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Global Research Trends on Yoga Interventions in Polycystic Ovary Syndrome: A Bibliometric Study

Dipika Mandal Sarkar[1], Dr. Lakshmi Narayan Kaibarta[2], Noorkalam Sekh[3]

[1,2]Post Graduate Government Institute for Physical Education, W.B., India
[3]Department of Physical Education and Sport Science, Visva-Bharati, Santiniketan-731235, West Bengal, India.

Abstract

Background: Polycystic Ovary Syndrome (PCOS) is an endocrine disorder that is prevalent in women of reproductive age and is characterized by the presence of metabolic, hormonal, and psychological complications. Yoga has become one of the non-pharmacological interventions that can be used to treat PCOS symptoms. The study aims to explore the trends of yoga intervention to manage PCOS in the context of international research.

Methods: A bibliometric analysis was done using the Biblioshiny interface of the bibliometrix R package based on major scientific databases (PubMed/Medline) between 2011 to 2026. The trends in the research and intellectual structure were investigated through the performance indicators, analysis of co-occurrence of keywords, thematic mapping, and collaboration networks.

Results: A total of 43 documents were found in 28 academic journals. The mean number of authors per document was 5.9, and this was a high degree of collaborative research. Themes of core research, such as yoga-interventions, insulin resistance, hormonal regulation, stress reduction, and quality of life in women with PCOS, were identified. The collaborative effort of the international research was moderate (18.6% of the total publications).

Conclusions: Yoga-based interventions to manage PCOS are becoming trendy and showing high scientific interest as an alternative. The future studies should be directed at standardized yoga regimens, multinational clinical studies, and improved global cooperation in an effort to reinforce the evidence-based assimilation of yoga into the management of PCOS.

Keywords: Yoga; Polycystic Ovary Syndrome; Bibliometric Analysis; Women's Health; Complementary Therapy

1. INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a widespread endocrine and metabolic condition in women of childbearing age throughout the globe, and the degree of prevalence is estimated to be between about 6 percent and 20 percent based on the diagnosis criteria (Teede et al., 2018). Hyperandrogenism, ovulatory dysfunction, insulin resistance, obesity, and polycystic ovarian morphology as well as important

psychological comorbidities, such as anxiety and depression (Azziz et al., 2016), characterize the syndrome.

In addition to reproductive dysfunction, PCOS has a close relationship with long-term metabolic problems, such as type 2 diabetes mellitus, dyslipidaemia, the risk of cardiovascular diseases, and chronic low-grade inflammation (Escobar-Morreale, 2018). These multidimensional implications require holistic and sustainable strategies of management.

Traditional interventions are hormonal therapy, insulin-sensitizing drugs, and lifestyle change, but the treatment results are limited by adherence difficulties and side effects, as well as partial long-term effectiveness (Teede et al., 2018). Therefore, research on complementary and integrative methods, especially yoga, is limited.

Yoga combines bodily poses, respiratory control, leisure, and meditation, which bring about overall physiologic and psycho-psychologic effects. There is clinical evidence that yoga is a technique that can be used to improve the insulin sensitivity, endocrine capacity, stress, and quality of life in PCOS women (Nidhi et al., 2012; Patel et al., 2020).

Although the scientific interest increases, the worldwide research framework and thematic development of yoga-based PCOS research literature is poorly charted. Bibliometric analysis can be used to quantitatively assess research productivity, collaboration and intellectual trend in a given scientific field (Aria and Cuccurullo, 2017).

Thus, this paper performs a bibliometric review of the international research trends of yoga and PCOS during 2011-2026.

2. OBJECTIVES

Primary Objective

To examine the available scientific literature on yoga-based interventions on PCOS globally by means of employing bibliometric methods.

Secondary Objectives

- Study the trends in publishing and the features of documents.
- Test patterns of authorship and collaboration.
- The thematic research clusters are identified based on the analysis of the keywords.
- Identify research directions in the future.

3. MATERIALS AND METHODS

3.1 Study Design: The scholarly bibliometric research design was used.

3.2 Data Source: Publications in PubMed/Medline that had been indexed since 2011-2026 were accessed.

3.3 Search Strategy: Search terms combined “Yoga” AND “Polycystic Ovary Syndrome” OR “PCOS”.

3.4 Inclusion Criteria

- English peer-reviewed publications.
- Yoga-related PCOS studies
- 2011-2026 publication period

3.5 Data Analysis

Analyses of data were done using Biblioshiny (bibliometrix R package) to:

- Descriptive indicators

- Collaboration networks
- Keyword co-occurrence
- Thematic mapping

4. RESULTS

4.1. The key features of the dataset are as follows:

The bibliometric resource was 2011-2026 and included 43 sources that were published in 28 academic journals. The mean age of the documents was 4.33 years, which demonstrates that scientific focus on yoga-based interventions to help with Polycystic Ovary Syndrome (PCOS) is not that old. The retrieved publications involved a total of 201 authors, and the collaboration among researchers was high since the single-authored studies were rather rare. The average number of co-authors in each document was 5.88, and the international co-authorship rate was 18.62, which is considered moderate global collaboration in this field of research shown in figure.1.

Figure 1 (Main Information)

4.2 The production of scientific output is yearly.

As per the annual production of scientific works, it produces. The time-related distribution of the publication is characterized by the progressive growth of the research output since 2015, which implies the emergence of the global interest in the use of yoga as the means of managing PCOS. It is shown in Figure 2 (Annual Scientific Production) which shows the gradual increase in the field over the last few years.

