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PSYCHOLOGICAL STRESS AS A PREDICTIVE FACTOR OF CHRONIC PAIN IN PATIENTS WITH FIBROMYALGIA: A BIBLIOMETRIC STUDY

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ABSTRACT

Psychiatric comorbidities in fibromyalgia are a relevant aspect, as a close correlation between stress and fibromyalgia symptoms has been described. These patients report increased sensitivity to stress, which increases pain, fatigue, and insomnia, worsening their clinical situation. The objective of this study was to analyze scientific literature on psychological stress as a predictor of chronic pain in patients with fibromyalgia, published between 2015 and 2025, through a bibliometric study. Scopus and Web of Science were used as databases through search strategies based on topics and Boolean operators; the selection was carried out using the COVIDENCE program and the PRISMA tool under eligibility parameters; and processing was performed in Bibliometrix (RStudio) and VOSviewer. In scientific performance it was found that, the 245 present an annual growth rate (-7.58%), average citations per document (17.11), while, the main and leaders are Lumley M (author), Clinical Journal Of Pain and Journal Of Pain (journal), Harvard University (Affiliation) and United States (country); in the scientific mapping of the co-authorship technique between authors identified 5 clusters and co-occurrence of keywords generated 4 clusters. Among the limitations found in the thematic map, it is emphasized that the subject is an active area with defined topics, but still in the process of integration and consolidation.

KEYWORDS: Stress, Psychology, Pain, Illness, Fibromyalgia, Bibliometrics.

1. INTRODUCTION

Fibromyalgia (FM) or fibromyalgia syndrome (FMS) is one of the most common causes of chronic musculoskeletal pain (Movasat et al., 2021) affecting 2% to 8% of people worldwide and is the (Siracusa et al., 2021; Wasti et al., 2023) second most prevalent rheumatic disease. Previously, it was also known as fibrositis, which referred to peripheral inflammation in pathogenesis (Pérez et al., 2023) (Maffei, 2020). This chronic disorder is characterized by symptoms such as generalized physical pain of unknown etiology, muscle discomfort, exhaustion, sleep disturbances, cognitive impairment or fibrous fog, and functional disability (Marshall et al., 2024) (Sumbul et al., 2025; Wasti et al., 2023).

For its part, it mentions that it is also accompanied by different comorbidities, including irritable bowel syndrome and chronic fatigue syndrome. It also highlights that, although the etiology is unknown, it is usually associated with predisposing factors such as negative events, stressful environments, and physical or emotional trauma, in which 90% of patients diagnosed with these symptoms are women. On the other hand, all the symptoms they present make it difficult to identify an accurate diagnosis and treatment, since they are often Galvez et al. (2019) (Tuta et al., 2022) (Wasti et al., 2023) (Oliva & García, 2024) confused with the various conditions of Carpal Tunnel syndrome, Raynaud's and Sjögren's syndrome, among others. (Pérez et al., 2023)

Siracusa et al. (2021) He emphasizes that psychiatric comorbidities in fibromyalgia are also a relevant aspect, as a close correlation between stress and fibromyalgia symptoms has been described. Previous studies indicate that these patients report a greater sensitivity to stress, which increases pain, fatigue and insomnia, worsening the clinical situation of FMS, on the contrary, the reduction of this is associated with the improvement of symptoms. (Ablin, 2025) (Oliva & García, 2024) (Álvarez et al., 2019)

In this context, psychological stress, as an active response involving an organized system of communication between the brain and other organs, including the endocrine and immune systems, to mobilize internal defenses for survival and safety, emerges as a relevant factor that can exacerbate pain perception and contribute to the development of chronic fibromyalgia symptoms. From this perspective, it is emphasized that with these symptoms the patient's quality of life is reduced at the level of physical and psychological well-being. (Spector et al., 2020)

The scientific literature has recorded the association between stress and chronic pain in the specific case of fibromyalgia, however, this relationship deserves particular attention through a bibliometric analysis, which shows the scientific interest in this topic over time. Bibliometric analysis is a crucial tool that assesses trends and patterns in scientific research, and is useful for identifying gaps in research and guiding further research. Its importance lies in the fact that it allows elucidating global research initiatives and identifying significant contributions to psychological stress as a predictor of chronic pain in patients with fibromyalgia.

