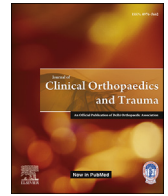




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A decade of evolution in Indonesian orthopedic publication: A bibliographic report



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ABSTRACT

During the past decade, there was an increasing interest in orthopedic research in Indonesia. Therefore we aimed to investigate the profile of Indonesian orthopedic trend publication from 2010 to 2019. Systematic research was conducted to identify all orthopedic articles authored by Indonesian orthopedic surgeons. Article details (number of authors, authors' affiliation, publishing journal), type of author's affiliation, affiliate collaboration, study field, type, and level of evidence (LOE) were recorded and evaluated. Publishing journal metric and author h-index were also recorded. Descriptive statistics were used to summarize the data.

Two hundred and twenty articles were included in our study. Clinical studies were the most common article type, followed by case reports and basic science. Among clinical articles, therapeutic studies were found significantly more frequent. On the other hand, economic studies were not found in this study period. The most popular field was oncology, followed by knee and spine. The average number of authors per article was 5.23 with a total of 205 individuals who had contributed during this decade. University hospital was the most common affiliation found and single-center study was the most common affiliate collaboration. The most common level of evidence was level V (case reports). Eighty-seven specific publishing journals were identified. More than 42% of the articles were published in journals with SJR between 0.25 and 0.50. The average author h-index was 3.56 (0–7). Although there was an increasing trend and quantity of publications among Indonesian authors, most articles had level 5 evidence (case reports) and the quality of publishing journals was mostly Q3 with a low-moderate SJR. Improvement of the article's quality and institutional collaboration will be needed for future contribution in global orthopedic society.

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1. Introduction

Publishing in medical journal is one of various ways to communicate new research to clinicians, medical scientists, and other healthcare workers. Communications that facilitate the widest global dissemination of such information are advantageous to the public. Their ability to prevent disease and improve health quality would be aided by improved access to reliable medical

information.¹

The current analysis of publication trends examines changes in research methodology within the modern era amongst leading medical journals. A paradigm shift in the publication has occurred from small single-centre studies to large multicentre RCTs. Moreover, there has been an increase in multi-authored papers and an increase in the mean number of co-authors on papers recently published.^{2,3} Additionally, there has been an increase in collaboration between authors of different countries over the past 10 years, which further contributes to the globalization of academic medicine.^{3,4} This pattern demonstrates a positive step towards clarity in disclosure and conduct amongst clinical studies.⁵ The

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increased interests in publication has also occurred in the orthopedic field. Previous studies provided country rankings of orthopedic publications in major orthopedic journals. However, not every orthopedic article were included, since not every orthopedic article were published in orthopedic-specific journals.^{6–8}

In Indonesia, there are also increasing interest to publication among Orthopedic surgeon especially in recent years, which is influenced by many factors. University or private hospital affiliated surgeon has some obligations to publish their works regularly. There are also increasing availability of government or private publication grants that can be obtained by the researchers. However, for the most part, the importance of scientific publication has been acknowledged by the Indonesian orthopedic society. The aim of this article is to systematically review the literature published by Indonesian orthopedic authors from 2010 to 2019 and evaluate the publication profile (article details and publishing journal metrics) which will show the contribution of Indonesian authors to orthopedic research.

2. Methods

2.1. Protocol and registration

This bibliographic review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.^{9,10}

2.2. Search strategy

A comprehensive literature search was undertaken from several databases (PUBMED, EMBASE, the Cochrane Library, CINAHL, and Scopus). The date was restricted to all publications from January 1st, 2010 to December 31st, 2019. The search was conducted on January 3rd, 2020. Search specifics were: (((orthopedic[Affiliation]) OR orthopedic[Affiliation]) OR orthopedi[Affiliation]) OR ortopedi[Affiliation]) OR orthopaedi[Affiliation]) AND Indonesia [Affiliation]. The search criteria were kept broad to capture all potentially relevant articles.

After combining the search results and removing duplicates, 2 authors (Y.P.D. and A.S.) independently screened the article's authors and their affiliation for eligibility. Subsequently, the same 2 authors independently performed an abstract review of the selected studies on inclusion and exclusion criteria. Disagreements regarding the inclusion of a given study were resolved by consensus or consultation with another author (R.P.).

