Jurnal SPORTIF: Jurnal Penelitian Pembelajaran
Vol. 8 No. 2, August 2022, pp. 259 - 275
https://doi.org/10.29407/js_unpgri.v8i2.18448

Developments, trends, and publication opportunities in sports medicine: Bibliometric analysis

Moch. Yunus[1ac], Yulingga Nanda Hanief[1bdef]

[1]Sport Coaching Study Program, Faculty of Sport Science, Universitas Negeri Malang, Semarang Street Number. 5, Lowokwaru, Malang City, East Java Province, 65145, Indonesia

Authors contribution: a – Preparing concepts; b – Formulating methods; c – Conducting research; d – Processing results; e – Interpretation and conclusions; f - Editing the final version

Received: 5 August 2022; Revised: 15 August 2022; Accepted: 29 August 2022

Abstract

The role of sport in reducing the prevalence of various diseases has led to a growing interest in sports and sports medicine. However, sports medicine has not progressed significantly. The development of publications in sports medicine has never been mapped, what themes are trending from year to year, and there are opportunities for interesting themes to be studied in the future. This study aims to determine the trend of publications in the field of sports medicine in Indonesia until 2022. This study was a quantitative study with a bibliometric analysis approach using Vosviewers software using keywords co-occurrence approach on secondary published bibliographic data from the Scopus database and manual exploration of distribution frequency of some variables in the CSV file. The search results found that 260 articles were published in both journals and proceedings indexed by Scopus from 1994 to 2022. The findings showed that there had been an increase in scientific production in the last five years. The University of Indonesia, with a total of 27 documents, became one of the affiliates that contributed the most documents on sports medicine in the Scopus database, while one of the most productive authors was Andri Maruli Tua Lubis, with a total of 5 documents. IOP Conference Series Materials Science and Engineering were the dominant source of documents in the field of sports medicine, with 19 documents. The mapping indicates that injury prevention and increasing physical activity are among the major clusters of research in the area of sports medicine. Finally, the bibliographic analysis also indicated that the integration of sports medicine with technology is still the direction of the future.

Keywords: publication trends, sports medicine, research mapping, bibliometrics.

INTRODUCTION

Sports medicine is the branch of medicine that deals with physical fitness and the treatment and prevention of sports-related injuries and sports. Sports and exercise medicine are ancient venerable medical specialties dating back to Herodicus, who first used therapeutic exercise to treat disease and maintain health. It has played an important role in many

Correspondence author: Yulingga Nanda Hanief, Universitas Negeri Malang, Indonesia.
Email: yulingga.hanief@um.ac.id

cultures and was a keystone in the writings and teachings of influential philosophers, such as Hippocrates, Galen, and Avicenna (Jenkins, 2015).

The problem of sports medicine is very complex, so there are many emerging studies investigating sports medicine. Starting from research on injury prevention (Mendonça et al., 2022), sports behavior (Li et al., 2022), consumption of juice and coffee together in professional football athletes (Berjisian et al., 2022), and even the implementation of technology in maintaining immunity (Paramitha et al., 2022). Based on these findings, the development of sports medicine in the world cannot be stopped, and its existence is very important in advancing the development of sports science.

Sports medicine research in Indonesia is still not popular, as evidenced by the minimal number of sports medicine research published in Indonesia (search data from the Scopus database found 198 publications as of July 28, 2022). Several studies have stated that the sports research area is still dominated by the area of physical education and sports coaching in engineering and physical training, while sports medicine is still only a study. A study conducted by Sofyan & Abdullah (2022) found 947 documents on sports publication trends in universities in the Scopus database. (Alpen et al., 2022) in their study also reported finding 473 documents in the Scopus database relating to the game learning model in physical education. Also, in the field of sports management, 757 articles were found in the database of journals that are important in the field of sport management, the names are Journal of Sport Management (JSM), European Sport Management Quarterly (ESMQ), and Sport Management Review (SMR) (Ciomaga, 2013). The difference in the number of publications in the field of sports medicine with other sports has become a very deep chasm. This creates a very high gap compared to the variety of sports medicine research that has developed internationally. With this development, it is necessary to conduct bibliometric research to map the extent of the development of sports medicine in Indonesian publications in particular so that sports medicine researchers can

understand their research position in the international world and plan efforts to catch up.

Several studies analyzing the development of sports medicine publications have been conducted, one of which is a study conducted by Fares et al. (2017) which analyzes 15 years of research developments in sports and sports medicine in Arabia. The analysis and research themes are similar to this study, but the research is limited to the database used, namely PubMed, and only analyzes publications in Arab countries. There has been no similar study using the familiar database, namely Scopus. Scopus uniquely combines abstracts and citations from a comprehensive and expertly curated database with enriched data and related scientific literature across multiple disciplines. This database has become a reference for many countries, one of them being Indonesia. In this study, the researcher seeks to offer novelty in the database used and displays research that is trending in the field of sports medicine in Indonesia until 2022.

