

## PATTERN OF MCKENZIE SYNDROMES AND DIRECTIONAL PREFERENCE IN PATIENTS WITH LONG-TERM MECHANICAL LOW-BACK PAIN

### PATERNUL SINDROMULUI MCKENZIE ȘI PREFERINȚELE DIREȚIONALE LA PACIENȚII CU DURERI LOMBARE JOASE MECANICE CRONICE

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**Key words:** McKenzie syndromes, directional preference, mechanical low-back pain, physical therapy

**Cuvinte cheie:** sindrom McKenzie, preferințe direcționale, durere mecanică lombară joasă, kinetoterapie

**Abstract. Objectives.** Failure of the plenitude of interventions in non-specific mechanical low-back pain (LBP) management is implicated on its heterogeneity. Identifying specific syndromes and subgroups of patients with mechanical LBP has been recognized as a recent development in LBP research. This study aimed to assess the pattern of McKenzie syndromes (MS) and directional preference (DP) of patients who were referred for physical therapy treatment of mechanical LBP. **Methods.** Eighty nine (48.3% males) consenting patients reporting mechanical LBP persisting for at least 3 months participated in the study. MS and DP were determined by McKenzie-trained faculty in Mechanical Diagnosis and Therapy. The participants' symptoms and mechanical responses to repeated end-range movement or sustained postures were classified as derangement, dysfunction, or postural syndromes. DP is defined as the movement or posture that decreases or centralizes pain that emanates from the spine and/or increases range of movement. Data were summarized using descriptive statistics. **Results.** The participants' ages ranged between 38 and 62 years. Prevalence of MS was 79.8%, 6.7% and 13.5% for derangement, dysfunction and postural syndromes. 94.4% of the participants had DP for extension, 3.4% for flexion while 2.2% had no direction preference at all. The participants' mean functional disability and pain intensity score on a scale of 0-10 was  $5.43 \pm 1.44$  and  $6.55 \pm 1.75$  respectively. **Conclusion.** Derangement was the most prevalent McKenzie syndromes in patients with long-term mechanical low-back pain. Therapeutic movement or posture in extension seems to be the most appropriate intervention for majority of these patients.

**Rezumat. Obiective.** Eșecul multitudinii intervențiilor în managementul durerii nespecifice lombare joase (DLJ) este implicat în heterogenitatea sa. Identificarea sindroamelor specifice și a subgrupelor de subiecți cu DLJ mecanică a fost recunoscut ca având o dezvoltare recentă în studiul DLJ. Studiul urmărește evaluarea patternului sindromului McKenzie (SM) și preferințele direcționale (PD) la pacienții care fac kinetoterapie pentru această afecțiune.

**Metode:** 89 subiecți, 48.3% bărbați, cu dureri lombare persistente de cel puțin 3 luni, au participat în acest studiu. SM și PD au fost determinate la facultatea McKenzie, specializată în diagnoză mecanică și terapie. Simptomele participanților și răspunsurile mecanice la mișcări complete repetate sau la postură susținute au fost clasificate ca și deranjamente, disfuncții sau sindroame posturale. PD este definit ca mișcarea sau postura care reduce sau centralizează durerea de la nivelul coloanei și/sau crește amplitudinea de mișcare. Pentru prelucrarea datelor s-a folosit statistica descriptivă. **Rezultate.** Subiecții au vârste între 38 și 62 ani. Prevalența SM este de 79.8%, 6.7% și 13.5% pentru deranjamente, disfuncții și sindrom postural. 94.4% dintre subiecți au avut PD pentru extensie, 3.4% pentru flexie, 2.2% fără PD. Scorurile pentru disabilitate funcțională și durere, pe o scală de la 0-10 a fost de  $5.43 \pm 1.44$  și  $6.55 \pm 1.75$ . **Concluzii.** Deranjamentul a avut cea mai mare prevalență în sindromul McKenzie la pacienții cu dureri lombare joase. Mișcările terapeutice sau postura în extensie pare să fie cea mai potrivită intervenție pentru majoritatea pacienților.

