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The Correlation between Altmetric Score and Citations in Pediatric Orthopaedic Journal Articles

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ABSTRACT

Background With the emergence and development of social media platforms, Altmetric score has been introduced as a quantitative measuring approach for online impact and exposure of research work. We aim to determine if Altmetric score correlates with the citation number of ar-ticles in specific major pediatric orthopaedic journals and analyze the characteristics of these publications further. Methods: The top 100 publications ranked by Altmetric score from four important pediatric orthopaedic journals were inspected. Pearson's correlation coefficients were performed by using GraphPad PRISM software to examine the correlation between Altmetric score and various factors including citation number, impact factor and impact index. Different aspects were analyzed to identify the characteristics of top articles. Results: A total of 100 publications were recorded and analyzed. There was no statistically significant correlation between citation number and Altmetric score (r=0.1027, p=0.3092, R2=0.0105), also no correlation was found between Alt-metric score and impact factor (r=0.0670, p=0.5079, R2=0.0045) or impact index (r=-0.1104, p=0.2768, R2=0.0122). Almost all the articles were focused on clinical studies in different types and topics. Only one publication discussed animal experiment. Conclusions: Altmetric score does not cor-relate with the traditional bibliometric factors including citation number, impact factor or impact index in specific major pediatric orthopaedic journal articles. However, Altmetric score provide large amount of online information, both Altmetric score and citation number should be con-sidered complementarity when assessing the impact of scientific publications in pediatric or-thopaedics.

Keywords: Altmetric Score; Pediatric Orthopaedics; Citations; Bibliometrics

Introduction

In scientific research, it is indispensable to take reliable and comprehensive meas-urement of the impact for published articles. It enables researchers to identify classical ar-ticles from a great number of publications, which can promote the development in special research areas. Traditionally, measures of bibliometrics are the mainstream for assessing the influence of article and journal performance, which have been widely used and accepted by researchers [1,2]. However, studies have shown that it takes up to 3 years after publication for a certain article to reach citation peak and this delayed period affects the judgement of influence [3,4]. The rapid development of social media platforms,

including Twitter, Blogs, Facebook and others are providing novel insights into the immediate impact of research work com-pared to traditional bibliometrics. Therefore, as a valuable adjunct tool for evaluating the impact of articles, Altmetric score was designed and created in 2010 [5]. Studies regarding the correlation between Altmetric score and traditional bibliometrics have been done in some other research fields, such as general surgery literature [1], urology literature [6] and dermatology journal articles [7]. To our knowledge, no similar study has been done in pe-diatric orthopaedic field. The objective of this study is to examine the correlation between traditional bibliometrics including citations, impact factor, impact index and Altmetric score among the classical articles in specific major pediatric orthopaedic journals, mean-while, analyzing and identifying the characteristics of these articles in different aspects.

Materials and Methods

Characteristics of the top 100 publications ranked by Altmetric score from four im-portant pediatric orthopaedic journals were recorded and analyzed via Altmetric database in April 2022. Considering the citation lag period, we set up the publication year range from 2016 to 2018. Altmetric scores, the number of citation, and online mentioned sources were obtained from Altmetric and Dimensions [8] . We gained the characteristics of articles by reviewing the detailed content. Pearson's correlation coefficient (r) and coefficient of determination (R2) were used to evaluate the correlation between Altmetric score and cita-tions, impact factor, impact index. A p -value of < 0.05 was considered statistically signif-icant. All statistics were performed by using GraphPad PRISM (GraphPad Software Inc, La Jolla, CA) or Microsoft Excel (Microsoft, Redmond, WA).

Results

A total of 100 publications from 2016 to 2018 were recorded and analyzed in our study. There was no statistically significant correlation between citation number and Alt-metric score (r=0.1027, p=0.3092, R2=0.0105), also no correlation was found between Alt-metric score and impact factor (r=0.0670, p=0.5079, R2=0.0045) or impact index (r=-0.1104, p=0.2768, R2=0.0122) (Figure 1). Retrospective study contributed to the highest proportion (52%) of the study type for these articles, followed by prospective study (11%) and review (11%) (Figure 2). Frac-ture research remained the most popular topic, followed by deformity and trauma (Figure 3). Journal of Pediatric Orthopaedics consisted of the most part (59%) in the four main journals, while the journal Pediatric Traumatology Orthopaedics and Reconstructive Sur-gery was excluded in the top 100 articles ranked by Altmetric score (Figure 4). Low evi-dence level (Level III and Level IV) maintained the mainstream (80%), correspondingly, high evidence level (Level II) only took 20% of the whole (Figure 5).

