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Mapping the Evolution of Research on Low Back Pain and Quality of Care: A bibliographic analysis

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Abstract
Low back pain (LBP) affects all ages, leading to disability, high costs, and reduced quality of life. This study aims to explore key trends, research, and emerging topics on LBP care. To establish an in-depth understanding of global LBP issues. A bibliometric analysis of 290 publications (through October 2023) from WoS and Scopus used ScientoPy, VOSviewer, and Biblioshiny. Results showed rising LBP research, with rehabilitation as the top focus and Turkey as the leading contributor. Psychosocial factors strongly predict outcomes. Five keyword clusters suggest future directions in blending traditional rehabilitation with digital health solutions.

Keywords: Bibliometric, Low back pain, Quality of care

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1.0 Introduction

Low back pain(LBP) is a pervasive global health issue that affects millions of individuals and poses a substantial burden on healthcare systems worldwide. According to the Global Burden of Disease Study, LBP is ranked as the leading cause of disability worldwide (Ferreira et al., 2023). It is estimated that approximately 80% of people experience LBP at some point in their lives, making it one of the most prevalent health conditions (Hemmer et al., 2021). This widespread condition burdens healthcare systems with millions of annual visits, treatments, and costs while causing pain, disability, and reduced quality of life, highlighting the need for high-quality care (Fatoye et al., 2023). Over the past few decades, research on LBP has evolved considerably, shifting from a purely biomedical model to a more

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holistic, biopsychosocial model emphasizing quality of care, patient-centered outcomes, and interdisciplinary treatment approaches. While the biopsychosocial model is widely accepted, its implementation in clinical practice remains challenging.

Bibliometric analysis, a quantitative and qualitative assessment of published literature, is a valuable tool for gaining insights into the research landscape of LBP and its relationship with quality of care. Such analyses provide a systematic means of examining trends, identifying key contributors, assessing research hotspots, and evaluating the impact of scientific publications. To our knowledge, no bibliometric study has mapped LBP and quality of care research. This analysis informs healthcare policies, guides research priorities, and improves care quality. By assessing existing literature, stakeholders can optimize resource allocation, interventions, and patient outcomes.

In this bibliometric analysis, we delve into the literature related to LBP and quality of care, aiming to uncover key trends, influential categories and countries, impactful research articles, and emerging topics. By doing so, we hope to establish a deeper understanding of the global issues surrounding LBP and underscore the critical importance of high-quality care in alleviating its burden on individuals and healthcare systems.

2.0 Literature Review

2.1 Trends in Low Back Pain Research

Recent studies emphasize LBP's rising prevalence and the need for better management. Bibliometric analyses highlight key trends, including increased focus on rehabilitation, multidisciplinary care, and psychosocial factors in treatment outcomes (Demir et al., 2025). A high-impact study emphasises a poor or very low quality of evidence for non-pharmacological therapies with a large effect in short- and long-term follow-up (Soares et al., 2023).

However, many questions about research trends in this field remain unanswered, such as: (1) Publication trends: How have LBP and quality of care publications evolved over the past decade? Are there significant fluctuations across years or decades? (2) Dominant categories & contributors: Which subject areas lead this research? Which countries or regions contribute the most? (3) Keyword analysis: What are the most frequent author keywords? Can co-occurrence analysis reveal clusters, emerging trends, or subfields?

2.2 Quality of Care in LBP Management

Research on LBP management increasingly focuses on quality of care, emphasizing evidence-based guidelines, patient-centered approaches, and healthcare efficiency (Russin et al., 2025). High-value care prioritizes conservative treatments—education, self-management, and structured exercise—while reducing low-value interventions like routine imaging and opioids. Multidisciplinary models involving physical therapists, psychologists, and primary care providers yield better results than isolated treatments. However, despite existing guidelines, low-value care persists.

2.3 Psychosocial Factors and Their Impact on Care Quality

Emerging research underscores the impact of psychosocial factors—fear-avoidance behaviors, depression, and work-related stress—on LBP prognosis (Wertli et al., 2021). Integrating psychological support, CBT, and patient education improves recovery and reduces disability risk. Healthcare accessibility and disparities are also gaining attention. Socioeconomic status, policies, and regional infrastructure significantly affect LBP care quality, with underserved populations facing poorer outcomes due to limited access to evidence-based treatments (Chehade, et al., 2020).

3.0 Methodology

3.1 Study design

This study was a bibliographic analysis and data retrieved from the Scopus and Web of Science data based in October 2023 on the to*pic of low back pain and quality of care.*

3.2 Search strategy

The search was conducted in October 2023 since the time of inception on the following search query: (TITLE ("low back pain") AND TITLE ("quality of life" OR "quality of care")). Studies that were published in English and matched the other eligibility criteria (see below) were retained for further analysis.