The development of publications in sports medicine in Indonesia (?) has never been mapped. The themes trending from year to year and the opportunities for interesting themes also need to be explored. The mapping is important in Indonesia so that researchers in sports medicine understand the extent of the development of sports medicine in Indonesia. On this basis, this study aims to examine the trend of publications in sports medicine. The study process is focused on: 1) how is the productivity of sports medicine publications in Indonesia? 2) Who are the most prolific contributors (author, affiliation, and publisher name)? 3) the thematic areas that interest academics the most. (4) what topics are emerging in the field of publication, 5) Future study opportunities in sports medicine.

METHOD

Source Database

Researchers used the Scopus database as a data source for the sampling process. The reason researchers use the Scopus database is that it has more documents than other databases, such as the Web of

Science (WoS) (Sweileh et al., 2017), and also many documents have been cited (Khiste & Paithankar, 2017). An advanced search was performed in the search field of the topic, referring to the document's title, abstracts, or keywords. The topic field was selected because these sections place the most relevant words on the article's subject. Data collection was carried out on June 5, 2022, using the keywords "sport" OR "exercise" AND "fitness" OR "injury" in the search within the menu with the choice of "Article title, abstracts, keywords" and the keyword "Indonesia" in the search menu within with the option "Affiliate country." With the search criteria, 260 articles were obtained from about the year of publication until 2022.

Research Design

To obtain article metadata, researchers searched the Scopus database for phrases on August 2, 2022. Found 260 publications indexed on Scopus. Researchers excluded articles still in press (2 articles) so that 258 publications were found that were ready for analysis. The tracing procedure can be shown in Figure 1 below.

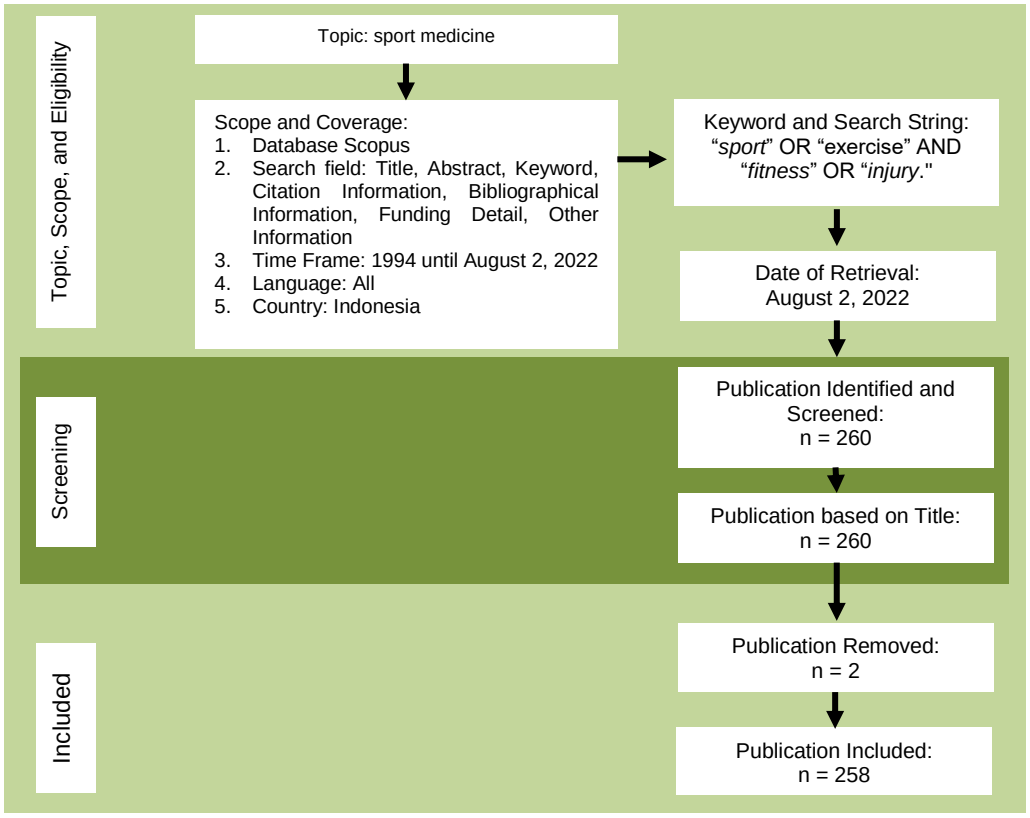

Figure 1. Article Metadata Search Design from Scopus

This study uses bibliometric analysis using publication mapping and keyword co-occurrences analysis, a kind of co-word analysis (Donthu et al., 2021). Researchers mapped the main contributors (author, university, and source name), applied keyword co-occurrence analysis and citation analysis to find publication trends, and tracked the main thematic or topics that appeared in the publication. This study also analyzed the number of documents in terms of document type and language, publication trends in the field of Sports Medicine from 1994 to 2022, and top 10 funding sponsors. This study also analyzed the Profiling of The Sports Medicine Research Field by subject area. To present the data, researchers used data visualization with the help of the VOSViewer application developed by researchers at Leiden University (Eck & Waltman, 2014). Researchers use several parameters in VOSViewer to obtain article metadata, as shown in Table 1 below.