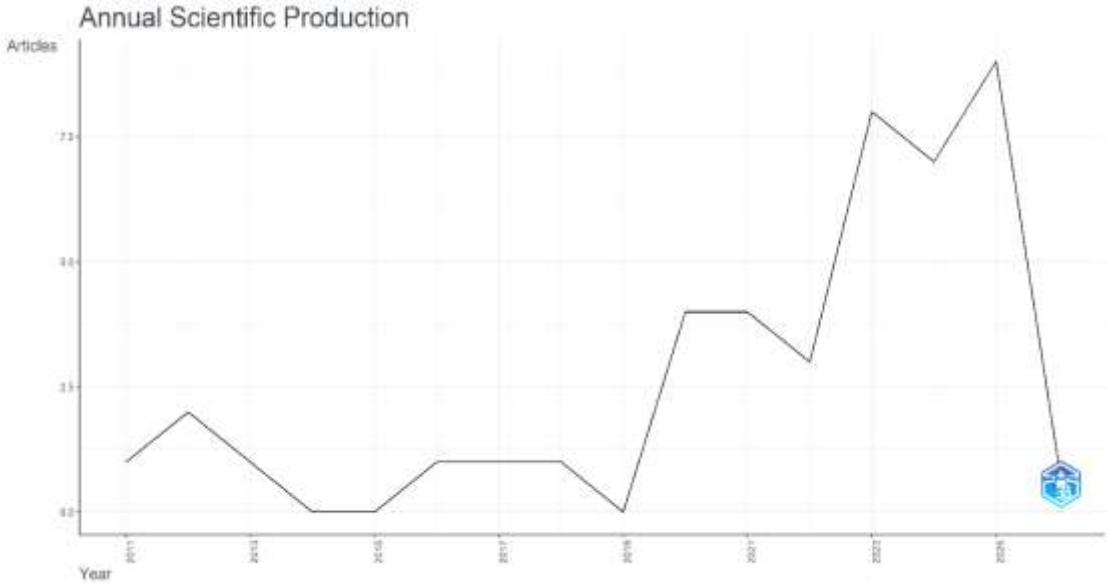


Figure 2 (Annual Scientific Production)

4.3 Productivity of Sources and Author Over Time.

Journal productivity analysis shows that the publication is spread across various academic sources and there is no one journal that would overtake the field. Figure 3 (Source Production Over Time) shows the development of the source contributions over time.

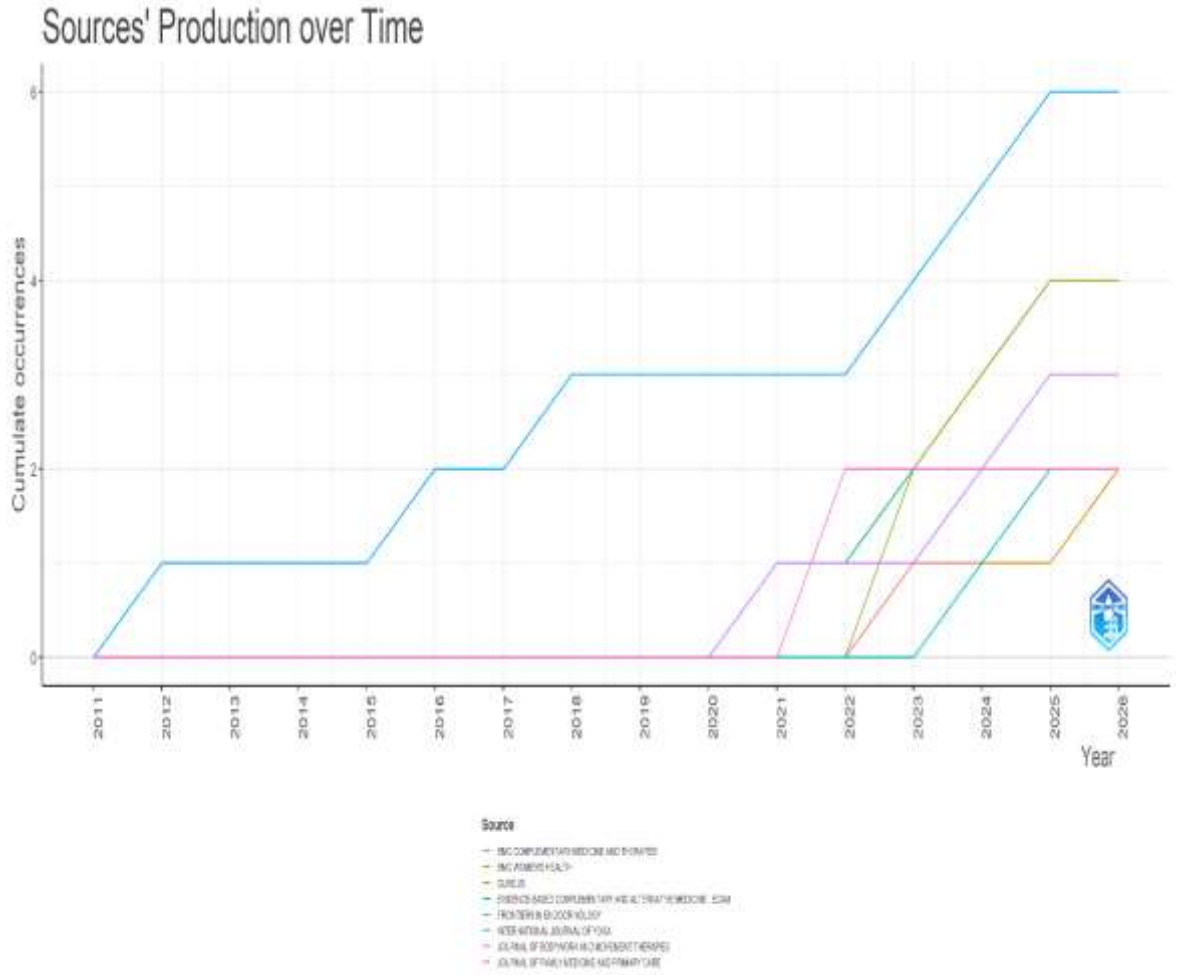


Figure 3 (Source Production Over Time)

Equally, the patterns of author productivity suggest continuous but minimal contribution by individual researchers, which are indicative of an emerging research community, and not an established core of authors. These are the dynamics depicted in Figure 4 (Author Production Over Time).