3.3 Eligibility criteria

Our review covers LBP and quality of care studies published from October 2023 to initiation. Keywords had to appear in the title or abstract, with irrelevant ones excluded. Articles without full text were removed to ensure quality assessment. Duplicates, reviews, and th*eses were also excluded due to insufficient data for evaluation.*

3.4 Bibliographic metadata and Pre-processing

Figure 1 outlines the research process, covering data collection, preprocessing, and analysis. ScientoPy handled data preprocessing, while VOSviewer and Biblioshiny facilitated bibliometric analysis. The study sourced 549 papers from WoS and Scopus. Using ScientoPy, 46 papers (8.4%) were excluded based on document type, and 213 duplicates were removed, ensuring data integrity. The final dataset included 290 unique papers—232 (80%) from WoS and 58 (20%) from Scopus—providing a balanced perspective. With this refined dataset, VOSviewer and Biblioshiny enabled in-depth analysis, uncovering key trends and insights into LBP research and its impact on care quality.

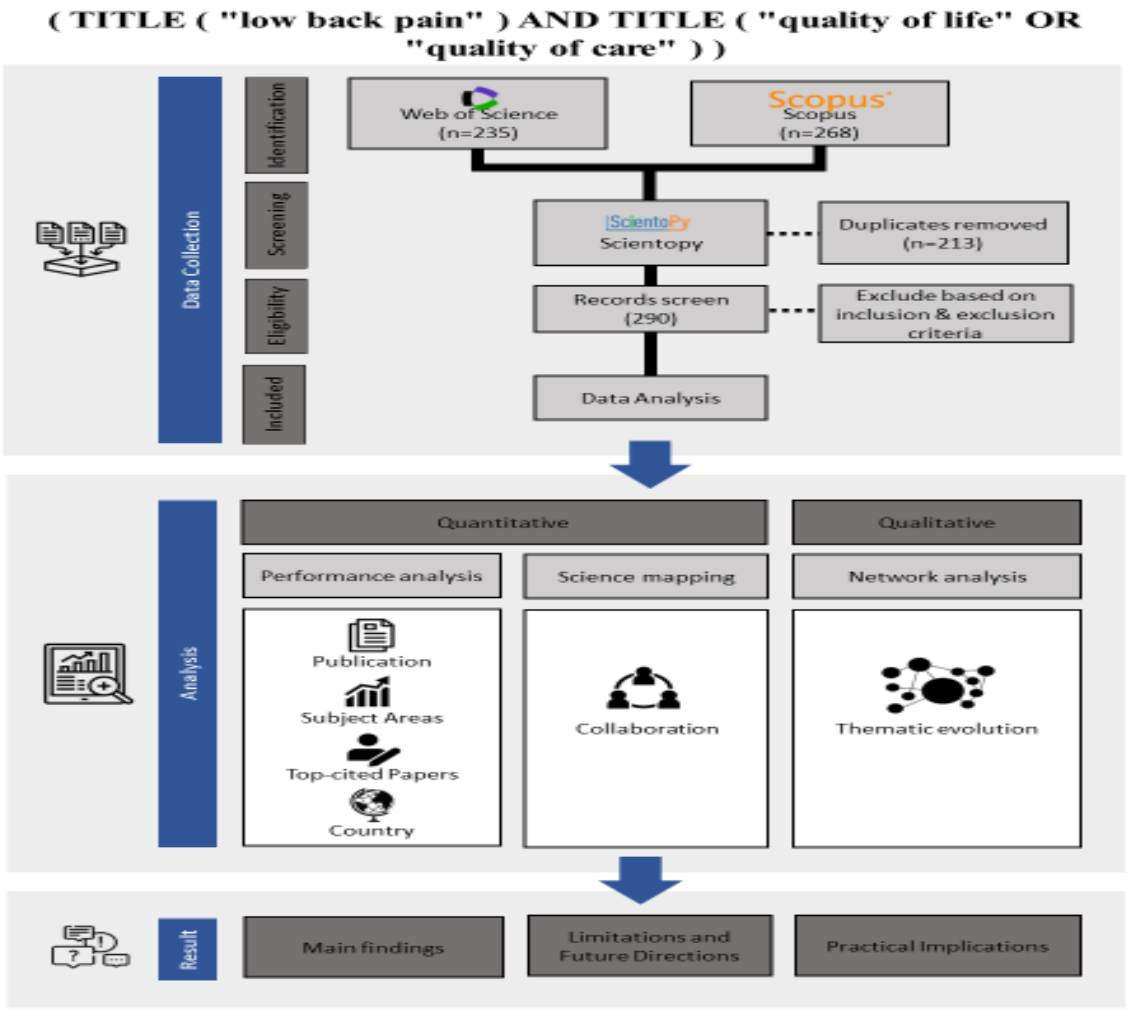

Fig.1: The study flowchart

4.0 Findings

4.1 Trends and Variations in LBP Research Publication Volume Over Time

WoS publications rose to 232 by 2023, with stable output (AGR 0). ADY reached 18.5, PDLY 15.9, and the h-index 37, reflecting high impact. Scopus, with fewer publications (58), shows gradual growth (AGR 1). ADY is 5, PDLY 17.2, and the h-index 9, indicating moderate scholarly influence.

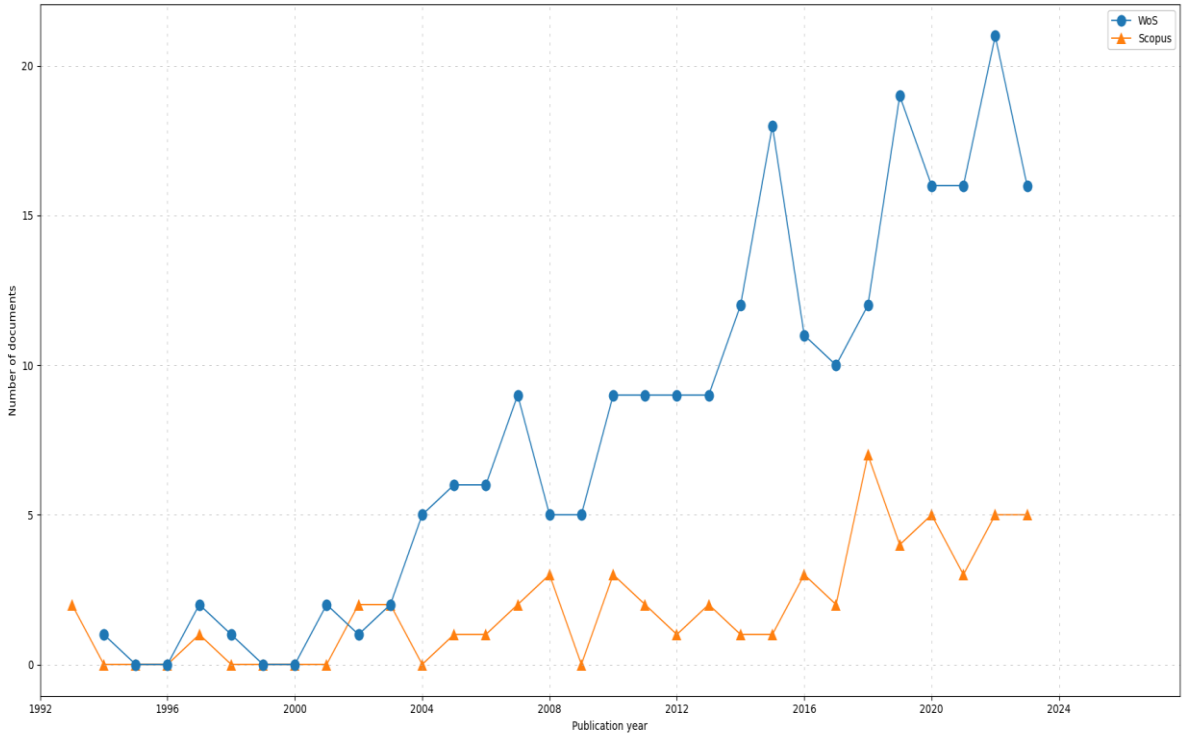

Fig.2: Publication volumes from WoS and Scopus (1993-2023)

