prevent development of WMSDs among physiotherapists in the south-south region of Nigeria

IV. There will be no significant difference between the coping strategies adapted towards work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria

1.6 Significance of study

I. The findings of this study may help determine the prevalence of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

II. The findings of this study could create awareness on major risk factors of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

III. The findings of this study could create awareness on the preventive measures to be taken by physiotherapists in the south-south region of Nigeria to prevent work related musculoskeletal disorders.

IV. The findings of this study could Identify Coping Strategies adopted by physiotherapists in the south-south region of Nigeria towards work related musculoskeletal injuries.

V. The findings of this study could educate the upcoming physiotherapists (undergraduates) globally, on the preventive and coping strategies of work related musculoskeletal disorders.

VI. The findings of this study may emphasize on the need of the regulating body of physiotherapists in Nigeria (MRBT) to monitor the ergonomics of hospital settings, treating cubicles and equipment as these will promote healthy working environments and prevent development of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

1.7 Delimitaion / Scope of study

A. Respondents

This study was delimited to male and female physiotherapists in the south-south region of Nigeria with a minimum practice of 1year

B. Instruments

The study was also delimited to the use of the following:

I. The standardized Nordic Musculoskeletal Questionnaire (NMQ) to assess the prevalence and regions of affectation of work related musculoskeletal injuries among respondents.

II. The standardized Job Factor Questionnaire (JFQ) to identify the risk factors that contribute to the development of WMSDs among respondents and the prevention of work related musculoskeletal disorders.

III. The standardized coping strategies questionnaire (CSQ) to assess the various coping Strategies adopted by respondents towards WMSDs.

1.8 Limitation of study

The study was limited to physiotherapists in the randomly selected hospitals in the south-south region of Nigeria namely; UBTH, UPTH, FMC ASABA and UUTH.

1.9 Definition of Terms

1. **Work-related musculoskeletal disorders (WMSDs)**: Situations in which the job environment and work performance play a substantial role in the development of the condition; the disorder is made worse or lasts longer as a result of the work environment (Bernard 1997)
2. **Prevalence**: The percentage of a population that is affected with a particular medical condition (disease) at a particular point in time. (Merriem Webster Dictionary)
3. **Prevention**: The act or practice of stopping something bad from happening. (Merriem Webster Dictionary)
4. **Coping Strategies**: Behavioral and cognitive tactics used to manage crises, conditions and demands that are appraised as distressing. (Carr et.al 2007)
5. **Physiotherapist**: Physiotherapy is a healthcare profession that assesses, diagnoses, treats and works to prevent diseases and disability through physical means. (Chigbo et al 2015)

1.9.1 List of abbreviation/acronyms

1. MSDs Musculoskeletal Disorder
2. WMSDs Work related Musculoskeletal disorder
3. MRBT Medical Rehabilitation Therapists Board of Nigeria
4. UBTH University of Benin Teaching Hospital Edo State
5. UPTH University of Port Harcourt Teaching Hospital Rivers State
6. FMC Federal Medical Center Asaba, Delta State
7. UUTH University of Uyo Teaching Hospital Akwa-Ibom State

Chapter 2

2.1 Preamble

Work related musculoskeletal disorders is a global concern among physiotherapists that significantly affect their lifestyle, quality of life as well as their responsibilities to their patients as physiotherapists. It puts a burden to the society that despite the knowledge of physiotherapists on work related musculoskeletal disorders they still fall victims of these conditions hence, they have to be lightened more on the preventive measures and coping strategies that will prevent them from developing these disorders as well as help them cope with them too. Also to their regulating body (MRBT), ergonomics of the hospital setting, treating cubicles and equipment should be monitored as these will promote healthy working environments and prevent development of work related musculoskeletal injuries among physiotherapists.

2.2 Work related musculoskeletal disorders (WMSDs)

Musculoskeletal Disorders/Injuries are disorders of the soft tissues and their surrounding structures that do not occur as a result of an acute or immediate incident e.g. slips or falls (Hales et al 1996). When work environment and work performance play a substantial role in the development of MSDs, they are called work-related disorders thus, Work-related MSDs differ from occupational diseases in that, occupational diseases have a direct cause-effect relationship between a single hazard and a specific disease (e.g., asbestosis, silicosis), whereas MSDs do not (Hales et al 1996). WMSDs develop gradually as a result of repeated trauma; disorders of the neck, shoulder, elbow, hand and wrist, lower back, and lower limbs have all been classified as

work-related musculoskeletal syndromes. Repetition, severe exertion, and confined or immobile postures are all linked to neck musculoskeletal issues. Work at or above shoulder height, lifting large weights, static postures, hand-arm vibration, and repetitive motion can all cause shoulder musculoskeletal issues. Overexertion of the finger and wrist extensor with the elbow in extension, as well as posture, is linked to elbow epicondylitis. Repetitive work, vigorous activities, flexed wrists, and long periods of continuous effort are all associated with hand-wrist tendinitis and work-related carpal tunnel syndrome. The intensity and duration of vibration exposure have been associated to hand-arm vibration syndrome (Raynaud's phenomenon). Repetition, the weight of goods lifted, twisting, and poor lifting biomechanics are all linked to lower back diseases at work. Awkward posture high static muscle load, high-force exertion at the hands and wrists, sudden applications of force, work with short cycle times, little task variety, frequent tight deadlines, inadequate rest or recovery periods, high cognitive demands, little control over work, a cold work environment, localized mechanical stresses to tissues, and poor spinal support are other risk factors for back-related musculoskeletal problems during work (Panush et al 2017). The main clinical manifestations of WMSD are pain and limited activity according to a study done by (Li et.al 2020). Collaboration among employees, employers, insurers, and health professionals has resulted in the creation of suggested treatment approaches (rehabilitation) for these occupational/ work related musculoskeletal disorders. The three phases of the procedure are Protection from and resolution of symptoms, restoration of strength /dynamic stability and return to work. Symptomatic therapies, physical therapy, and ergonomic assessments were all part of the process of the rehabilitation though the prognosis for these disorders hasn't been thoroughly researched or established (Torralba et al 2013).

2.3 Physiotherapy/Physiotherapists

Physiotherapy is a healthcare profession that assesses, diagnoses, treats and works to prevent diseases and disability through physical means. (Chigbo et al 2015) Also, World Confederation for Physical Therapy (WCPT 2019) now known as World Physiotherapy (WPT) defines physiotherapy as a profession that provides services to individuals and populations to develop, maintain and restore maximum movement and functional ability throughout lifespan. Physiotherapists are licensed autonomous healthcare practitioners trained in the professional entry-level for physiotherapy education (WPT 2019). Physiotherapy Specialties includes: Neurology, Sports, Musculoskeletal, Geriatrics, Cardio-Pulmonary, Women Health, Pediatrics, Community and Ergonomics.

2.4 Epidemiology of WMSD among Physiotherapists in Nigeria

Epidemiological evidence has proposed the prevalence of WMSDs among physiotherapists using lifetime prevalence, 12-month prevalence, and one-week prevalence and its prevalence was found to be high regardless of the time frame for recall, with lifetime prevalence ranging from 40% to 91% and 12-month prevalence ranging from 58% to 91%. Lower back (48%) injuries, neck (33%) injuries, upper back (23%) injuries, and thumb injuries (23%) have all been reported as work-related injuries in physiotherapists. Aside from the nature of therapists' jobs, working in certain clinical specialties in physiotherapy has also been linked to work-related disorders. Musculoskeletal outpatients (31%), neurological rehabilitation (14%), and elderly care (12%) have been suggested (Nordin 2011). In a Nigerian study by (Adegoke et.al 2008) the prevalence of WMSDs was higher in female physiotherapists ($p = 0.007$) and those with lower body BMI (p

= 0.045), the most affected body region was the lower back (69.8%) followed by the neck (34.1%). A one-year cross sectional study among Slovenian physiotherapists showed that the prevalence of pain was significantly higher in the neck (64%) followed by the low back (63%). The body parts with the least symptoms were the elbows (8%) and ankles/feet (15%) (Meh et.al 2020). (Iqbal et.al 2015) also in his study found the prevalence of work-related musculoskeletal disorders to be 92% he also proposed that specialty, gender and ergonomic factors in the clinic and duration of patient contact are related to the pain development ($p<0.05$).

2.5 Body regions and work related musculoskeletal disorders

Studies have shown the affectation of work related musculoskeletal disorders on the neck, shoulders, elbow, wrist, upper back, lower back, knees and ankle joint. These body regions have different anatomical orientation via joint properties and type of movement.

