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## **Diagnosis of the Causes of Lower Back Pain by Diagnostic Radiology Ultrasound**

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### **Abstract**

The most often reported form of musculoskeletal pain, low back pain (LBP), is frequently persistent and has significant socioeconomic ramifications. The guidelines and recent systematic reviews of therapeutic ultrasonography have brought attention to the need for additional research to determine the true impact of these modalities. It is crucial to determine if the advantages of this often-used intervention outweigh the risks because the use of ultrasonography may have a negative impact on patients with LBP (for example, due to the transmission of heat energy). A quantitative technique will be used to address the study question in accordance with the dependent and independent research variables. In order to obtain



more accurate and valuable responses, questionnaires will be distributed, and the data will be analyzed using SPSS. Doctors and patients with lower back pain will make up the research population, and a random selection procedure will be used. According to earlier research, there aren't many pertinent studies that use the research variables to determine the causes of lower back pain by diagnostic radiology ultrasound. Therefore, the current research seeks to investigate the causes of lower back pain through diagnostic radiology ultrasound.

**Keywords:** (*Low back pain (LBP), Doctors, patients, Ultrasound, Diagnostic radiology ultrasound*)

## 1. Introduction

When a patient has low back pain (LBP), imaging is primarily used to assist medical professionals in determining the most likely source of the discomfort (Al-Tameemi, 2019). The prompt identification of the underlying cause of the lower back pain (LBP) can be improved by using one or more of the many radiological studies in an appropriate manner. Furthermore, radiography plays a part in treating some illnesses that cause LBP in addition to helping with diagnosis. The quickly developing field of interventional radiology is being used more and more for a range of illnesses, including malignancies and vascular abnormalities, as the only or adjuvant therapeutic choice (Kreiner, 2020).

In addition to being one of the most frequent causes of disability and missed work, low back pain (LBP) is also one of the main causes of doctor visits. It happens in a variety of demographic groups with varying socioeconomic conditions. However, reports of a rising frequency of LBP have surfaced recently. According to



reports, ultrasonography (US) is a costly, user-friendly, and safe diagnostic method for a wide range of illnesses. Since many years ago, several researchers have concentrated on the diagnostic functions of the US in patients with LBP because of the high frequency of LBP and the unique characteristics of the US (NIH, 2018).

One of the most common complaints in the general population, low back pain (LBP) affects the social and economic well-being of those who experience it, and accounts for the greatest number of years of life adjusted for disability. An extensive examination of the worldwide burden revealed that, at the start of the decade, roughly 619 million people were impacted, and by the middle of the century, 843 million instances were expected to be prominent. The degree of discomfort is correlated with a reduction in the person's overall productivity and loss of normal function (Yelland, 2004).

Specific and non-specific LBP are the results of dividing the condition based on the presence or absence of a nociceptive etiology. When comorbidities (like a metastasis) or anticipated trauma (like spinal fractures) are present, a medical history supporting the pathoanatomical substrate can be found on imaging in the situations of directly associated causes of LBP (Forward, 2008).

Many physiotherapists worldwide treat low back pain (LBP) with therapeutic ultrasonography; however, its utility remains controversial even after over 60 years of clinical practice. Although TENS, ultrasound, laser, interferential treatment, and other electrotherapy modalities are frequently utilized in physical therapy practices, there is no proof that they are beneficial.

In the context of well-conducted, randomized controlled trials, the guidelines and recent systematic reviews of therapeutic ultrasonography have brought attention to



the need for additional research to determine the true impact of these modalities (Ebadi, 2011). It is crucial to determine if the advantages of this often-used intervention outweigh the risks because the use of ultrasonography may have a negative impact on patients with LBP (for example, due to the transmission of heat energy) (Al-Tameemi, 2019).

