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Review Article

Foot and Ankle Medicine: Analysis of a Decade of Research in Renowned Brazilian Orthopedic Journals

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Abstract

Evidence-based medicine is a new paradigm for medical practice in situations that generate uncertainties regarding disease diagnosis, prognosis, and therapeutic management, requiring professionals to develop expertise in the critical evaluation and validation of scientific publications. Thus, this study aimed to evaluate the articles published in Brazil between 2010 and 2019 on foot and ankle medicine. Three researchers independently searched for articles on foot and ankle medicine in three renowned Brazilian orthopedic journals, as follows: Revista Brasileira de Ortopedia, Acta Ortopédica Brasileira, and Revista Abtpé. In total, 296 articles were identified and complied with the inclusion criteria, being thus analyzed. Applying the Oxford hierarchy of evidence classification, we found that, across the three journals, most articles were at levels 4 and 5 of evidence and originated in the state of São Paulo. The most discussed topics were trauma, hallux valgus, pathologies of the calcaneus tendon, and ligament injuries. Given that the predominance of articles with a lower level of evidence has also been reported in the literature for international journals, initiatives that encourage an increase in the number, in the

popularization, and the improvement of the level of evidence for foot and ankle medicine research in Brazil are warranted.

Keywords: Evidence based medicine; Foot and ankle; Orthopedic surgery

1. Introduction

Evidence-based medicine is a new paradigm for medical practice, especially in situations that generate uncertainties regarding disease diagnosis, prognosis, and therapeutic management; this approach requires professionals to develop expertise in the critical evaluation and validation of scientific publications [1]. Specifically, evidence-based medicine differs from traditional medicine in that it is not guided by intuition nor by pathophysiological reasoning, both of which relate to clinicians' decision-making; instead, it is based on literature research and clinical evidence evaluations, thereby requiring the development of new skills for most doctors.

Moreover, owing to the large increase in the number of scientific publications and search tools and to help avoid methodological pitfalls-that can lead readers to misleading and dangerous decisions in clinical practice—evaluating these studies requires critical appraisal [2]. Although the practice of medicine has been based on empirical knowledge since at least the time of Galen of Pergamon, the term evidence-based medicine is more recent, appearing for the first time in a 1992 article [1]. The modern concept of evidence-based medicine is based on the notion that doctors' decisions should be based not only on evidence in general, but also on evidence of the highest quality [3]. A cornerstone of evidence-based medicine is the hierarchical evidence classification system; this hierarchy is known as the levels of evidence. Doctors are encouraged to find the highest level of evidence to answer to clinical questions [4].

Several systems have been proposed for the classification of levels of evidence in evidence-based medicine. In the classification proposed by the "Oxford Center for Evidence-based Medicine" (OCEBM), there is a distinctive feature; the levels of evidence cover the entire range of clinical issues, in the order that the clinician requires. Namely, while most classification schemes consider the levels of evidence regarding therapeutic effects and damage, the OCEBM system allows for doctors and patients to assess evidence regarding prevalence, accuracy of diagnostic tests, prognosis, therapeutic effects, rare damage, common damage, and screening utility [5].

Accordingly, this study aimed to evaluate the articles on foot and ankle medi cine published in three renowned Brazilian orthopedic journals between 2010 and 2019.

2. Review

Three researchers independently searched for articles on foot and ankle medicine published in three renowned Brazilian orthopedic journals (i.e., Revista Brasileira de Ortopedia, Acta Ortopédica Brasileira, and Revista Abtpé) from 2010 to 2019. Articles were classified according to the level of evidence based on the classification proposed by the OCEBM (Figure 1). Controversies were resolved by all members of the research group meeting and discussing until reaching

consensus. Articles unrelated to foot and ankle medicine, editorials, and letters to the editor were excluded. The variables evaluated were as follows: institution of origin of the research, place of origin of the article (country or state), and article theme.