4.2 Leading Research Categories and Global Contributors in LBP Studies

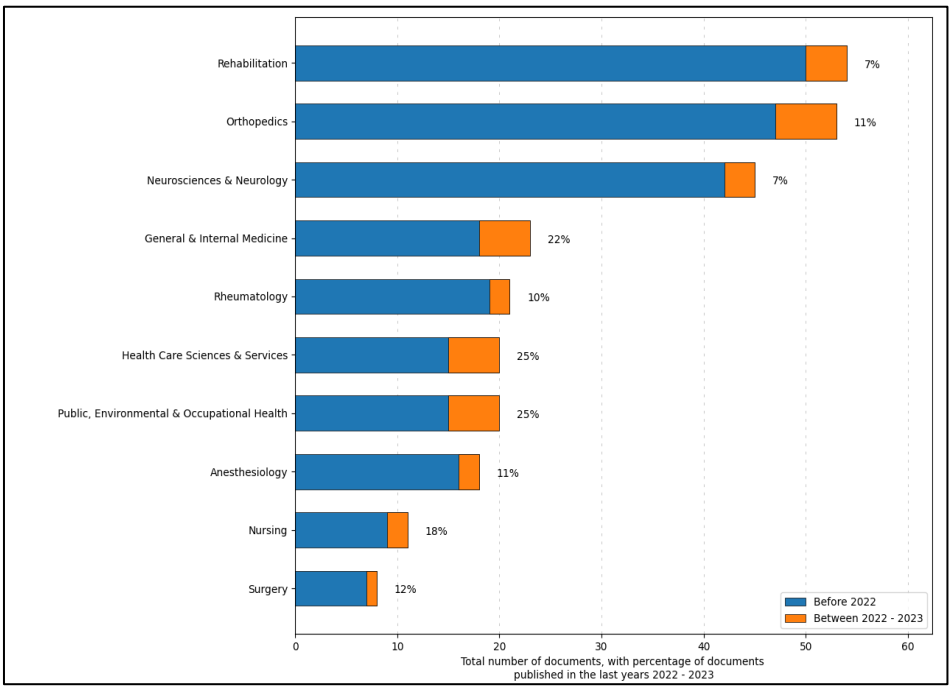

Fig.3: The top subject's areas

Rehabilitation leads with 54 publications but declines (AGR -2), adding 2 yearly (ADY), averaging 7.4 (PDLY), with an h-index of 16. Orthopedics (53 pubs) remains stable (AGR 0), adding 3 (ADY), averaging 11.3 (PDLY), h-index 23. Neurosciences & neurology (45 pubs) grows moderately (AGR 0.5), adding 1.5 (ADY), averaging 6.7 (PDLY), h-index 22. General & internal medicine (23 pubs) grows

steadily (AGR 0.5), adding 2.5 (ADY), averaging 21.7 (PDLY), h-index 9. Rheumatology (21 pubs) slightly declines (AGR -0.5), adding 1 (ADY), averaging 9.5 (PDLY), h-index 11. Health care sciences & services and public, environmental & occupational health (20 pubs each) grow strongly (AGR 1.5 & 0.5), averaging 25 (PDLY), h-indices 11 & 12. Anesthesiology (18 pubs) and nursing (11 pubs) remain stable (AGR 0), with h-indices of 12 and 7. Surgery (8 pubs) grows modestly (AGR 0.5), h-index 6. Turkey leads (32 pubs) despite a decline, h-index 14.

The U.S. follows (29 pubs), stable (AGR slightly negative), high PDLY (20.7). Japan (24 pubs) remains stable (AGR -0.5), h-index 12. Iran grows significantly (AGR 1, PDLY 27.3), h-index 6. Spain (AGR 1, PDLY 13.6), h-index 13. Brazil declines (AGR -2) but remains influential (20 pubs, h-index 9). Germany (AGR 0.5, h-index 9) and India (AGR -0.5, PDLY 18.2) remain stable. South Korea grows strongly (AGR 0.5, PDLY 27.3), h-index 4. China leads in growth (AGR 2, PDLY 40) but has an emerging impact (h-index 3). The UK grows moderately (AGR 0.5, h-index 8). Poland (AGR 0, h-index 5) and France (h-index 6) remain stable. Canada grows moderately (PDLY 28.6, h-index 4). The Netherlands (AGR 0.5, h-index 5) shows promising potential.