https://doi.org/10.29407/js_unpgri.v8i2.18448
8 (2) 2022 | 259-275

Table 1. VOSViewer parameters used for analysis

Item	Characteristic/Value
Type of analysis	Co-occurrence analysis, co-occurrence keywords analysis, and citation
Unit of analysis	All Keywords
Counting method	Full counting
Minimum number of documents of author	2
Layout:	
Attraction	2 (default setting)
Repulsion	0 (default setting)
Clustering	
Resolution parameter (detail of clustering)	1 (default setting)
Minimum cluster size [N]	1 (default setting)
Visualization:	
Scale	1.00
Weights	Occurrences
Labels size	0.50
Maximum number of lines	1000

Source: Researcher Data

RESULT

The development of publications in the field of Sport Medicine

The search results obtained 260 (2 in press) documents published in the Scopus database. The first published article was in 1994 regarding the impact of Modern Balinese Baris Dancing Exercise on body composition, blood pressure, and heart rate. Of the 258 documents, there are several documents and languages, namely articles, conference manuscripts, reviews, editorials, short surveys, and book chapters (Table 2).

Table 2. Document type and language

Document type	Record count	%	Language	Record count	%
Article	189	73.26	English	256	99.22
Conference Paper	54	20.93	Portuguese	2	0.78
Review	10	3.88			
Editorial	2	0.77			
Short Survey	2	0.77			
Book Chapter	1	0.39			

The development of sports medicine publications from early 1990-1999 did not exist, but in 2017 it began to grow with a total of 22 documents. From then until 2022, developments began to stabilize. It was

noted that the number of publications in 2019 was double the number of publications in 2017. This development will continue to increase in 2020, 2021, and 2022. The development data can be seen in Figure 1.

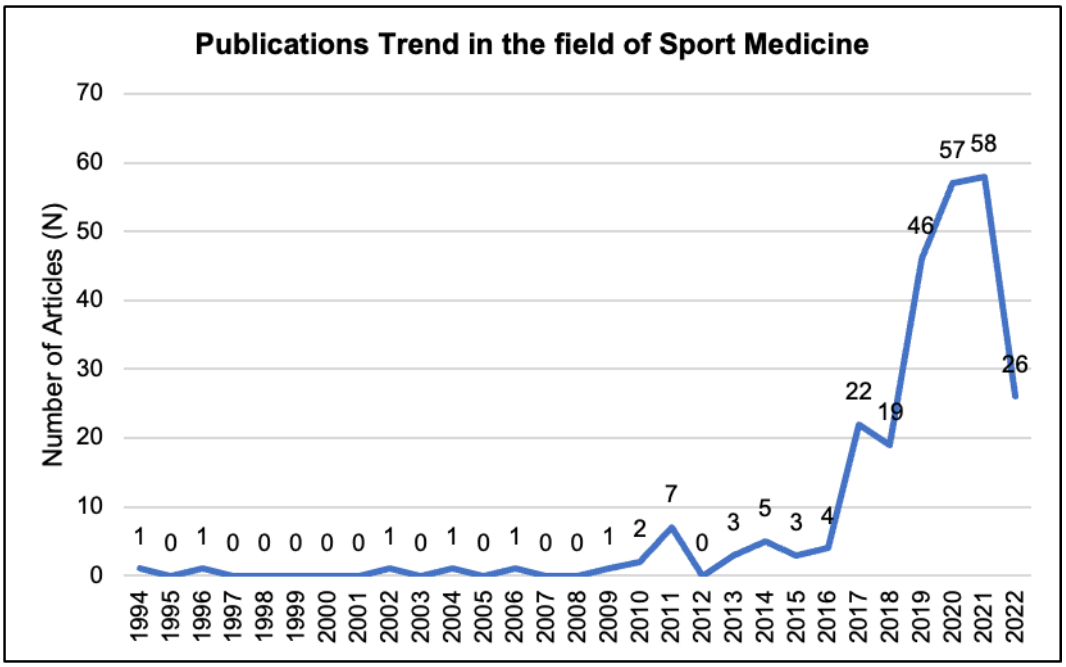

Figure 2. The Publication trend in the field of Sports Medicine from 1994 to 2022 (August 2, 2022)

We also seek to identify Funding Sponsors to take into account to analyze whether publication trends are also influenced by these factors (Table 3).

