

The Philippine Journal of Physical Therapy
Official Journal of the Philippine Physical Therapy Association

VOLUME 3, ISSUE 1

February 2024



Evolution of Physical Therapy Scholarship in the Philippines: A Scientometric Analysis of Peer-Reviewed Publications

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To cite this article: Lazaro, R.T., Escuadra, C.J.T., Robinson, E., Rotor, E., Vitente, A.C., and Gorgon, E.J.R. (2024). Evolution of Physical Therapy Scholarship in the Philippines: A Scientometric Analysis of Peer-Reviewed Publications. *Philippine Journal of Physical Therapy*. 3(1), 5-11. <https://doi.org/10.46409/002.XFDX2637>



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Abstract

Introduction. The *Philippine Journal of Physical Therapy* began publication in 2021. The editorial board identified as a high-priority project to undertake a detailed analysis of current publishing practice among physical therapy researchers in the Philippines.

Methods. This study systematically mined publications from Web of Science, Scopus and PubMed using the keywords “physical therapy” OR “physiotherapy” OR “physical therapist” OR “physiotherapist.” Results were further refined to only include English publications by authors from the Philippines. Publication, citation, collaboration, and text-co-occurrence network analysis were done using RStudio and VOSViewer.

Results. A total of 122 publications from 1987 to 2022 were identified. Majority of the literature was primary studies (70.49%), secondary or review articles (13.93%) and proceedings of national and/or international conferences (10.65%). The most common and earliest collaborators of Filipino authors were from Australia, United States of America and Hong Kong. Five clusters of co-occurring keywords were identified: (1) case report, validity, function, mobility; (2) meta-analysis, systematic review, database, search; (3) perception, qualitative, barrier, value; (4) Evidence-based practice, attitude, need, confidence; and (5) COVID-19, pandemic, Filipino, cross-sectional.

Discussion. This study provides an overview and valuable guidance for physical therapy researchers, practitioners, educators, and policymakers to plan for the future direction of physical therapy research in the country. Stakeholders should consider the results of the study in identifying future projects to build capacity, develop research agendas and policy guidelines, and create collaborative opportunities to further improve physical therapy research productivity in the country.

Keywords: scientometric analysis, physical therapy, Philippines

Introduction

The *Philippine Journal of Physical Therapy* (PhJPT) was launched in July 2021. PhJPT is the official publication of the Philippine Physical Therapy Association, which is the duly recognized professional organization representing physical therapists in the Philippines. The journal “strives to identify, publish, and recognize research studies in physical therapy and related fields, with the expressed aim to improve patient care through the elevation of physical therapist education and practice” (Philippine Journal of Physical Therapy, 2023). The journal anticipates an increase in the publication of scholarly reports pertaining to physical therapy practice in the Philippines. To this end, PhJPT endeavors to be involved in capacity-building activities to encourage scholarly research and publication. The PhJPT editorial board has determined as a high-priority project to undertake a study that reports and describes what has been published to date in peer-reviewed journals in relation to physical therapy in the Philippines. This could be accomplished via scientometric analysis of the literature.

Scientometrics is a field that falls within the broader discipline of bibliometrics. (Muneem, 2020). Scientometric analysis is a research methodology that quantitatively and qualitatively examines scientific publications, citations, and related data to understand scientific knowledge production, dissemination, and impact. It involves collecting, organizing, and analyzing bibliographic data from various scholarly sources. Scientometric analysis uncovers patterns and relationships within scientific literature, including authorship, citations, collaborations, productivity, and impact. It informs research evaluation, identifies emerging areas, assesses research influence, and aids decision-making in academia, funding, and policy (Muneem, 2020). This tool facilitates knowledge visualization, exploration of research trends, and finds applications in diverse fields, including environmental ecology, public health, business economics, artificial intelligence, education, resource science, and medicine. (Wang, 2020) Researchers benefit from scientometric analysis by gaining insights into the discipline structure, focal points, and by staying updated with research advancements.