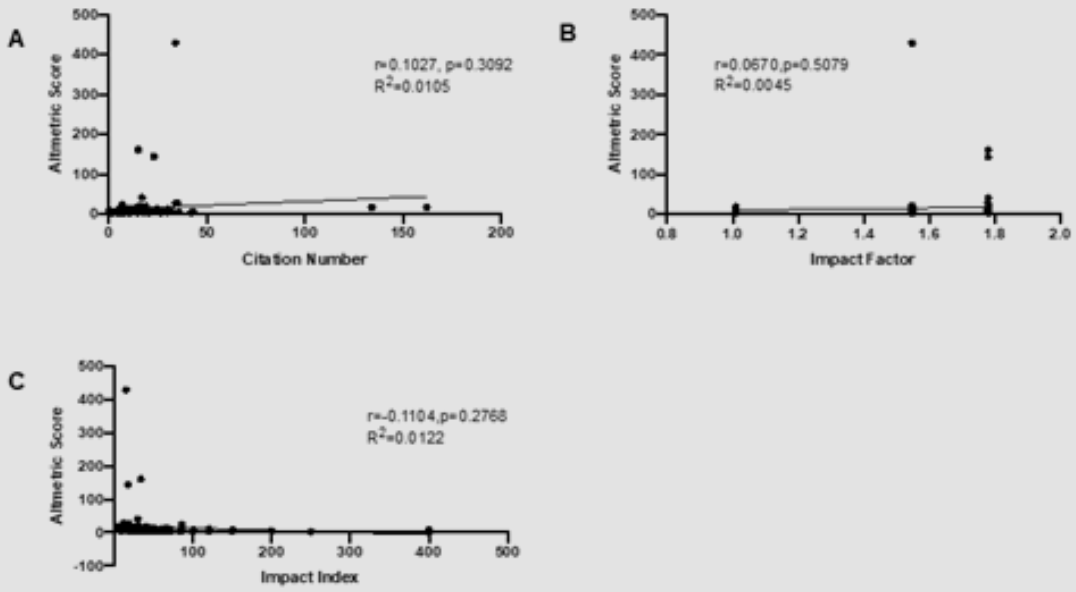

Figure 1: Correlations between Altmetric score and traditional bibliometrics.
a) There is no significant correlation between Altmetric score and citation number for articles (p=0.3092)
b) Altmetric score does not correlate with impact factor significantly (p=0.5079).
c) Altmetric score does not correlate with impact index significantly (p=0.2768).

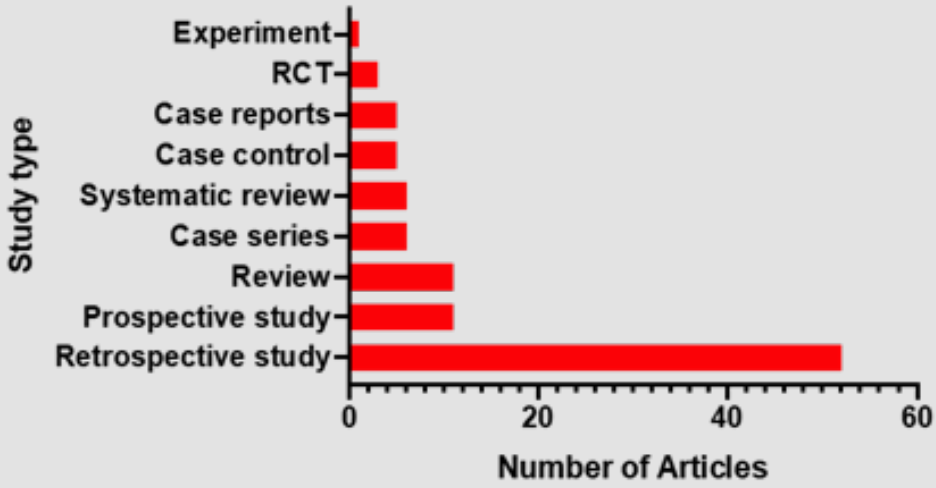

Figure 2: Study types in classical articles. RCT: randomized controlled trial

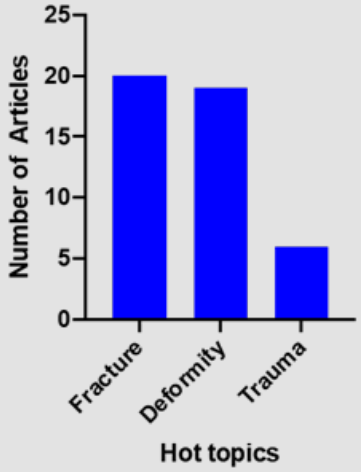

Figure 3: Hot topics in classical articles.

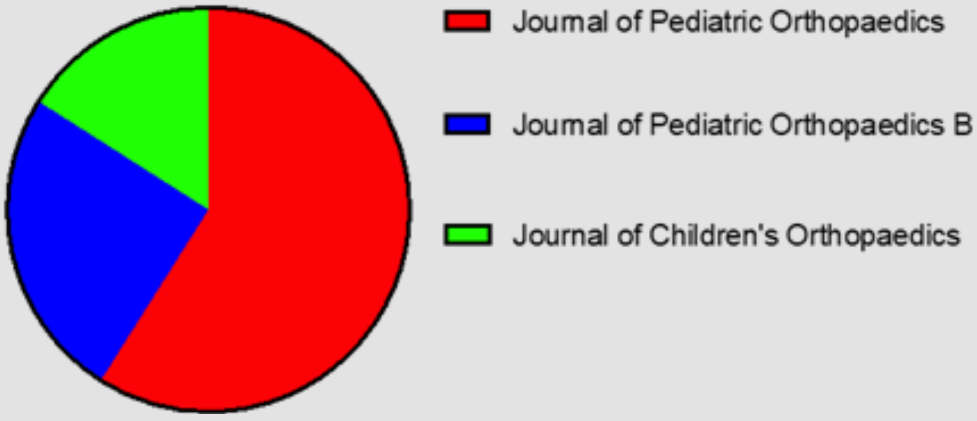

Figure 4: Proportion of journals in classical articles.