Table 3. Top 10 funding sponsor

No	Funding Sponsor	Number
1	Universitas Indonesia	9
2	Universitas Brawijaya	3
3	Institut Teknologi Bandung	2
4	Japan Society for the Promotion of Science	2
5	Kementerian Pendidikan dan Kebudayaan	2
6	Kementerian Riset Teknologi Dan Pendidikan Tinggi Republik Indonesia	2
7	Lembaga Penelitian dan Pengabdian Kepada Masyarakat	2
8	Lembaga Pengelola Dana Pendidikan	2
9	Ministry of Education, Culture, Sports, Science and Technology	2
10	National Center for Research Resources	2

The University of Indonesia is the top affiliate (9 grants) in providing funding to researchers to conduct research and publish their manuscripts in the Scopus database.

https://doi.org/10.29407/js_unpgri.v8i2.18448
8 (2) 2022 | 259-275

Thematic trends of sports medicine publications (10 top Subject Areas, Affiliates, Source Titles, and Authors)

Of the 258 documents that have been published, there are at least ten subject areas that are the focus of each article. In addition, there are also the top 10 most productive universities. The University of Indonesia is ranked at the top as the most productive affiliate in producing documents on sports medicine in Scopus-indexed international journals. Then it was also found that the top 10 publication sources that publish the most articles are the IOP Conference Series Materials Science and Engineering publication source that publishes the most articles with a total of 19 documents. Furthermore, the top 10 most productive ranks were also reported, namely Andri Maruli Tua Lubis, with five documents occupying the top rank. All details can be seen in Table 4.

Table 4. General publication profiling of the sports medicine research field

Category	Top 10 items
Scopus Subject Area	Medicine (138); Engineering (50); Health Professions (44); Social Sciences (40); Materials Science (22); Physics and Astronomy (22); Computer Science (21); Biochemistry, Genetics and Molecular Biology (19); Business, Management and Accounting (14); and Pharmacology, Toxicology and Pharmaceutics (13)
Affiliation	Universitas Indonesia (27); Hasanuddin University (18); Universitas Pendidikan Indonesia (18); Universitas Negeri Jakarta (15); Universitas Negeri Yogyakarta (14); Universitas Indonesia, RSUPN Dr. Cipto Mangunkusumo (13); Universitas Gadjah Mada (13); Universitas Sebelas Maret (13); Universitas Airlangga (11); dan Universitas Padjajaran (11)
Source Title	IOP Conference Series Materials Science And Engineering (19); Journal Of Physics Conference Series (16); International Journal Of Human Movement And Sports Sciences (11); International Journal Of Surgery Case Reports (11); Open Access Macedonian Journal of Medical Sciences (10); Journal of Physical Education and Sport (8); Indian Journal of Public Health Research and Development (6); Medical Journal of Indonesia (5); Annals of Medicine and Surgery (4); dan Annals of Tropical Medicine and Public Health (4)
Author	Andri Maruli Tua Lubis (5); Muchsin Doewes (4); Rumi Iqbal Doewes (4); Yulingga Nanda Hanief (4); Jull Kurniarobbi (4); Ramdan Pelana (4); Krisna Yuarno Phatama (4); Sri Sumartiningsih (4); Tomoliyus (4); and Harun Achmad (3)

Source: Own study based on data retrieved from Scopus (2 August 2022)

Top Citation

Lim & Pranata (2021) became the authors to have their work cited the most, with 32 citations. The document was published in 2021. A more recent document published recently (in 2022) written by Washif et al. (2022) with the theme of exercise studies during the Covid-19 lockdown

was cited 14 times. The list of 10 top-ranking citations can be seen in Table 5.

Table 5. The top ten citations

Cite	Author	Title	Source Title	Year
32	M.A. Lim, R. Pranata	Sports activities during any pandemic lockdown	Irish Journal of Medical Science 190(1), pp. 447-451	2021
25	Ruslin, M., Boffano, P., Ten Brincke, Y.J.D., Forouzanfar, T., Brand, H.S.	Sport-related maxillofacial fractures	Journal of Craniofacial Surgery 27(1), pp. e91-e94	2016
24	Kario, K., Morisawa, Y., Sukonthasarn, A., Li, Y., Wang, J.-G.	COVID-19 and hypertension—evidence and practical management: Guidance from the HOPE Asia Network	Journal of Clinical Hypertension 22(7), pp. 1109-1119	2020
21	Lim, M.A.	Exercise addiction and COVID-19-associated restrictions	Journal of Mental Health 30(2), pp. 135-137	2021
20	Huldani, Achmad, H., Arsyad, A., Putra, A., Sukmana, B. I., Adiputro, D.L., Kasab, J.	Differences in VO_2 max based on age, gender, hemoglobin levels, and leukocyte counts in Hajj prospective pilgrims in Hulu Sungai Tengah Regency, South Kalimantan	Systematic Reviews in Pharmacy 11(4), pp. 9-14	2020
20	Ambrosino, N., Janah, N., Vaghegginia, G.	Physiotherapy in critically ill patients | [Fisioterapia Em Pacientes Gravemente Doentes]	Revista Portuguesa de Pneumologia 17(6), pp. 283-288	2011
19	Jalnapurkar, I., Rafika, N., Tassone, F., Hagerman, R.	Immune-mediated disorders in women with a fragile X expansion and FXTAS	American Journal of Medical Genetics, Part A 167(1), pp. 190-197	2015
14	Washif, J.A., Farooq, A., Krug, I., (...), Ben Saad, H., Chamari, K.	Training During the COVID-19 Lockdown: Knowledge, Beliefs, and Practices of 12,526 Athletes from 142 Countries and Six Continents	Sports Medicine 52(4), pp. 933-948	2022
14	Arfianti, A., Pok, S., Barn, V., (...), Teoh, N.C.-H., Farrell, G.C.	Exercise retards hepatocarcinogenesis in obese mice independently of weight control.	Journal of Hepatology 73(1), pp. 140-148	2020