In this sense, the present research aims to analyze the scientific production on psychological stress as a predictor of chronic pain in patients with fibromyalgia, published between 2015 and 2025, through a bibliometric study. In order to fulfill the purpose of the study, **the following questions were raised that made the development of the research viable**

1. What is the scientific performance of the literature on stress as a predictor of chronic pain in patients with fibromyalgia?
2. What is the scientific mapping of networks on stress production as a predictor of chronic pain in fibromyalgia patients?
3. What are the research gaps in stress production as a predictor of chronic pain in fibromyalgia patients?

2. METHODOLOGY

2.1. Databases Used

The main databases consulted were Scopus and Web of Science, since both contain scientific literature published in peer-reviewed journals (Aguiar et al., 2021) , and are generally considered the most complete sources of data for various purposes, therefore, their choice was based on the wide scope they have. (Pranckutė, 2021) On the other hand, all the data was downloaded on June 10, 2025 to avoid biases that may arise from continuous updates.

2.2. Search Strategy

The search strategy was formulated with the variables of the research theme "Psychological stress", "Chronic pain", "Fibromyalgia" translated into English for a greater scope. In the first instance, descriptors based on the topic (title, abstract, Keyword Plus and author's keywords) and Boolean operators (AND/OR) were used, these aspects facilitated the precision of the search in each database. Table 1 details the combination of the strategies specified in search strings:

Table 1: Search Strategies.

Database	Strategy
Scopus	TITLE-ABS-KEY (("psychological stress" OR "emotional stress") AND ("chronic pain") AND ("fibromyalgia"))
Web of Science	(((TS=(psychological stress)) OR TS=(emotional stress)) AND TS=(chronic pain)) AND TS=(fibromyalgia)
Source: Prepared by the authors based on the data provided by the databases in the advanced search.	

Table 2: Eligibility Criteria: Inclusion and Exclusion.

Inclusion criteria	Exclusion Criteria
Year: 2015 to 2025	Year: before 2015
Population: Patient diagnosed with fibromyalgia	Population: Patients without a diagnosis
Document Type: Scientific Articles	Type of document: Essays, memoirs, book chapters, among others
Language: Spanish and English	Language: studies that are not in Spanish or English
Access: Open	Access: Restricted or paid
Source: Authors.	

2.3. Study Selection

For the selection of the studies collected through the search strategy, COVIDENCE was used, a web-based program that uses various tools to evaluate the retrieved documents and selects them under eligibility criteria: inclusion and exclusion (Table 2) with the built-in PRISMA tool that guarantees a rigorous and systematic approach to selecting relevant literature through its structured process.

From this, a flow chart was generated with the three levels of selection: (i) identification, (ii) screening and (iii) inclusion.

Figure 1 details the level of selection flow of the scientific literature. At the first level of identification, a total of 543 publications were recovered, Scopus (79) and Web of Science (464), of which 63 documents were automatically deleted by duplication. In the second level of screening, 216 were omitted once the title and abstract were evaluated, therefore, they did not fit the topic of study, leaving a total of 319, which were filtered under the eligibility criteria previously determined. Based on these filters, 74 that did not meet the inclusion indicators were excluded. Consequently, the included level was considered the final selection of 245 scientific articles for the final analysis.