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## Introduction

Low-Back Pain (LBP) is described as the constellation of symptoms of pain or discomfort originating from the lumbar spine with or without sciatica [1, 2]. It is a complicated condition which affects the physiological and psychosocial aspects of the patient [3] and it is characterized by exacerbated nociceptive sensations, impaired physical performance and work disability [4]. LBP is typically classified as being specific or non-specific [5]. Non-specific LBP refers to mechanical back pain of musculoskeletal origin in which symptoms vary with physical activity [6]. However, mechanical LBP has maintained a defiant stance against most therapeutic approaches and constitutes a challenge to clinicians and researchers.

Exercises of various types have been used in managing mechanical LBP with varying reported successes [7]. Still, there does not appear to be a consensus of opinion on the most effective exercise programme. Failure of the plentitude of interventions in non-specific mechanical low-back pain (LBP) management is implicated on its heterogeneity. Investigators posited that heterogeneity of patient samples in many trials on exercise in LBP could account for possible flaws and lack of support for the prescription of specific exercise programs observed in much of the previous research [8-10]. Sub-grouping of patients with LBP according to their signs and symptoms where treatment is then prescribed according to these subgroups is considered as an important advance in the management of LBP [8-10].

Different types of classification systems for low-back troubles have been developed varying degrees of clinical applicability [11-14]. However, there is no agreement among the clinicians on an acceptable classification system [15]. One of the more commonly used methods of sub-grouping amongst physical therapists in the Western countries is the McKenzie method [8, 10, 16-19]. Although, the McKenzie method is a popular classification-based treatment for LBP with documented effectiveness [19-22], there is an apparent scarcity of studies on its use among patients with long-term mechanical LBP from the Sub-Sahara Africa.

The McKenzie method entails the assessment and classification of patients into one of three mechanical syndromes (postural, dysfunction and derangement). This method is based on the patient's pain response to certain movements and postures during assessment. During assessment, the physical therapist identifies the patient's directional preference. Directional preference is defined as the movement or posture that decreases or centralizes pain that emanates from the spine and/or increases range of movement [23]. There is a growing body of literature on the McKenzie's Mechanical Diagnosis and Therapy using the centralization and directional preference principles [19, 24-28]. However, studies reporting pattern of McKenzie mechanical syndromes and directional preference of patients with mechanical LBP are scant in the literature. However, identifying specific syndromes in mechanical LBP has been recognized as a recent development in LBP management and research. This study aimed to assess the pattern of McKenzie syndromes and directional preference of patients who were referred for physical therapy treatment of mechanical LBP.

## Materials and Methods

Eighty nine (48.3% males) consecutive patients referred for physical therapy for non-specific long-term LBP were recruited from the physiotherapy department, Obafemi Awolowo University (OAU) Teaching Hospital and the department of Medical Rehabilitation, OAU Ile-Ife, Nigeria. Eligibility to take part in the study was determined using the McKenzie Institute's Lumbar Spine Assessment Format (MILSAF). Long-term low-back pain was defined as a history of LBP persisting for more at least 3 months. Exclusion criteria were red flags indicative of serious spinal pathology with signs and symptoms of nerve root compromise (with at least two of these signs: dermatomal sensory loss, myotomal muscle weakness, reduced lower limb reflexes) [29]. Patients were also excluded if they were under age 18 or failed to give consent. Ethical approval for the study was obtained from the joint University of Ibadan/University College Hospital Institutional Review Committee (Ref no.: UI/UC/10/0194) and the Obafemi Awolowo University Teaching Hospitals Complex Ethical Review Committee (Reg no.: ERC/2010/01/02)

respectively. The researchers (CEM and OA) in this study were credentialed physical therapists in the McKenzie's Mechanical Diagnosis and Therapy.