2.3. Eligibility criteria

English language orthopedic studies whose one or more authors affiliated to Indonesian orthopedic organizations were included. No publication status restrictions were imposed. All types of studies were included as long as it was correlated with field of orthopedics. Non-orthopedic articles were excluded even though the authors were affiliated to Indonesian orthopedics. Conversely, the articles were also excluded if the Indonesian authors were not affiliated to orthopedic.

2.4. Data extraction and collection

Two authors (Y.P.D. and A.S.) independently extracted the data from the article using a predesigned form which included: (1) Article details (Authors, number of authors, authors' affiliation, article title, publishing journal, year); (2) Type of author's affiliation (general hospital, private hospital, satellite hospital, university hospital); (3) Field of study (trauma, oncology, spine, etc.); (4)

Study type (case report/case series, clinical, basic science, review article, systematic review, meta-analysis); (5) Level of evidence (LOE). Clinical articles were assigned LOE based on guidelines from the University of Oxford's Centre for Evidence-Based Medicine.¹¹ Clinical articles were further classified into therapeutic, diagnostic, prognostic, or economic.¹² We also classified the publication based on the author's affiliate collaboration: (1) Single-center (if there's only one affiliation among authors); (2) Multicenter (more than one local Indonesian affiliation); (3) Multinational (involving investigators from more than one nation). Disagreements were resolved by discussion between two review authors. If no agreement could be reached, consultation with a third author would be performed.

Further evaluation was performed to collect each article's citation count and the publishing journals' rank. The citation count was extracted from Google Scholar citation index; meanwhile publishing journals' ranks were extracted from Scimago Journal and Country Ranks (SJR) 2019. Publishing journal ranks was evaluated using q-index and SJR 2019 indicator. Q-index was obtained from SJR 2019 rank. The journals that were not categorized in "Orthopedics and Sports Medicine" will be separately categorized based on their best rank/q-index in their corresponding category.

Evaluation of the author profile was performed separately by extracting each author from each article then calculating the contribution based on the type of authorship (first author, corresponding author, co-author). Personal h-index calculations were also performed for those who had published more than 5 articles. All information above was recorded in a spreadsheet (Excel, Microsoft, Redwood WA).

2.5. Statistical analysis

Descriptive statistics were used to summarize the data in the spreadsheet (Excel, Microsoft, Redwood WA).

3. Results

In total, 220 articles were included in our study. The summary of article selection process was summarized in Fig. 1. Before the selected study period, 3 original articles were published and the number of articles published increased significantly especially in 2018–2019, where the increase was 274%(Fig. 2). The publication profile was summarized in Table 1.

Overall, clinical studies were the most common article type, followed by case reports and basic science. Among these clinical articles, therapeutic studies were found significantly higher than the other studies. On the other hand, economic studies were not found in this study period. The most popular topic/orthopedic field was oncology, followed by knee and spine (Fig. 3).

Average number of authors per article was 5.23 with a total of 205 individuals who had contributed during this decade. Ninety-eight articles had an identical first and corresponding author. Regarding the number of publications per author, there were 115 authors that only had one publication and only 18 authors that had published more than 5 articles during the timeframe. University hospital was the most common affiliation found and the single-center study was the most common affiliate collaboration. Despite having a quite large proportion of multinational studies, local multicenter collaboration was only found in 19 articles. The trend of affiliate collaboration was not significantly changed in this decade (Fig. 4).

The most common level of evidence was level V (case reports). The pattern of publication during this decade also showed an increasing trend to publish level V evidence papers, especially in 2019 (Fig. 5). Meanwhile, among the clinical articles, level III studies