### **1.1 Research Problem and Questions**

Depending on the pathophysiology and length of the condition, LBP is categorized as acute or chronic. Pain lasting less than six weeks is referred to as acute LBP, whereas pain lasting more than months is referred to as chronic LBP. This type of LBP is called non-specific LBP if the causal pathology is not conclusive. Regrettably, almost 90% of people with LBP have non-specific LBP, which has a prevalence incidence of 23% (Kreiner, 2020). According to earlier research, there aren't many pertinent studies that use the research variables to determine the causes of lower back pain by diagnostic radiology ultrasound.

Regarding this, the current research aims to investigate answers to the main questions; **“What are the causes of lower back pain by diagnostic radiology ultrasound?”**

The main question is divided into the following sub-question:

- What are the specific anatomical changes or abnormalities that ultrasound can detect in patients with lower back pain?
- How does ultrasound compare to other imaging techniques in terms of safety, speed, and diagnostic accuracy for lower back pain?



- What are the advantages of using ultrasound for diagnosing joint laxity, muscle degeneration, or inflammation associated with lower back pain?
- How can ultrasound imaging be utilized to develop and monitor treatment plans for patients with chronic lower back pain?

## 1.2 Research Objectives

The research seeks **“to investigate the causes of lower back pain by diagnostic radiology ultrasound”**.

The main objective is divided into the following sub objective:

- To evaluate the accuracy of ultrasound in diagnosing specific and non-specific lower back pain.
- To assess the role of ultrasound in identifying structural abnormalities associated with lower back pain, such as muscle, joint, and soft tissue changes.
- To investigate the non-invasive and radiation-free benefits of ultrasound as compared to other imaging techniques in diagnosing lower back pain.
- To explore the utility of ultrasound in guiding treatment decisions and monitoring the progression of lower back pain-related conditions.

## 1.3 Research Significance

This study could have a significant impact on the medical sector, including physicians and people with lower back pain. This research investigates the diagnosis of lower back pain using ultrasound.

- The results of the research will provide information on the causes of lower back pain and how to diagnose this condition using ultrasound.



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- This research could help hospital and department managers in preparing training courses for physicians and patients on the possible causes of lower back pain, in addition to educating patients and their families about ultrasound diagnosis.
- In addition to providing information to patients, physicians and researchers about the dependent research variables (ultrasound) and their relationship to the independent variable (causes of lower back pain).
- Providing a conceptual framework for each variable in the current research.
- By providing actionable insights, the research could impact the international community, including patients, physicians, policy makers, international libraries, academic sites and academic researchers.

## **2. Literature Review**

### **2.1 Lower Back Pain (LBP)**

Globally, low back pain (LBP) is a significant musculoskeletal condition. The Global Burden of Disease 2010 Study, which presents disability-adjusted life years (DALYs) and ranks mortality and disability from major diseases, injuries, and risk factors, shows that LBP ranked first for disability and sixth for overall burden. The World Health Organization reports that it is one of the main causes that limit movement and the capacity to work, which has a negative impact on society and the economy (NIH, 2018).

According to Kreiner (2020), at some point in their lives, eighty percent of adults will suffer from significant low back pain. The supporting muscles along the



spine typically spasm when someone has low back discomfort. Additionally, lower extremity or buttock discomfort, numbness, and tingling may be connected to the back. The causes of low back discomfort are numerous. It is crucial to prevent low back discomfort because the symptoms can recur again.

Across the world, one of the most common musculoskeletal conditions is low back pain (LBP). The Global Burden of Disease 2010 Study, which presents the overall burden expressed as disability-adjusted life years, ranks LBP sixth in terms of overall burden and first in terms of disability from main diseases, injuries, and risk factors. The World Health Organization reports that it is one of the main reasons that limit mobility and workability, which has a negative impact on society and the economy (Forward, 2008).

NIH (2018) confirmed that back discomfort is a regular occurrence for many people. Pain that lacks a known cause is referred to as "non-specific." 'Chronic' pain is defined as pain that lasts more than three months. Unspecific chronic low back pain can be incapacitating. It may result in individuals missing work. People with non-specific chronic back pain frequently seek medical attention.