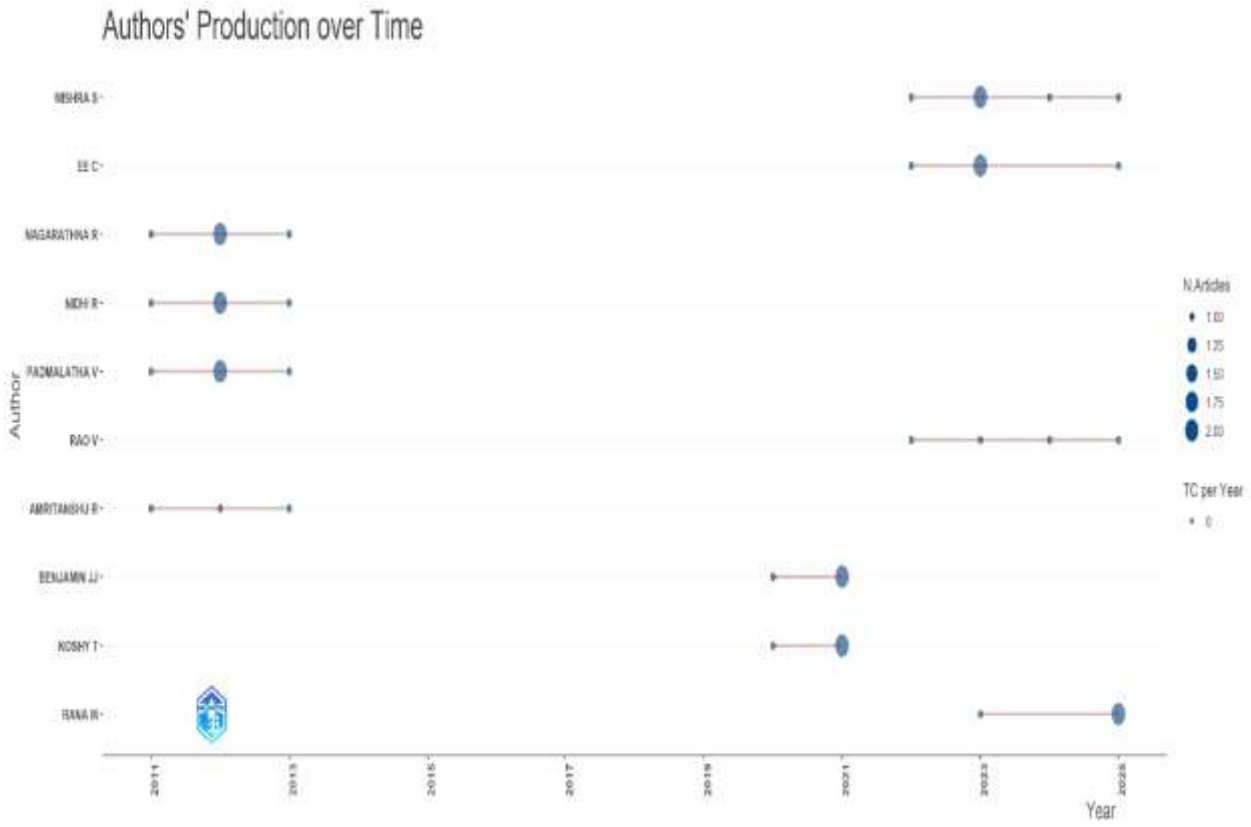


Figure 4 (Author Production Over Time)

4.4 Scientific Production Country-Wise and Corresponding Authors.

The country level analysis shows that the results of the research are concentrated in few countries and this implies that there is an unequal distribution of the global participation in the research on yoga PCOS.

This distribution is represented in:

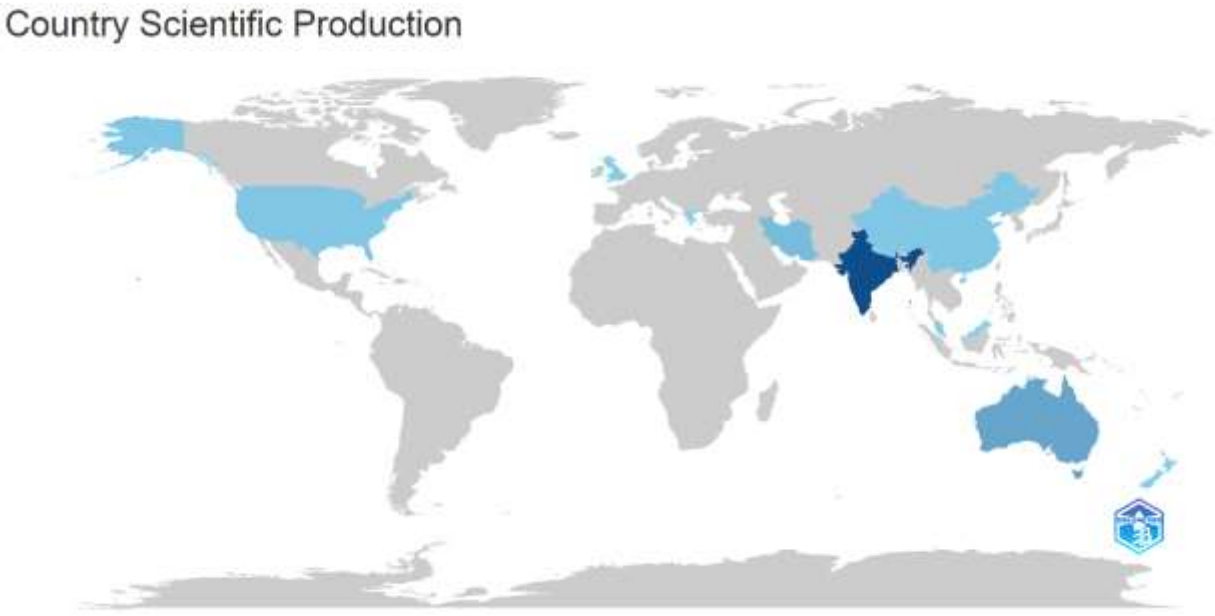


Figure 5 (Country Scientific Product)

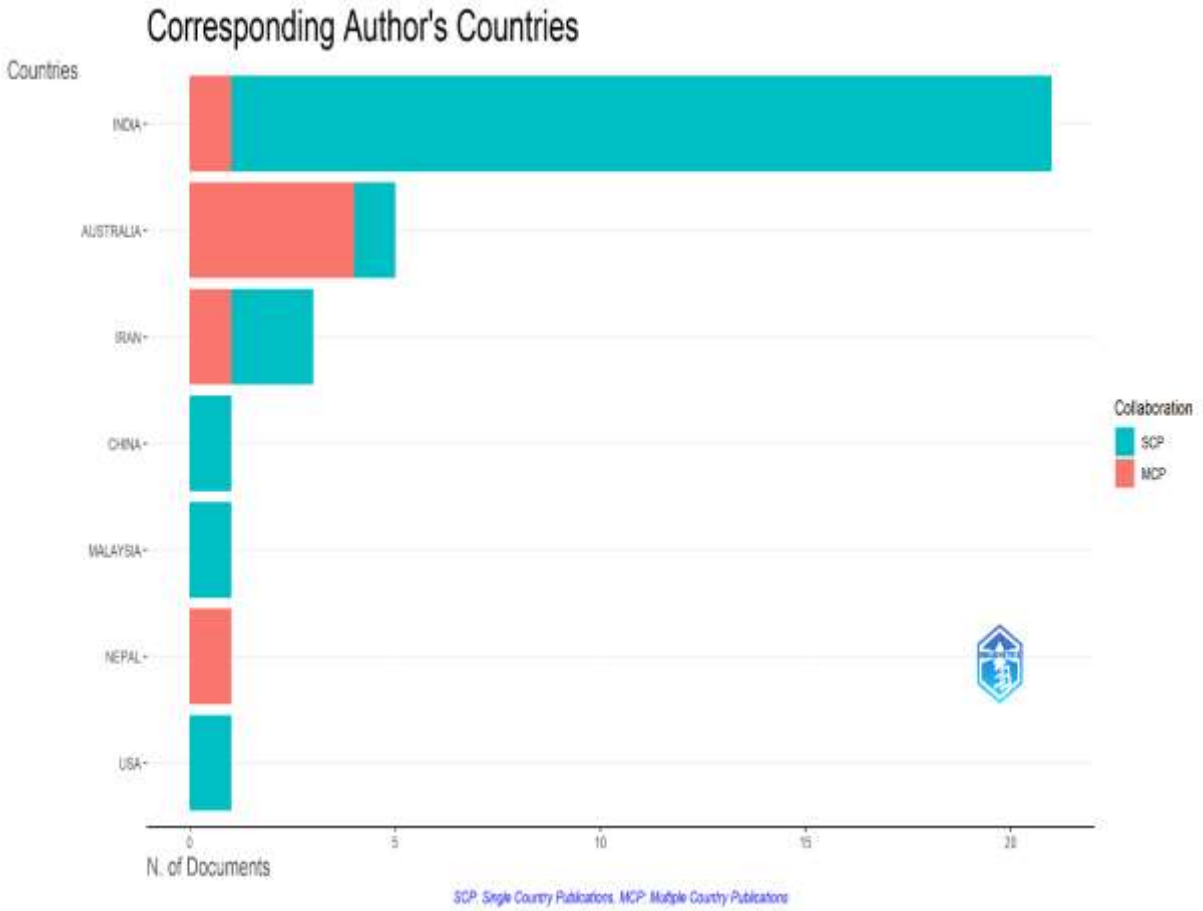


Figure 6 (Countries of the corresponding authors)

Figure 7 (World Collaboration Map)

The collaboration map shows that there is a moderate international collaboration, which is in line with the 18.6% international co-authorship rate obtained in the descriptive analysis.

4.5 Keyword Frequency and Conceptual Structure

Keywords analysis provided topics of literature that were major:

- Therapeutic interventions based on yoga.
- Insulin metabolic control and resistance.
- Hormonal balance
- Stress reduction

- Women with PCOS Quality of life.