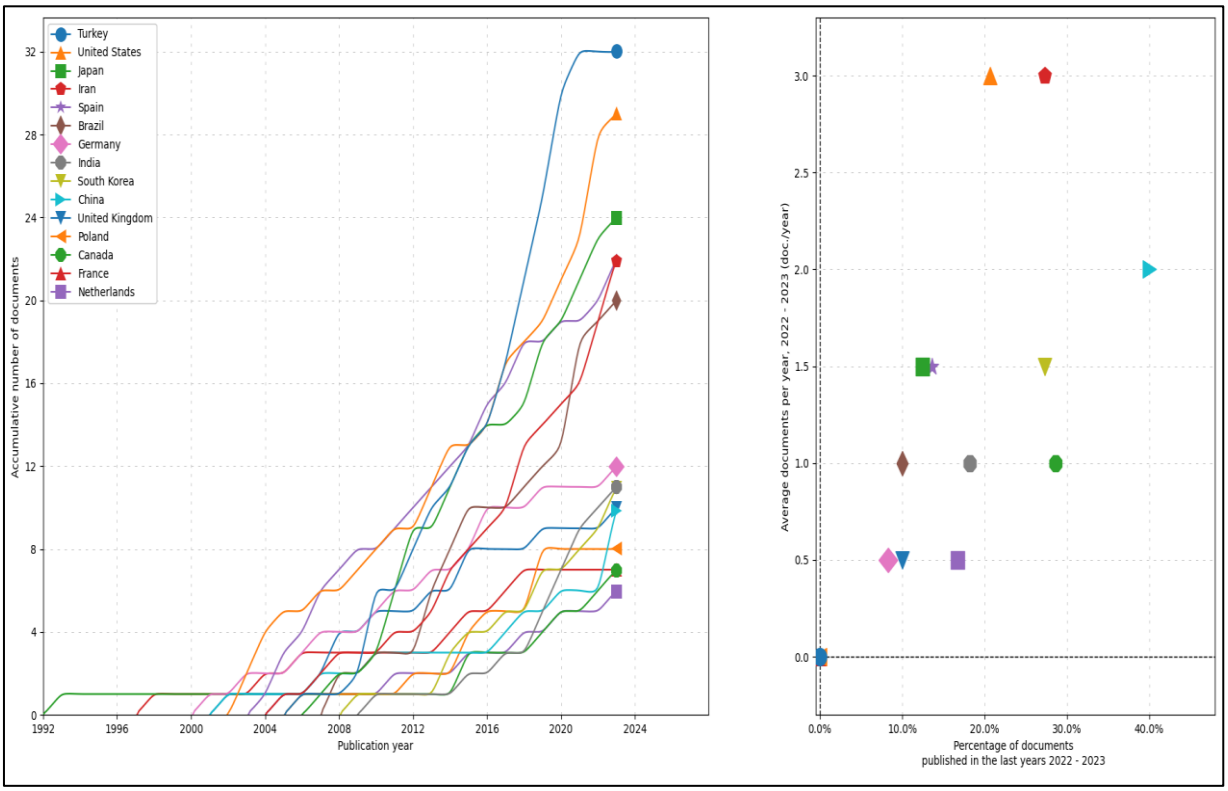

Fig.4: The top 15 countries contributing to research related back pain and quality of care

4.3 Highly Cited LBP Research: Key Themes and Influential Methodologies

A search of WoS and Scopus identified seven highly cited documents (≥100 citations), published between 1997 and 2009 (Table 1). Three studies found that disability is predicted by pain duration, quality of life by disability, but pain severity predicts neither (Pellisé et al., 2009; Kovacs et al., 2004; Kovacs et al., 2005). Two studies highlighted psychological factors (anxiety, depression, fear avoidance) as key influences on quality of life (Koleck et al., 2006; Keeley et al., 2008). Guideline-based active treatment and cognitive behavioral therapy were commonly recommended for LBP management.

Overall, these highly cited studies focused on pain intensity, quality of life, disability, and psychological conditions. Pain intensity was assessed in four studies, all using the Visual Analogue Scale (VAS). Disability was evaluated in four studies, with three using the Roland-Morris Questionnaire (RMQ) and two employing the Oswestry Questionnaire. Four studies examined quality of life, while two explored psychological status. These widely recognized measures have significantly influenced clinical and research approaches to LBP.

Table 1. The top cited papers (minimum 100 above citations)

Authors	DOI	Year	Cited by
Kovacs, F.M., Abraira, V., Zamora, J., del Real, M.T.G., Llobera, J., Fernandez, C.	10.1097/01.BRS.0000107235.47465.08	2004	190
Fritz, J.M., Cleland, J.A., Brennan, G.P.	10.1097/MLR.0b013e318070c6cd	2007	174
LeidigBruckner, G., Minne, H.W., Schlaich, C., Wagner, G., ScheidtNave, C., Bruckner, T., Gebest, H.J., Ziegler, R.	10.1359/jbmr.1997.12.4.663	1997	154
Kovacs, F.M., Abraira, V., Zamora, J., Fernandez, C.	10.1097/01.brs.0000172159.47152.dc	2005	126

Keeley, P., Creed, F., Tomenson, B., Todd, C., Borglin, G., Dickens, C.	10.1016/j.pain.2007.05.015	2008	120
Koleck, M., Mazaux, J.M., Rascle, N., Bruchon-Schweitzer, M.	10.1016/j.ejpain.2005.01.003	2006	108
Pellise, F., Balague, F., Rajmil, L., Cedraschi, C., Aguirre, M., Fontecha, C.G., Pasarin, M., Ferrer, M.	10.1001/archpediatrics.2008.512	2009	103

4.4 Keyword Analysis and Emerging Research Trends in LBP Studies

This study utilizes VOSviewer, a powerful bibliometric tool, to analyze academic keywords. The dataset is highly selective, including only 105 keywords that appear at least five times from a total of 1,308. Using this refined dataset, VOSviewer identifies five distinct keyword clusters (Fig. 5), each representing a cohesive group of related terms.