According to (Al-Tameemi, 2019; Ebadi, 2011), the level of back pain can vary, ranging from a mild, continuous discomfort to an abrupt, sharp, or shooting agony. It may start off slowly as we age, or it may worsen over time as a consequence of an injury or carrying something heavy. Back discomfort can also result from a vigorous workout followed by an insufficient exercise regimen. Two categories of back discomfort exist: 1. Acute back pain can last anywhere from a few days to a few weeks. Acute lower back discomfort predominates. With self-care, it usually goes away on its own in a few days and leaves no residual function loss. Sometimes



it takes several months for the symptoms to go away. 2. Pain that lasts for 12 weeks or more is referred to as chronic back pain, even after treatment for an initial injury or underlying cause of acute low back pain. After a year, about 20% of patients with acute low back pain experience chronic low back pain with enduring symptoms. Persistent pain does not always indicate a serious medical underlying cause or one that can be readily diagnosed and treated.

According to NIH (2018), the majority of acute low back pain is mechanical in nature, which means that there is an issue with how the nerves, muscles, intervertebral discs, and spine move and fit against each other. The following are a few instances of mechanical reasons for low back pain:

- Skeletal abnormalities include kyphosis, an excessive outward arch of the spine, lordosis, an unnaturally exaggerated arch in the lower back, and other congenital defects of the spine. Spina bifida is a condition in which the spinal cords and/or their covering do not fully mature. This can lead to aberrant sensation, spinal deformity, and even paralysis.
- Strains are tears in tendons or muscles, sprains are overextended or torn ligaments, and spasms are abrupt contractions of a muscle or set of muscles.
- Traumatic injuries, which can occur from falls, playing sports, or auto accidents, can damage the tendons, ligaments, or muscles that are causing the discomfort. They can also compress the spine and result in disc herniation or rupture.
- Intervertebral disc degeneration is the result of the normally springy discs losing their ability to cushion as a normal part of aging.





Spondylosis is the general deterioration of the spine brought on by natural aging-related wear and tear on the spine's joints, discs, and bones.

## **2.2 Diagnosing (LBP) by Radiology Ultrasound**

The most often reported form of musculoskeletal pain, low back pain (LBP), is frequently persistent and has significant socioeconomic ramifications. As much as 33% for point prevalence, 65% for 1-year prevalence, and 84% for lifetime prevalence are estimated to be affected by LBP (Kreiner, 2020).

LBP is characterized by pain and suffering above the gluteal crease, below the twelfth rib, and in the lumbosacral region. Three categories of back pain can be distinguished based on the suggested diagnostic triage: 1) non-specific low back pain; 2) back pain associated with symptoms from the nerve roots; and 3) back pain arising from significant disease (e.g., malignancy, fracture, ankylosing spondylitis, infection). Although non-specific low back pain (LBP) without a known pathoanatomic etiology is typically benign, it can become chronic LBP if left untreated (Ferdinandov, 2024). LBP is further classified using the conventional approach into three groups based on how long it has been present: acute (<6 weeks), sub-acute (6–12 weeks), and chronic (>12 weeks). Chronic low back pain (LBP) is still a prevalent issue that many primary care, secondary care, and occupational health professionals must address (Yelland, 2004).

According to (Heidari, 2015; Huntoon, 2004), regaining the patient's desired level of activity and engagement and preventing the recurrence of chronic symptoms are the main goals of treatment for long-term low back pain. For LBP, a variety of therapies are frequently employed, including medication, physical therapy, and



surgery. Numerous of these strategies have undergone systematic reviews and randomized controlled trials for evaluation. There is evidence to support the effectiveness of some interventions (like exercise) for LBP, but not for other interventions (like traction and laser therapy). Across therapies, there are a wide range of randomized trials: 61 for exercise therapy, 19 for back school, and 4 for transcutaneous electrical nerve stimulation (TENS).