2.5.1 Vertebrae Column

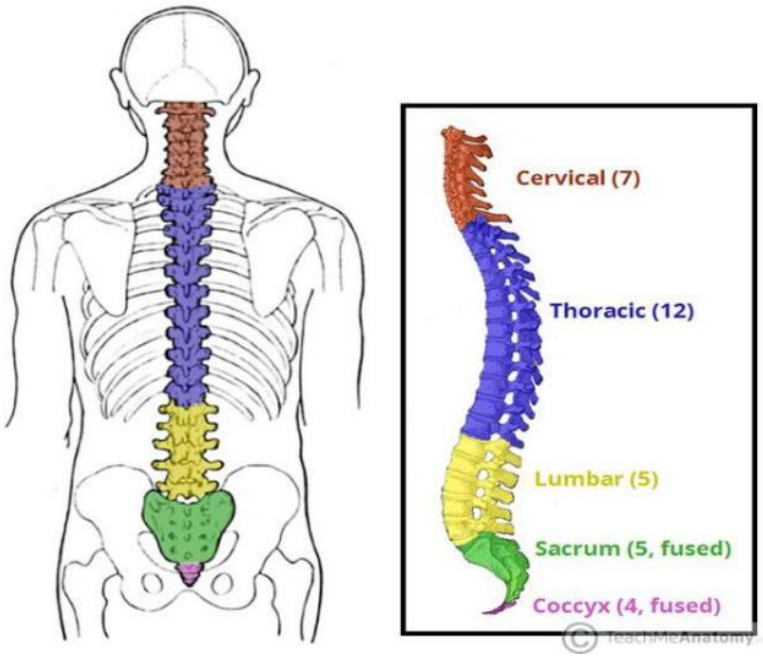


Figure 1: Anatomy of the vertebrae column (Adopted from: https://teachmeanatomy.info/back/bones/vertebral column)

The vertebral column is divided into different segments which are the cervical (neck), thoracic (upper back), lumbar (lower back), sacrum and coccyx. It comprises of numerous components that protect the spinal cord, allow for mobility, and provide support to the body these components include:

I. Vertebral bones: The vertebral bones are also referred to as the vertebral column and comprise of 33 vertebrae connected by ligaments and the inter-vertebral disc; these

vertebrae are separated into five portions: the 7 cervical, 12 thoracic, 5 lumbar, 5 sacrum and 4 coccyx bones; its length in males is 71cm while in females its 61cm. (Kayalioglu 2008). It allows for movement, balance, upright posture, spinal cord protection, and stress absorption; the cervical and lumbar vertebrae are the secondary curvatures which are concave posteriorly and convex anteriorly hence they are referred to as lordosis whereas the thoracic spine are the primary curvatures which are concave anteriorly and convex posteriorly hence they are referred to as kyphosis. These curvatures in the spine aid in upright balance and support the weight of the head and upper torso. Too much curvature, on the other hand, can produce spinal imbalance, which can lead to pain or loss of motion (Kayalioglu 2008). These structures are exposed to injuries among physiotherapists due to the nature of their work. From previous studies conducted, it was deduced that work related musculoskeletal injuries among physiotherapists is more prevalent in the low back followed by the cervical region. (Nordin 2011).The low back which is the lumbar region comprises of five vertebrae (L1-L5) and referred to as the strongest and largest vertebrae column because of the amount of body weight it carries, its spinous process is short and thick relative to the size of the vertebra and projects perpendicularly from the body; the articular facets are markedly vertical, with the superior facets directed posteromedial and medially; and the articular facets are markedly vertical, with the superior facets directed posteromedial and medially. The facets also have a curved articular surface, which is a distinctive feature (Waxenbaum et.al 2021). The cervical vertebrae being the second prevalent region of work related musculoskeletal injuries among physiotherapists according to previous studies comprises of seven vertebrae (C1-C7). The cranio-cervical junction (CCJ) and the sub-axial spine are the two primary parts of the cervical spine.

The occiput and atlas (C1), as well as the axis (C2), are all part of the CCJ. The five most caudal cervical vertebrae make up the sub-axial spine (C3-C5). The cervical spine is crucial for sustaining the cranium's weight and facilitating movement of the head and neck as a whole. The atlas' principal purpose is to support and cradle the base of the occiput at the atlanto-occipital articulation, whereas the axis is the upper cervical region's primary weight-bearing bone. Neck flexion, rotation, lateral bending, and skull stabilization are all controlled by muscles. (Kaise et.at 2021) C1-C2 are located at the level of the mandible's body, at the level of the hyoid bone and the superior portion of the thyroid cartilage are C3-C4 located, at the level of the posterior cricoid cartilage are C5 - C6 located while C7 is the lowest point in the neck. (Snyderman et.al 2008)

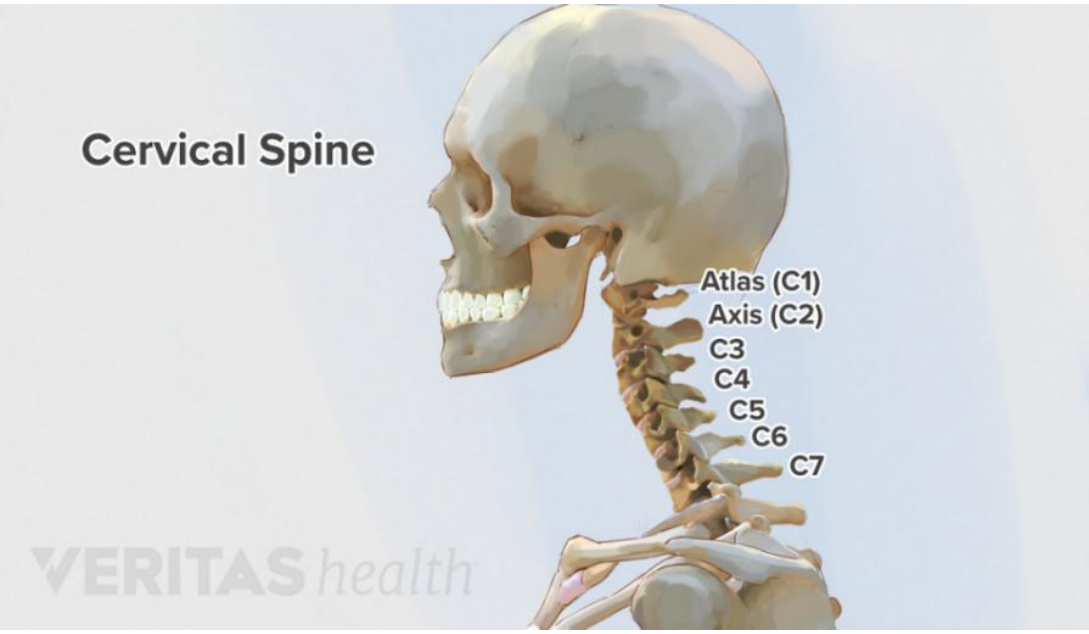


Figure 2: Anatomy of the cervical spine (Adopted from: https://embed.widencdn.net/img/veritas/ggicqiv9e9/1200x675px/Adult-Cervical-spine-anatomy-overview.png)

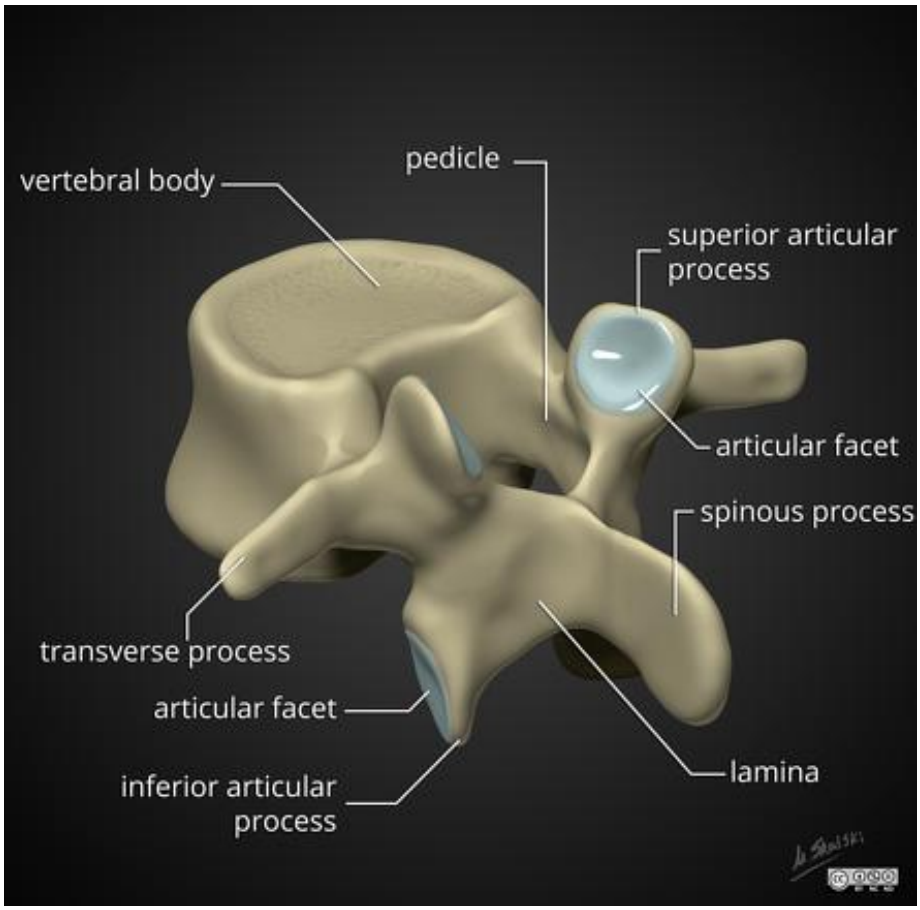


Figure 3: Cross section of the lumbar vertebrae

(Adopted from https://radiopaedia.org/articles/vertebrae)