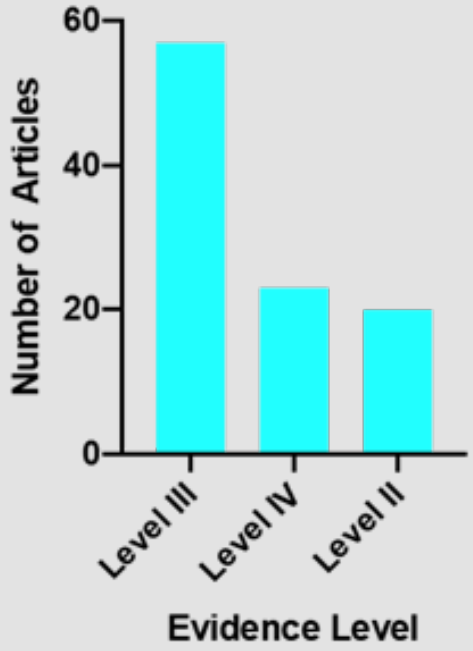

Figure 5: The level of evidence in classical articles.

Discussion

Table 1: Social media platforms in classical articles.

Social media platforms	Article mentions
Twitter	439
News outlet	120
Facebook	44
Blog	32
Wikipedia	22
Policy sources	4
Google+	2

This novel study, to our knowledge, is the first article to examine the correlation be-tween Altmetric score and traditional bibliometric factors including citation number, im-pact factor and impact index in this specialty. Our study demonstrated a lack of strong association between novel Altmetric score and traditional bibliometrics, which is sup-ported by the low coefficients of determination furtherly. It indicates that traditional bib-liometrics and Altmetric score should not be seen alternatively but complementarily when evaluating the scientific impact of publications, which was also demonstrated by pre-vious studies in other fields including orthopaedic, implantology, plastic surgery and pe-diatric surgery [9-12]. Shortness of papers with high evidence level was found in our data, which is similar with most traditional bibliometric studies [13-15]. This suggests either Altmetric score or traditional citation times are not assuredly affected by the evidence level. It can be ex-plained that novel ideas or designs are frequently published as observational studies ini-tially, then garnering concentration over time. Most of top 100 publications focus on clini-cal research, only one of them talks about basic science, which indicates that the research direction of pediatric orthopaedics is still clinical field, this result is consistent with pre-vious study of the same type [7]. Notably, previous studies have demonstrated that social media platforms can pro-vide a popular approach for resident and academic clinicians obtaining training and communication [16-18]. This might suggest these social media platforms are paths for participating within both academic professional communities and potential patients, thus, it should attract the interest of clinicians and scientific researchers. In our study, Twitter hold the majority of online platforms, which is consistent with other studies [9,19]. Either Altmetric score or traditional bibliometrics does have their own value in the influ-ence assessment of research work. However, Altmetric score can estimate the interest and attention immediately after the publication. While traditional bibliometrics remain a reli-able, valid, and stable method of evaluating the impact of research in a particular field as time goes by [4,20]. Our study is not without limitations (Table 1). Only the main specific journals of pediatric orthopaedics were included in our analysis, other related publications in journals outside of the specific area were excluded, although many of these may be impactful and outstanding. We used retrospective study to analyze the data. Retrospective is a limitation itself, which can only reflect situations at the time of data collection. Correspondingly, current trends might be different compared with

«old» trends. Therefore, it is unavailable to de-duce the trend or correlation among publications at different time points from our results. Despite these limitations, our study can help to illuminate the correlation between tradi-tional bibliometrics and Altmetric score.

Conclusions

Although Altmetric score provides a novel perception about the immediate reflection of impact and performance in the scientific work, there is insufficient information to sup-port Altmetric score has a concrete relationship with traditional bibliometrics or could re-place that independently. Our findings indicate that Altmetric score should be considered as a complementary tool to traditional bibliometrics which may ignore the immediate impact of several publications. As the utilization and popularity of social media platforms will presumably continue to rise, recognizing the part that Altmetric score has played in responding immediate impact may help guide future research and promote the wide-spread dissemination progress of science.

Author Contributions

Conceptualization, B.S.; methodology, B.S.; software, B.S.; validation, B.S., P.G. and J.Z.; formal analysis, B.S.; investigation, B.S.; resources, B.S.; data curation, B.S.; writ-ing—original draft preparation, B.S.; writing—review and editing, B.S and J.Z.; visualization, B.S.; supervision, J.Z. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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