

EFFICIENCY OF WILLIAM’S VERSUS McKENZIE’S THERAPY FOR PATIENTS DIAGNOSED WITH LOW BACK PAIN

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Abstract. From the category of musculoskeletal disorders, lumbar pathology registered a 50% increase between 1990 and 2019, directly correlated with an age decrease for the onset of symptoms among patients diagnosed with lumbar pain. Consequently, we are witnessing a younger population experiencing lumbar pain and at times, functional disability. According to statistical analysis, the economic impact of low back pain (LBP) in highly industrialized countries produces costs of up to 134 billion dollars annually. In this context, the appropriate therapeutic approach of LBP becomes a factor of major interest. This review uses 137 primary articles and specialized literature published between 2010-2022. Article selection was based on keywords and focused on comparing the effectiveness of William's and McKenzie's exercises. As the two rehabilitation programs are founded on different principles - William's therapy emphasizes flexion exercises while McKenzie's therapy focuses on extension exercises - patient assessment was conducted using evaluation scales. The evaluation employed the Visual Analogue Scale (VAS), the Oswestry Low Back Pain Disability Index (OSLBPDI), and the Short Form 36 (SF 36). The comparative analysis revealed modified scale scores following completion of the therapeutic protocol: 50-65% reduction in pain, 10-40 % increase in flexibility, and significant improvement in mental state. Based on these findings, an advancement in the patient's condition can be observed for both William's and McKenzie protocols. Nonetheless, the reviewed articles underscore the importance of selecting and adapting the therapeutic approach to the characteristics of lumbar pain.

Keywords: Williams; McKenzie; low back pain; rehabilitation.

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Introduction

Back pain ranks among the most common reasons why patients seek medical assistance, whether through primary care or emergency services. An estimated \$200 billion is spent annually on back pain management (Freburger et al., 2009).

Considering the complexity inherent in the concept of low back pain, the assessment and diagnosis of patients with low back pain (LBP) can be challenging and requires tailored clinical decisions. The answer to the question “which is the generator of pain” among the various structures potentially involved in LBP is a key factor in the management of these patients, as an incorrect diagnosis can lead to therapeutic errors. Traditionally, the idea that the etiology of

80% to 90% of LBP cases is unknown has been erroneously perpetuated over decades (Allegri et al., 2016).

Studies developed in recent years indicate various causes of low back pain. Disorders such as inflammation, cancer, trauma, osteoporosis, the compression of a nerve root, disc pathology, sacroiliac joint dysfunction, and infection must be considered in the differential diagnosis. To accurately diagnose low back pain, nociceptive pain (mechanical) should be distinguished from neuropathic pain (radiculopathy) (Casiano et al., 2023).

Disability occurs in many back pain situations. Since 1990, disability due to back pain has surged by over 50%, particularly in low- and middle-income countries, but also in heavily industrialized nations (Clark & Horton, 2018). In low- and middle-income countries, the disability and costs caused by back pain are expected to increase in the near future, especially where health systems cannot cope with the accelerated rate of spread of low back pain (Hartvigsen et al., 2018).

Functional disability can be partially explained by factors unrelated to the disease itself, such as psychosocial and professional factors, and may impose personal, professional and family limitations. A 2012 study revealed that 65% of participants diagnosed with LBP presented functional disabilities, with over 80% of them experiencing moderate to severe functional impairment (Salveti et al., 2012). In this context, an adapted management for low back pain becomes necessary. Specialized literature recommends a non-pharmacological and non-invasive treatment approach, especially when the severity of the condition is reduced and allows such therapy. In such situations, individualized advice is essential for each the patient: to remain active and to use education in order to approach therapy through physical exercises (Jorgensen et al., 2018).

At a prophylactic level, engaging in regular physical exercise comprising strength, stretching, and aerobic activities, performed 2-3 times weekly, can lead to a reduction in the risk of low back pain by up to 33% (Shiri et al., 2018). However, when a patient is diagnosed with low back pain, a different therapeutic approach is required. The purpose of physical therapy is to improve the functional status of the patient and prevent the aggravation of the condition, thus limiting the risk of increasing the degree of disability (Foster et al., 2018).