Frequency distribution of keywords is given in:

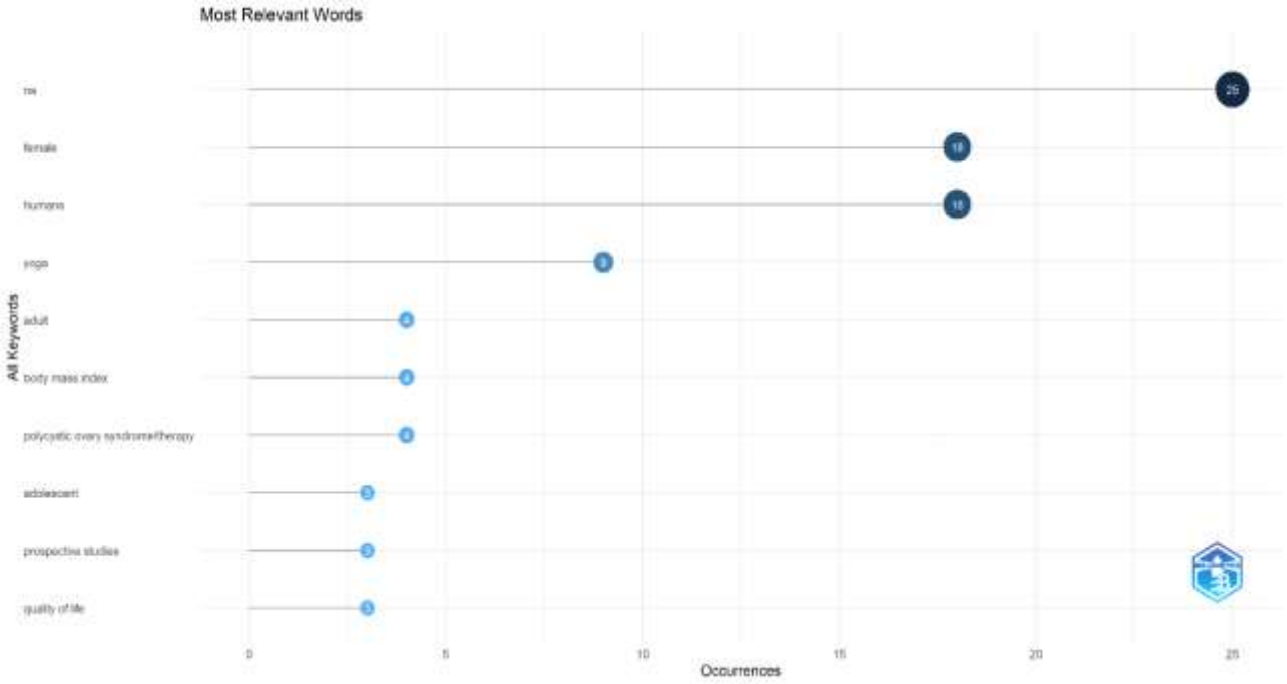


Figure 8 (Most Frequent Words)

Figure 9 (word cloud)

Figure 10 (Treemap of Distribution)

Such visualizations attest to a good clinical and lifestyle-intervention focus of the discipline.

4.6 Keyword Trends and Co-Word Network.

Evolution of key words over time shows the growing focus on lifestyle management, metabolic health and psychological well-being over the past few years. Figure 11 below (Word Frequency Over Time) illustrates this development.