Keywords that appear together (Co-occurrence keywords)

The keywords provided by the author that appear at least five times in the Scopus database are carried out by co-occurrence of all keyword analyses. Of the 2,450 keywords that appeared, 100 keywords were found that met the threshold. The keyword that appears the most is "human," with a total link strength of 1027. A total of 94 keyword items were found by forming 4 clusters. Each cluster forms a pattern and intersects with other clusters. Cluster 1 (red) includes physical activity, physical condition,

and exercise. Cluster 2 (green) includes human, adults, physiotherapy, injury, and lower limb. Cluster 3 (blue) includes aerobic exercise, training, and metabolism. Cluster 4 (yellow) includes female, child, and male public relations.

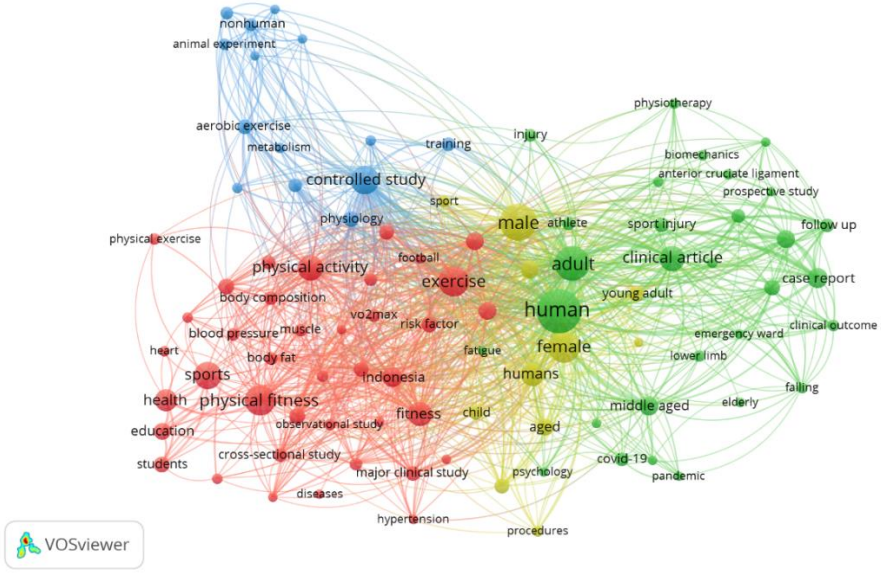

Figure 3. High-frequency keyword occurrence network in sports medicine publications

These clusters also form a thematic, such as the thematic first cluster, which is more likely to report the research results on exercise and physical activity. The second cluster appears to be thematic injuries that occur in humans. The third cluster appears to be the thematic impact of aerobic exercise on body metabolism, and the fourth emerging thematic subject involves human research. It can be said that the trending thematic research is research that investigates the treatment of an exercise on the physiology and injuries experienced by humans.

Publication Opportunities in Sport Medicine

We try to provide an overview of the opportunities for further research themes that can be carried out by researchers who are pursuing sports medicine. We display the visualization overlay in Figure 4.

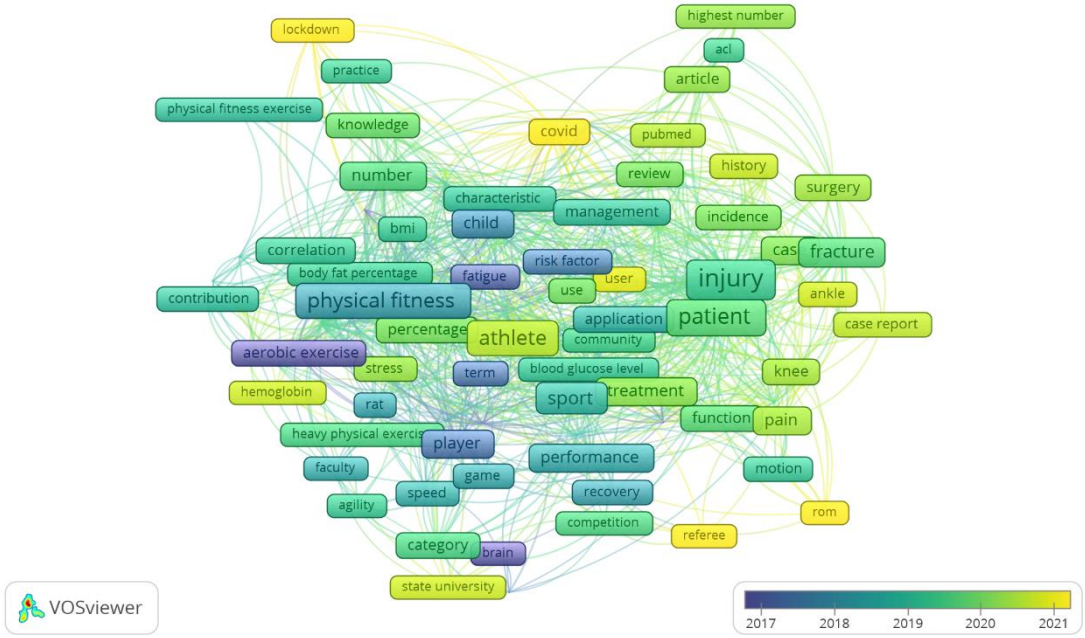

Figure 4. Analysis of Further Research Opportunities Based on Overlay Visualization