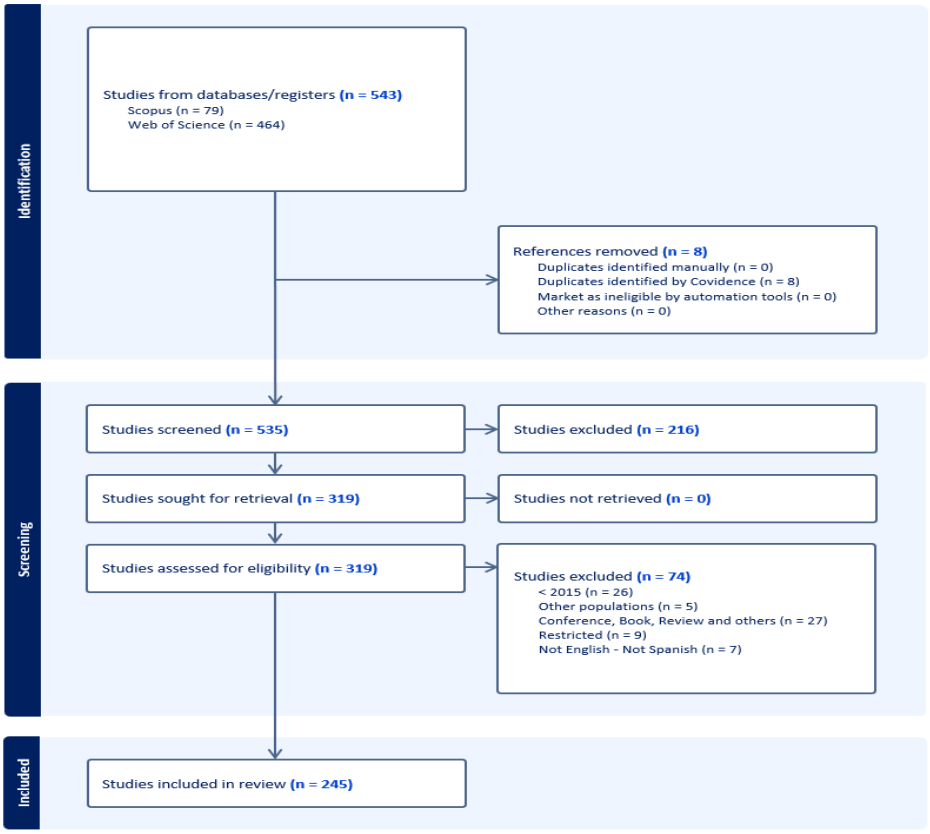

Figure 1: PRISMA Flowchart of the Study Selection Process.
Source: Diagram exported from COVIDENCE.

2.4. Data Extraction and Processing

The 245 selected studies were exported through the COVIDENCE program in CSV format. Subsequently, the Bibliometrix software (version 4.3.0) and RStudio (version 4.4.1) were used for processing, which allowed merging the results of both databases and generating graphs of scientific performance.

Then, VOSviewer was used, another commonly used bibliometric tool that allowed generating structures, network of collaborations and relationships through various techniques and units of analysis. In general, in the network analysis provided by the program, the node size represents the volume of publication, the frequency of citations, or the frequency of occurrence; The color of the node indicates different clusters, and the lines between these represent dating or co-occurrence relationships. From this, the graphs of the scientific mapping were generated using techniques such as co-authorship and co-word analysis.

2.5. Bibliometric Methods

Two main bibliometric methods based on performance analysis and scientific mapping were used to analyze the data. On the one hand, the performance analysis used metrics to assess research productivity by year, citation, author, source, affiliation, and country. On the other hand, through scientific mapping, the intellectual structure that focuses on the relationships between the research constituents was explored, for this, two types of mapping were used: co-authorship analysis with author unit and co-occurrence analysis with keyword unit.

3. RESULTS

3.1. Scientific Performance

Figure 2: General Description of the Production Published in the Period 2015 to 2025. Source: Extracted from Bibliometrix. In Original Language Spanish.

The analysis of the general graph reveals interesting trends in scientific production related to psychological stress and chronic pain in patients with fibromyalgia during the period 2015-2025. During this time interval, 145 sources were identified, which together published a total of 245 documents (scientific articles). The annual growth rate of scientific production in this field is -7.58%, which indicates a decrease in the number of publications throughout the period analyzed.

We found 657 self-authored keywords (DEs). In addition, the average age of the documents is 5 years, and the average number of citations per document is 17.11, therefore, it is an active and high-impact field of research.

As far as authors are concerned, the study identified a total of 1298 researchers who have published in this field and of these, only 3 are of sole authorship, emphasizing a predominance of collaboration between researchers. In this sense, when analyzing the collaboration, it was found that the average number of co-authors per document is 6.39. In addition, 22.45% of the documents have international co-authorship, that is, there is a high degree of cooperation at a global level.