Published literature exists that provides several examples of bibliometric and scientometric analysis in physical therapy. Wiles and Colleagues (2012) conducted a bibliographic analysis of published research in the journal *Physical Therapy*, from its inception in 1945 to 2010. *Physical Therapy* is the official publication of the American Physical Therapy Association. The authors reported an evolution in the nature of research published over the 60-year period, describing a typical paper published in 1945 to be anecdotal in nature, authored by an average of 1.4 American authors, with 4 pages and 4 references, to a cross sectional survey of a randomized controlled trial in 2010, written by an average of 4.6 multinational authors and having 12 pages and 49 references. Kausugal and Ravi (2018) conducted a

scientometric analysis of *Physiotherapy* (Elsevier), the official journal of the Chartered Society of Physiotherapy (United Kingdom), and primarily reported the yearly number of published articles from 2008 to 2017, types of institutions attributed to the published articles, publication subjects, number of citations, authorship pattern, country-wide distribution and collaboration, and length of articles. In another published study, Benton and Benton (2019) conducted a bibliometric analysis of physiotherapy publications at two ten-year time periods (1978-1987 and 2008-2017) spanning 40 years to describe the evolution of physiotherapy scholarship. The authors noted a ten-fold increase in the number of publications over the two time periods, and the shift towards publication of medical-disease oriented work to descriptions of efficacy of physical therapy interventions to improve activity limitations. The authors also noted an improvement in the level of evidence of the publications, indicating an increase in the publication of systematic reviews and meta-analyses. There have also been scientometric or bibliographic studies related to published work in specific physical therapy management of conditions such as post joint replacement surgeries (Khoziainova et al., 2019), essential hypertension (Kovlen & Ponomarenko, 2017), osteoarthritis (Gupta & Gupta, 2018), acute stroke (Pantea, Repanovici, & Cocuz, 2022) or aging (Rojas-Montesino et al., 2022). These examples provide evidence on the evolution of physical therapy practice in general via bibliographic and scientographic analysis. Examples of analyses pertaining to physical therapy management of certain conditions can also provide insight of the need to investigate other conditions that can be managed through physical therapy.

To the authors' knowledge at the time of writing, there is no scientometric study analyzing the collective research output of physical therapy in the Philippines. Therefore, the aims of this study were to determine the 1) publication trends of Philippine physical research publications, 2) research collaboration of the country with other countries and institutions and, 3) cluster of keywords in Philippine physical therapy research publications using text co-occurrence analysis. The main objective of the study was to identify the publication and topic trend of Philippine physical therapy research using scientometric techniques.

Methods

Research Design

The study used scientometric approaches following the work of Gracio, de Oliveira, de Araujo Gurgel, Escalona, & Guerrero (2013) to analyze and summarize the research productivity of an entity. The approach is beneficial in identifying the current status and possible future directions for a specific topic in terms of research, policy, education, and health.

Data Sources

We used Web of Science (WoS), Scopus, and PubMed to access indexed journal articles. These databases index large volumes of biomedical and allied health literature with a wide interdisciplinary scope and are therefore considered main sources of citation data (Mongeon et al., 2015; Mingers & Leydesdorff, 2015; Falagas, Pitsouni, Malietzis, & Pappas, 2008). These databases allowed extraction of information required for the analyses (i.e., author, publication, citation details, and abstract), as well as filtering of results by location which could not be done in databases such as CINAHL and Google Scholar.

Search Strategy

We used the terms “physical therapy” OR “physiotherapy” OR “physical therapist” OR “physiotherapist” as the keywords to search the databases. Results were further refined to limit to publications from the Philippines (e.g., study site was or study participants were from the Philippines) or with author/s from the Philippine (e.g., at least one author is affiliated with an institution in the Philippines). Results were further filtered to include only English publications until December 31, 2022.

Data Extraction and Cleaning

Full records of each publication were then extracted as plain text files from WoS, Scopus, and PubMed. Bibliometrix, tidyverse and dplyr packages of R studio were used to merge data and remove duplicates and records with incomplete results. The VOSviewer thesaurus file was used to merge different variants of author, journal names, and institutional affiliations and synonyms.