In clinical practice inconsistencies remain regarding the required exercise programme (yoga, stretching, hydrotherapy exercises, tai chi, the McKenzie exercise approach, and back schools) and how it is delivered (individual group exercise programmes or supervised exercise at home). The choice ultimately depends on patient preferences and therapist experience (Kamper et al., 2016). The therapeutic approach to low back pain is based in many situations on the Williams programme. The flexion exercise in Williams program is designed to reduce back pain by strengthening the muscles that serve the lumbosacral spine, as well as the abdominal and gluteal muscles. The principle of the therapy is to restore the correct posture, the reduction of low back hyperlordosis, and the reduction of muscle spasms, aiming towards relaxation (Amila et al., 2020).

Physiotherapist Robin Anthony McKenzie introduced the McKenzie back exercises, which, although popularized around 1985, are first referenced in specialized literature in the 1950s. The McKenzie method, synonymous with spinal extension and also known as Mechanical Diagnosis and Therapy (MDT), is widely accepted as an effective program for back pain. On the opposite side, the Williams protocol (named after Dr. Paul C. Williams) is associated to low

back flexion exercises. The McKenzie Method is widely accepted as an effective programme for back pain. The McKenzie method promotes self-treatment by correcting posture and repetitive exercises at the end of the therapeutic programme, performed with high frequency (Mann et al., 2023).

Williams exercises for the back, also known as Williams flexion or low back exercises, date back to 1930 and aim to improve low back flexion and strengthening the gluteal and abdominal muscles. The exercises were originally developed for men under the age of 50 and women under the age of 40 with moderate to severe low back lordosis and whose radiographic films showed reduced disc space between the L1-S1 lumbar segments. The Williams exercises had a wide application for people with different types of back pains, even in the absence of an official diagnosis (Dydyk & Sapra, 2022).

The main aspect under analysis is whether Williams exercises are superior or inferior to the McKenzie protocol. Researchers have compared the Williams and McKenzie protocols for patients with back pain. The decrease in pain and the regaining of lumbar mobility were the variables examined (Jeganathen et al., 2018).

In assessing pain, the Visual Analog Scale (VAS) is the most frequently used tool, alongside the Numeric Rating Scale (NRS) and the Brief Pain Inventory (BPI-PS) (Chiarroto et al., 2019). The assessment of patients' global functionality can be supplemented by the Oswestry Disability Index (ODI), an index that provides numerical information related to the patients' ability to cope with daily activities (El-Hady et al., 2023). Widely adopted at the international level for assessing quality of life is the Short Form 36 (SF 36), a multidimensional concept evaluating the physical, mental, and social aspects of patients' lives (Iguti et al., 2021).

The purpose of the work is to perform a comparative analysis of the Williams and McKenzie programs, in the sense of tracking their effectiveness in lumbar pathology, based on an analysis of the specialized literature.

Topic addressed

The documentation process involved consulting various databases, including MEDLINE, EMBASE, AMED, and CINAHL. Additionally, specialized databases focusing on physiotherapy and occupational therapy segments such as OTseeker, Physiotherapy Evidence Database (PEDro), Chartered Society of Physiotherapy Research Database, and REHABDATA were utilized. The search strategy primarily used MEDLINE through combinations of terms and free text.

Keywords for the search strategy:

1. Low back pain OR LBP OR Spinal disc herniation OR Disc degeneration
2. Pain OR Radiculopathy OR Neuropathic pain
3. McKenzie OR Williams OR Physical exercise OR Physical therapy OR Therapeutic programme OR Kinetic therapy OR Rehabilitation programme
4. VAS OR ODI OR SF 36
5. 1 AND 2 AND 3 AND 4

Selection of Studies

The selection of the articles was based on aspects that focus on the assessment and quantification of Williams and McKenzie therapies applied to patients with low back pain. A synthesis of the specialized literature is outlined in Figure 1. Initially, 240 full-text articles were identified, with 130 remaining available in English. Out of these, 60 articles underwent analysis, with 12 being excluded due to duplication of the theme. This left 48 articles eligible for inclusion, of which 28 were ultimately incorporated into this synthesis. The remaining 20 articles were excluded as they did not address information relevant to the topic.