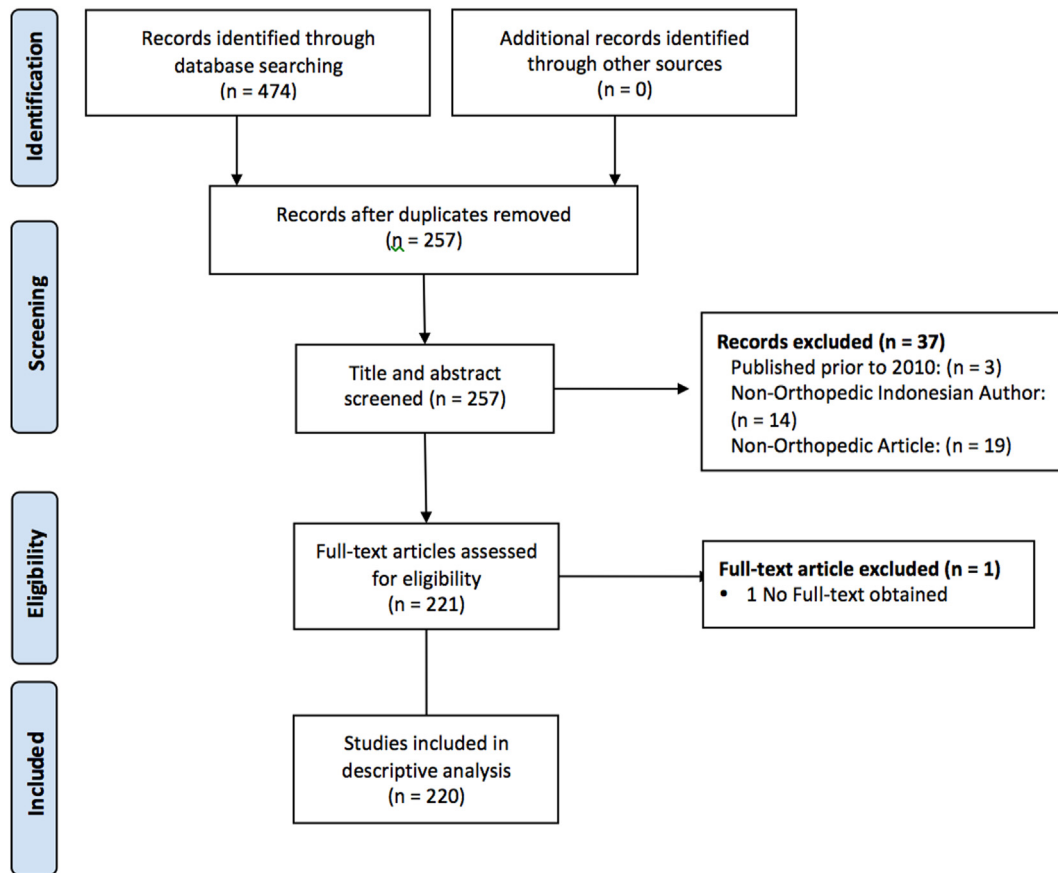


Fig. 1. Flow diagram of articles during selection process using PRISMA (Preferred Reporting Items for Systematic Meta-Analyses) guidelines.

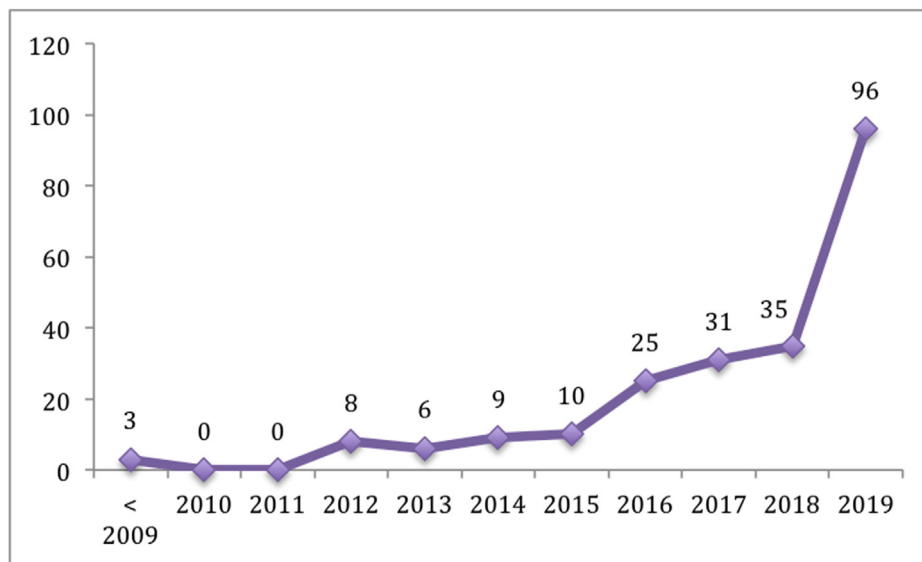


Fig. 2. Number of publications per year.

were the most common type. Level II evidences were more common in prognostic studies (Fig. 6).