## Procedure

The participants were assessed for directional preference. This involved 5-10 sets of repeated movements in extension, flexion and lateral flexion (right and left) while the participants' symptomatic and mechanical responses were assessed. All the movement assessment was done to end range i.e. the point at which the patient's range is limited for any reason. Assessment in extension or flexion was in two variants depending on the patients' preference [14, 30].

### The extension assessment

1. Extension in Prone: The participant lay in prone position, placed his/her hands under his/her shoulders in the press-up position. The participant was then instructed to straighten his/her elbows and push the top half of his/her body up as far as pain could permit. He/she maintained the extended position for at least one second but not more than 2 seconds [14, 30].
2. Extension in standing: The participant stood upright with the feet slightly apart and placed his/her hands in the small of his/her back with the fingers pointing backwards. The participant was then instructed to stretch the trunk backwards at the waist level as far as he/she could, using the hands as a fulcrum while keeping the knees straight [14, 30].

### The flexion assessment

1. Flexion in lying: The participant lay in supine position with his/her knees bent and feet flat on the plinth and brought both knees up towards the chest. The participant was then instructed to place both hands around the knees and gently but firmly pull the knees as close to the chest as pain could permit, while his/her head remained on the plinth. The knees were kept bent in returning to the starting position.
2. Flexion in Sitting: The participant sat on the edge of a sturdy chair with his/her knees and feet well apart with the hands resting between the legs. The participant was then instructed to bend the trunk forward and to attempt to touch the floor with his/her hands and to return immediately to the starting position [14, 30].

### The lateral flexion assessment

Lateral flexion movement of the trunk to the right and left sides were also performed. The participant stood upright with the feet slightly apart and placed his/her hands in the small of his/her back with the fingers pointing backwards. The participant was then instructed to bend the trunk sideways with the arm pointing to the floor as far as he/she could while the contralateral hip swayed to the opposite direction while keeping the knees straight.

Following the repeated-movement testing, the participants were asked whether pain was centralizing or peripheralizing during and after movements or there was no effect. The participants' mechanical response to repeated movements was used to establish their directional preference. Information such as age, gender, educational level, occupation, marital status, onset of back pain, recurrence, duration of complaint, were recorded for each participant accordingly [14, 30].

## Results

The participants' ages ranged between 38 and 62 years. The participants' mean functional disability and pain intensity score on a scale of 0-10 was  $5.43 \pm 1.44$  and  $6.55 \pm 1.75$  respectively. 68.7% of the participants had been off work because of current episode of the LBP. The demographic and clinical characteristics of the participants are presented in Table 1. The result indicated that difficulty with sitting (48.3%) and cooking 24.7% were the most impaired functional and leisure activity. The profile of the participants based symptoms, aggravating factors; previous episodes and treatment sought are presented in Table 2. From the result, symptoms affected the back mostly (54.0%), was made worse by bending (54.0%), affected

sleep (37.1%) and was relieved by lying down (65.2%). All participants have had a previous history of LBP but mostly (42.7%) within 6 to 10 months.

Table 3 shows that pattern of posture, movements, McKenzie syndromes and directional preference. The prevalence of McKenzie syndromes was 79.8%, 6.7% and 13.5% for derangement, dysfunction and postural syndrome respectively. 68(95.8%) of the participants with derangement syndrome presented with posterior derangement and demonstrated directional preference for extension. 94.4% of all the participants had directional preference for extension, 3.4% for flexion while 2.3% had no direction preference at all. 2(16.7%) of the participants with postural syndrome demonstrated no directional preference at all.

## Discussion

This study used the McKenzie algorithm in the classification of patients referred for physical therapy treatment of mechanical LBP. From the result, difficulty with sitting was the most reported functional disability among the patients. This finding is consistent with previous reports that showed that exacerbation of pain by movement or by prolonged sitting or standing were the most common complaints of patients with mechanical LBP [31-33]. Majority of the participants reported that the symptoms at onset mostly affected the back and that pain was made worse by bending forward but was often relieved when in the lying position even though it affected sleep. Furthermore, the finding of this study showed that cooking was the most affected leisure activity of the patients. This finding is in agreement with a study by De Souza and Frank [34] who reported difficulty with cooking as one of the physical disabilities of patients with chronic LBP.