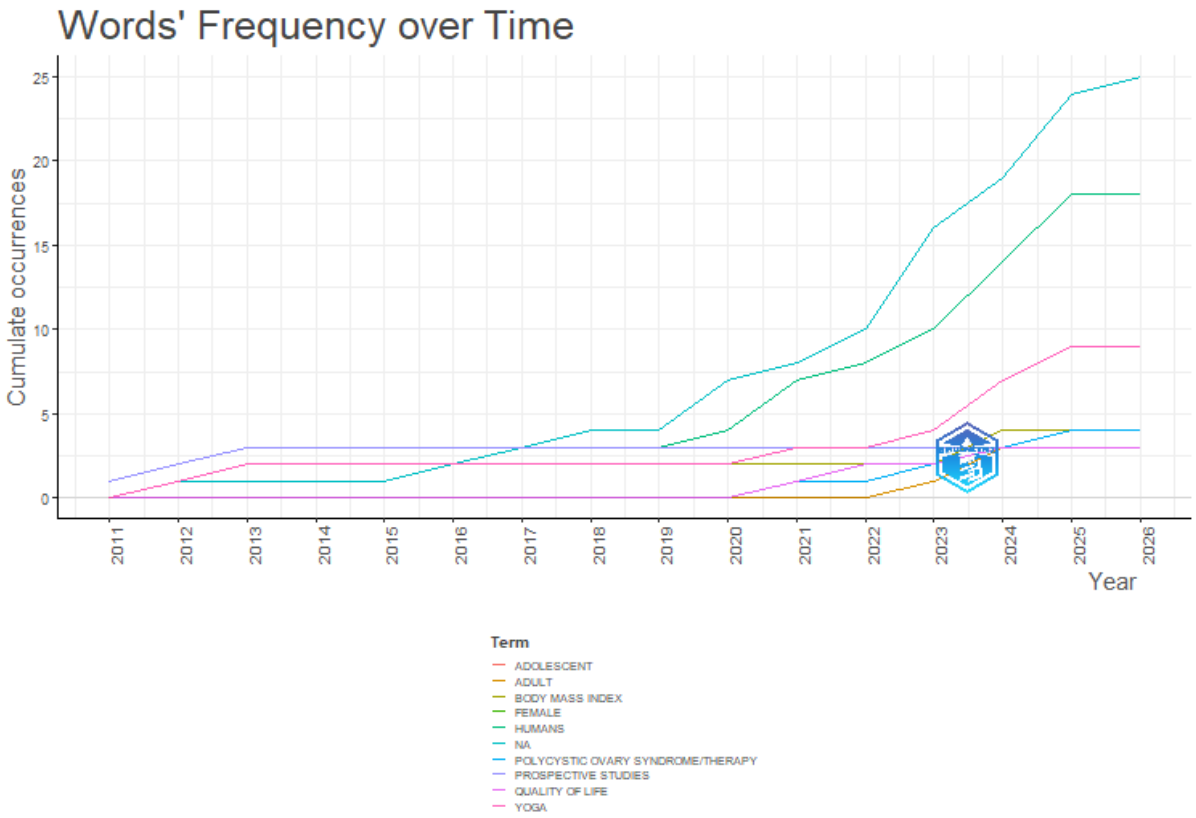


Figure 11 (Word Frequency Over Time)

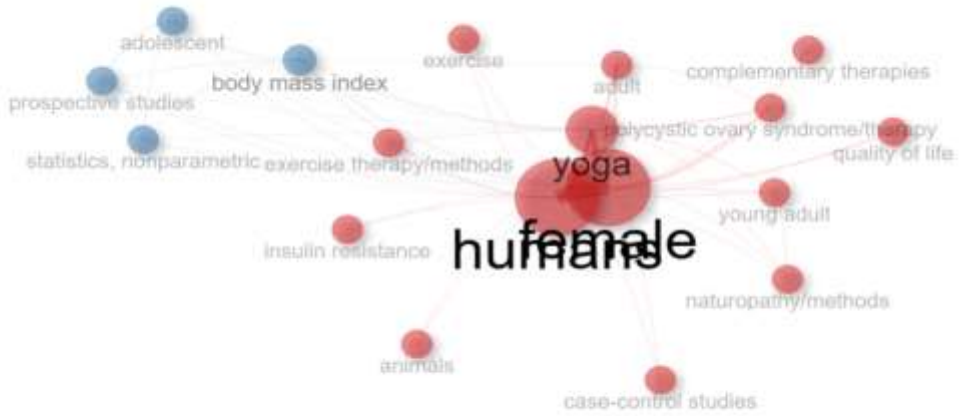


Figure 12 (co-word network structure)

Figure 12 (co-word network structure) demonstrates that the research on PCOS is multidimensional, as thematic clusters are interconnected in relation to yoga, insulin resistance, hormonal regulation, and mental health outcomes.

4.7 Thematic Mapping

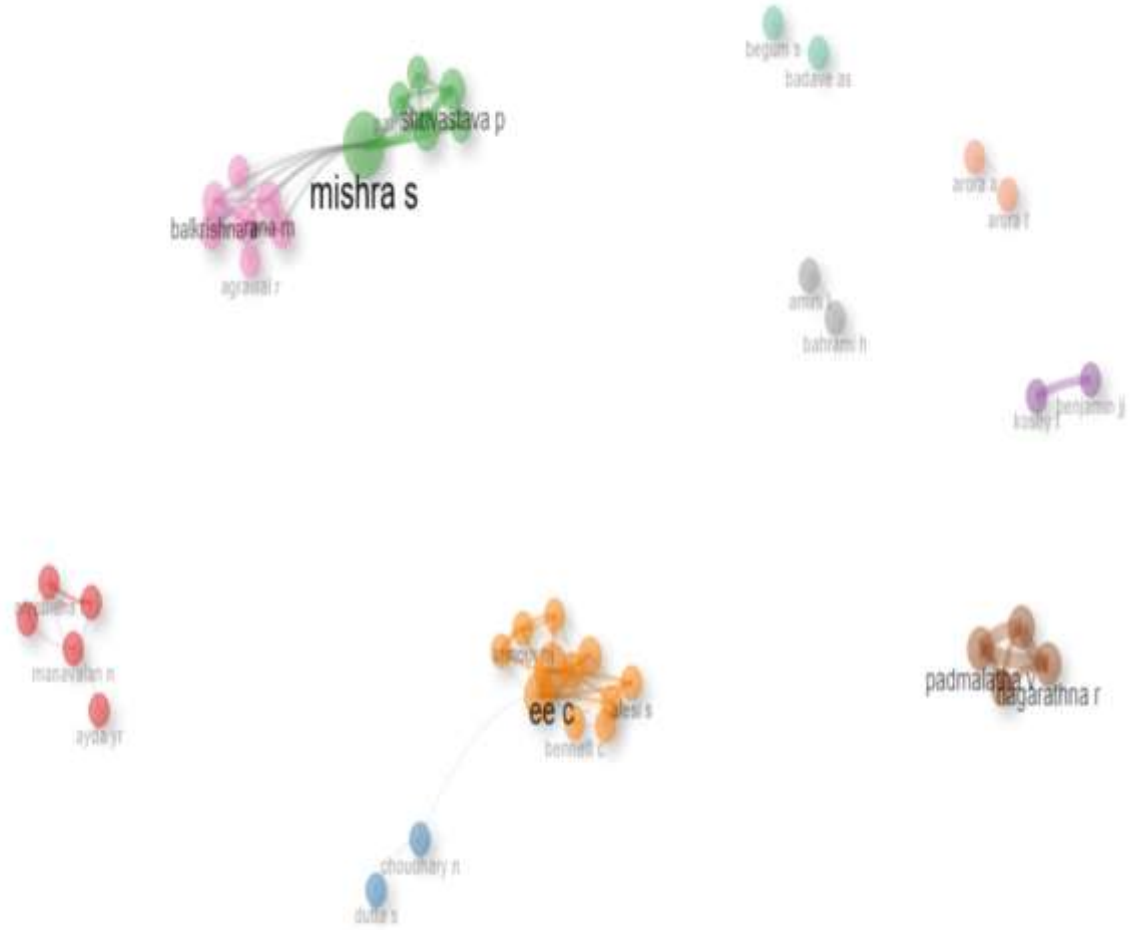
The thematic map (Figure 13) is divided into research themes:

1. **Motor themes:** Yoga-based therapeutic and metabolic control studies.
2. **Primary themes:** Lifestyle intervention and women reproductive endocrinology.
3. **Emerging themes or niche:** Psychological health and integrative treatment models.