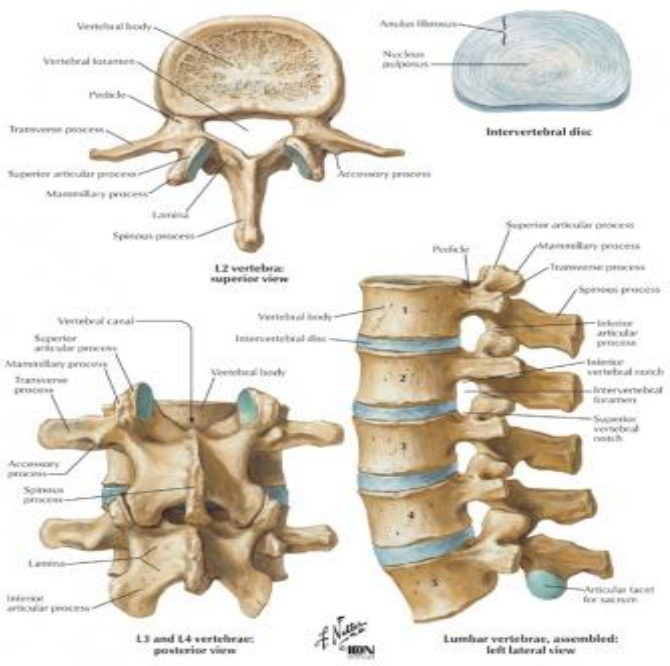


Figure 4: Anatomy of the lumbar vertebrae

(Adopted from: https://www.physiopedia.com/LumbarVertebrae)

II. Spinal Cord: The spinal cord is the lowest level and most simply organized segment of the central nervous system (Nieuwenhuys 1964). It extends caudally and is covered by the vertebral column, it comprises of Grey and White Matter, different levels of spinal cord injuries manifest different clinical presentations. (Nogradi et al 2006)

III. Nerves roots: Nerves exits their roots through the vertebral foramina and emerge as a peripheral nerve that extend to the limbs; lesions in the nerve roots, plexus and peripheral nerve are called Radiculopathy, Plexopathy and Peripheral neuropathy respectively (McGee 2018). The amount of the injury determines the timing and success of the peripheral nerve restoration process. Seddon classified nerve injuries into three groups

based on their severity: neurapraxia, axon-otmesis, and neurotmesis. Neurapraxia is the mildest damage type, with no loss of nerve continuity and only temporary functional loss. Axonotmesis occurs when the nerve axon and surrounding myelin are completely disrupted while the surrounding mesenchymal tissues, such as the perineurium and epineurium, are maintained. Axon and myelin degradation occurs far beyond the damage site, resulting in total denervation. The complete disconnection of a nerve is known as neurotmesis, because of scar development and the lack of the mesenchymal guide that appropriately directs axonal regeneration, functional loss is complete and recovery without surgical intervention is rare. (Burnett et al 2004). Nerves are responsible for transmitting information throughout the body via electrochemical signals. Sensory neurons, motor neurons, and interneurons are the three functional groups of nerves. Sensory neurons receive and interpret sensory stimuli, motor neurons communicate with muscles or glands, and interneurons communicate with other neurons. Afferent nerve fibers convey sensory information to the central nervous system whereas efferent nerve fibers carry information away from the central nervous system. (Ashley et al 2021). The central and peripheral nerve systems are connected by the spinal roots. The nerve roots pass via the spinal column, where they are found in narrow spaces near vertebrae and intervertebral discs. Nerve roots can be compressed mechanically in these areas as a result of disc herniation, spinal stenosis, and spine trauma (Rydevik 1992). Nerve root compression can cause motor weakness, decreased sensitivity, and discomfort through a variety of neuro-physiologic pathways; repetitive motions and awkward postures exposes nerves to compression/entrapment. (Rydevik et al 1984)

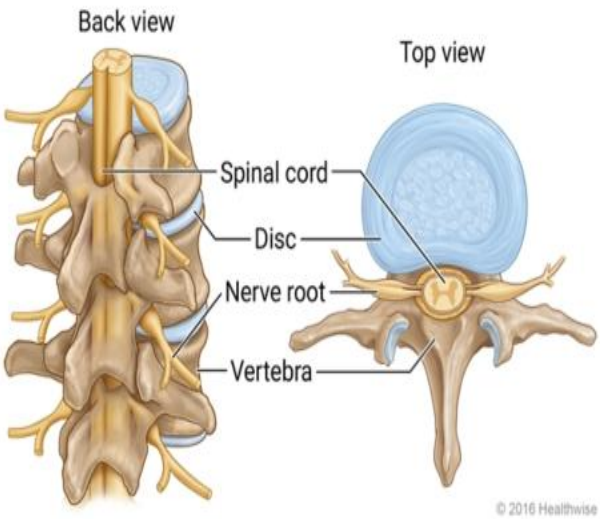


Figure 5: Posterior view of the vertebrae column (Adopted from: https://www.northhore.org/healthresources/encyclopedia/encyclopedia.aspx?DocumentHwid=zm2325)

Having discussed about the anatomy of the vertebrae, repetitive movement to the vertebrae could result to different anomalies hence resulting to postural deformities and these include:

I. Spondylosis: Spondylosis or spondylosis deformans is a generic term where degenerative diseases of the spinal column in elder individuals involve the vertebrae, inter-vertebral joints, ligaments, and inter-vertebral disc hence no inflammation or infection. (Girolami et al 2018)

II. Spondylolysis: This is a posterior defect in the vertebral body at the pars interarticularis. Trauma or chronic repeated loading and hyper-extension are the most common causes of this deformity. (Donnally et al 2018)

III. Spondylolisthesis: This occurs when instability caused by spondylolysis causes the vertebral body to translate either anteriorly or posteriorly; this procedure necessitates a fracture or deformation of the posterior spine components, resulting in pars elongation. This ailment affects people of all ages, with the underlying reason differing depending on their age group. If the slip progresses to the point of neurologic compromise, surgery to decompress and stabilize the affected segments may be required. (Donnally et al 2018)

IV. Radiculopathy: Radiculopathy is most commonly caused by foraminal entrapment of spinal nerves (Zivkovic et al 2017) Pain, weakness, reflex abnormalities, and sensory loss are among symptoms of radiculopathy. (Fuller et al 2010)

i. Pain: spreads from the spine in the distribution of the damaged nerve root; mechanical forces that increase intraspinal pressure such as coughing, sneezing, or straining, exacerbate the pain. (Fuller et al 2010)

ii. Weakness and alterations in reflexes: loss of function in the nerve root's distribution causes muscle weakening in the muscles innervated by that root as well as changes in or absence of sensation in the dermatomal distribution. There could be atrophy or fasciculation of muscles innervated by that root, as well as a loss of reflexes. (Fuller et al 2010)

iii. Sensory loss or impaired sensation in the afflicted nerve root's distribution. (Fuller et al 2010)

2.5.2 Bones and joints

Bone is a metabolically active connective tissue that supports the body's structure, allows for movement, and protects the vital organs. It's crucial for maintaining mineral and acid-base balance homeostasis and allows for hematopoiesis (the creation of blood cells) in the bone marrow. Extracellular matrix and bone cells (osteocytes, osteoclasts, and osteoblasts) make up the bone (Sayed et al 2021). A joint is a point where two bones make contact and be classified based on type of connective tissue and amount of movement permitted. Fibrous, cartilaginous, and synovial are of the former while synarthrosis (immovable), amphiarthrosis (slightly moveable), and diarthrosis (freely moveable) are of the latter classification. (Junejaet al 2021).The two classification schemes correlates: synarthroses are fibrous, amphiarthroses are cartilaginous, and diarthroses are synovial. (Junejaet al 2021)

I. Fibrous joint comprises of fibrous tissue made mostly of collagen, they are frequently immobile and lack a joint cavity (synarthroses). Its classification are Sutures, gomphoses, and syndesmoses. Sutures are cranial joints that are immovable, Gomphoses are immobile joints between the teeth and their sockets in the mandible and maxillae and Syndesmoses are joints that can move slightly. (Junejaet al 2021)

II. In cartilaginous joints, the bones are connected by hyaline cartilage or fibrocartilage. (Junejaet al 2021)

III. Synovial joints are freely mobile (diarthroses) and are considered the main functional joints of the body; they are classified based on the amount of movement they permit: hinge (elbow), saddle (carpometacarpal joint), planar (acromioclavicular joint), pivot (atlantoaxial joint), condyloid (metacarpophalangeal joint), and ball and socket (hip joint). (Junejaet al 2021)