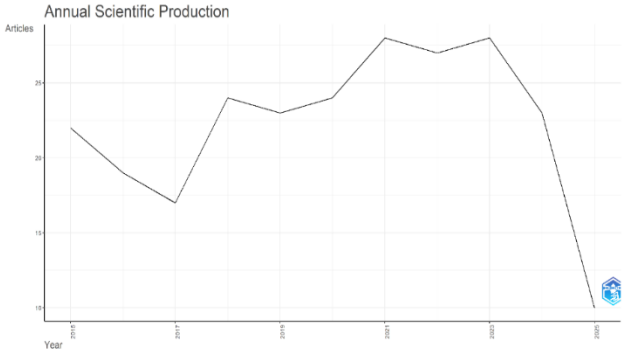

Figure 3: Annual Growth in Scientific Production. Source: Extracted from Bibliometrix.

Figure 3 shows that scientific production has an irregular growth between 2015 and 2024. In 2015, a total of 22 papers were published, but the number decreased to 19 in 2016 and 17 in 2017, evidencing a downward trend in those early years. However, from 2018 production began to increase, reaching 24 documents published that year, growth that was maintained in 2019, with 23 publications. Meanwhile, the highest point was recorded in 2020 and 2021, with 24 and 28 articles published, subsequently, in 2022 there were 27 publications, followed by another 28 in 2023, but in 2024 production decreased again to 23 documents.

These results show ups and downs, therefore, the general annual growth rate of scientific production in

this field is negative, since it stands at -7.58%. In other words, there is a general trend towards a decrease in the number of publications throughout the period analyzed.

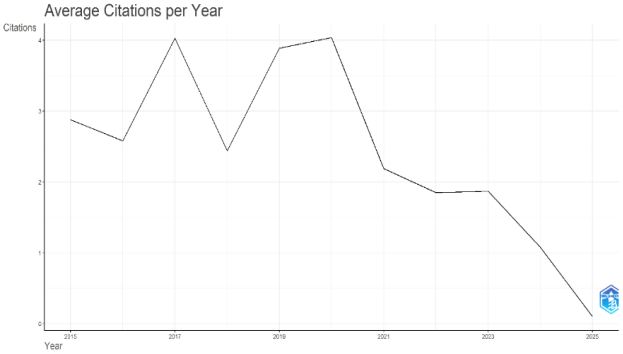

Figure 4: Average Citations per Year. Source: Extracted from Bibliometrix.

Figure 4 shows that, in 2015, the average number of citations per document was 31.68, decreasing to 25.79 in 2016. Then, in 2017, the highest peak was recorded with 36.24. Starting in 2018, the average began to decline, reaching 19.50 that year. Meanwhile, in 2019 and 2020, average values of 27.22 and 24.21 citations were observed, respectively.

However, as of 2021 the average number of citations per document has decreased significantly, from 10.96 in 2021 to 7.41 in 2022 and 5.61 in 2023. And in 2024 the average stood at 2.17, considered the lowest value in the period analysed.

The findings indicate that, although there were periods with a high impact in terms of citations, during the last few years a downward trend has been observed in the average number of citations per document published in this field of research.

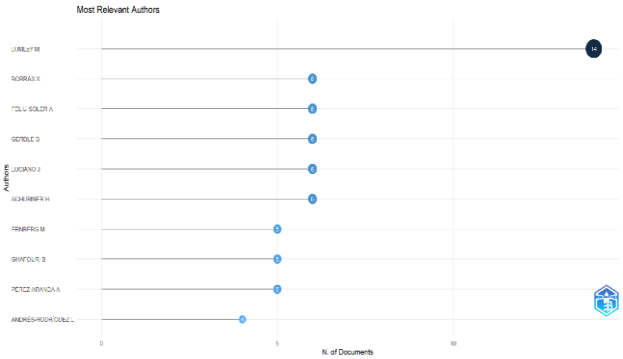

Figure 5: Most Relevant Authors. Source: Extracted from Bibliometrix.