This dispersion suggests the shift of a more exploratory clinical interest to formal therapeutic studies.

4.8 Collaboration Network

It is shown in the author collaboration network (Figure 14):



- Individual and author multi-participation.
- Clustered research groups
- Lack of integration across countries.

These conclusions support the idea that multinational clinical cooperation is needed to enhance the quality of evidence in yoga-based interventions in PCOS.

5. DISCUSSION

The current bibliometric review gives systematic summary of international scientific studies on yoga-interventions to Polycystic Ovary Syndrome (PCOS) since 2011. The results suggest that this is a new area, a collaborative, and a clinically-focused field but still growing in size and globalization.

5.1 Development of Scientific Production.

The trend of slow growth in the number of publications annually (Figure 2) indicates the growing awareness of the world towards the use of lifestyle-based and mind-body interventions in chronic endocrine diseases. The trend is in line with international clinical recommendations that focus on lifestyle change as a primary method of managing PCOS (Teede et al., 2018). The average age of documents is relatively small (4.33 years) which once again proves the fact that yoga-PCOS studies are not a well-developed discipline but an emerging scientific branch.

5.2 Sources and Authors Distribution.

The scattered nature of publications in various journals (Figure 3) and no single source of core is an indication that research on yoga and PCOS is still multidisciplinary and disjointed. This kind of

fragmentation has been documented in more general scholarship in the field of complementary-medicine, with research publications appearing in endocrinology journals, gynecology journals, psychology journals, and integrative-health journals (Donthu et al., 2021).

The patterns of productivity of the authors (Figure 4) show that there is a lack of long-term contributions of individual researchers, which is a sign that the core research community is not well established. However, it is actually fascinating that the mean co-authorship (5.88) is very high, which can be attributed to the good collaboration in teams and interdisciplinary cooperation, which is typical of clinical and lifestyle-intervention research.

5.3 Collaboration and Geographic Distribution

Patterns of production and cooperation on the country level (Figures 5-7) indicate that research life is concentrated in few countries, and there is average international collaboration (18.6%). Despite the current presence of collaborative research, the current lack of multinational integration is rather low, which means that there is a notable gap in the evidence base.

Multicenter randomized controlled trials done on a large scale are crucial in reinforcing clinical suggestions in the PCOS (Azziz et al., 2016; Teede et al., 2018). The existing trend of collaboration thus indicates that the future developments in management of PCOS based on yoga will be largely left to be based on increased global research projects.

5.4. Conceptual and Thematic Research Structure

Visualization (keywords frequency, word cloud, and treemap) (Figures 8-10) proves the fact that the literature mostly focuses on the idea that:

1. Therapeutic intervention based on yoga.
2. Metabolic control Insulin resistance.
3. Hormonal balance
4. Reduction of stresses in psychology.
5. The quality of life in PCOS women.

These topics are closely related to the multifactorial pathophysiology of PCOS that combines endocrinological, metabolic, and psychological aspects (Escobar-Morreale, 2018).

The temporal evolution of keywords (Figure 11) shows that the focus on general clinical interest has changed to the lifestyle-oriented and mental-health-oriented subject, which is also a tendency in the world of integrative medicine.

5.5 Intellectual Organisation and Thematic Development

Figure 12 is the co-word network that shows that yoga has close interconnections with metabolic dysfunction, hormonal regulation, and psychological outcomes, that yoga is a phenomenon with both, physiological and neuroendocrine action. Structured yoga interventions have been clinical trials regarding the increase in endocrine parameters, insulin sensitivity, and psychological well-being in adolescents and women with PCOS (Nidhi et al., 2012).

The thematic map (Figure 13) further subdivides research into:

1. **Themes of motors:** Therapeutic and metabolic regulation research.
2. **Principles:** Reproductive endocrinology and lifestyle management.
3. **Categories of emerging themes:** Mental health and integrative treatment models.

According to this spread, the discipline is no longer in the exploratory phase of clinical observation, but it is shifting to systematic therapeutic inquiry.

5.6 Collaboration Networks and Research Maturity

Figure 14 (collaboration network) reveals the clustered research groups that have limited cross-national connectivity. These are common in cases of an emergent scientific discipline, whereby localized knowledge is followed by greater concentration worldwide (Aria and Cuccurullo, 2017).

- Future studies are required to focus on:
- Predetermined yoga intervention guidelines.
- Randomized trials, large sample.
- Long-term metabolic and reproduction
- International joint ventures.

5.7 Clinical and Public Health Implications

The scientific interest in the use of yoga in PCOS is part of a larger trend of preferring low-cost, holistic, and sustainable health interventions. The overall impact of yoga on metabolic control, endocrine equilibrium, stress management, and the quality of life makes it a potential complementary therapy in the management of PCOS (Patel et al., 2020).