Data Visualization Analysis

R studio and VOSviewer were used to analyze and visualize the data. Descriptive statistics for publication and citation analysis such as frequency, proportion, and graphs were conducted using R studio. Publication analysis used data on document types (e.g., article, review, conference proceeding etc.), year of publication, institutional affiliation of authors, and authors' names, while citation analysis focused on the trend and frequency of citation. Co-authorship and text co-occurrence analyses from title and abstract were conducted using VOSviewer. Note that for text co-occurrence analysis, words were clustered based on the frequency of co-occurrence in each publication.

Results

The search yielded the following hits: WoS = 41, Scopus = 122, and PubMed = 13 hits. After data cleaning, a total of 54 duplicates were found and removed from the final analysis and 122 unique records were included in the scientometric analysis.

The first relevant article was “Percutaneous desmotomy of digits for stiffness from fixed edema”, published in 1987. Figure 1 shows the number of publications each year from 1987 to the

2022. There was a notable increase in publication output starting in 2017 until 2022. The greatest number of publications was reported in 2022 (n=22).

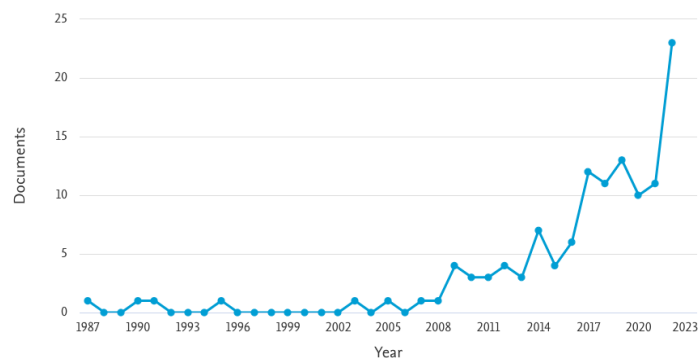


Figure 1. Distribution of Physical Therapy research publications in the Philippines by year (n=122)

In terms of document types, majority of the literature were journal articles which included primary studies (70.49%) and secondary or review articles (13.93%). Another form of publication for Filipino researchers was through the proceedings of national and/or international conferences (10.65%). Most of the literature were published in *BMJ Case Reports* (n=6, 4.90%), *ACTA Medica Philippina* (n=6, 4.90%), *Journal of Bodywork and Movement Therapies* (n=3, 2.50%), *Physiotherapy Theory and Practice* (n=3, 2.50%), *Musculoskeletal Science and Practice* (3, 1.78%), and *BMC Medical Education* (n=3, 2.50%).

In terms of local affiliations, most of the publications were authored by researchers from University of the Philippines Manila (n = 44), University of Santo Tomas (n = 19), and Philippine General Hospital (n = 19). Other publishing Filipino researchers were found to be from University of the Philippines Diliman, University of the Philippines Los Banos, University of Santo Tomas Hospital, De La Salle University, De La Salle Medical and Health Institute, Our Lady of Fatima University, Angeles University Foundation, University of the East Ramon Magsaysay Medical Center, St. Luke's Medical Center, Rizal Medical Center, Emilio Aguinaldo College, Metropolitan Medical Center, Chevron Geothermal Holdings, Inc., Cebu Doctors College, Rizal Medical Center and Veterans Memorial Medical Center. Table 1 presents authors with the greatest number of publications.

Table 1. Top Publishing Authors

Author	Publications	Affiliation/s
Gorgon, EJ R	9	University of the Philippines, Manila
Dizon, JM	7	University of Santo Tomas, Manila
Bandong, AN	6	University of the Philippines, Manila
Rebbeck, T	6	NHMRC Centre of Research Excellence in Road Traffic Injury Recovery, Queensland, Australia

Author	Publications	Affiliation/s
Capio, CM	5	University of Hong Kong

Figure 2 presents the collaboration pattern of authors from different countries. Results revealed that authors from the

Philippines have collaborated with authors and institutions from Australia, Canada, China, France, Hong Kong, Italy, South Africa, Spain, Taiwan, United States of America, and United Kingdom. The top and earliest collaborators of Filipino authors are from Australia, United States of America, and Hong Kong.