In correspondence with Figure 5, the 10 most relevant authors are evidenced. Lumley M stands out as the most relevant author with 14 published articles, that is, he is the most prolific of the group analyzed. Other authors have also made important contributions, such as Borras X, Feliu-Soler A, Gerdle B, Luciano J and Schubiner H, each with 6 publications. Meanwhile, Ernberg M, Ghafouri B and Pérez-Aranda A, have published 5 papers each, occupying a relevant position. Finally, Andrés-Rodríguez L, with 4 documents, completes the set of the most outstanding researchers in this field.

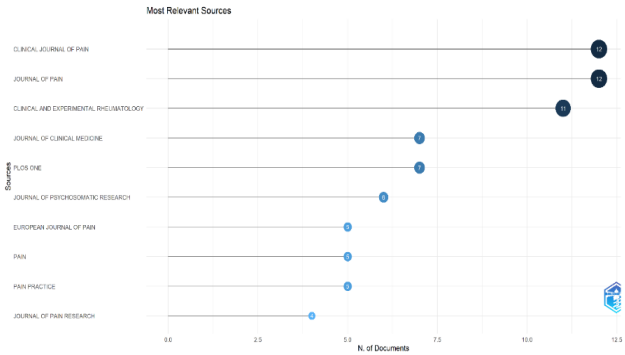

Figure 6: Most Relevant Sources. Source: Extracted from Bibliometrix.

Figure 6 shows the 10 most relevant sources. It is noteworthy that the journals Clinical Journal Of Pain and Journal Of Pain lead with 12 publications each, making them the most prominent sources in this field. Followed by Clinical And Experimental Rheumatology in third place with 11 papers. Other important journals include Journal Of Clinical Medicine and Plos One, both with 7 papers, followed by Journal Of Psychosomatic Research, European Journal Of Pain, Pain, and Pain Practice, with 5-6 papers published, and lastly, Journal Of Pain Research with 4. This panorama reflects the diversity and relevance of the sources in which the most outstanding findings related to the previously analyzed authors are disseminated.

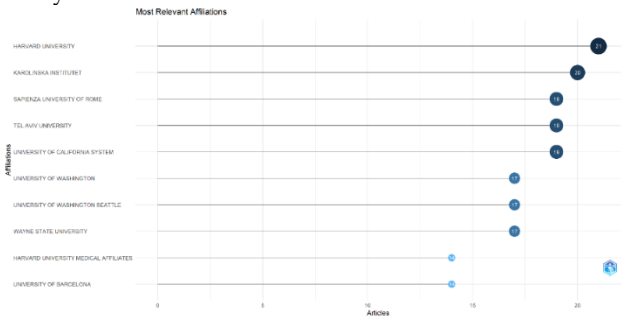

Figure 7: Most Relevant Affiliations. Source: Extracted from Bibliometrix.

In relation to the analysis of Figure 7 that addresses the most relevant affiliations, Harvard University stands out as the leading institution with 21 documents, followed by Karolinska Institutet with

20 and Sapienza University Of Rome, Tel Aviv University and University Of California System, each with 19 publications. Other institutions include the University Of Washington, University Of Washington Seattle, and Wayne State University, with 17 papers each, as well as Harvard University Medical Affiliates and University Of Barcelona, both with 14 papers. This panorama shows the prominence of these leading research institutions, mainly concentrated in some of the most prestigious academic and research centers internationally.

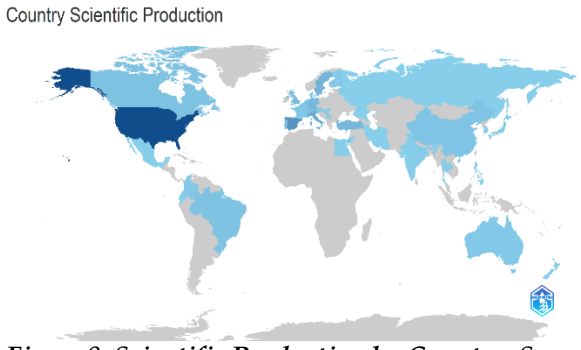

Figure 8: Scientific Production by Country. Source: Extracted from Bibliometrix.