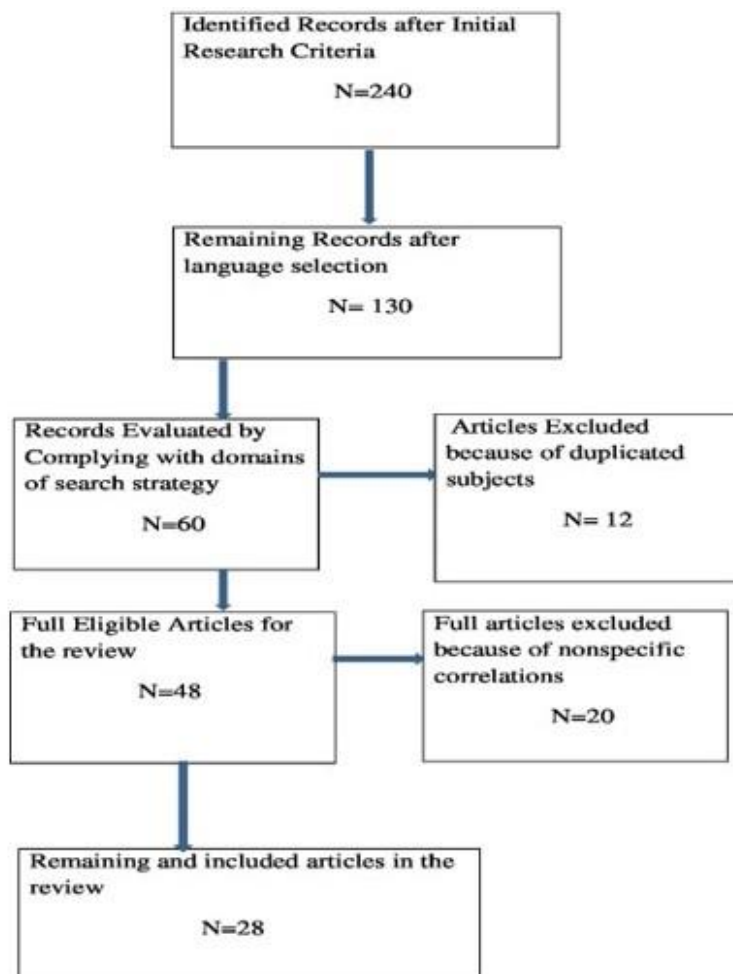


Figure 1. PRISMA diagram

Results

Given the limited quantity of studies directly comparing the Williams and McKenzie therapies, and in order to attain conclusive information regarding the benefits of each therapy, this synthesis will rely on specialized articles discussing each therapeutic protocol individually: the Williams therapeutic protocol and the McKenzie therapeutic protocol. Subsequently, the

results will be quantified and compared using the following indicators: VAS scale, ODI index, and SF 36.

Williams protocol

The first study examining the effectiveness of Williams therapy for low back pain involved a group of 42 patients, with 90% being female. The follow-up period was 2 months, from June to July 2018. Regarding Body Mass Index (BMI), 62.9% of participants were categorized as having a normal weight. The efficacy of the therapeutic program was monitored by calculating the ODI index before and after completing the program. Results showed a decrease in the ODI index from 31.05 ± 17.40 to 14.10 ± 11.78 when the Williams therapy was applied once a day, with a more significant decrease observed when the program was performed multiple times per day (Sukmajaya et al., 2020).

According to a study undertaken within the Department of Physiotherapy of the ACS Medical College in India, a group of 30 participants aged between 18 and 45 underwent Williams therapy, as they have been diagnosed with low back pain. The Williams programme, comprising 5 exercises, performed 2 times per day, for 4 weeks, was evaluated by means of the VAS scale and the ODI index.

The assessment of the patients was carried out both at the beginning of the programme and after the completion of the 4 weeks. Changes in the VAS from 5.6 to 3.5 were observed, as the change of ODI from 28.80 to 17.6, the effectiveness of Williams therapy being thus supported in value (Mohan-Kumar et al., 2015).

In 2020, in the months of August-September, the University of Nusa, Cendana had undertaken a study involving 23 farmers experiencing low back pain. The therapeutic approach was represented by the Williams therapy. The study monitored the reduction of pain and the reintegration of patients into a normal work schedule (8 hours/day). The assessment was based on the Oswestry questionnaire applied before and after the therapeutic intervention. Results demonstrated that the Williams exercise reduced the farmers' back pain by 40% and restored their functionality, the ODI index starting from an average score of 64.26 and evolving to 47.96 which translates into a decrease of 25.36% (Nelvin et al., 2021).