Publishing journal profile was summarized in Table 2. Eighty-seven specific journals were identified. International Journal Surgery Case Report (IJSCR) was the most common publisher, as it was identified in 12 articles. More than 42% of the articles were

published in journals with an SJR between 0.25 and 0.50, which corresponded to the fact that Q3 journals were the most popular publishing journals. Despite the increasing number of publications annually, there was no significant change in the average publishing journal's SJR; with the average value was around 0.66 in this decade. However, in 2019, there were some articles that were

Table 1
Profile of Indonesian authors' publication in 2010–2019.

Profile Parameters	Total
Articles Published	220
Average author/article Authors	5.23 (1–38)
First Author	160
Corresponding Author	132
Co-Author	317
First & Corresponding	98
Gross Total	511
Individual count	205
Number of publication/author	
1	115
2–5	72
6–10	13
>10	5
Affiliation	
General hospital	3
Private hospital	40
Satellite hospital	24
University hospital	153
Affiliate Collaboration	
Single Center	118
Multicenter	19
Multinational	83
Article Type	
Basic Science	56
Case Report	66
Case Series	16
Clinical Studies	80
Others	2

published in the high-ranking journal (Fig. 7).

The average article citation was 4.1 with one article have a citation count of 82. The top 25-most-cited Indonesian orthopedic article ranged from 11 to 82. Author h-index calculation was performed in 18 authors with more than 5 publications. The average author h-index was 3.56; with 1 author has the highest h-index of 7.

4. Discussion

The aim of this study was to conduct a bibliometric analysis of

orthopedic articles published by Indonesian authors over the past decade. To the best of our knowledge, this is the first report to reveal the contribution of Indonesian authors to orthopedic research. We found a total 220 publications from 2010 to 2019. Although the trend in 2019 showed a significantly increasing number of publications (Fig. 2), the total number of publications was far lower when compared to other countries. Australia and New Zealand published 3097 orthopedic articles during the period 2008 to 2018¹³, while Chinese authors published a total of 3473 articles from 2003 to 2012 which include 1859 (Mainland China), 1111 (Taiwan), and 503 (Hong Kong).¹⁴ For comparison, Egypt also published 481 orthopedic articles in 5 years period (2013–2017).¹⁵ Indonesian orthopedic surgeon/researchers need to be encouraged to do more scientific publications in the future.

There was a total 8855 individuals involved as authors in the publications in Australia and New Zealand study.¹³ On the other hand, there were only 205 individuals contributed as an author in Indonesia during the evaluated timeframe. This number was only around 20% if it is compared to the total number of orthopedic surgeons in Indonesia during the period. The majority of the authors (153/205, 74.6%) were affiliated to a university hospital, while the rest were affiliated to private/satellite hospital. In Indonesia, it is mandatory for an orthopedic surgeon who works for a university hospital and orthopedic education centre to have scientific publications. In contrast, no similar rule applied for an orthopedic surgeon who works at other types of hospitals to have scientific publications during their orthopedic service. The situation might be also associated with the availability of research/publications grant, where the most of the government research grants were awarded to a university hospital. Unfortunately, private research grants also still difficult to obtain. Modification of the research/publication grant regulations might be also needed in the orthopedic field.

The orthopedic oncology, knee, and spine were the main topics of publication during the timeframe by Indonesian authors with more than 30 articles, followed by publications about orthopedic trauma dan basic orthopedic science with more than 20 articles. The trend showed different pattern compared another region. Australian authors have more publications on orthopedic basic sciences and implant material,¹³ Egyptian authors have more