Many physiotherapists worldwide routinely employ therapeutic ultrasonography to treat lower back pain (LBP); yet, after over 60 years of clinical usage, there is still significant debate regarding its efficacy. Although TENS, ultrasound, laser, interferential treatment, and other electrotherapy modalities are frequently utilized in physical therapy practices, there is no proof that they are beneficial (Kreiner, 2020).

In the context of well-conducted, randomized controlled trials, the guidelines and recent systematic reviews of therapeutic ultrasonography have brought attention to the need for additional research to determine the true impact of these modalities. It is crucial to determine if the advantages of this often-used intervention outweigh the risks because the use of ultrasonography may have a negative impact on patients with LBP (for example, due to the transmission of heat energy) (Al-Tameemi, 2019).

It is proposed that therapeutic ultrasound uses ultrasonic waves to provide energy to deep tissue areas in order to cause non-thermal physiologic changes or increases in tissue temperature. Therapeutic ultrasound is a one-way energy delivery method that uses a crystal sound heat to transmit acoustic waves at 1 or 3 MHz and at amplitude densities between 0.1 and 3 W/cm<sup>2</sup>. This is not the same as ultrasound



for medical imaging, which transmits ultrasonic waves and processes a returning echo to generate an image. Soft tissue molecules that are exposed to an acoustic wave vibrate as a result of ultrasonic energy (Ferdinandov, 2024). Because of the increased molecular motion, frictional heat is produced, raising the temperature of the tissue. Known as the "thermal effects" of ultrasound, this heating is hypothesized to improve the flexibility of collagen, nerve transmission velocity, local vascular perfusion, enzymatic activity, skeletal muscle contractile activity, and nociceptive threshold (Huntoon, 2004).

### **3. Methodology**

Utilizing questionnaires, a quantitative technique will be used to address the study question in accordance with the dependent and independent research variables. In order to obtain more accurate and valuable responses, questionnaires will be distributed, and the data will be analyzed using SPSS. Doctors and patients with lower back pain will make up the research population, and a random selection procedure will be used. The sample size will be 60 doctors. In order to get data covering the variables of the current research, the researcher will also conceptually consult earlier research. Prior to implementing the quantitative technique, the researcher must have approval from the appropriate committee within the hospitals involved in the current research's methodology. They were free to accept or decline the offer of participation. Additionally, all participant data used in the research technique would be kept private and confidential.



## 4. Results and Discussion

### 4.1 Demographic Variables

Table 1. Gender characteristics

<b>Gender</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	34	56.7	56.7	56.7
	Female	26	43.3	43.3	100.0
	Total	60	100.0	100.0	

The results show that males made up 56.7% of the overall sample size, whereas the female made up 43.3% of the total sample size.

Table 2. Experience characteristics

<b>Experience</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1	3	5.0	5.0	5.0
	1-5	18	30.0	30.0	35.0
	6-10	19	31.7	31.7	66.7
	More than 10	20	33.3	33.3	100.0
	Total	60	100.0	100.0	



The results show that doctors with less than 1 year of experience made up 5% of the total sample size, whereas doctors with 1-5 years of experience made up 30% of the overall sample size, whereas doctors with 6-10 years of experience made up 31.7% of the overall sample size, finally, doctors with more than 10 years of experience made up 33.3% of the overall sample.

#### 4.2 Investigating the causes of lower back pain by diagnostic radiology ultrasound

Table 3. Investigating the causes of lower back pain by diagnostic radiology ultrasound

Item No.	Statements	Means	Standard deviations	Practices degree
Q1	Ultrasound helps doctors diagnose and treat medical conditions	4.23	0.427	Very high
Q2	One of the most common complaints in the general population, low back pain (LBP)	4.30	0.462	Very high
Q3	The most common indication for a spinal ultrasound is a patient complaining of unexplained chronic back pain.	4.28	0.454	Very high
Q4	Spine ultrasound can diagnose infection or inflammation in this area.	4.25	0.437	Very high
Q5	Ultrasound imaging shows the inflamed areas better.	4.28	0.454	Very high