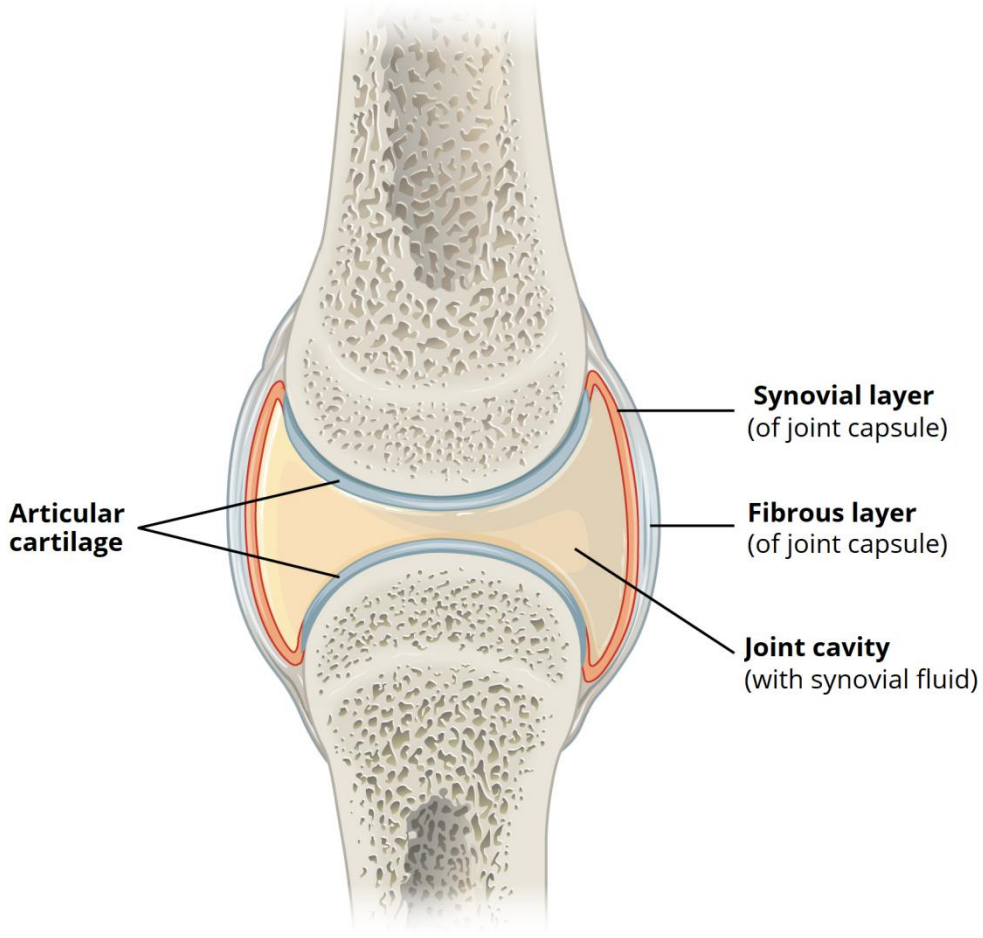


Figure 6: Anatomy of a synovial joint (Adopted from https://teachmeanatomy.info/the-basics/joints-basic/synovial-joint/)

Structural functions of the components of a synovial joint

I. Articular cartilage: this cartilage is a smooth white tissue that covers the ends of bones that form synovial joints and allows for practically friction-free mobility while minimizing pressure on the underlying subchondral bone. (Clark et al 2020)

II. Synovial fluid: The synovial fluid fills the joint cavity and the articular cartilage that linings the ends of the articulating bones receives nutrition and lubrication from it. (Hayes et al 2016)

III. Ligaments: Ligament are specialized tough fibrous band of connective tissue that hold bones together in proper articulation at the joints, injury to them is termed sprain (Frank 2004)

2.6 Muscles

The function of the muscles cannot not be over emphasize in movement facilitation. The muscles of the human body that function with the skeletal system, are under voluntary control, and are concerned with movement, posture, and balance are referred to as the human muscle system. Human muscle is often split into striated muscle (or skeletal muscle), smooth muscle, and cardiac muscle, just like the muscles of all vertebrates. Smooth muscle is located in the walls of blood vessels, as well as tissues like the urine bladder, intestines, and stomach, and is controlled in an automatic manner. The heart's bulk is made up of cardiac muscle, which is responsible for the heart's rhythmic beat. (Muscolino2010). Contractility, excitability, extensibility, and elasticity are the four major functional qualities of skeletal muscle.

I. Contractility: Muscle contractility is an important feature of all muscle types; this feature allows the heart to generate the necessary power for its pumping function. Muscle contraction is controlled at the cellular level by a process known as excitation–contraction coupling (EC coupling). This procedure begins with an action potential (AP) in the cell membrane (excitation), which is followed by a sequence of steps that connect the AP-mediated excitation to the initiation of contractile work. (Andersson et al 2012).

II. Excitability: Excitation–contraction coupling (ECC) refers to the quick communication between electrical events in skeletal muscle fiber, plasma membranes and Ca2+ release from the Sarcoplasmic Recticulum, which causes contraction. (Calderón et al 2014)

III. Extensibility: The ability of a muscle to lengthen to a certain endpoint is known as extensibility; subject's sensation is the most common determinant of endpoints of stretch in humans. Increases in end-range joint angles are a sign of increased human muscle extensibility, increase in muscle extensibility can be attributed to a simple decrease in muscle stiffness or an increase in muscle length. (Weppler et al 2010)

IV. Elasticity: Muscle force production occurs in an environment of tissues that exhibit spring-like behavior, so elasticity is a critical determinant of muscle performance during locomotion; elastic structures have a profound effect on muscle force, power, and work by influencing the speed of contractile elements, this elastic processes in muscles rely mostly on in-series tendons and spring-like components in the muscles. (Roberts 2016)

V. Adaptability: The ability of mammalian skeletal muscles to adapt to variations in functional load is exceptional. This adaptability of muscle tissue is based on adaptive changes in muscle power output, rapid movement, and/or fatigue resistance and results in

the ability to function efficiently under a variety of conditions. Muscle responses to increased use are closely linked to the mode of exercises. (Bigard 2019)

The Major Work related musculoskeletal disorder to the muscles is muscle strain. (Fernandes et al 2011). The tensile force exerted on a muscle may lead to excessive stretching of the muscle fibers and consequently a tear close to the muscle-tendon junction hence the name strain and its classification are:

i. Mild sprains and bruises (grade I): Injuries affecting only some of the muscle fibers, with slight edema and discomfort, accompanied by little or no loss of strength or limitation of movements; during muscle contraction, it is impossible to palpate any muscle defect, although the pain does not cause any significant functional impairment, the athlete should not continue with his or her activities because there is a significant risk that the injury will worsen. (Fernandes et al 2011)

ii. Moderate sprains and bruising (grade II): Results in more muscle damage and loss of function which is inability to contract; It's possible Within two to three days, a little muscular defect or gap can be palpated at the damage site, and a slight local hematoma with potential ecchymosis forms. Healing normally takes two to three weeks, and after about a month, the patient can gently and carefully resume physical activities. (Fernandes et al 2011)

iii. Severe sprains or bruises (grade III): Are injuries that span the entire cross-section of a muscle, resulting in virtually complete loss of muscle function and excruciating pain. The muscle structure clearly fails and the ecchymosis is usually extensive and positioned far away from the injured site. The healing duration for such injuries varies between four and

six weeks. This specific sort of injury necessitates long-term therapy (up to three or four months). (Fernandes et al 2011)

2.7 Risk factors of WMSD among physiotherapists

The risks factors of WMSDs can be classified into three (Nunes et al. 2012), (Campo et al 2008)

I. Physical factors - such as prolonged or awkward postures, repetitive movements, forceful exertions, hand-arm vibration, all-body vibration, mechanical compression, and cold;

II. Psycho-social factors - such as work pace, autonomy, monotony, work/rest cycle, task demands, social support from colleagues and management, bad and non-adjustable plinths and job uncertainty;

III. Individual factors - such as age, gender, body weight, professional activities, sport activities, domestic activities, recreational activities, and job uncertainty;

2.8 SUMMARY OF EMPIRICAL LITERATURE

S/N	TITLE	STUDY ID	COUN-TRY	PARTICIPANTS	METHOD	RESULTS	CONCLUSION
1	Work-related injuries among physiotherapists in public hospitals—a Southeast Asian picture	Nordin et.al 2011	Malaysia	105 physiotherapists at three main public hospitals in Kuala Lumpur, Malaysia.	A cross sectional study: Self-administered questionnaires adapted from the Nordic Musculoskeletal Questionnaire	Prevalence of work-related injuries in 12 months was 71.6%.Female therapists were mostly affected and the most common techniques that contributed to WMSDs were Manual therapy (58.6%) and lifting/transfer tasks (41.3%)	Work-related injuries was significantly higher among the physiotherapists in Malaysia compared with many other countries in this study

2	Work-related musculoskeletal disorders among physical therapists	Bork et.al 1996	Lowa city, USA	(N = 1,160) Physiotherapists who attended The University of Iowa between 1943 and 1993	A cross sectional study: A survey instrument was constructed consisting of a symptom survey, a job-factor survey, and various demographic information.	The anatomical regions affected were the low back (45%), wrist/hand (29.6%), upper back (28.7%), and neck (24.7%). "lifting or transferring dependent patients, work setting, practice specialty, age of patient, and gender of therapist was said to increase risk of WMSDs	It was recommended that Specific strategies should be developed to reduce WMSDs in the practice of physical therapy.

3	Work-related musculoskeletal disorders among Nigerian physiotherapists	Adegoke et.al 2008	Nigeria	Two hundred and seventeen copies of the questionnaire were distributed but 126 copies were returned, giving a 58.1% response	A cross-sectional survey was administered to physiotherapists in different parts of Nigeria using a 2- part questionnaire with items adopted from questionnaires used for similar studies around the world.	12- Month prevalence of WRMSDs among Nigerian physiotherapists was 91.3%. The low back (69.8%) and neck (34.1%). 50% of these PTs experienced WRMDs within their first five years of graduation; treating large number of patients in a day was a major factor and their major coping strategy was modification of	Nigeria has a higher prevalence of WRMSDs around the world. Their coping strategies and work factors of WRMDs are mostly similar to those of their counterparts elsewhere.

						their position and treatment techniques.	
4	Work Related Musculoskeletal Disorders among Physiotherapists in Dhaka City	Mondal et.al 2019	Dhaka city	61 male and female Physiotherapists. excluding those having unstable medical condition	Self-administered questionnaire were given and MSDs were identified by taking face to face interview	The Prevalence of WMSDs was 46% with the males significantly affected with the lowerback mostly affected.	Further research was recommended for preventive and ergonomics measures to reduce WMSDs
5	Work-related musculoskeletal disorders in physical therapists:	Cromie et.al 2000	Australia	n= (824) were surveyed.	Questionnaire was mailed to each subject and questions investigated musculoskeletal symptoms, specialty areas, tasks and job-	Lifetime prevalence of WMSDs was 91%,risk factors pertaining to workload gave a higher prevalence of neck and upper-	Further research was recommended to establish effective ergonomic practice.

	prevalence, severity, risks, and responses				related risk factors, injury prevention strategies, and responses to injury.	limb symptoms, and postural risk factors proposed a higher prevalence of spinal symptoms.	