Keywords with a yellow circle are keywords that have been published recently (2021), while those with purple color are those that have been published recently (2017). Each keyword is related to the other when the cursor hovers over one of the keywords. This means that these keywords appear simultaneously in other, different articles. However, some keywords are not related if the above is done. We think this is it's one way to find new research in the future. Combining unrelated keywords is the best way to find further research opportunities. For example, Figure 4 shows one possible future research theme.

https://doi.org/10.29407/js_unpgri.v8i2.18448
8 (2) 2022 | 259-275

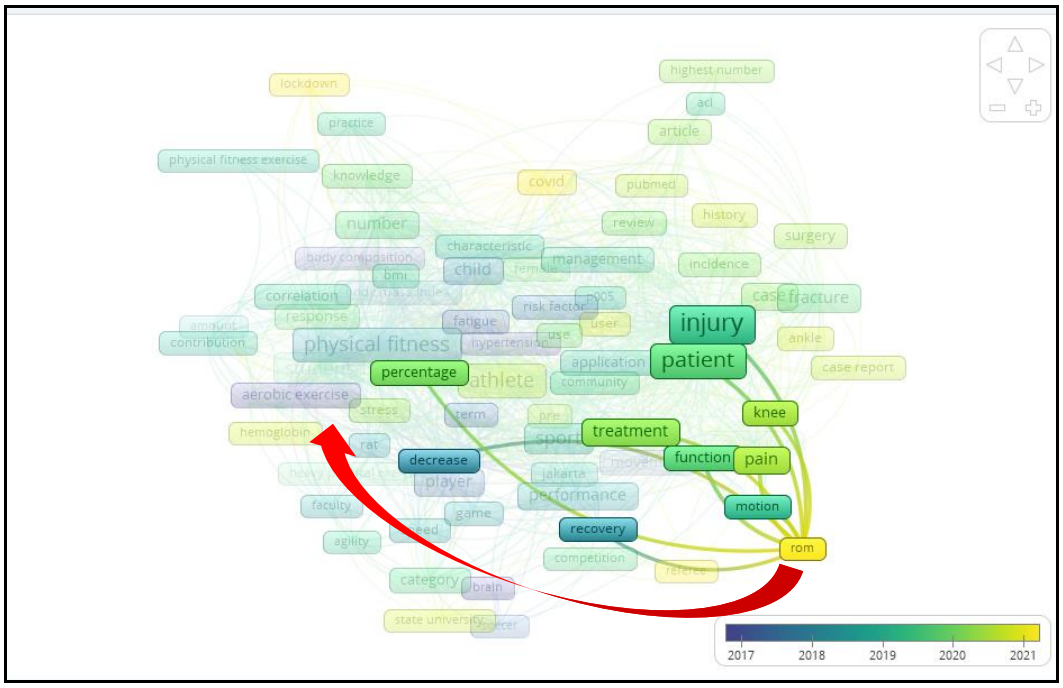

Figure 5. Further Research Opportunities between ROM and Aerobic Exercise

In Figure 5, it can be seen that the Range of Motion (ROM) is not related to Aerobic Exercise. This is a gap for further research. Researchers can conduct aerobic exercise experiments on ROM.

DISCUSSION

In the last decade, there has been a significant increase in scientific production. The author reports interesting findings regarding publication productivity in sports medicine, from the number of documents, the most productive authors, the most productive affiliations, and the most productive sources of titles. Furthermore, from the analysis of co-occurrence keywords, it was found that there were 4 clusters, each of which carried the thematic research.

The publications in 1994-2010 are assumed to be minimal due to a lack of research culture (Fares & Fares, 2017), so very little research has been successfully produced, especially in the Scopus database. In addition, a government policy that requires all research to be published in the Scopus database has also not emerged. The lack of grant funds due to the monetary crisis in early 1998 (Waters et al., 2003) also triggered the

deepening gap between Indonesia and neighboring countries such as Singapore, Malaysia, and Thailand.

The increased sports medicine research outcomes in recent years can be attributed to a greater allocation of funds dedicated to academic research. Research conducted by Jalnapurkar et al. (2015) is one of the research grants from several institutions, including one from the Indonesian government. In early 2016, the government also encouraged researchers and academics to publish their articles on the Scopus database through journals or conferences. The obstacles in publishing the manuscript in reputable international journals also affected the case. Several studies reported high publication costs (Purwanto et al., 2021), language skills, lack of collaboration networks, and limited time to compile articles (Hanief et al., 2021).