In a study carried out on 80 subjects diagnosed with non-specific low back pain, the Williams programme was applied through a batch of 7 exercises for a period of 8 weeks. The participants were assessed by means of the VAS scale and the ODI index both at the beginning and at the end of the rehabilitation programme. Changes were observed in both indicators, in the sense of decrease as follows: VAS 6.95 before therapy and VAS 2.82 after therapeutic intervention, while the ODI index underwent changes from 39.08 to 20.78 post-therapy (Shareef et al., 2021).

A group of thirty people who had previously been diagnosed with non-specific chronic low back pain were included in research carried out in 2013. The patients, both female and male, were aged between 19 and 60. The exercises that made up the therapeutic plan included elements of stretching, global postural re-education and elements of the Williams programme.

Evaluation involved observing life quality, using the Short Form 36 (SF 36) and quantifying the intensity of pain through the VAS scale. The effectiveness of the therapeutic protocol was analysed; assessments were carried out 60 days after the end of the therapy. A significant

decrease in the VAS index from 5.3 to 1.4 and an increase in the SF 36 value from 62.2 to 86.1 could be observed 60 days after ending the therapy (Adorno & Brasil-Neto, 2013).

A synthesis of the data obtained from specialized studies that refer to the benefit brought by the Williams programme can be seen in Table 1.

Table 1. Assessment indices of patients diagnosed with low back pain, before and after Williams therapy (ODI= Oswestry low back pain disability index, VAS=Visual Analog Scale, SF 36 = Short Form 36)

Author and study year	Number of subjects	Study period	ODI		VAS		SF 36	
			BEFORE/AFTER	BEFORE/AFTER	BEFORE/AFTER	BEFORE/AFTER		
Sukmajaya et al., 2020	42 patients	60 days	31.05	14.10	-	-	-	-
Mohan-Kumar et al., 2015	30 patients	4 weeks	28.80	17.6	5.6	3.5	-	-
Nelvin et al., 2021	23 patients	60 days	64,26	47.96	8	6.2	-	-
Shareef et al., 2021	80 patients	8 weeks	39.08	20.78	6.95	2.825	-	-
Adorno and Brasil-Neto, 2013	30 patients				5.3	1.4	62.2	86.1

The average values can also be observed in Figures 2, 3 and 4, the images showing the evolution of each of the indicators taken into account both before and after completing the therapeutic programme.