Figure 8 provides information on the scientific production of the most prominent countries according to the colors of the map, in which those with the highest production are represented in blue and turquoise tones, while those with the lowest production are shown in gray tones.

This distribution made it possible to clearly visualize the disparity in scientific activity between the different regions of the world. Therefore, it is detailed that the United States stands out as the leading country, with a scientific production of 300 units, which positions it well above the rest of the countries. In a second level, Spain with 129 units, Italy with 81 and Sweden with 61, making up a group of European countries with outstanding scientific activity. Turkey, with 51 points, is also emerging as a relevant player. Meanwhile, Germany, the United Kingdom, Israel and Portugal make up a next group, with values ranging from 32 to 46 production units. In last place, Canada closes the ranking with 28 units, reflecting a more moderate activity compared to the leaders.

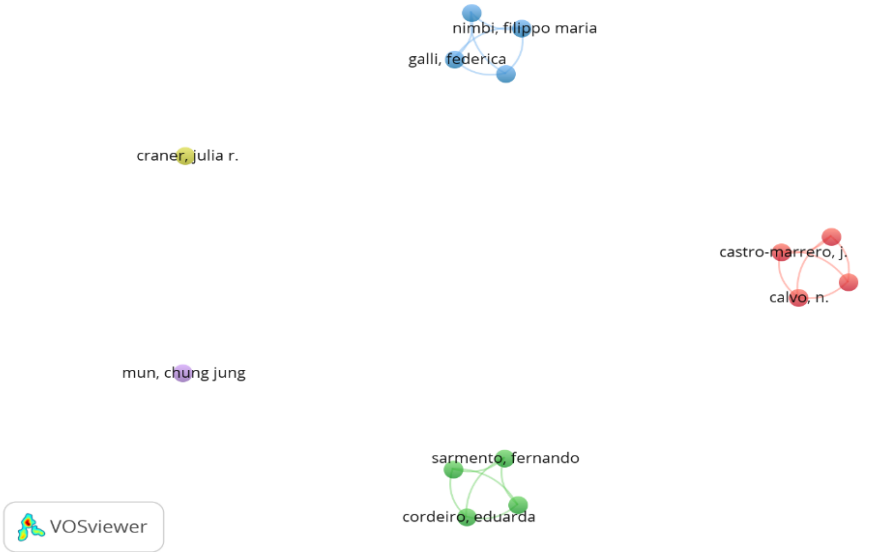

Figure 9: Co-authorship of Authors. Source: Extracted from VOSviewer.

Figure 9 represents the co-authorship relationships between authors that allowed us to address the understanding of the dynamics of collaboration. "Co-authorship" was selected as the type of analysis and "Authors" as the unit. A threshold of 5 was established, in which only 14 of the 1298 met the parameter, showing a connection through collaborative studies with a minimum of two citations.

The analysis of the co-authorship network shows that Nimbi, Filippo Maria and Galli Federica have collaborated on publications, establishing a link between them. Similarly, Castro-Marrero, J. and Calvo, N. also present a joint collaboration. On the other hand, Sarmento Fernando and Cordeiro Eduarda exhibit a closer collaboration, emphasizing a more significant co-authorship relationship between them.

In contrast, Craner, Julia R. and Mun, Chung Jung appear as individual nodes, without direct

connections with the other authors represented on the map, that is, they have not established collaborations like the other authors. In summary, both joint working groups and those that have developed their research more independently have been highlighted.

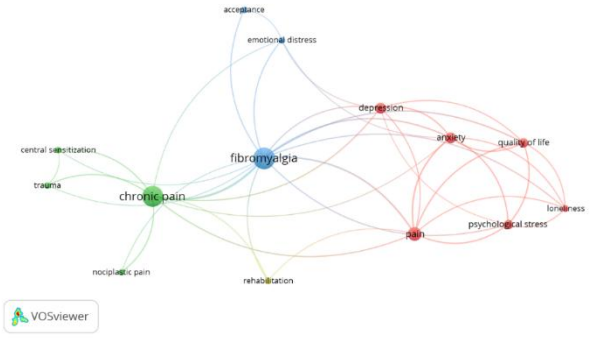

Figure 10: Co-occurrence of Author Keywords. Source: Extracted from VOSviewer.