The University of Indonesia is the most consistent in producing scientific sports medicine, with 27 documents. This success is certainly supported by many factors, including funding and a conducive research climate. Of the top 10 universities providing funding support, Universitas Indonesia is listed as the one with the most funding for nine documents. This means funding sources are important in producing research and publications. Andri Maruli Tua Lubis from the University of Indonesia was able to publish five documents from 2019-2022. This could not be separated from the financial support provided by the University of Indonesia.

IOP Conference Series Materials Science and Engineering became the publication source with the most published manuscripts, totaling 19 manuscripts. IOP is one of the conferences that consistently publishes manuscripts, but in this case, IOP has the scope of manuscripts on Materials Science and Engineering, while the search results use keywords in the sports field. This means that there is a research collaboration in the field of sports with Materials Science and Engineering. This is what has the potential for a manuscript to have novelty, an example of an article entitled “Muscle strength endurance testing development based

https://doi.org/10.29407/js_unpgri.v8i2.18448
8 (2) 2022 | 259-275

phototransistor with motion sensor ultrasonic" by Rusdiana (2017). The study reports that the pull-up test using digital devices is still not perfect when compared to manual calculations, however, the article has succeeded in collaborating two different fields of science.

We also try to point out one of the themes that could potentially be investigated in the future (Figure 4). The analysis results are still related to the needs of today's society, which have problems with ROM. From the results of the analysis, several other opportunities can be found. We also suggest involving sports biomechanics in evaluating locomotion activity in athletes and non-athletes. Quality research integrating sports psychology and sports medicine presents unique challenges due to the multifactorial nature of sports injuries and the need for sound interpretation of research results relative to the nature of sport psychology and injury (Flint, 1998).

This study has limitations, including researchers only limiting research conducted by researchers and academics in Indonesia. This study also only uses the Scopus database, which is not globally representative of sports medicine publications, other databases that are wider in scope in sports medicine, such as NCBI and PubMed, are expected to be part of further research. Another limitation, the authors did not explore comprehensively, which did not involve other potential keywords such as physical activity, therapy, and major disease focused in sports medicine such as diabetes, osteoporosis, hypertension, hyperlipidemia, and did not include co-occurrence terms. Another limitation is the method used in analyzing documents, timing, language, funding, etc. has not been stated.

CONCLUSION

The findings show that more academic papers published by Indonesian authors are published in the Scopus database. The findings showed that there had been an increase in scientific production in the last five years. The University of Indonesia, with a total of 27 documents, became one of the affiliates that contributed the most documents on sports medicine in the Scopus database, while one of the most productive

authors was Andri Maruli Tua Lubis, with a total of 5 documents. IOP Conference Series Materials Science and Engineering were the dominant source of documents in the field of sports medicine, with 19 documents. It is important to evaluate the quality of a large number of research papers and obtain valuable information. Research on sports medicine has an important role in advancing sport, preventing injury, and increasing physical activity and human well-being. The integration of sports medicine with technology is still the direction of the future.

ACKNOWLEDGMENT

The author would like to thank the Faculty of Sports Science, the State University of Malang, which has supported this research by providing grants so that this research can be completed and useful.

REFERENCES

Alpen, J., Dlis, F., Apriani, L., Kurniawan, E., & Sofyan, D. (2022). Trends in scientific publication of traditional game learning models in physical education and sports in Indonesia: A bibliometric analysis. *Journal Sport Area*, *7*(2), 214-226. https://doi.org/10.25299/sportarea.2022.vol7(2).9072

Berjisian, E., McGawley, K., Saunders, B., Domínguez, R., Koozehchian, M. S., de Oliveira, C. V. C., Rafiei, R., Miraftabi, H., Sarshin, A., & Naderi, A. (2022). Acute effects of beetroot juice and caffeine co-ingestion during a team-sport-specific intermittent exercise test in semi-professional soccer players: a randomized, double-blind, placebo-controlled study. *BMC Sports Science, Medicine and Rehabilitation*, *14*(1), 1–11. https://doi.org/10.1186/s13102-022-00441-1

Ciomaga, B. (2013). Sport management: A bibliometric study on central themes and trends. *European sport management quarterly*, *13*(5), 557-578. https://doi.org/10.1080/16184742.2013.838283

Eck, N. J. Van, & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact* (pp. 285–320). Springer. https://doi.org/10.1007/978-3-319-10377-8_13

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fares, M. Y., Fares, J., Baydoun, H., & Fares, Y. (2017). Sport and exercise medicine research activity in the Arab world: a 15-year

bibliometric analysis. *BMJ Open Sport & Exercise Medicine*, *3*(1), e000292. http://dx.doi.org/10.1136/bmjsem-2017-000292

Fares, Y., & Fares, J. (2017). Neurosurgery in Lebanon: History, Development, and Future Challenges. *World Neurosurgery*, *99*, 524–532. https://doi.org/https://doi.org/10.1016/j.wneu.2016.12.014

Flint, F. A. (1998). Integrating sport psychology and sports medicine in research: The dilemmas. *Journal of applied sport psychology*, *10*(1), 83-102. https://doi.org/10.1080/10413209808406379

Hanief, Y. N., Haqiyah, A., Winarno, M. E., Pratama, B. A., & Sinulingga, A. (2021). Factors Inhibiting Sports Lecturer's Publication Productivity in International Journals. *Journal of Learning for Development*, *8*(3), 568–581. https://doi.org/10.56059/jl4d.v8i3.522

He, Q. (1999). *Knowledge discovery through co-word analysis*.