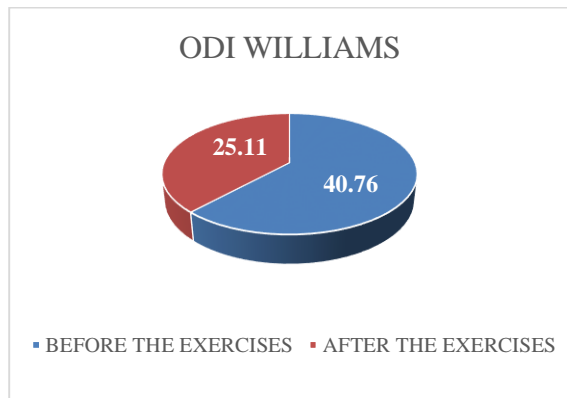


Figure 2. ODI index average value

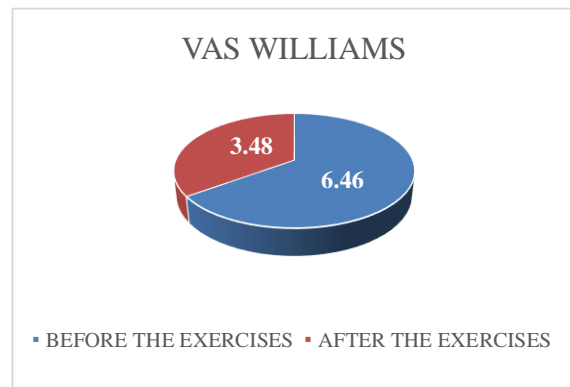


Figure 3. VAS index average value

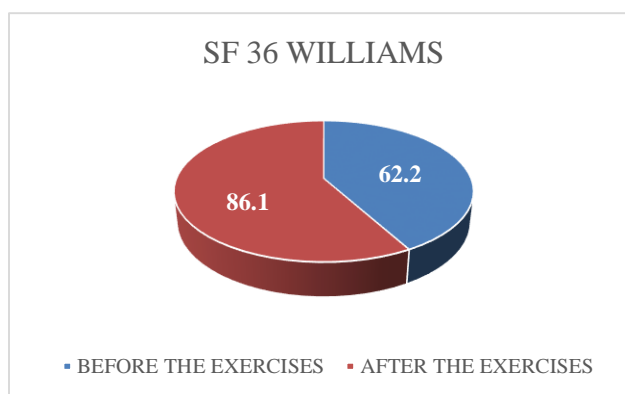


Figure 4. SF 36 average value

McKenzie protocol

A study was conducted involving 68 patients aged between 28 and 47, all diagnosed with disc herniation via magnetic resonance imaging. The study aimed to evaluate the effectiveness of different therapeutic protocols. Patients were divided into two groups: the control group underwent stretching and mobilization exercises, while the experimental group received McKenzie therapy. Both groups followed the rehabilitation program for four weeks. Patient assessments were conducted at the beginning of the therapy, upon completion, and six months after the therapy ended. Results were measured using the VAS scale and the ODI index. The study found that the VAS index decreased from 3.77 to 2.89, and the ODI index decreased from an initial value of 32.77 to 25.13 at the end of the therapy (Hossain et al., 2012)

A review article, based on an analysis of 50 studies, evaluates the effectiveness of McKenzie therapy in managing low back pain among diagnosed patients. To accurately assess the benefits of the therapy program, various indices such as the Roland-Morris Disability Questionnaire, ODI, and VAS scale are used. The data collected indicates a significant decrease in the average ODI index value from 52.37 to 9.31, as well as a decrease in the average VAS scale values from 6.9 to 2.28 upon completion of the therapeutic protocol (Czajka et al., 2018).

A study conducted from July 1st to December 31st, 2014, involving 37 patients aged between 30 and 70, diagnosed with low back pain, examined the effectiveness of McKenzie therapy compared to Mulligan therapy. The assessment of the therapeutic protocol used the VAS, ODI, and Range of Motion (ROM) scale, administered both at the onset and upon completion of the program, 4 weeks apart. The VAS scale value decreased from 9.12 to 1.46, and the ODI index decreased significantly from 73.82 to 6.24 (Waggar et al., 2016).

In another study, 60 patients, with an average age of 44, were enrolled in a study to assess the efficacy of McKenzie therapy. All patients had clinically and imaging diagnosed spinal disc herniation and experienced severe pain. Assessment of the patients was based on the VAS, ODI scales at the beginning as well as at the end of the therapeutic protocol. The rehabilitation program consisted of daily sessions over 5 consecutive days. The data indicate a decrease in the VAS value from 6.25 to 2.05 and a decrease in the ODI index from 28.35 to 10.90 (Szulc et al., 2015).

In the study carried out during 2020, 41 patients diagnosed with low back pain were analysed after completing the McKenzie therapy. The therapeutic programme was applied for 4 weeks,

and the patients were evaluated to determine the quality of life through the SF 36 questionnaire. Increases in SF 36 values were noticed; if at the beginning of the therapeutic programme a score of 59.62 was recorded, after the 4 weeks the score reached 69.23 (Akobu & Odunfa, 2020).

Table 2 provides a synthesis of data obtained from specialized studies regarding the benefits of the McKenzie program.

Table 2. Assessment indexes of patients diagnosed with low back pain, before and after McKenzie therapy (ODI= Oswestry low back pain disability index, VAS=Visual Analog Scale, SF 36 = Short Form 36)

Author and study year	Number of subjects	Study period	ODI		VAS		SF 36	
			BEFORE/AFTER	BEFORE/AFTER	BEFORE/AFTER	BEFORE/AFTER		
Hossain et al., 2012	68 patients	4 weeks	32.77	25.13	3.77	2.89	-	-
Czajtka et al., 2018	-	-	52.37	9.31	6.9	2.28	-	-
Waggar et al., 2016	37 patients	6 months	73.82	6.24	9.12	1.46	-	-
Szulc et al., 2015	60 patients	5 days	28.35	10.90	6.25	2.05	-	-
Akobu and Odunfa, 2020	41 patients	4 weeks	-	-	-	-	59.62	69.23

The average values are also depicted in Figures 5, 6, and 7, illustrating the evolution of each indicator taken into account, both before and after the completion of the therapeutic program.