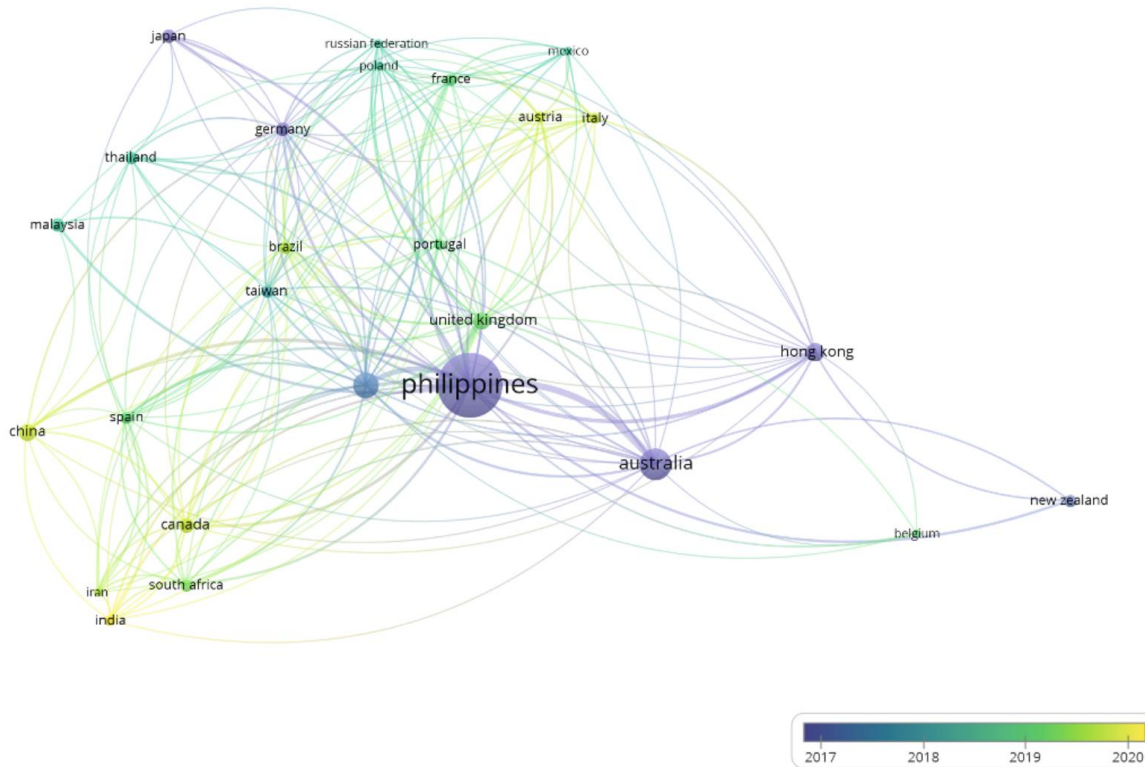


Figure 2. Co-authorship collaboration from 1987 to 2022 per country

There were 1024 total citations of all publications with a median citation of 6 per paper. Table 2 presents the top ten most cited publications.

Table 2. Top 10 Most Cited Publications

Title	Year	Citation
Effectiveness of botulinum toxin A for upper and lower limb spasticity in children with cerebral palsy: A summary of evidence	2009	93
Nature of cardiac rehabilitation around the globe	2019	75
An examination of the causes, consequences, and policy responses to the migration of highly trained health personnel from the Philippines: The high cost of living/leaving-a mixed method study	2017	54
Current evidence on evidence-based practice training in allied health: A systematic review of the literature	2012	50

Title	Year	Citation
Healthcare workers' burdens during the COVID-19 pandemic: A qualitative systematic review	2021	47
Cardiac rehabilitation delivery in low/middle-income countries	2019	38
Fundamental movement skills training to promote physical activity in children with and without disability: A pilot study	2015	35
Promoting patient utilization of outpatient cardiac rehabilitation: A joint International Council and Canadian Association of Cardiovascular Prevention and Rehabilitation position statement	2020	31
Research evidence uptake in a developing country: A survey of attitudes, education and self-efficacy, engagement, and barriers among physical therapists in the Philippines	2013	25
Postoperative bowel function after anal sphincter-preserving rectal cancer surgery: Risks factors, diagnostic modalities, and management	2019	24

research expertise and interest are expected to vary. However, it is interesting to note that the evolution of keywords in the study reflects the continuous evolution of practice and scholarship in the country. As the physical therapy profession mainly provides management to address functional problems of patients and clients, it is not surprising that the initial research, particularly the case reports and feasibility studies, were exploratory studies that could lead to determining effectiveness of various treatments or procedures. However, as evidence-based informed practice is now a central theme in the health professions, secondary studies and psychometrics are gaining more attention to establish not just the effectiveness and efficiency of treatment, but also the validity and reliability of outcome measures (Benton, & Benton, 2019).