Nevertheless, the bibliometric evidence suggests that the problem of clinical translation is still associated with heterogeneity of methods and not enough global cooperation. Intensifying research design and global collaboration will thus be necessary to incorporate yoga in the evidence-based reproductive health.

Overall Interpretation

- Combined, the discussion reveals the fact that:
- Yoga-COS studies are quickly developing but not quite mature.
- It is a multidisciplinary field of clinical relevance.
- The primary gaps are the international cooperation and massive trials.
- The future practice of women health practitioners around the globe can be greatly affected by the future work.

The current bibliometric analysis summarizes the scientific evidence on yoga-based interventions in the management of Polycystic Ovary Syndrome (PCOS) across the world in 2011-2026. The results show this area is rather new and is developing steadily, which can be explained by the increased awareness of complementary and lifestyle-based practices when it comes to endocrine and reproductive health.

6. STRENGTHS AND LIMITATIONS

6.1 Strengths

The current research project will make a number of significant contributions to the existing body of literature on yoga-based interventions of Polycystic Ovary Syndrome (PCOS).

To begin with, this study presents a knowledge gap of considerable magnitude on the integrative reproductive health research since it presents a systematic bibliometric mapping of the global scientific production on yoga and PCOS between 2011 and 2026. Bibliometric tools allow quantifying publication patterns, collaboration patterns, and thematic development, and they provide the information unattainable in the context of conventional narrative reviews.

Second, the research will be done with the help of the Biblioshiny interface of the bibliometrix R package, which is a well-known and tested instrument of the science mapping and performance analysis. This increases the methodological transparency, reproducibility and reliability of the results.

Third, the analysis is based on various dimensions of scholarly activity and includes:

- Scientific production per annum.
- The productivity of the source and author.
- Distribution of research at country level.
- Co-occurrence of keywords and thematic mapping.
- Collaboration networks
- A multidimensional approach of this type offers an in-depth mental model of the yoga-COS study.

Fourth, the results point to the emergence of the clinical and lifestyle-focused themes, specifically insulin resistance, hormonal levels, psychological health, and the quality of life. These topics are in line with the multifactorial pathophysiology of PCOS, which validates the clinical position of yoga-based interventions.

Lastly, this research can provide a clear guidance of future quality clinical studies by outlining gaps in the research including scarce multinational collaboration and insufficient evidence base, thus contributing to the evidence-based women health practice.

6.2 Limitations

Although it has made its contributions, it can also be noted that there are a number of limitations.

To begin with, the bibliometric dataset was obtained mainly by the means of one biomedical database (PubMed/Medline). Though this database offers good quality indexed literature the studies are not always covered, and there are other sources like Scopus or Web of Science which could have offered relevant research.

Second, a small number of tomatoes (n = 43) of the retrieved publications are indicative of the newness of yoga-based PCOS studies. As a result, citation-based indicators and collaboration measures must be viewed with reservations.

Third, bibliometric analysis is used to assess research productivity and structure and not clinical effectiveness. Thus, the statement of therapeutic efficacy of yoga should be based on clinical trials and systematic reviews, but not on bibliometric indicators.

Fourth, the publications are recent and have little time to amass citations, and thus they can underestimate the scientific impact.

Lastly, the diversity in study design, intervention duration, yoga protocols and outcome measures in the literature creates a heterogeneity, which cannot be obtained completely with the help of bibliometric methods.

7. IMPLICATIONS FOR PRACTICE

The results of this bibliometric review have significant clinical practice and future research implications as well as implications in the public health policy.

Clinically, the accumulating evidence in the field of metabolic control, endocrine equilibrium, stress alleviation, and quality of life justifies the use of yoga as an alternative, non-pharmacological intervention in the management of PCOS. The long-term patient outcomes can be enhanced by using integrative methods, where lifestyle changes are used with conventional therapy because of the chronic and multifactorial nature of PCOS.

Regarding its implications to the field of public health, yoga is a cheap, available and culturally flexible intervention, especially in the resource-contained environment where long-term pharmacological management might be difficult to obtain. Implementing yoga programs in the community health, reproductive health and preventive health practices might help in enhancing women health outcomes.

Regarding the medical community, the findings indicate that endocrinologists, gynecologists, physiotherapists, psychologists, and yoga therapists should collaborate in endocrinology-gynecology, endocrinology-physiotherapy, and endocrinology-psychology to develop evidence-based intervention plans.

Regarding the research, the low level of international collaboration (18.6) highlights the need to urgently:

- Randomized controlled trials Multicentre.
- unified yoga intervention programs.
- Prolonged follow-up of metabolic and reproductive follow-up.
- Combination of psychological and quality-of-life indicators.

These areas should also be strengthened in order to translate yoga-based interventions into international clinical guidelines on managing PCOS.

8. CONCLUSION

The given bibliometric analysis will give a detailed view of the current global research tendencies on yoga-based interventions in relation to Polycystic Ovary Syndrome in 2011-2026.

- The results show that yoga-PCOS studies are:
- Recent and rapidly emerging
- Co-operative and moderately globalized.
- Clinically focused on the metabolic, hormonal and psychological outcomes.
- Growing both thematic and scientifically.

Regardless of growth promises, the field is still methodologically heterogeneous and lacks much large-scale clinical evidence. Such aspects as gaps in standardization, multinational collaboration, and long-term outcome evaluation are essential in proving yoga as an evidence-based complementary therapy in the management of PCOS.

Altogether, the application of yoga to reproductive and metabolic care has a great potential in enhancing health, living conditions and long-run disease control among women globally. The future clinical effects of this integrative method of therapy will be ascertained by continued high quality research and international scientific collaboration.

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