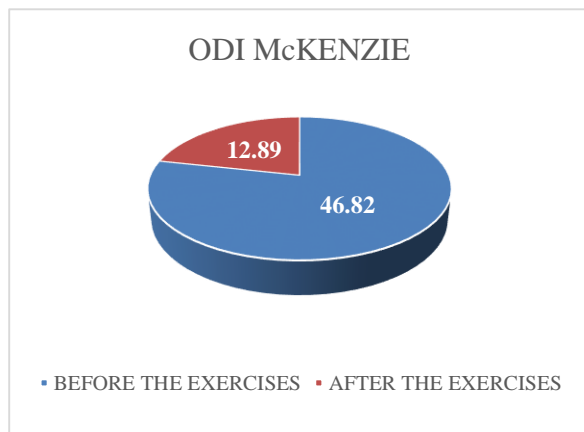


Figure 5. ODI index average value

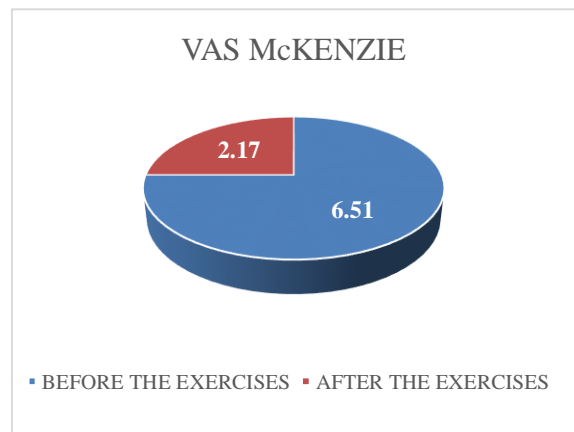


Figure 6. VAS index average value (McKenzie)

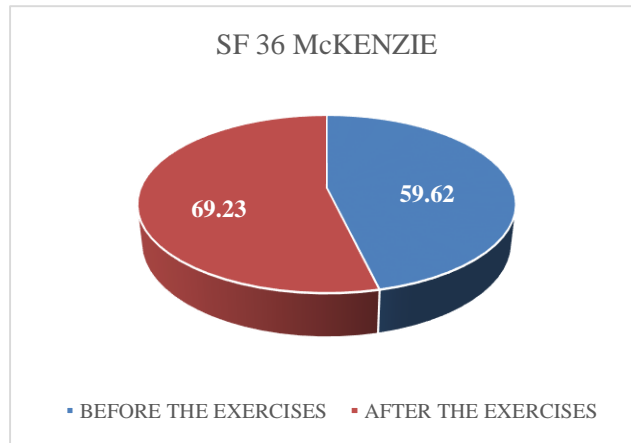


Figure 7. SF 36 average value (McKenzie)

To obtain an integrated and comparative image of the two therapeutic programs applied to patients with low back pain, the percentage change (before and after the application of the therapeutic protocol) was calculated for each individual index, both for the Williams therapy and McKenzie therapy. Consequently, in a percentage representation it is possible to notice a decrease in the ODI index by 38.4%, a decrease in the values of the VAS scale by 46%, and an increase in SF 36 by 38.4% with the application of the Williams therapy. Conversely, completion of the McKenzie therapy resulted in the following percentage changes in the previously mentioned indices: a decrease of ODI by 72.45%, a decrease of VAS by 50.9% and an increase of SF 36 by 16.2%. The values can also be seen in Figure 8.