Q6	Spine inflammation can be identified very well by ultrasound.	4.25	0.437	Very high
Q7	The beginnings of lower back pain can be detected by ultrasound imaging.	4.27	0.446	Very high
Q8	Ultrasound imaging is considered a more successful and safer adjunct to imaging.	4.23	0.427	Very high
Q9	An ultrasound examination for lower back pain takes about 15 minutes.	4.27	0.446	Very high
Q10	Ultrasound can show the structure and movement of internal organs in the body.	4.25	0.437	Very high
Q11	Ultrasound can show the flow of blood through blood vessels.	4.30	0.462	Very high
Q12	Ultrasound allows your doctor to see and evaluate blood flow through the arteries and veins in your body.	4.25	0.437	Very high
Q13	Ultrasound is safe and painless for low back pain.	4.25	0.437	Very high
Q14	Ultrasound produces images of the internal organs of back	4.32	0.469	Very high
Q15	Ultrasound tests do not use radiation	4.30	0.462	Very high
Q16	Ultrasound imaging can help guide the diagnosis and treatment of many diseases and health conditions.	4.32	0.469	Very high



Q17	Ultrasound imaging in pregnant patients with low back pain is also a safe and sensitive method	4.22	0.415	Very high
Q18	Patients with chronic low back pain may also show changes in the density and appearance of the muscles surrounding the damaged spine	4.32	0.469	Very high
Q19	Measuring changes in muscle activation associated with low back pain could lead to the development of selective interventions to reverse the specific weakness	4.32	0.469	Very high
Q20	Ultrasound plays an important role in the objective measurement of joint laxity as a common cause of LBP	4.30	0.462	Very high
Q21	Diagnosis is often possible from the patient's medical history and physical examination without the need for additional tests.	4.23	0.427	Very high
Q22	US showed to have a good repeatability for measuring CSA of LM muscle.	4.27	0.446	Very high
Q23	US are a feasible way to assess CSA, size and shape of LM muscle in young adults.	4.25	0.437	Very high
	Overall	4.27	0.095	Very high

Table 3's findings demonstrate the general agreement on the usefulness of ultrasonography as a lower back pain (LBP) diagnostic technique. All statements have a strong, favorable view, as evidenced by the total mean score of 4.27. The fact



that every item in the table has received a "very high" practice degree indicates how highly respondents regard the value of ultrasonography. This broad consensus highlights the importance of ultrasonography in the diagnosis and treatment of a number of underlying causes of low back pain (LPB), which affects a large percentage of the population.

When considering the use of ultrasonography for LBP, the statements Q14, Q16, Q18, and Q19—which have the highest mean score (4.32)—stand out as being especially important. The importance of ultrasonography in generating finely detailed images of internal organs, assisting with precise diagnosis, identifying alterations in the muscles linked to long-term lower back pain, and gauging muscle activity for focused therapies is highlighted by these items. The high ratings on all of these categories show that ultrasonography is viewed by respondents as a thorough tool for both diagnosing and treating low back pain (LBP), especially in cases where degeneration of the muscles and joints is a significant factor.

Regarding Q14, which says, "Ultrasound produces images of the internal organs of the back," the respondents strongly agreed with the statement, as evidenced by the mean score of 4.32. This research suggests that a major contributing reason to ultrasonography's efficacy in diagnosing low back pain (LBP) is its capacity to offer precise, high-definition imaging of internal structures, especially in the spinal and muscular regions. Healthcare providers are better able to make accurate diagnoses and treatment decisions for patients with lower back pain (LBP) when they have real-time visualization of internal organs. This technique is very helpful





in pinpointing the precise anatomical causes of back discomfort, which can include inflammation, nerve impingements, or soft tissue damage.