Figure 10 shows co-occurrence as a type of analysis and key words as unity. A minimum threshold of 5 was established, highlighting a total of 657 identified words, of these only 15 met the threshold, generating 4 clusters. In this sense, the analysis of co-occurrence of author keywords reveals several important connections between the different concepts.

First, it is observed that the green cluster "chronic pain" is closely related to "trauma", "central sensitization" and "nociplastic pain", which points to an association between these factors in the context of chronic pain. Meanwhile, the blue cluster of "fibromyalgia" is significantly linked to "acceptance" and "emotional distress".

The red cluster "pain" is related to "psychological stress", "anxiety", "depression", "quality of life" and "loneliness", this means that the multidimensional nature of this chronic disease addresses both the physical and psychological aspects of the patient. On the other hand, the yellow cluster of "rehabilitation" presents a connection with the main groups "fibromyalgia", "pain" and "chronic pain", which emphasizes that rehabilitation is a key component in the scientific production that addresses the comprehensive management of fibromyalgia and the associated chronic pain symptoms.

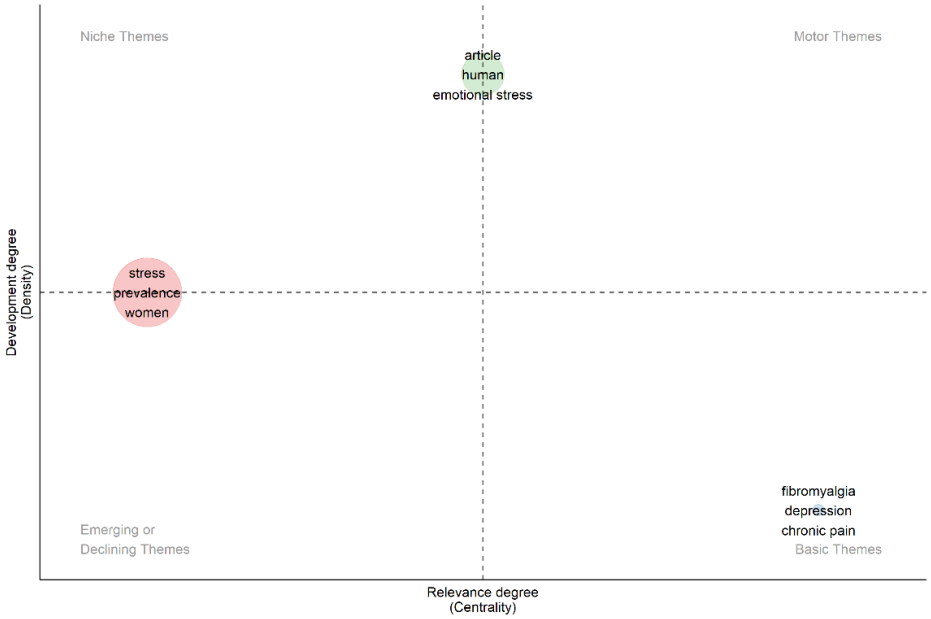

Figure 11: Thematic Map of Author's Keywords.

Figure 11 of the quadrants reveals a diverse and multifaceted structure in the field of study

In the upper left quadrant of specialized or niche topics, concepts such as "emotional stress", "article" and "human" are defined. These units are highly developed, i.e. they have been the subject of detailed and specific research. However, their low centrality suggests that they are not strongly connected to other topics in the field, which may limit the overall impact.

On the other hand, the lower right quadrant represents the basic or cross-cutting topics, it houses terms such as "fibromyalgia", "depression" and "chronic pain". These issues are central to the field and act as articulating axes of the scientific literature on psychological stress and chronic pain. However, the low density indicates that, although they are fundamental, they still require greater depth and

theoretical-methodological development. This represents an opportunity for future research that is interested in consolidating them with an empirical basis.