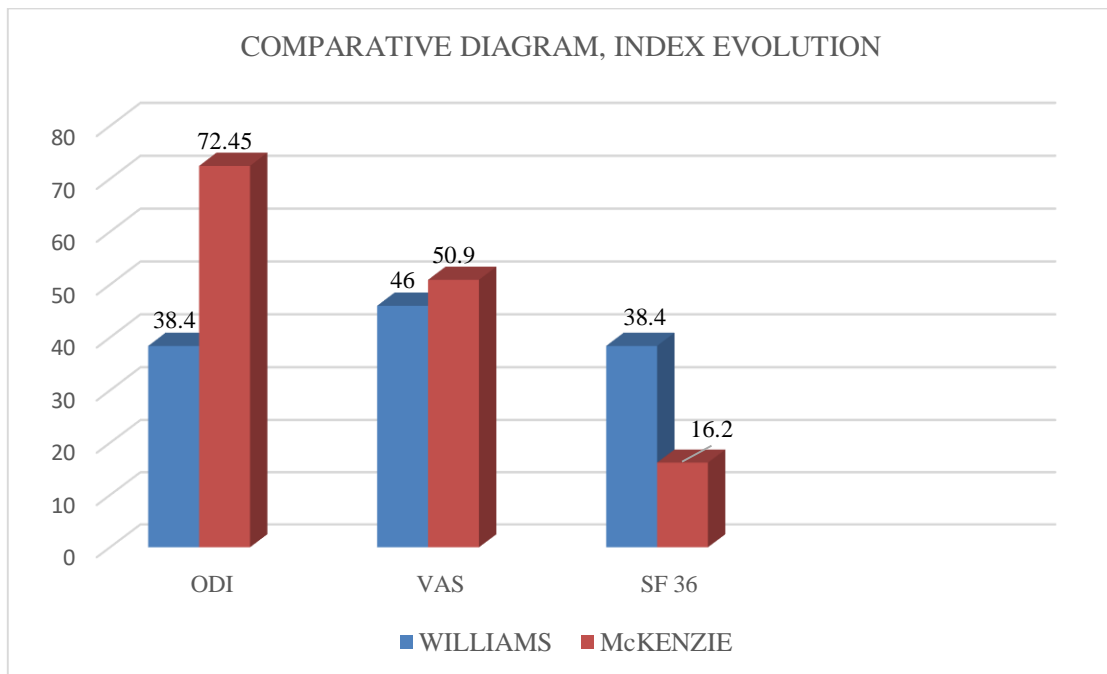


Figure 8. Comparative percentage changes of ODI, VAS, SF 36 index in Williams and McKenzie therapy

Discussions and conclusion

This review investigated the effectiveness of Williams therapy, which is based on flexion exercises, and McKenzie therapy, which is based on extension exercises. The analysis was addressed to patients with low back pain. Results indicated improvement in functional status for all patients, the differences among the applied therapeutic programmes being hardly noticeable.

The ODI questionnaire was applied to determine the ability to manage daily activities, the data collected providing information related to pain, self-care, lifting weights, walking, sitting and standing, sleep, sexual life, social life, and the ability to travel. According to the data collected, an improvement in the ODI score could be observed both by completing the Williams rehabilitation programme, and by completing the McKenzie programme, with values tending towards the latter therapeutic option (Hossain et al., 2012; Sukmajaya et al., 2020).

The VAS scale was used to determine the pain intensity and applied both before the beginning of the therapeutic protocol, and at its completion. Even if, according to the articles selected in this paper, a slightly higher percentage change related to McKenzie therapy can be observed, approximately equal values are obtained on the VAS scale and by going through the Williams protocol (Nelvin et al., 2021).

The global assessment of life quality was analysed by applying the SF 36 questionnaire, which indicates a significant improvement offered by completing the Williams programme compared to McKenzie. However, the data cannot be generalized because there is not a sufficiently large number of studies to lead to an edifying conclusion (Akobu & Odunfa, 2020).

Despite data indicating clear benefits of both Williams therapy and McKenzie therapy in treating back pain, it would be inaccurate to consider one program more beneficial than the other. Instead, these therapeutic protocols should be viewed as complementary, potentially working together synergistically to achieve maximum effectiveness (Moldovan, 2012).

This synthesis, based on specialized literature, draws the following conclusions:

1. Patients with low back pain require a therapeutic protocol in order to improve their functional and mental status.
2. Williams therapy, based on flexion exercises, improves the patients' quality of life and alleviates pain.
3. McKenzie therapy, based on extension exercises, produces beneficial effects on the patient diagnosed with low back pain by reducing pain and improving functionality.
4. The assessment scales prove to be effective, allowing accurate numerical values to frame the patient's status over time.
5. Neither Williams nor McKenzie therapy demonstrates superiority; both contribute to enhancing patients' quality of life.

Further research and data could provide valuable insights for a deeper understanding of this topic.

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Conflicts of Interest: The authors declare no conflicts of interest.

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