CHAPTER 3

MATERIALS AND METHOD

3.1 Respondents

3.1.1 Respondents section

The respondents of this study were both male and female physiotherapists in the south-south region of Nigeria.

1.1.2 Inclusion Criteria

This Included:

I. Physiotherapists in the south-south region of Nigeria with a minimum of 1year practice, this included corp members
II. Physiotherapists in the randomly selected hospitals in the south-south region of Nigeria
III. Physiotherapists with history of work related musculoskeletal disorders/injuries

3.1.3 Exclusion Criteria

This Included:

I. Pregnant physiotherapists
II. Physiotherapists with injuries/pain/discomfort sustained outside place of work
III. Non practicing Physiotherapists
IV. Intern Physiotherapists

V. Retired physiotherapists

VI. Physiotherapists outside the randomly selected hospitals in the south-south region of Nigeria

3.2 Materials

3.2.1 Apparatus / Instruments

I. The standardized Nordic Musculoskeletal Questionnaire (NMQ): This Instrument was used to assess the prevalence and region of WMSDs among participants, the questionnaire comprises of a general assessment section and a section with assessment that focuses on different regions of the body. This instrument was proved a valid and reliable assessment instrument for assessing complaints of MSDs in formal and informal sector workers in a cross sectional study of the Validity and Reliability Test of the NMQ with 2 group of workers (former and informer workers),data were collected by in-depth interviews and questionnaire. (chairani 2020)

II. The standardized Job Factor Questionnaire(JFQ): This instrument was used to assess the high-risk factors of MSDs at workplace and prevention of development of WRMSDs. JFQ was proved to be a valid and reliable assessment instrument to assess workload and identify high-risk groups of MSDs at workplace in a study of Validity and reliability of JFQ related to the work tasks of physical therapists conducted among 142 physical therapists from a hospital complex associated with a ml Brazilian public hospital (Shimabukuro et.al 2012)

III. The standardized coping strategies questionnaire (CSQ): This Instrument developed by Rosenstiel and Keefe in 1983 was used to assess the various coping strategies adopted by participants. Coping strategies questionnaire was proved a valid and reliable instrument for assessing various coping strategies in musculoskeletal injuries/pain/discomfort in a cross cultural study of coping with musculoskeletal pain in Portugal and in the United States and participants of this study were 170 individuals with musculoskeletal pain (Ferreira-Valente et.al 2011).

3.3 Method

3.3.1 Sampling Technique

Simple random sampling technique was used in this study to randomly select hospitals in the south-south region of Nigeria and physiotherapists in these selected hospitals were the respondents for this study. These randomly selected hospitals were:

1. University of Benin Teaching Hospital (UBTH), Edo State
2. Federal Medical Centre Asaba, Delta State
3. University of Port Harcourt Teaching Hospital (UPTH), Rivers State
4. University of Uyo Teaching Hospital (UUTH), Akwa Ibom

3.3.2 Sample Size

N= 52

1.3.3 Research Design

This study was Descriptive and Cross sectional

3.3.4 Method for data collection

I. An ethical approval for this study was obtained from Ethical Approval Committee of college of Medical sciences, University of Benin, Benin City.

II. An informed consent from the respondents was obtained after sharing objectives of the study and its processes, filling of this questionnaire by the respondent meant the respondent agreed to the shared objectives of this research.

III. Questionnaire was administered by the researcher to the respondents either handy or online as a google form.

IV. Questionnaire was retrieved immediately

3.3.5 Data analysis

Data was analyzed using SPSS version 26, Descriptive statistics of mean, percentage, frequency and standard -deviation was used to analyze the socio-demographic characteristics, prevalence, preventive and coping strategies data of respondents; Interferential statistics of chi square was used to measure the association between the socio-demographic characteristics and prevalence of work related musculoskeletal disorders among respondents.

CHAPTER 4

DATA ANALYSIS

4.0 Introduction

The purpose of this study was to determine the prevalence, prevention and coping strategies of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria. This chapter presents the result of the data analysis done using IBM SPSS version 26. The study hypotheses were also tested using the appropriate statistical tool.

4.1 Socio-demographic characteristics of respondents

Table 1 shows that there were 52 respondents in the study, 65.4% were male and 34.6 % were female. 51.9% of the respondents were below 30 years, 71.2% have Bachelor's degrees in Physiotherapy and 80.8 % worked for 8 hours and above. The average age of the respondents was observed to be 32.54. On the other hand, just 1 of the respondents is a Doctor of Physiotherapy and 67.3% of the respondents work in FMC and UBTH respectively. The least number of work hours and years of experience were 4 hours and 2 years respectively. The results show that the average work hour of the respondents was 7.6 hours while the average years of experience was 7.13 years.

Table 1: Socio-demographic characteristics of respondents

n = 52

		Frequency F	Percentage %	
Age	Below 30 years	27	51.9	
	31 - 40 years	18	34.6	
	Above 40 years	7	13.5	
	Range			22 - 53 years
	M±SD			32.54±6.93
Gender	Male	34	65.4	
	Female	18	34.6	
Highest Qualification	Bachelor (BPT)	37	71.2	
	Masters (MPT)	11	21.2	
	PhD	3	5.8	
	Doctor (DPT)	1	1.9	
Years of Experience	Below 5 years	24	46.2	
	5 – 10 years	18	34.6	
	Above 10 years	10	19.2	
	Range			2 – 26 years
	M±SD			7.13±5.66
Working Hours	Below 8 hours	10	19.2	
	8 hours and above	42	80.8	
	Range			4 – 10 hours
	M±SD			7.60±1.13
Place of Work	FMC	17	32.7	
	UBTH	18	34.6	
	UPTH	10	19.2	
	UUTH	7	13.5	

4.2 Prevalence of work related musculoskeletal disorders

Table 2 explains the prevalence of work-related musculoskeletal disorders symptoms as observed by the participants. Exactly 86.5% of the respondents indicated that they have experienced pain, discomfort as well as injuries arising from their work however 50.2% reported to have experience it first 5 years after graduation. Similarly, 8.7% believed that these pains have prevented them from carrying out normal activities in the last 12 months and also had troubles that emanated from the pain in the last 7 days. However, none of them indicated they have seen a physician about this condition in the last 12 months.

Table 2: Prevalence of work related musculoskeletal disorders

	F	%
1. Have you ever experience any pain/discomfort/injury arising From your work as a physiotherapist?	45	**86.5**
2. Have you been prevented from carrying out normal activities in the Last 12 months?	5	8.7
3. Have you seen a physician bout this condition in the last 12 months	0	0
4. Have you hand trouble in the last 7 days?	5	8.7
5. When did you first experience this work related pain/injury/discomfort		
i. First 5 years after graduation	26	**50.2**
ii. 6-15 years after graduation	11	20.5
iii. More than 15 years after graduation	8	15.8
iv. I have never experienced any work related pain/injury/discomfort	7	13.5

4.2.1 Prevalence of pain/discomfort in body regions

Table 3 displays the prevalence and area of the pain as indicated by the respondents. The most prominent body region that experience pain was observed to be the lower back (63.5%), neck (21.2%), and shoulders (19.2%) while the reverse was the case for hips/thighs (1.9%) as observed by the respondents. Other body regions the respondents observed pain in were their upper back (9.6%), wrist/hand (5.8%) and knees (7.7%).

Table 3: **Prevalence of pain/discomfort in body regions**

	Experienced Trouble during the last 12 months	
Body Region	**F**	**%**
Neck	11	21.2
Shoulders	10	19.2
Upper back	5	9.6
Wrist/Hand	3	5.8
Lower back	33	63.5
Hips/Thighs	1	1.9
Knees	4	7.7

4.3 Risk Factors of work related musculoskeletal disorders

Table 4 shows the risk factors of WRMSDs as reported by the respondents, majority of them believed that working in the same position for long periods (94.2%) and working in awkward or cramped positions (84.6%) were major risk factors. Other prominent risk factors observed by the respondents were bending or twisting your back awkwardly (80.8%), carrying, lifting or moving patients (69.2%), lifting or transferring dependent patients (67.3%), performing the same task over and over without rest (67.3%) and working very fast on short periods (65.4). On the other hand, 55.8% of the respondents believe that prevention of these risk factors cannot serve as preventive measures while 44% have a different opinion.

Table 4: Risk Factors of work related musculoskeletal disorders

	Major Factor	
Risk factors of WRMSDs	**F**	**%**
Performing the same task over and over without rest	35	67.3
Treating a large number of patients in one day	24	46.2
No break time during working hours	29	55.8
Working very fast on short periods	34	65.4
Working in awkward or cramped positions	**44**	**84.6**
Working in the same position for long periods	**48**	**94.2**
Bending or twisting your back awkwardly	**42**	**80.8**
Carrying, lifting or moving patients	36	69.2
Lifting or transferring dependent patients	35	67.3
Carrying, lifting or moving heavy materials or equipment in a wrong posture	27	51.9
Working at or near your physical limits	16	30.8
Continuing work when injured or hurt	11	21.2
Work schedule (overtime, irregular shift, length of workday)	14	26.9
Working in an inadequate environment	4	7.7
Reaching or working over your head or away from your body	2	3.8
Lack of specific training for self-injury and musculoskeletal symptom prevention	26	50.0

Preventive Measures of WRMSDs

Table 5 shows that 55.8% of respondents indicated that prevention of the risk factors of work related musculoskeletal disorders cannot prevent its occurrence while 44.2% said otherwise

1.4 Table 5: Preventive Measures of WRMSDs

		%	F
Can the prevention of these identified Risk factor serve as preventive Measures for work related musculoskeletal Disorders?	Yes	44.2	23
	No	55.8	29

4.5 Coping Strategies of work related musculoskeletal disorder

Table 6 presents the coping strategies practiced by the respondents in handling WRMSDs. The most common coping strategies of the respondents were adjusting the plinth/bed height before treating a patient (65.4%), pausing regularly to stretch and change posture (59.6%), and modifying the patient's position or my position (57.7%), Other common strategies employed my respondents to cope include stopping treatment if it causes or aggravates my discomfort (50.0%)

and getting someone else to help handle a heavy patient (50.0%). Specifically, none of the respondents opined that taking time off on sick leave was a coping strategy they practiced.