Jalnapurkar, I., Rafika, N., Tassone, F., & Hagerman, R. (2015). Immune mediated disorders in women with a fragile X expansion and FXTAS. *American Journal of Medical Genetics Part A*, *167*(1), 190–197. https://doi.org/https://doi.org/10.1002/ajmg.a.36748

Jenkins, D. W. (2015). The podiatrist as a member of the sports medicine team. *Clinics in Podiatric Medicine and Surgery*, *32*(2), 171–181.

Khiste, G. P., & Paithankar, R. R. (2017). Analysis of Bibliometric term in Scopus. *International Journal of Library Science and Information Management (IJLSIM)*, *3*(3), 81–88.

Li, B., Han, S., Meng, S., Lee, J., Cheng, J., & Liu, Y. (2022). Promoting exercise behavior and cardiorespiratory fitness among college students based on the motivation theory. *BMC Public Health*, *22*(1), 1–11. https://doi.org/10.1186/s12889-022-13159-z

Mendonça, L. D. M., Schuermans, J., Denolf, S., Napier, C., Bittencourt, N. F. N., Romanuk, A., Tak, I., Thorborg, K., Bizzini, M., & Ramponi, C. (2022). Sports injury prevention programmes from the sports physical therapist's perspective: An international expert Delphi approach. *Physical Therapy in Sport*, *55*, 146–154. https://doi.org/10.1016/j.ptsp.2022.04.002

Paramitha, S. T., Komarudin, K., Fitri, M., Anggraeni, L., & Ramadhan, M. G. (2022). Implementation of Healthy Gymnastics and Use of Technology as an Effort to Maintain Body Immunity during the Pandemic. *International Journal of Education in Mathematics, Science and Technology*, *10*(2), 328–340. https://doi.org/10.46328/ijemst.2166

Porter, A. L., Kongthon, A., & Lu, J.-C. J. C. (2002). Research profiling: Improving the literature review. *Scientometrics*, *53*(3), 351–370. https://doi.org/10.1023/A:1014873029258

Purwanto, A., Ardiyanto, J., & Sudargini, Y. (2021). Inhibiting Factors for

Publishing in Reputable International Journals among Doctoral Students: An Exploratory Mixed Method Study. *Journal of Industrial Engineering & Management Research*, *2*(2), 1–20. https://doi.org/10.7777/jiemar.v2i2.123

Rusdiana, A. (2017). Muscle Strength Endurance Testing Development Based Photo Transistor with Motion Sensor Ultrasonic. *IOP Conference Series: Materials Science and Engineering*, *180*(1), 12050. https://iopscience.iop.org/article/10.1088/1757-899X/180/1/012050/meta

Sofyan, D., & Abdullah, K. H. (2022). College Sport Publication Trends Over 15 Decades: A Bibliometric Analysis. *Khizanah Al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan*, *10*(1), 69-82.

Sweileh, W. M., Al-Jabi, S. W., AbuTaha, A. S., Zyoud, S. H., Anayah, F., & Sawalha, A. F. (2017). Bibliometric analysis of worldwide scientific literature in mobile-health: 2006–2016. *BMC Medical Informatics and Decision Making*, *17*(1), 1–12. https://doi.org/https://doi.org/10.1186/s12911-017-0476-7

Washif, J. A., Farooq, A., Krug, I., Pyne, D. B., Verhagen, E., Taylor, L., & Chamari, K. (2022). Training during the COVID-19 lockdown: knowledge, beliefs, and practices of 12,526 athletes from 142 countries and six continents. *Sports Medicine*, *52*(4), 933-948. https://doi.org/10.1007/s40279-021-01573-z

Wash, J. A., Farooq, A., Krug, I., Pyne, D. B., Verhagen, E., Taylor, L., Wong, D. P., Mujika, I., Cortis, C., Haddad, M., Ahmadian, O., Al Jufaili, M., Al-Horani, R. A., Al-Mohannadi, A. S., Aloui, A., Ammar, A., Arifi, F., Aziz, A. R., Batuev, M., Chamari, K. (2022). Training During the COVID-19 Lockdown: Knowledge, Beliefs, and Practices of 12,526 Athletes from 142 Countries and Six Continents. *Sports Medicine*, *52*(4), 933–948. https://doi.org/10.1007/s40279-021-01573-z

Waters, H., Saadah, F., & Pradhan, M. (2003). The impact of the 1997–98 East Asian economic crisis on health and health care in Indonesia. *Health Policy and Planning*, *18*(2), 172–181. https://doi.org/10.1093/heapol/czg022