Levels of Evidence and Grades of Recommendations for Diagnostic Studies from the Oxford Centre for Evidence-Based Medicine

Grade of Recommendation/ Level of Evidence	Description
A/1a	Systematic review (with homogeneity) of level 1 diagnostic studies or a clinical decision rule with 1b studies from different clinical centers
A/1b	Independent blind comparison of an appropriate spectrum of consecutive patients, all of whom have undergone both the diagnostic test and the reference standard
A/1c	Diagnostic finding for which specificity is so high that positive result rules in the diagnosis or for which sensitivity is so high that negative result rules out the diagnosis
B/2a	Systematic review (with homogeneity) of level 2 diagnostic studies
B/2b	Independent blind comparison but either in nonconsecutive patients or confined to a narrow spectrum of study patients (or both), all of whom have undergone both the diagnostic test and the reference standard; or a clinical decision rule not validated by means of a test set
B/3a	Systematic review (with homogeneity) of studies with a level of 3b and better
B/3b	Nonconsecutive study or independent blind comparison of an appropriate spectrum, but reference standard was not applied to all study patients
C/4	Reference standard was not applied independently or was not applied blindly
D/5	Expert opinion without explicit critical appraisal or based on physiology, bench research, or "first principles"

Figure 1: Levels of evidence according to the Oxford Center for Evidence-based Medicine.

3. Results

In total, 1786 (199 articles from Abtpé, 623 from Acta Ortopédica Brasileira, and 964 from Revista Brasileira de Ortopedia) articles were found related to foot and ankle medicine, of which 296 were selected (171 from Abtpé, 54 from Acta Ortopédica Brasileira, and 71 from Revista Brasileira de Ortopedia). Table 1 shows the absolute number of articles published in each journal per year and the percentage regarding the total number of published scientific articles.

Journal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Abtpé	16	14	17	16	15	19	20	15	18	21	171
Acta	10	2	9	6	5	1	4	8	3	6	54
RBO	5	6	9	6	11	3	8	9	6	8	71

Table 1: Total number of publications on foot and ankle medicine by year of publication and journal.

When assessing the distribution by place of origin of the articles, we identified published articles from 11 Brazilian states. The state with the largest number of publications was São Paulo (152, 51.35% of the total). Authors from different countries (i.e., USA, Portugal, China, Chile, Switzerland, England, South Korea, Turkey, Poland, Argentina, and Germany) contributed to the publication of 33 articles in the analyzed national journals. Figure 2 shows the geographic distribution of the articles by place of origin.

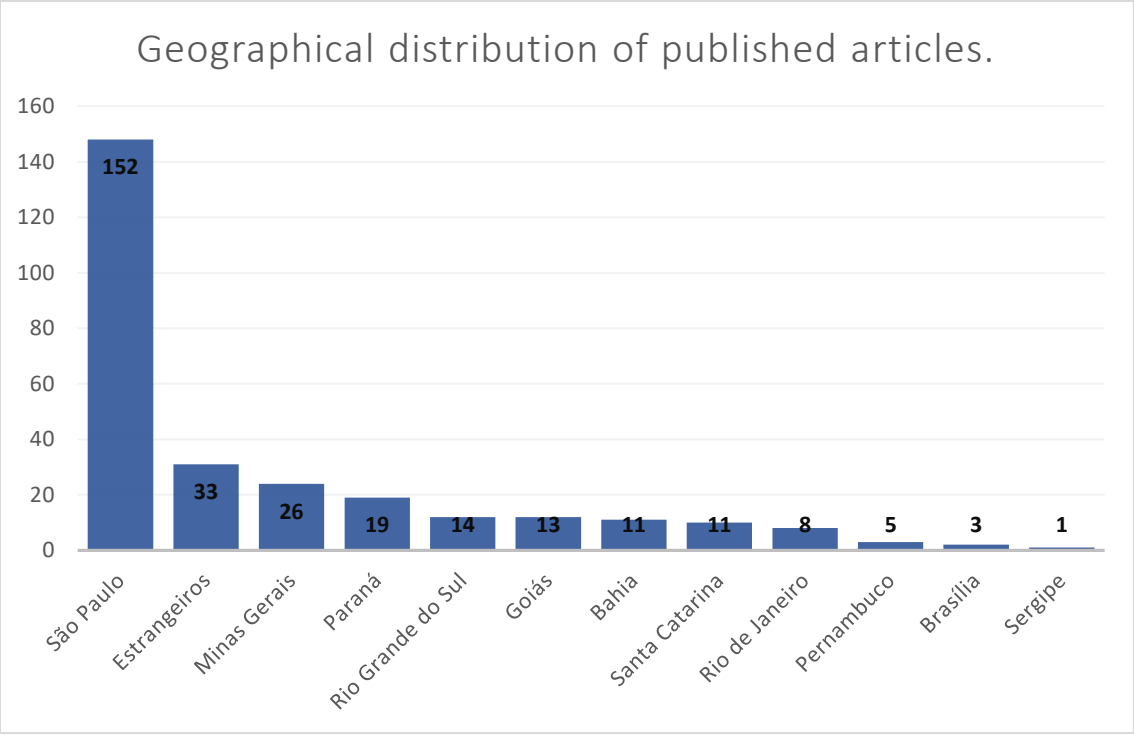

Figure 2: Geographical distribution of published articles.