Table 6: Coping Strategies of work related musculoskeletal disorders

Coping Strategies	%
I get someone else to help me handle a heavy patient	50.0
I modify the patient's position or my position	57.7
I use a different part of my body to administer a manual technique	32.7
I warm up and stretch before performing a technique	23.1
I use electro-therapy more often to avoid stressing an injury	73.1
I pause regularly so I can stretch and change posture	59.6
I adjust the plinth/bed height before treating a patient	65.4
I select techniques that will not aggravate or provoke my discomfort	50.0
I stop treatment if it causes or aggravates my discomfort	53.8
I ask a technician to treat a patient	38.5
I modify my physiotherapy techniques	25.0
I changing my working schedules	23.1
I decrease my patient contact hours	46.2
I take time off on sick leave	0
I use braces, splints or other orthoses	23.1
I take on an exercise or posture program	21.2

4.6 Association between socio demographic data and prevalence of WRMSDs

4.6.1: Association of age and prevalence of WRMSDs

Table 7 shows that there was no significant association between the prevalence of WRMSDs and the age groups of the respondents (P > 0.05). In the same vein, 100% of respondents above 40 years have experienced WRMSDs, 91.3% of the respondents between 30 – 40 years have had similar experience while 77.3% of the respondents below 30 years share the same experience.

Table 7: Association of age and prevalence of WRMSDs

	Ever Experienced WRMSDs		
Age	**Yes (%)**	**No (%)**	
Below 30 years	77.3	22.7	
30 – 40 years	91.3	8.7	
Above 40 years	100.0	0.0	
P-value			> 0.05

4.6.2 Association between specialty and prevalence of WRMSDs

Table 8 shows that there was no significant association between the prevalence of WRMSDs and the area of specialization of the respondents (P > 0.05). Specifically, majority of the respondents in each specialization have experienced WRMSDs except for respondents specialized in Community physiotherapy. 100% of the respondents who specialized in Sports, Geriatrics, Cardio-Respiratory, Women Health, Pediatrics and Ergonomics have experienced WRMSDs. On the other hand, 17.4% and 11.8% of the respondents who specialized in Neurology and Musculoskeletal respectively have not experienced WRMSDs.

Table 8: Association between specialty and prevalence of WRMSDs

	Ever Experienced WRMSDs		
Specialty	**Yes (%)**	**No (%)**	
Neurology	82.6%	17.4%	
Sports	100.0%	0.0%	
Musculoskeletal	88.2%	11.8%	
Geriatrics	100.0%	0.0%	
Cardio-Respiratory	100.0%	0.0%	
Women Health	100.0%	0.0%	
Pediatrics	100.0%	0.0%	
Community	100.0%	100.0%	
Ergonomics	100.0%	0.0%	
P-value			> 0.05

4.6.3 Association between work hours and prevalence of WRMSDs

Table 9 displays the association between work hours and the prevalence of WRMSDs as reported by the respondents. There was no significant association between work hours and the prevalence of WRMSDs among respondents (P > 0.05). Most of the respondents that worked for less than 8 hours (90.0%) as well as 8 hours and above (85.7%) have experienced WRMDs.

Table 9: Association between work hours and prevalence of WRMSDs

	Ever Experienced WRMSDs		
Work Hours	**Yes (%)**	**No (%)**	
Below 8 hours	90.0%	10.0%	
8 hours and above	85.7%	14.3%	
P-value			> 0.05

1.6.4 Association between years of Experience and prevalence of WRMSDs

Table 10 presents the association between years of experience and the prevalence of WRMSDs among respondents. There was no significant association between years of experience and the prevalence of WRMSDs among respondents (P > 0.05). Over 70% of the respondents with less than 5 years of experience have experienced WRMSDs and majority of the respondents with 5 – 10 years of experience (94.4%) and above 10 years of experience (90%) have equally experienced WRMSDs.

Table 10: Association between years of Experience and prevalence of WRMSDs

	Ever Experienced WRMSDs		
Years of Experience	**Yes (%)**	**No (%)**	
Below 5 years	79.2%	20.8%	
5 – 10 years	94.4%	5.6%	
Above 10 years	90.0%	10.0%	
P-value			> 0.05

1.6.5 Association between Gender and prevalence of WRMSDs

Table 11 shows the association between gender and the prevalence of WRMSDs as reported by the respondents. Generally, no significant association was found between gender and the prevalence of WRMSDs. However, a slightly larger proportion of the male respondents (88.2%) have experienced WRMSDs compared to the female respondents (83.3%)

1.6.6 Table 11: Association between Gender and prevalence of WRMSDs

	Ever Experienced WRMSDs		
Gender	**Yes (%)**	**No (%)**	
Male	88.2%	11.8%	
Female	83.3%	16.7%	
P-value			> 0.05

4.7 HYPOTHESES TESTING

4.7.1 Hypothesis 1

Statement: There will be no significant prevalence of work-related musculoskeletal disorders among physiotherapists in Nigeria

Test statistics: Chi-Square Goodness of fit test

Significance level: 0.05

Result: The results show that indeed there is a significant prevalence of WRMSDs ($P \leq 0.05$)

Decision: Hypothesis was REJECTED

1.7.2 Hypothesis 2

Statement: There will be no significant difference between the risk factors that contribute to the development of work-related musculoskeletal disorders among physiotherapists in Nigeria

Test statistics: Chi-Square Goodness of fit test

Significance level: 0.05

Result: The results show that indeed there is a significant difference in the risk factors that contribute to the development of WRMSDs ($P \leq 0.05$)

Decision: Hypothesis was REJECTED

4.7.3 Hypothesis 3

Statement: There will be no significant difference between the preventive measures to prevent work-related musculoskeletal disorders among physiotherapists in Nigeria

Test statistics: Chy-Square Goodness of fit test

Result: The results show that indeed there is a significant difference in the preventive measures of WRMSDs ($P \leq 0.05$)

Decision: Hypothesis was REJECTED

4.7.4 Hypothesis 4

Statement: There will be no significant difference in the coping strategies adapted towards work-related musculoskeletal disorders among physiotherapists in Nigeria

Test statistics: Chy-Square Goodness of fit test

Result: there is no significant difference in the coping strategies adapted towards WRMSDs ($P > 0.05$).

Decision: Hypothesis was ACCEPTED

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

1.1 DISCUSSION

Work related musculoskeletal disorders are common among physiotherapists despite their experience and knowledge about it. In this study, 52 respondents were recruited; the purpose of this study was to determine the prevalence, prevention and coping strategies of work related musculoskeletal disorders among physiotherapists in the south-south region of Nigeria.

1.1.1 prevalence of work wmsds among respondents

This study showed a significant prevalence of WMSDs among respondents, with the lower back reported to be the commonly affected body part followed by the neck; this findings is in line with the findings of Adegoke et.al (2008) who also reported a significant prevalence of WMSDs among physiotherapists in Nigeria and also reported the lower back as the commonly affected part followed by the neck; This could be due to the job description of physiotherapists that involves repetitive movements, awkward positions and forceful exertions. A higher percentage of the respondents reported to have experienced work related musculoskeletal disorder in the first 5years of graduation, this is in line with the findings of a study by cromie et.al (2002), the study stated that the incidence of work related musculoskeletal disorders is increased within the first 5years of practice; this could be because most of them are junior physiotherapists and newly qualified graduates who are not well skilled in patients handling. In this study, there was no significant association between specialty of respondents and the prevalence of work related

musculoskeletal disorders, this finding is in contrasts with the findings of Nordin (2011) who found a significant association between specialty and prevalence of WMSDs, this may be because a significant percentage of his respondents who has experienced WMSDs were specialized in musculoskeletal physiotherapy whereas in this study irrespective of the specialty a significant percentage of the respondents were reported to have experienced WMSDs from each specialty. Also, there was no significant association between gender, age, work hours, years of experience and prevalence of WRMSDs among respondents, this finding supports the findings of prerana et.al (2016) who also observed weak association between age, gender, working hours, years of experience and the prevalence of WMSDs; this could be because, irrespective of these factors one could develop WMSDs due to poor or no preventive measures or strategies to WMSDs.