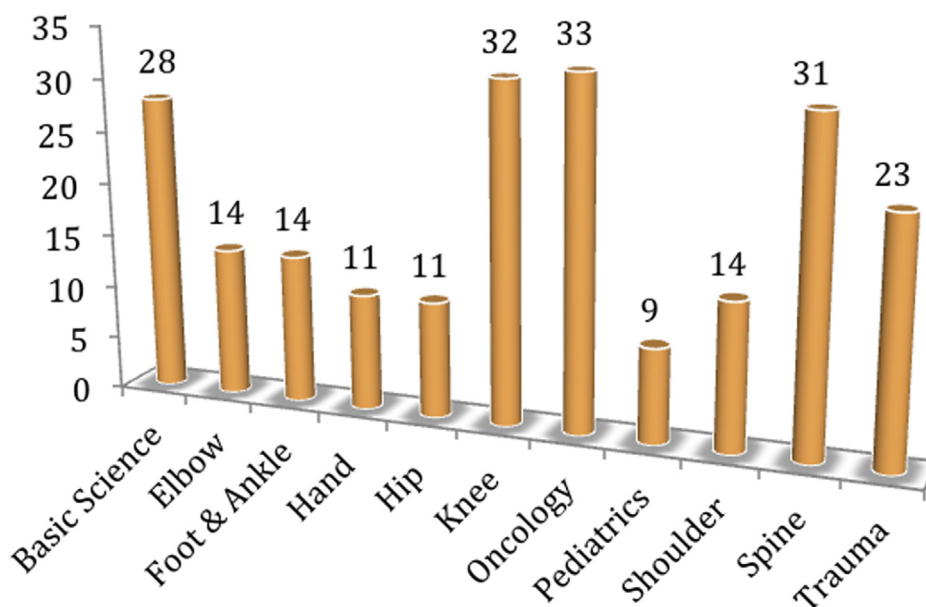


Fig. 3. Topic field of articles.

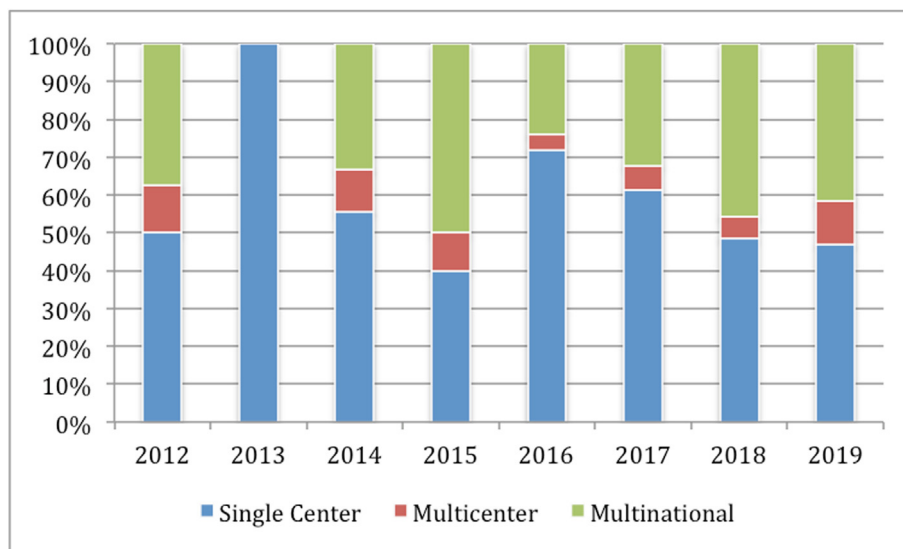


Fig. 4. Trends of affiliate collaborations.

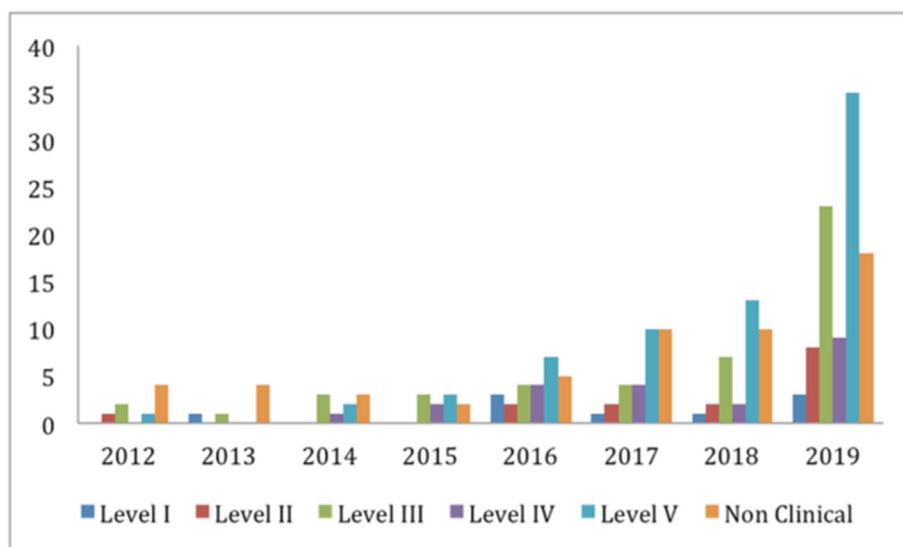


Fig. 5. Trends of article level of evidence.

publications on the field of orthopedic trauma and arthroscopy,¹⁵ while Chinese authors have more publications on spine topic.¹⁴ Our recent data showed interesting findings. Despite of high number of trauma cases in Indonesia, orthopedic trauma was not the main topic of Indonesian orthopedic publications. This indicate that the interest of research and publications was not always associated with number of specific orthopedic cases in a region. The development of orthopedic sub-specialities, research facilities and the personal researcher interest may have higher impact.