Legend: The articles from other countries were compiled together and are referred to in Figures as "Foreigners".

Moreover, results showed that a great number of articles across all three journals were classified as levels 4 and 5 of evidence, with only a few having high levels of evidence. Figure 3 shows the distribution of the absolute number of articles by level of evidence, and Figures 4, 5, and 6 shows the distribution by journal.

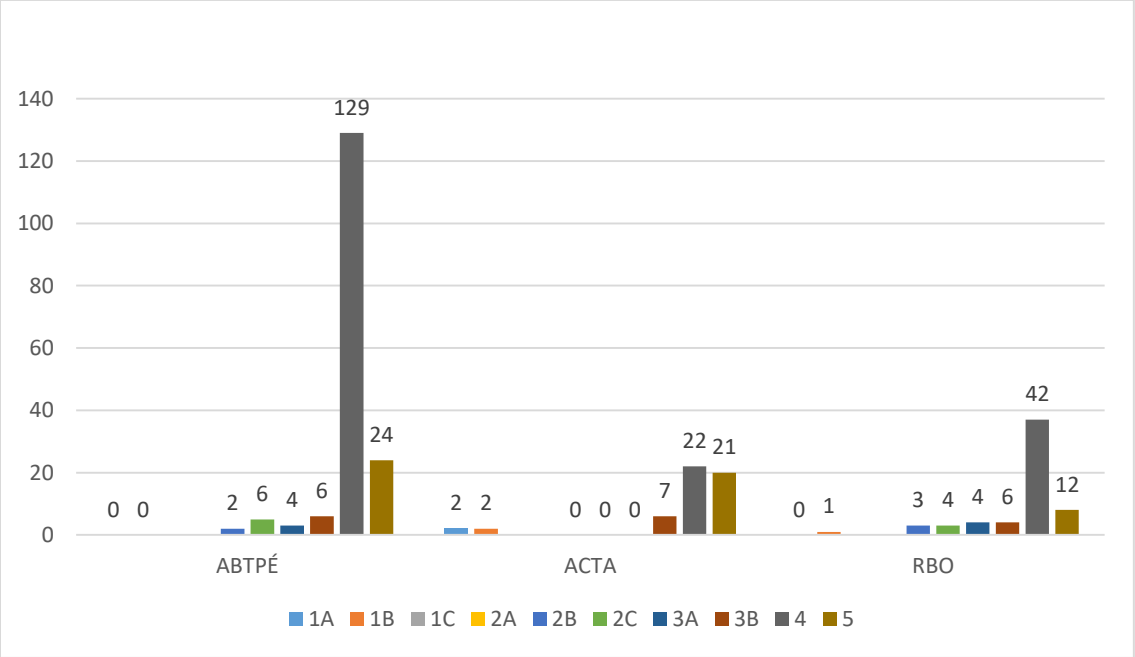

Figure 3: Distribution of articles by level of evidence.

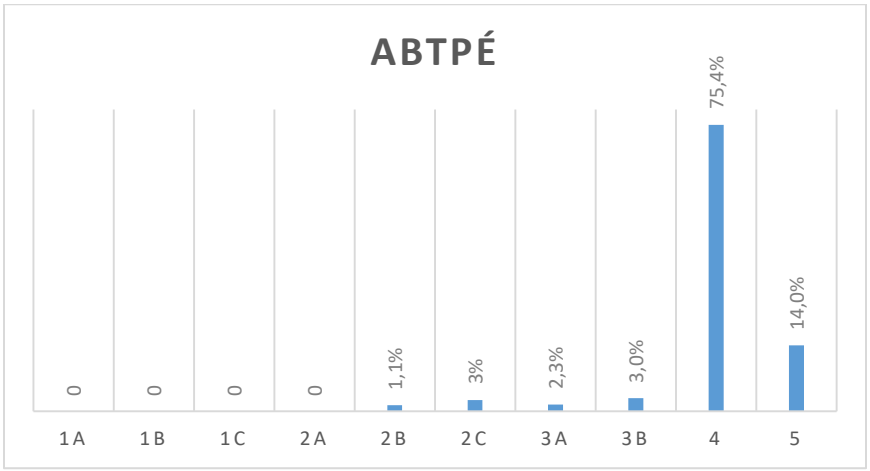

Figure 4: Percentage distribution of articles from Revista Abtpé by level of evidence.