All the participants in this study have had a previous history of LBP but most of them had positive history of recurrent LBP. Recurrent LBP is defined as a new episode after a symptom-free period of six months [35]. In line with literature, it is suggested that LBP often becomes a chronic problem, with recurrent episodes of minor or severe LBP symptoms interspersed with periods of being relatively pain-free [36]. The challenge of recurrence associated with chronic LBP underscores episodic nature of LBP, therefore clinicians are advised to seek appropriate interventions that would not only alleviate acute symptoms but also help to prevent recurrence [37]. The profile of the patients in this study also indicated that mechanical LBP was a major reason for work absenteeism. This concurs with previous reports that long-term LBP is a major cause of back-related work absenteeism [38, 39].

The pattern of McKenzie syndromes observed in this study showed that 79.8%, of the participants had derangement syndrome, 6.7% had dysfunction syndrome and 13.5% had postural syndrome. The prevalence of syndromes of mechanical LBP observed in this study is similar to the trends reported in the few available studies among patients with mechanical LBP. Kilby et al [40] in a study among 41 patients found the prevalence of 42.7%, 22% and 2.4% for derangement, dysfunction and postural syndromes respectively. Riddle and Rothstein [41] in a study among 363 patients found a prevalence of 52.9%, 34.7% and 9.6% for derangement, dysfunction and postural syndromes respectively. Razmjou et al [42] in a study among 45 patients found 86.7%, 4.4% and 2.2% for derangement, dysfunction and postural syndromes respectively, while Kilpikoski et al [43] in a study among 39 patients found 90% and 2% for derangement and dysfunction syndromes respectively. A common trend among all the cited studies is the preponderance of derangement syndrome in patients with mechanical LBP. Furthermore, the pattern of directional preference of the participants in this study showed that 94.4% had direction preference for extension, 3.4% had direction preference for flexion, while 2.3% had no direction preference at all. The pattern of direction preference found in this study is comparable to a study by Hefford [24] who found 70% and 6% direction preference for extension and flexion respectively among 140 patients with mechanical LBP. Similarly, another study by Glover and May [10] found extension as the most common directional preference (83%) among 28 patients who had mechanical assessment. A further analysis showed that 95.8% of the participants with derangement syndrome presented with posterior derangement and

demonstrated directional preference for extension. This finding corroborates a previous report that directional preference and centralization occur only in the substantial derangement group [23]. This result implies that LBP subgroup with derangement may present with a good prognosis with extension exercise.

The results of this study support previous research reports that non-specific or mechanical LBP is not a homogeneous entity but stressed the need for sub-grouping of patients based on directional preference [26, 28, 45, 46]. It is believed that the fact that much of the current research has investigated the management of LBP as a homogenous group could account for the lack of support for the prescription of specific exercise programs [10]. This study found different homogenous subgroup of syndromes in patients with LBP and determined specific treatments that may be utilized. Furthermore, the result of study confirms the findings of other investigators about the pattern of McKenzie syndromes and directional preference in patients with long-term mechanical LBP. A potential limitation of this study was that the classification was based on the first assessment of each patient. Some researchers have suggested that in some cases, classification may be better judged over several visits [27]. However, McKenzie's directional preference determination is often times based on repeated movement or posture in order to confirm mechanical responses of patients.

## Conclusion

Derangement was the most prevalent McKenzie syndromes in patients with long-term mechanical low-back pain. Therapeutic movement or posture in extension seems to be the most appropriate intervention for majority of these patients. Posterior derangement was the most preponderant type of derangement with exclusive directional preference for extension. The result of this study may guide decision making in the selection of interventions for patients with mechanical LBP and help improve physical therapy outcome. The profile of McKenzie syndromes and directional preference observed in this study is consistent with previous studies.

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