4.4.1 Cluster 1 (red) - Health and Quality of Life

Cluster 1 includes keywords related to health aspects such as prevalence, risk factors, disease, disability, and health-related quality of life. It also covers psychosocial factors like anxiety, fear, and beliefs that impact health. The average publication year for keywords in this cluster is around 2014.

4.4.2 Cluster 2 (green) - Chronic Pain Management

Cluster 2 focuses on interventions, therapies, and exercises for pain management. Keywords such as "efficacy," "functional restoration," and "physical activity" indicate an emphasis on assessing treatment effectiveness. The average publication year for this cluster is around 2014.

4.4.3 Cluster 3 (blue) - Demographic and Clinical Factors

Cluster 3 encompasses demographic keywords such as "aged," "female," "male," and "middle aged," along with clinical terms like "randomized controlled trial" and "treatment outcome." This cluster, focused on demographic and clinical research, has an average publication year of around 2014.

4.4.4 Cluster 4 (yellow) - Research Methods and Determinants

Cluster 4 includes terms like "correlation," "determinants," "reliability," "version", "united-states" and "veterans". Keywords in this cluster have an average publication year of around 2016.

4.4.5 Cluster 5 (purple)- Surgical and Outcome Measures

Cluster 5 focuses on low back pain, spinal fusion surgery, outcome assessments, and quality of life measures like "SF-36." The average publication year for keywords in this cluster is around 2014, reflecting research on surgical approaches and patient outcomes in LBP management.