Likewise, the excellent score of 4.32 obtained for Question 16, "Ultrasound imaging can help guide the diagnosis and treatment of many diseases and health conditions," emphasizes the importance of ultrasound even more in a therapeutic context. It is evident from the responses that ultrasonography is used for purposes other than just detecting low back pain. It is a vital tool that helps physicians track the course of the disease, guide treatment decisions, and assess the efficacy of therapy. When treating lower back pain (LBP), ultrasonography can help determine the source of the pain as well as evaluate the effectiveness of various treatment options, including medication, physical therapy, and surgery.

Regarding Q18, "Patients with chronic low back pain may also show changes in the density and appearance of the muscles surrounding the damaged spine," the respondents recognized the value of ultrasonography in identifying potential muscle abnormalities that could be linked to persistent LBP, as seen by the high score for this question. Respondents' affirmation that ultrasonography can offer important insights about the state of the muscles surrounding the spine—which frequently experience atrophy, spasm, or degeneration in chronic pain conditions—has a mean score of 4.32. Healthcare professionals can more effectively and precisely manage chronic low back pain by customizing therapies that target specific muscle imbalances or weaknesses thanks to the visualization of these changes.

With a score of 4.32, the statement in Q19, "Measuring changes in muscle activation associated with low back pain could lead to the development of selective



interventions to reverse the specific weakness," was likewise very significant in creating focused treatment plans. According to the respondents, ultrasonography is a useful technique for both diagnosing the underlying causes of low back pain (LBP) and for developing targeted muscle-strengthening therapies. This may result in more focused rehabilitation techniques, like physical activities or treatments intended to relieve discomfort and improve muscular function. The efficacy of managing lower back pain (LBP) can be further increased by doctors being able to monitor progress and modify therapies based on real-time muscle activation measurements.

Items with a mean score of 4.30, such as Q2 and Q15, emphasize the non-invasive and radiation-free characteristics of ultrasound as well as its significance in treating low back pain (LBP), one of the most prevalent complaints in the general population. The respondents recognize the prevalence of low back pain (LBP) and value the safety advantages of ultrasonography, especially since it doesn't involve ionizing radiation. Due to its ability to avoid radiation exposure hazards, ultrasonography is particularly well suited for patients who need repeated imaging, such as those with recurrent or persistent low back pain. Patient safety is a top priority in healthcare settings, where this component of ultrasonography is especially valued.

According to respondents, ultrasound can accurately detect joint laxity, which is a major contributor to lower back pain (LBP). This is shown in Q20, "Ultrasound plays an important role in the objective measurement of joint laxity as a common cause of LBP," which similarly scored 4.30. Excessive looseness in the joints, or joint laxity, can cause pain and instability, especially in the lower back. The ability



of ultrasonography to quantify joint laxity precisely enables early detection and intervention, thereby halting progressive degeneration. The significance of ultrasound in the diagnosis and follow-up of joint-related disorders that aggravate low back pain (LBP) is further supported by this finding.

Respondents emphasized the importance of ultrasound's capability to visualize blood flow in Q11, which likewise received a 4.30, emphasizing how important it is for evaluating circulatory problems that could worsen LBP. Vascular issues, such as vascular inflammation or poor circulation, can occasionally be connected to back discomfort. Because ultrasound can display blood flow in real time, it gives doctors access to extra diagnostic data that other imaging modalities can overlook. This feature of ultrasound is particularly helpful in locating possible issues or underlying diseases that may be contributing factors to low back pain (LBP), enabling a more thorough evaluation of the patient's general health.

The somewhat lower but still high score of 4.22 for Q17 indicates widespread acceptance for the application of ultrasonography in particular demographics, like LBP sufferers who are pregnant. In this instance, responders concur that ultrasonography is a secure, accurate, and dependable imaging technique for identifying the underlying reasons of pregnant patients' back pain. Ultrasound is one of the few imaging modalities that may be used safely during pregnancy because it is non-invasive and radiation-free. This finding suggests that medical professionals have faith in ultrasonography to offer precise diagnostic findings without endangering patient safety, particularly in populations that are more susceptible.