1.1.2 risk factors and prevention of wmsds among respondents

This study showed that there is significant difference between the risk factors contributing to work related musculoskeletal disorders, working in same position for long periods was identified as the major contributor to WMSDs, this finding is in contrast to the findings of Bork et.al (1996) which identified the major contributor to work related musculoskeletal disorders as lifting or transferring dependent patients; this could be because of the difference in the time of research as a lot is expected to have changed in the systems, physiotherapists might have adopted easier means of lifting or transferring dependent patients. Also, in this study a significant percentage of the respondents reported that prevention of the risk factors of WMSDs cannot prevent work related musculoskeletal disorders hence there is a significant difference in the preventive

measures in preventing work related musculoskeletal disorders, this isn't in line with the findings of Mondal et.al (2019) which states that the modification of these risk factors can prevent work related musculoskeletal disorders; However, the result of this study is supported in a study by Prerana et.al (2016) which states that elimination of these risk factors are least possible due to nature and pattern of job involvement in physiotherapy hence the need to implement ergonomic modifications suitable to the work situations; also Milhem et.at (2015) in his study also stated that the extent of musculoskeletal disorders among physiotherapists suggests that their skills and knowledge are not effective in preventing work related musculoskeletal disorders hence there is need to adopt new work techniques especially mechanical aids like lifts in lifting patients and sliding sheets for repositioning patients.

5.1.3 Coping strategies of wmsds among respondents

The result of this study showed that there's no significant difference between the coping strategies practiced by the respondents in handling WRMSDs, the most common coping strategy identified was adjusting of the plinth/bed height before treating a patient, this is in contrasts to the findings of kashif et al (2022) who identified the most coping strategy as getting someone else to help in handling a heavy patient moreover this study was done among health workers in Faisalabad, Pakistan hence could be the reason for the difference in result

5.2 Conclusion

Based on the objectives of this study the following conclusions were made:

I. There is a high prevalence of WMSDs among physiotherapists in the south-south region of Nigeria

II. The major risk factor that contributes to the development of WMSDs among physiotherapists in the south-south region of Nigeria is working in same position for long periods

III. The prevention of the risk factors of WMSDs cannot be a preventive measure of WMSDs among physiotherapists in the south-south region of Nigeria hence the need of implementation of ergonomic modifications suitable to work situation because elimination of the risk factors of WMSDs are least possible due to physiotherapist's nature of job

IV. The commonly adopted coping strategies of physiotherapists in the south-south region of Nigeria towards WMSDs is adjusting of plinth/bed height before treating a patient

1.2 Recommendation

Based on the conclusions of this study, the following could help reduce the prevalence of WMSDs among physiotherapists in the south-south region of Nigeria.

I. Break time should be given in between working hours for stretching and relaxation as this could reduce the risk of developing WMSDs

II. Ergonomic modifications like lifts for lifting patients and sliding sheets for patient's repositioning could help in preventing WMSDs

III. Adjustment of plinth/bed height could be the best coping strategies of WMSDs

1.3 Implication for further study

Further studies should be carried out on the preventive measures of WMSDs amongst physiotherapists in Nigeria as this study was limited to only physiotherapists in the south-south region of Nigeria.

References

Asish M and Murad H.M (2019). 'Work related musculoskeletal disorders among Physiotherapists in Dhaka city'. *Bone muscle.* 2(1)001-004

Antal N and Gerta V (2006). 'Transplantation of neural tissue into the spinal cord'. *Springer.* (123)

Ann M, Margaret M and Chris G, (2016). 'Musculoskeletal System'. *Science direct.* 97-124

Aulia C (2020). 'Validity and Reliability test of the Nordic Musculoskeletal Questionnaire with Formal and Informal Sector Workers'. *International Conference on public health.* DOI: https://doi.org/10.26911/the7thicph-FP.05.06

Andersson1 D.C, Betzenhauser1 M.J and Andrew R.Marks (2012). 'Excitation–Contraction Coupling in the Heart'. *Science direct*.Volume 1, (153-159)

Adegoke B.O.A, Ashiyat K.A and Adewale L.O (2008). 'Work-related musculoskeletal disorders among Nigerian Physiotherapists'. *BMC musculoskeletal disorders.* 9: (1) 112

Ayanniyi O, Nudamajo O.S, Mbada C.E (2016). 'Pattern of work-related musculoskeletal disorders among Nigerian Hospital workers'. *Journal of Environmental and Occupational Science.* 5(1)

Bork B, Thomas M.C, John C.R, Kristen A.E, Ivalyn J.W, Raheal K.W (1996). 'Work related musculoskeletal disorders among Physical therapists'. *Phys Ther.* 76(8):827-35

Burnett M.G. and Eric L.Z (2004). 'Pathophysiology of peripheral nerve injury: a brief review' *Journals of Neurosurgery.* Volume 16(1-7)

Bernard B.P (1997). 'Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back'. *National institute for occupational safety and health (NIOSH)* .97-141

Cyril B.F (2004). 'Ligament Structure, Physiology and Function'. *Journal of Musculoskeletal and Neuronal Interactions* 4(2)

Charles W.H and Magnusson S.P (2010). 'Increasing Muscle Extensibility: A Matter of Increasing Length or Modifying Sensation'. *Physical Therapy and rehab journal* Volume 90 (438–449)

Clark N.C, MGlaisterLyndsey, CannonNicPerrem M (2020). 'The physiology of disuse, Immobilization and low-load environments'. *Semantic Scholar.*15-24

Cromie J.E, Robertson V, Best M. (2000).'Work related musculoskeletal disorders in Physical therapists: Prevalence, Severity, Risks and Responses'. *Physical Therapy*. (8)336-351

Carr C, T.Pudrovska (2007). Mid-Life and Later-Life Crises. Encyclopedia of Gerontology 2nd ED

Chigbo N.N, Ezeome E.R, Onyeka T.C and Amah C.C (2015). 'Ethics of Physiotherapy practice in terminally ill Patients in a developing country, Nigeria'. *Nigeria Journal of Clinical Practice.* 18:S40-S5

Chester J.D and Varacallo.M (2018). 'Lumbar Spondylolysis and Spondylolisthesis'. *StatPearls [Internet]. Treasure Island (FL): StatPearls*

Carl H.S and Amin B.K (2008). 'Transcervical Approaches to the Cervical Spine'. *In* Operative Otolaryngology: Head and Neck Surgery (Second Edition) Volume (1), Pages 709-718

Ferreira-Valente M.A, José L.P.R, Jensen M.P and Almeida R (2011). 'Coping with Chronic Musculoskeletal Pain in Portugal and in the United States: a cross-cultural study'. *Pain medicine.* PMID: 21834916 DOI: 10.1111/j.1526-4637.2011.01208.x

Glover W (2000).'Work-related Strain Injuries in Physiotherapists: Prevalence and Prevention of Musculoskeletal disorders'. *Physiotherapy.* 88(6):364-372

Hesham N.A, Talal A.A and Sahar S.A (2010). 'Prevalence, Characteristics, and impacts of work-related musculoskeletal disorders: a survey among Physical therapists in the State of Kuwait'. *BMC Musculoskeletal Disorders*. 11 (116)

Hales T.R, and Bernard B.P (1996).' Epidemiology of work Related musculoskeletal disorders'. *Occupational disorder management.* Volume 27 (4)

Isabel L.N and Pamela M.B (2012). 'Work-Related Musculoskeletal Disorders Assessment and Prevention, Ergonomics - A Systems Approach'. *IntechOpen*

Iqbal Z and Ahmad A (2015). 'Prevalence of Work-related musculoskeletal disorder among Physical therapists'. *Medycyna Pracy*. PMID: 26536963 DOI: 10.13075/mp.5893.00142

Jennifer N.K, Andreas D, Leonardo L.G, Michael B and Boonstra.W (2008). 'Network Structure of the Human Musculoskeletal System shapes neural Interactions on multiple time scales' .*Sci.Adv.* 4(6).

Joshua T.K, Vamsi R and Julian G.L (2021). 'Anatomy, Head and Neck, Cervical Vertebrae*' StatPearls [Internet]*.

Joseph E.M (2010). 'The Muscular System Manual' *the Skeletal Muscles of the Human Body.*3rd Ed.

Joshua A.W, Vamsi R, Caroline W and Bennett F (2021). 'Anatomy, Back, Lumbar Vertebrae'. *In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing* PMID: 29083618

Juan C.C, Pura B and Carlo C (2014). 'The Excitation–Contraction Coupling Mechanism in Skeletal Muscle'. *Springer Biophysical Reviews*. Volume 1(133–160).

Jan M, Nataša B, Nataša K, Miroljub J (2020). 'Work-related musculoskeletal disorders among Slovenian Physiotherapists. *Journal of Health Sciences.* DOI: https://doi.org/10.17532/jhsci.2020.880

Kashif M, Hassan S, Younas M.A, Shafique A and Zahid M.B (2022). 'Prevalence, workplace risk factors and coping strategies of work related musculoskeletal disorders among health workers in tertiary care hospitals'. PMID: 36214010, DOI: 10.3233/WOR-210644

Karina D.R, Panush R.S (2013). 'Occupational and Recreational Musculoskeletal Disorders' *in Kelley's Textbook of Rheumatology (Ninth Edition). scidirect._Volume I(493-504)*

Kevin A and Forshing L. (2021) 'Physiology, Nerve, *StatPearls [Internet]*.