In the lower left quadrant that corresponds to emerging or declining themes, there is a thematic group made up of "stress", "prevalence" and "women". These have low density and centrality, that is, on the one hand, they may be in the process of consolidation as emerging lines of research; and on the other, it is losing relevance in the field, however, due to the current context it is more likely that it is a growing thematic group towards research that explores the prevalence of stress in women with fibromyalgia.

Meanwhile, the upper right quadrant of the motor themes (highly developed and central) is empty. This emphasizes that, although there are relevant and growing topics, so far it has not yet reached a degree of maturity and connection sufficient to be considered a pillar of the field. Overall, the map reveals that the study of psychological stress as a predictor of chronic pain in patients with fibromyalgia is an active area, with defined topics, but still in the process of integration and consolidation.

4. DISCUSSION

The main findings of the bibliometric study allowed us to identify several significant contributions related to the scientific production of psychological stress as a predictor of chronic pain in patients with fibromyalgia. In the first instance, a considerable scientific production was evidenced with 245 documents published between 2015 and 2025, which despite the negative trend in the annual growth rate (-7.58%), both the high average of citations per document (17.11) and international collaboration (22.45%) highlight that the area has impact, relevance and collaborative dynamics. In this way, the main and leading contributors of the research actors were identified, among them, Lumley M (author), Clinical Journal Of Pain and Journal Of Pain (journal), Harvard University (Affiliation) and the United States (country).

In relation to scientific mapping, the use of bibliometric techniques made it possible to quantify production and map the relationships between authors and keywords. In the co-authorship technique between authors, 5 clusters were identified, and in the dispersion, 3 joint working groups and 2 groups that have developed the research independently, that is, do not maintain a connection with other authors, were evidenced. Meanwhile, in the technique of co-occurrence of authors' keywords, 4 clusters were generated with main topics such as "chronic pain", "fibromyalgia", "pain" and "rehabilitation"

Another important finding is displaced from the thematic map, in which it was found that, although central themes such as "fibromyalgia", "chronic pain" and "depressio" are positioned in centrality, they still present low density, emphasizing a still limited theoretical development. At the same time, no motor themes were identified within the field, which establishes a structural in the consolidation of the theme. On the other hand, the identification of emerging themes such as "stress", "prevalence" and "women" point to areas of recent interest that can respond to contemporary approaches, such as research with a gender perspective and the search for psychological biomarkers predictive of chronic pain.

Among the main limitations of this study, lies in the exclusive dependence on only two databases such as Scopus and Web of Science, this selection may omit valuable contributions not recorded in these sources. On the other hand, the minimum threshold established for both co-authorships and keywords may exclude key, but less recurring, authors or concepts.

Based on the above, it is recommended that future research focus on the consideration of other databases and suggest another number of thresholds for the processing of networks. Likewise, it is essential to explore in greater depth the emerging issues that combine psychological stress and the other topics identified in the quadrant of the thematic map in order to address the identified needs of scientific production.

5. CONCLUSION

The bibliometric analysis showed that 245 documents on psychological stress as a predictor of chronic pain in patients with fibromyalgia, published between 2015 and 2025, show a declining annual production (-7.58%), but with a high average of citations per document (17.11) and international collaboration (22.45%). In addition, among the main and leading contributors of the research actors, Lumley M (author), Clinical Journal Of Pain and Journal Of Pain (journal), Harvard University (Affiliation) and the United States (country) were identified.

Scientific mapping made it possible to quantify production and map the relationships between authors and keywords. In the co-authorship technique between authors, 5 clusters were identified, with an evident dispersion, 3 joint

working groups and 2 groups that have developed research independently. And in the technique of co-occurrence of authors' keywords, 4 clusters were generated that point out the main topics such as "chronic pain", "fibromyalgia", "pain" and "rehabilitation".

Despite these findings, it is concluded that the study has limitations in the selection of databases such as Scopus and Web of Science and the minimum threshold established for both the co-authorship technique and keywords. Therefore, it is essential that future research considers the compilation of scientific production in other databases such as PubMed, which contains biomedical research publications.

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