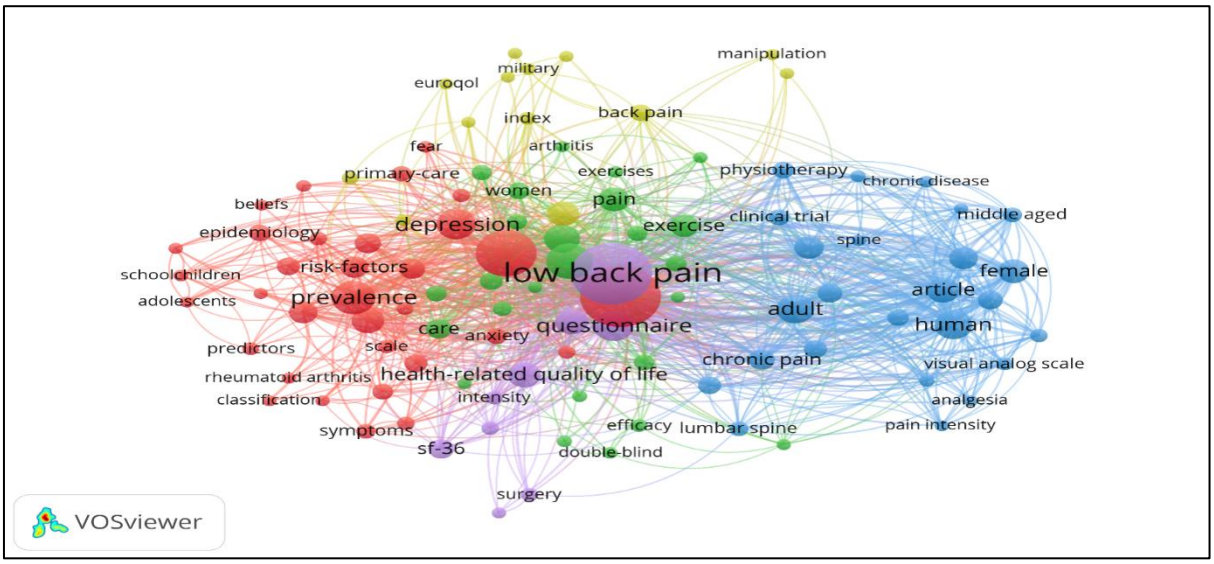

Fig.5: Network Visualization of Keywords

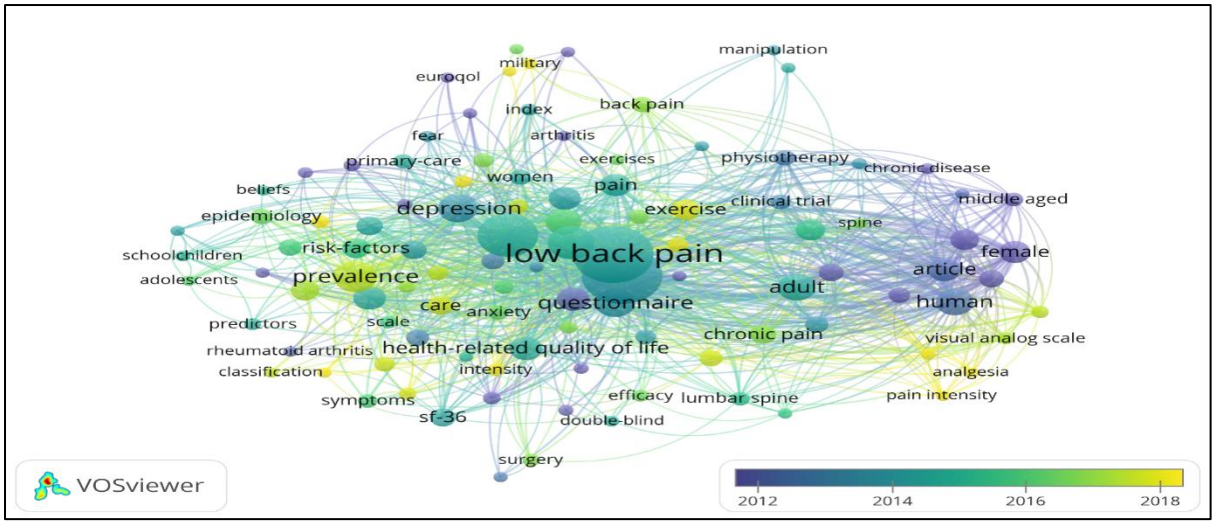

Fig.6: Overlay Visualization of Keywords

5.0 Discussions

The findings from section 4.1 offer key insights into LBP research and quality of care. First, WoS has a significantly higher publication count (232) than Scopus (58) by 2023, indicating its dominance in LBP-related research dissemination. However, WoS shows an AGR of 0, suggesting stable output rather than continuous growth, possibly indicating research saturation. This highlights the need for novel directions, such as digital rehabilitation, telehealth, and AI-assisted therapy. In contrast, Scopus has an AGR of 1, reflecting gradual expansion and the integration of emerging therapies, patient-centered models, and innovative rehabilitation techniques, including biopsychosocial approaches, wearable technology, and machine learning applications. Second, WoS exhibits a higher annual publication growth rate (ADY: 18.5) compared to Scopus (5), reinforcing its role as the primary database for LBP research. However, PDLY is higher in Scopus (17.2) than in WoS (15.9), suggesting increased recent interest in Scopus. Third, WoS holds a substantially higher h-index (37) versus Scopus (9), indicating greater research impact and citation frequency. This suggests that systematic reviews, meta-analyses, and high-quality RCTs contribute to citation trends in WoS, reinforcing evidence-based practice in physical therapy. The lower h-index in Scopus implies that while LBP research there is growing, it has yet to achieve comparable influence, possibly due to differences in journal indexing and citation networks. To enhance impact, physical therapy researchers should prioritize clinically meaningful outcomes, such as functional recovery, patient-reported measures, and long-term rehabilitation effectiveness.

This study found that despite the highest publication count, rehabilitation research in LBP is declining (AGR -2). While rehabilitation remains central to LBP management, growing interest in alternative treatments (e.g., surgical, pharmacological, or multidisciplinary approaches) may be shifting research focus. The moderate h-index (16) suggests a need for higher-quality studies, such as RCTs and meta-analyses, to enhance citation impact. Stable ADY (2) and PDLY (7.4) indicate ongoing research activity but highlight the need for innovation, including digital rehabilitation, telerehabilitation, and AI-assisted therapy. Orthopedics maintains stable output (AGR 0) with a higher h-index (23), reflecting greater impact and clinical relevance. This consistency suggests sustained interest in orthopedic interventions, such as spinal fusion, minimally invasive procedures, and biomechanical assessments. A higher PDLY (11.3) compared to rehabilitation (7.4) implies broader adoption in clinical decision-making and surgical advancements. Rising interest in neurosciences underscores the role of pain neuroscience education (PNE) and cognitive behavioral therapy (CBT) in physical therapy. Recent bibliometric studies also highlight a shift toward digital health, precision rehabilitation, and integrative pain management. Mohapatra et al. (2024) found increasing research in AI-driven rehabilitation, machine learning, and telerehabilitation for physiotherapy.