The increasing number of publications in the study was found to be consistent with the previous studies of Kusugal, & Ravi, (2018), Benton and Benton (2019) and Wiles, Olds, and Williams (2013). This could be explained by the advancement of practice and efficiency of the research process through use of more sophisticated technology. The recent pandemic has also paved the way for health researchers to explore research activities that can be done remotely, such as synthesizing existing data, generating secondary reviews, creating online surveys and applying for grants (Martelli, Machado, Martelli, Cruz Perez, Pires, & Martelli Júnior, 2021). Another possible reason is the increase in authorship collaboration between researchers from different institutions and countries. Collaboration between researchers and local and international governments were reported to be key factors to increase research productivity to conduct larger studies with greater statistical power for generalizability, and funding support for transnational data collection (Benton & Benton, 2019).

We sought to identify all publications having Filipino PT authors with affiliations in Philippine institutions. When analyzing co-authorship trends, we noted that several of these publications were by international researchers with primary research lines who included Filipino PTs as part of their research teams. These scholarly products were likely produced as part of doctoral training of these Filipino PTs. We anticipate these types of scholarly products to increase as more Filipino PTs pursue international opportunities to pursue doctoral education. Future studies may consider analyzing publication trends according to primary authorship to provide a better picture of physical therapy research productivity in the Philippines.

While there has been a trend toward an increasing number of scholarly publications, overall, the total research productivity of the Filipino physical therapy authors was still low compared with other authors worldwide. The findings were similar to the low productivity in the areas of education and psychology research in the Philippines compared to other ASEAN countries (Vinluan, 2012). The relatively low research productivity among physical therapists in the Philippines can be attributed to several factors deeply ingrained in the research culture of the country. These factors include lack of sufficient time, resources, motivation, and skills. (Gorgon, Barrozo, Mariano, & Rivera, 2013). The findings further highlight the importance of collaboration and mentorship for research resource and knowledge sharing, continuing education programs to enhance research-related skills, and

relevant guidelines and policies to assist in research publication (Benton & Benton, 2019).

This study has limitations, like other similar reviews. First, the study only included publications from WoS, Scopus and PubMed, which may have excluded other information published in journals not indexed in the selected databases. When compared to databases like Google Scholar and other newer platforms, it is important to note that WoS, Scopus, and PubMed have more stringent criteria for journal indexing. As a result, our study may not have captured publications from new or small journals that are not indexed in the selected databases. Next, some publication metadata were simply not captured in some of the databases, and those may have provided additional information that would have enhanced our analysis. For the text network maps, the study only analyzed the words in the title and abstract based on the frequency of occurrence. More advanced analysis of topics is recommended for future research using topic modeling techniques such as Latent Dirichlet Allocation (Blei, Ng & Jordan, 2003) for better categorization of publications. However, to the authors' knowledge, this is the first extensive review that involved research publications about physical therapy from the Philippines. Lastly, only one person in the research team was responsible for data extraction and cleaning, because this stage was performed using a computerized program managed only by one person, based on the set algorithm by the research team.

Conclusion

This study provided an overview of the scientific research output, authorship, trends, and topics in physical therapy in the Philippines. The study revealed that physical therapy publications in the country have been increasing for the past several years. This may be attributed to the increased research collaboration between several institutions and countries. In addition, several clusters of topics consistent with the scope and evolution of physical therapy practices were also identified. This study provides an overview and valuable guidance for physical therapy researchers, practitioners, educators, and policymakers to find the future direction of physical therapy research in the country. The authors highly suggest that various stakeholders consider the study results in identifying future capacity-building projects, research agendas and policy guidelines, and possibly collaborative projects to further improve physical therapy research productivity in the country.

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