Further demonstrating the respondents' consensus that ultrasonography is a useful diagnostic tool are Q1 and Q8, both with a score of 4.23. The universal agreement that ultrasonography is a crucial part of diagnostic practice is reaffirmed by the statement in Q1, "Ultrasound helps doctors diagnose and treat medical conditions." Q8 highlights the complementary role of ultrasonography by stating that it is a safer and more effective supplement to other imaging modalities. According to the respondents, ultrasonography can be a useful adjunct to other imaging modalities, offering more diagnostic clarity at a lower risk than more invasive or radiation-based approaches.

With a mean score of 4.27, Q7 and Q9 demonstrate the efficiency and efficacy of ultrasonography in identifying early indications of lower back pain. The fact that an ultrasound examination for LBP only takes roughly fifteen minutes, according to the respondents, makes it a convenient and speedy diagnostic method. Moreover, early detection of LBP by ultrasonography enables prompt intervention, thereby halting the progression of the illness. According to this finding, respondents believe ultrasonography to be a quick, accurate, painless, and effective diagnostic technique that helps with early detection and timely treatment.

In conclusion, a strong, persistent belief in the usefulness of ultrasonography for diagnosing and treating LBP is shown in the high mean scores obtained for each item in the table. In addition to its accuracy as a diagnostic tool, respondents value ultrasonography for its efficiency, safety, and capacity to inform treatment choices. These results are consistent with the increasing awareness that ultrasonography is a key tool in the treatment of lower back pain (LBP), especially for patients who need



ongoing evaluations or have chronic problems. Ultrasound is viewed as a safe, dependable, and efficient imaging technique, which makes it an essential part of LBP treatment.

Respondents to the current study place a high value on ultrasound's effectiveness in identifying underlying reasons of chronic low back pain, such as joint laxity, and in diagnosing cases quickly (mean 4.30). This adds to the body of research that indicates ultrasound can be used to determine the cause of LBP and categorize it as non-specific, connected to nerve roots, or associated to disease (Kreiner, 2020). However, the literature presents doubts over the uneven therapeutic benefits of ultrasonography, with systematic reviews urging further investigation into the technology's efficacy. In contrast, the current study views ultrasound as critical for managing chronic LBP and early intervention, in addition to being diagnostic.

## **5. Conclusion and Recommendations**

According to the study's findings, ultrasonography is a very reliable and successful method for identifying and treating lower back pain (LBP). Regarding the usefulness of ultrasonography, especially as a non-invasive and radiation-free diagnostic technique, respondents showed a high degree of agreement. Strong confidence in ultrasonography's ability to provide finely detailed images of the internal organs of the back, evaluate blood flow, and detect problems including inflammation and joint laxity was found in the survey. The responders appreciated ultrasound's capacity to deliver quick diagnostic results, particularly in situations of



chronic lower back pain. The speed and efficiency of ultrasound in detecting LBP were also recognized. Overall, the study supports the critical role that ultrasonography plays in the diagnosis of lower back pain, especially in chronic cases where degradation of the muscles and joints is a problem.

Based on the study's findings, several recommendations are proposed:

- Due to its non-invasiveness and safety, ultrasound should remain the preferred first-line diagnostic technique for low back pain (LBP), especially for those who need regular testing.
- Even though this study emphasizes the diagnostic utility of ultrasound, further research is necessary to determine whether or not it can effectively treat persistent low back pain, especially in view of the inconsistent results shown in the literature to date.
- To optimize the use of diagnostic ultrasound for LBP and optimize its benefits in early diagnosis and treatment, healthcare providers should receive ongoing education and training on the subject.
- Creating patient awareness initiatives to educate the public about the effectiveness and safety of ultrasound technology may motivate more people with low back pain to seek prompt diagnosis and treatment.



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