In terms of affiliate collaboration, single-center studies were the most common type and predominated every year during the decade. Collaborating with the colleague within the same institution provide several advantages such as easier communication and possibly faster article writing. However, there are some major limitations to a single-center study/trial. Many of those trials have been contradicted when they were tested in other settings (lack of external validity). Application of single center trial should be performed if the careful evaluation of the methodology was performed

initially and after comparing the context of the article with its own current situation.¹⁶ Another interesting point was the fact that multinational studies were more commonly found than multicenter studies. International fellowship programs may have played an important role in stimulating the research interest and multinational studies. However, the fact that multicenter studies was still very lacking in the past decade should be a major concern for Indonesian orthopedic since it was more suited as a guideline and to support widespread changes in local practices.

The level of evidence of the published articles also one of the important issue to discuss. A previous study showed a decreasing trend of publications of a low level of evidence of orthopedic trauma publications within 15 years in several high reputed journals.¹⁷ A different situation was found in our recent study. The level V of clinical studies were still the main publications performed by Indonesian authors during the timeframe. Moreover, the level V clinical study (case report) was significantly increased during the year 2019. Publishing a case report article is easier and faster.

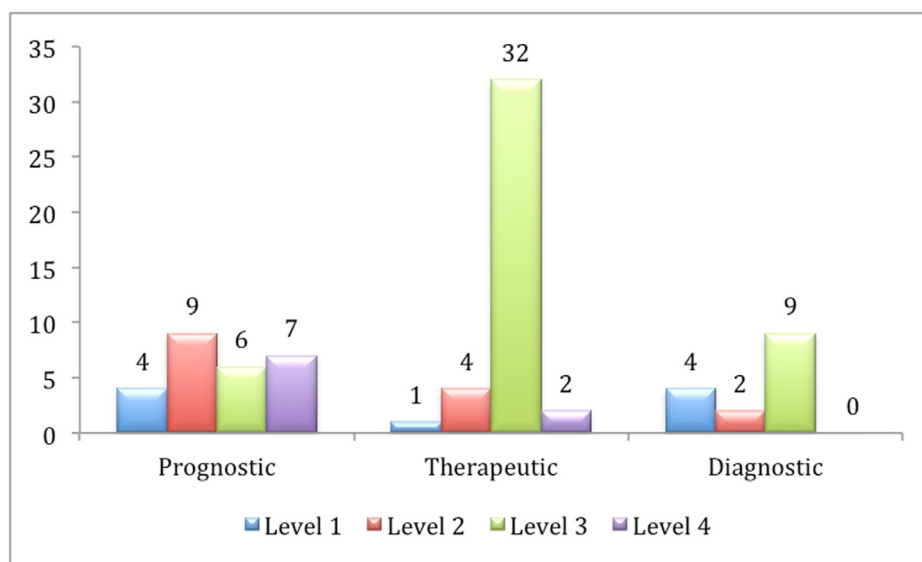


Fig. 6. Level of evidence of clinical studies published.

Table 2
Publishing journal profile.

Parameters	Total
Number of Publishing Journal	87
Average h-index	38.65 (2–268)
Publishing Journal Impact Factor	
Not Indexed	17
<0.25	33
0.25–0.50	93
0.51–1.00	43
1.01–2.00	22
>2.01	12
Publishing Journal q-index	
Q1	37
Q2	28
Q3	36
Q1 (non-ortho)	5
Q2 (non-ortho)	26
Q3 (non-ortho)	67
Q4 (non-ortho)	4
Average Impact Factor (SJR 2019)	0.66 (0.14–3.62)