Marc C, Sherri W, Karen L.K and Margareta N (2008). 'Work related musculoskeletal disorders in Physical therapists: a prospective cohort study with 1-year follow-up'. *Physical Therapy Journal (PTJ).* 88(5) 608-19

Nordin N.A.M, Leonard J.H and Thye N.C (2011). 'Work related injuries among Physiotherapists in public hospital'– A Southeast Asian picture. 66(3):373-378

Pedrinelli Aand Arnaldo J.H (2011). 'Muscle Injury – Physiopathology, Diagnosis, Treatment and Clinical Presentation'. *Rev Bras Ortop.* Volume 3(247–255)

Pallavi J, Akul M and Hubbard J.B (2021). 'Anatomy, Joints'. *StatPearls [Internet]. Treasure Island (FL): StatPearls* PMID: 29939670

Passier L and Steven M (2011). 'Work related musculoskeletal disorders among Therapists in physically demanding roles: qualitative analysis of risk factors and strategies for prevention'. *BMC Musculoskeletal Disorder*

Panush R.S (2017). 'Occupational and Recreational Musculoskeletal Disorders' in *Kelley and Firestein's Textbook of Rheumatology (Tenth Edition)*. DOI:10.1016/B978-0-323-31696

Roberts T.J (2016). 'Contribution of Elastic Tissues to the Mechanics and Energetics of Muscle Function during Movement' .*Journal of Experimental Biology*.volume 2 (266–275)

Rydevik B.L (1992). 'The effects of compression on the physiology of nerve roots'. *Journal of Manipulative Physiol Ther.* 62-63

Rydevik B, Brown M.D and Lundborg G (1984). Pathoanatomy and pathophysiology of nerve root Compression. *Journal of Manipulative Physiol Ther.* 7-15

Steven M.M (2018). 'Disorders of the nerve roots, plexuses and peripheral nerves'. *Sciencedirect*. Volume 4(595-612)

Suzan A. Sayed E.L, Trevor A. N, Varacallo M (2021). Physiology of Bone *StatPearls [Internet]*.

Tahmasebi R, Majid M, Torkashvand S, Anbarian M, Olfatifar M, Sarvi F and Farhadian M (2019). 'Validity and reliability of the Persian version of the Dutch musculoskeletal questionnaire'. *Medical journal of the Islamic Republic of Iran*. doi: 10.34171/mjiri.33.27

Umberto G and Bale T.A (2018).' Spinal cord'. *Sciencedirent*. Volume 145(405-425)

Watson C, George P and Kulgun K (2008). 'The spinal cord'. *Academic press*. 17-36

XavierBigard (2019). 'Chapter 4 - Adaptation of Skeletal Muscle Mass and Metabolism to Physical Exercise'. *Academic press* (47-61)

Zivkovic S.T, Ali S.T and El-Dokla A.M (2017). Translational Correlation: Disorders of the spinal cord *Sciencedirect*.489-494

Anatomy of the vertebrae column Available at https://teachmeanatomy.info/back/bones/vertebral column

Posterior view of the vertebrae column Available at https://www.northshore.org/healthresources/encyclopedia/encyclopedia.aspx?DocumentHwid=zm2325

Cross section of the lumbar vertebrae Available at: https://radiopaedia.org/articles/vertebrae

Anatomy of the lumbar vertebrae Available at : https://www.physiopedia.com/LumbarVertebrae

Anatomy of the lumbar vertebrae Available at: https://embed.widencdn.net/img/veritas/ggicqiv9e9/1200x675px/Adult-Cervical-Spine-anatomy-overview.png

Anatomy of the synovial joint Available at: https://teachmeanatomy.info/the-basics/joints-basic/synovial-joint/

APPENDICES

APPENDIX 1

QUESTIONNAIRE

The prevalence, prevention and coping strategies of work-related musculoskeletal disorders (WMSD) among clinical physiotherapists in Nigeria are not very well documented, you are kindly requested to answer the following questions either by filling the blank or by putting a cross, tick or asterisk next to or in the appropriate box. You may be in doubt as to how to answer, but please do your best all the same.

Please note that by completing and returning this form to the researcher, you have consented to participate in this study.

SECTION 1: GENERAL INFORMATION

1. Age? ___ years

2. What is your gender? Male ☐ Female ☐

3. What is your highest qualification in physiotherapy profession?

i. BPT ☐

ii. MPT ☐

iii. DPT ☐

iv. PhD ☐

4. How long have you been working as a physiotherapist? _____years

5. What is your area of specialization in physiotherapy practice? ☐

i. Neurology

ii. Sports ☐

iii. Musculoskeletal ☐

iv. Geriatric ☐

v. Cardio- Respiratory ☐

vi. Women Health ☐

vii. Paediatrics ☐

viii. Community ☐

ix. Ergonomics ☐

Others (please specify)…….

6. How many hours a day do you work? _____hours

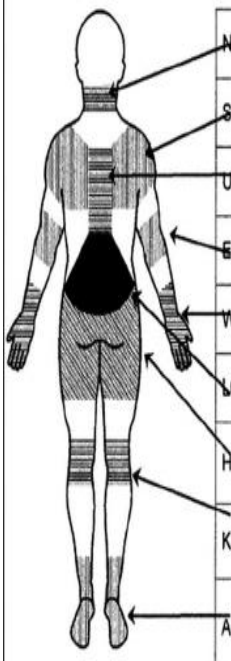
7. Current place of work?

SECTION 2: PREVALENCE AND AREA OF PAIN

Note well: Please do not include any pain or injury you acquired outside of your work as a physiotherapist

1. Have you ever experienced any pain/discomfort/injury arising from your work as a physiotherapist? Yes ☐ No ☐

If you have answered 'yes' to the question above please specify below which areas you have experienced the pain or discomfort by ticking/putting cross/asterisk in the boxes that apply to you. If you have answered 'no' please proceed to the next section



	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	During the last 12 months have you seen a physician for this condition:	During the last 7 days have you had trouble in:
NECK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
SHOULDERS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
UPPER BACK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
ELBOWS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
WRISTS/ HANDS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
LOWER BACK	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
HIPS/ THIGHS	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
KNEES	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
ANKLES/ FEET	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes

https://www.researchgate.net/figure/Strain-assessment-based-on-the-Nordic Musculoskeletal-Questionnaire_fig1_269413910

3. When did you first experience this work-related pain/injury/discomfort?

a) In the first 5 years after graduation ☐

b) 6-15 years after graduation

c) >15 years after graduation ☐

d) I have never experienced any work related musculoskeletal pain or discomfort ☐

SECTION 3: RISK FACTORS ASSESSMENT

This list describes factors that contributes to the development of work related musculoskeletal disorders. In your opinion, to what extent have these factors contribute to your developing of work related musculoskeletal disorder? (Please tick what is applicable to you or please move to the next section if you have never suffered from any work related musculoskeletal disorder)

Note well: Please don't include any pain/discomfort/injury acquired

Outside your work as a physiotherapist

No	Risk factors of WRMSDs	Major factor	Minor factor	Not a factor
1	Performing the same task over and over without rest			
2	Treating a large number of patients in one day			
3	No break time during working hours			
4	Working very fast on short periods			

5	Working in awkward or cramped positions			
6	Working in the same position for long periods			
7	Bending or twisting your back awkwardly			
8	Carrying,lifting or moving patients			
9	Lifting or transferring dependent patients			
10	Carrying, lifting or moving heavy materials or equipment in a wrong posture			
11	Working at or near your physical limits			
12	Continuing work when injured or hurt			
13	Work schedule (over time, irregular shift, length of workday)			
14	Working on an inadequate environment			
15	Reaching or working over your head or away from your body			
16	Lack of specific training for self injury and musculoskeletal symptom prevention			

Can the prevention of these risk factors serve as preventive measures for work related musculoskeletal disorders?

Yes

No

SECTION 4: COPING MECHANISMS

The responses to the following statements should reflect what you **actually do in practice rather than what you would like to do or think you should do** in reducing the strain on your body when working:

No	Coping Strategies	Yes	No
1	I get someone else to help me handle a heavy patient		
2	I modify patient‟s position or my position		
3	I use a different part of my body to administer a manual technique		
4	I warm up and stretch before performing a technique		
5	I use electro-therapy more often to avoid stressing an injury		

6	I pause regularly so I can stretch and change posture		
7	I adjust plinth/bed height before treating a patient		
8	I select techniques that will not aggravate or provoke my discomfort		
9	I stop a treatment if it causes or aggravates my discomfort		
10	I ask a technician to treat a patient		
11	I modify my physiotherapy techniques		
12	I changing my working schedules		
13	I decrease my patient contact hours		
14	I take time off on sick leave		
15	I use braces, splints or other orthoses		
16	I taeke on an exercise or posture programme		
17	Considering leaving the physiotherapy profession		
18	Considering retiring early		
19	I take medication		

Please state any other coping mechanisms you use in practice to reduce strain on your body when working.

……

THE END

THANK YOU FOR YOUR PARTICIPATION

APPENDIX 2

INFORMED CONSENT FORM

My name is OGBUKAA GOODNESS CHINYERE, a 500 level Student of the Department of Physiotherapy, School of Basic Medical Sciences University of Benin.

I'm carrying out my project research on "PREVALENCE, PREVENTION AND COPING STRATEGIES OF WORK RELATED MUSCULOSKELETAL DISORDERS (WMSDS) AMONG PHYSIOTHERAPISTS IN THE SOUTH-SOUTH REGION OF NIGERIA". I humbly request your participation in this research as your response will help us evaluate the prevalence, prevention and coping strategies of work related musculoskeletal disorders (WRMSDs) among physiotherapists in the south-south region of Nigeria.

This survey is in 4 sections, section 1 consists your demographic data, section 2 consists of questions to assess the prevalence and area of pain associated with your work as a physiotherapist, section 3 consists of questions to assess the risk factors and your preventive measures to work related musculoskeletal disorders as a physiotherapist and section 4 consists of questions to assess your coping mechanisms/ strategies towards these injuries.

All the responses in this study will be kept confidential and your participation is voluntary. Thank you for your cooperation.

Consent: I have gone through the information on this survey and I understand the purpose of this study; I'm willing to partake in this study.

Signature ……..

Date …….