This study also found that Iran, China, and South Korea are rapidly expanding their research efforts but may benefit from more high-quality studies (e.g., RCTs, systematic reviews) to increase impact. The U.S., Germany, and the U.K. continue to lead in high-impact research, influencing clinical guidelines and evidence-based practice. Meanwhile, countries with stable or declining AGRs (Turkey, Japan, Brazil, India) may require strategic investments to stay competitive in the global research landscape.

Earlier studies (1997–2009) found that pain duration, rather than severity, predicts disability and that quality of life is more affected by disability than direct pain intensity. Recent research supports these findings while introducing new factors, such as social determinants of health, occupational influences, and central sensitization. Vergeld et al. (2021) highlighted the biopsychosocial impact of LBP, showing that psychological distress (anxiety, depression, catastrophizing) significantly influences long-term disability and quality of life, reinforcing earlier findings on fear-avoidance behavior. Older studies supported guideline-based active treatments and CBT as effective LBP management strategies. Newer research validates this while exploring digital interventions, personalized rehabilitation, and hybrid therapy models (telehealth + in-person therapy).

Keyword visualization analysis revealed evolving research trends across clusters: For cluster 1, early research focused on: (1) LBP epidemiology, including prevalence and risk factors. (2) Psychosocial impacts such as anxiety, fear-avoidance, and pain beliefs. (3) Biopsychosocial pain management models emphasizing psychological and social influences on recovery. Recent research has shifted

toward: Lifestyle factors (e.g., sedentary behavior, obesity) as LBP risk factors (Mahdavi et al., 2021). For cluster 2, early research centered on: (1) Evaluating LBP treatment effectiveness, particularly exercise-based therapies and functional restoration programs. (2) Emphasizing physical activity as a core treatment approach. (3) Aligning with evidence-based physical therapy interventions. Recent research has advanced to: (1) AI-driven rehabilitation and machine learning-based personalized therapy (Yagi et al., 2023). (2) Increased use of multidisciplinary approaches, integrating exercise therapy with CBT. For cluster 3, early research explored: (1) Demographic influences on LBP, including age, sex, and gender differences in pain perception. (2) High-quality clinical trials assessing treatment effectiveness. Recent research has evolved toward: Personalized medicine approaches considering demographic variations in treatment response (Hassan et al., 2023). For luster 4, early research emphasized: (1) Methodological advances, including statistical validation and cross-cultural assessment tool adaptations. (2) LBP in military veterans and occupational health contexts. Recent research has focused on: (1) Big data and machine learning applications for identifying LBP risk factors and treatment predictors (Bhak et al., 2024). For cluster 5, early research investigated: (1) Surgical interventions, particularly spinal fusion. (2) Outcome assessments using standardized tools like SF-36. Recent research has shifted toward: Greater use of patient-reported outcome measures (PROMs) to assess functional recovery (Jacob et al., 2021).

6.0 Conclusion & Recommendations

Before 2003, research on LBP and quality of care was limited, but publications increased significantly from 2003 to 2023. The field is primarily driven by rehabilitation, orthopedics, and neurosciences, with Turkey leading in contributions. A review of the seven most cited articles highlights pain duration and psychological factors as key influences on disability and quality of life in LBP patients. Cognitive behavioral therapy and guideline-based active treatments are recommended, with pain intensity, quality of life, disability, and psychological status serving as key evaluation indicators. Previous LBP research has primarily focused on five areas: health and quality of life, chronic pain management, demographic and clinical factors, research methods and determinants, and surgical outcomes. Meanwhile, digital health solutions, AI-driven rehabilitation, and remote therapy models (e.g., digital CBT, telehealth-based pain management) are emerging as transformative approaches in LBP care.

This study has some limitations. It only includes literature from Scopus and WoS core databases, which may limit data completeness. Additionally, the focus on English-language studies excludes relevant research in other languages.

Future studies should explore individualized rehabilitation plans incorporating AI, wearable motion sensors, neuroplasticity-based interventions, and big data analysis while integrating traditional rehabilitation with modern digital health strategies to optimize LBP treatment.

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Paper Contribution to Related Field of Study

Our findings contribute to a deeper understanding of global issues surrounding LBP, emphasizing the need for high-quality care to reduce its impact on individuals and healthcare systems. This study may also benefit researchers aiming to enhance functional performance in individuals with LBP and guide future research on LBP and its quality of care.

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