While, conducting higher level of research such as meta-analysis, randomized control study, prospective study and case-control study were more time and cost-consuming. This may also affect the interest of the orthopedic surgeon to perform research/publications. Development of a research team or collaboration with another field of medicine, national, or international research centre may become a solution for this problem.^{3,18}

Our study showed that the average citation rates were quite low. Eventhough one article had been cited for 82 times (which was an international consensus article), this number was significantly lower than those of global orthopedic community. In 2011, the 100 most cited articles in orthopedic surgery had the number of citations that ranged from 1748 to 353¹⁹. Meanwhile, the top 50-most-cited orthopedic article from mainland China in 2015 ranged from 181 to 31²⁰. Our result also show that it is important to improve not only the quantity but also the quality of Orthopedic research in Indonesia. The lack of citations was possibly caused by the fact that the majority of Indonesian publications were level V studies (case reports/series). Meanwhile, it was suggested that basic science articles, level I and II clinical studies are cited more frequently.²¹ And

among 100 most cited orthopedic articles in 2011, 24 were basic science research and 42 were level IV clinical studies that mostly introduced or tested classification system or outcome measurement tools.¹⁹

The Hirsch index (h-index), is widely considered a valuable measure of assessing academic productivity. It was measured by counting the number of publications for which an author has been cited by other authors at least that same number of times. Hirsch suggested that the good h-index is indicated by dividing the h-index with the number of years that have passed since the first publication, with a score of 1 being very good, 2 being outstanding and 3 being exceptional.^{22,23} The limited citation rates also implicated in Indonesian author’s h-index, with 7 as the highest one. However improvement of the h-index may be predicted in the next decade since most of the articles that were published in 2019 haven’t been cited yet.

This study has several limitations. First, SJR indicator evaluations were performed using SJR 2019, not using the index for each corresponding year. The journal rank may increase/decrease during those times (especially the ones in published since before 2010). Second, the author h-index may be inaccurate especially for more recent articles. Newer published articles (eg. ones who was published in 2019) may significantly have fewer citations than the older ones. Nevertheless, the increasing research trend in 2019 should be maintained by incorporating research into the daily clinical orthopedic practice.

5. Conclusion

This bibliographic study documented 220 orthopedic articles involving 205 Indonesian authors. Clinical therapeutic article and single-center studies were most common. Although there was an increasing trend and quantity of publications among Indonesian authors, most articles had level 5 evidence (case reports) and the quality of publishing journals were mostly Q3 with low-moderate SJR. Improvement of the article’s quality and institutional collaboration will be needed for future contribution in global orthopedic society.

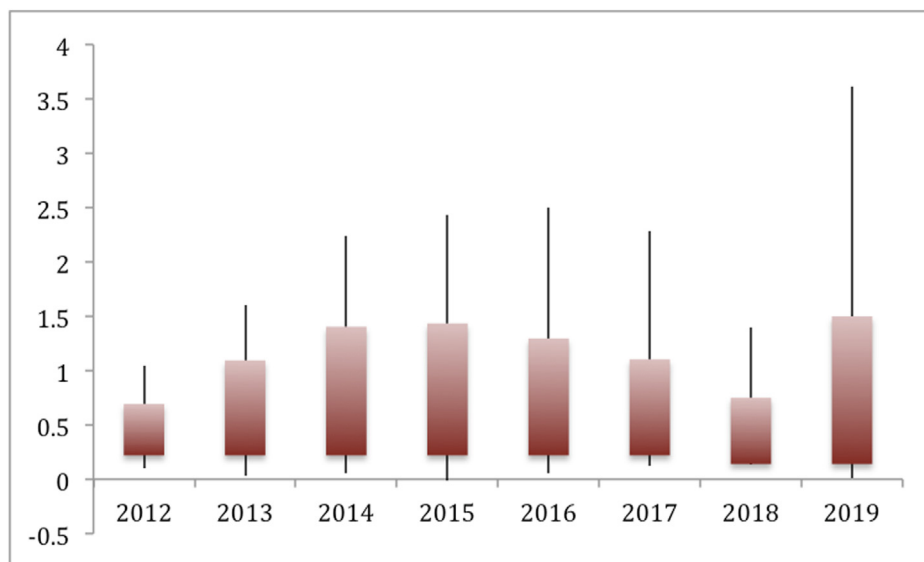


Fig. 7. Trends of publishing journal SJR

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Contributions of Authors

Declaration of competing interest

The authors declare that they have no conflict of interest.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

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