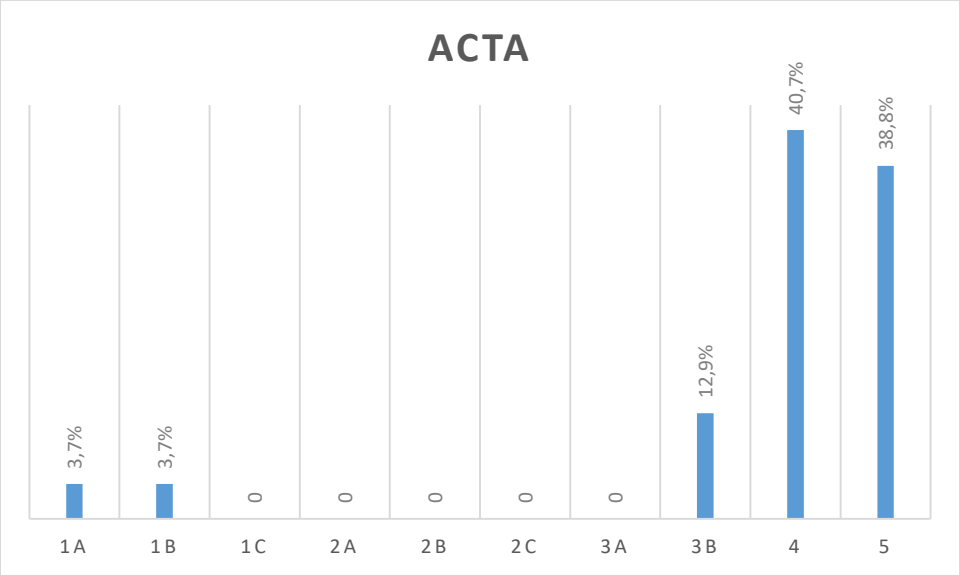

Figure 5: Percentage distribution of articles from Acta Ortopédica Brasileira by level of evidence.

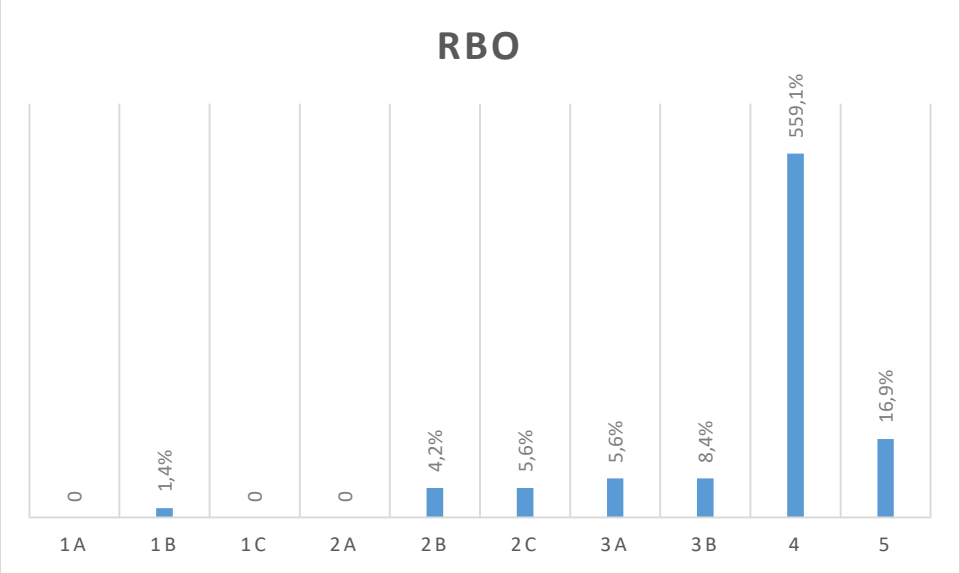

Figure 6: Percentage distribution of articles from Revista Brasileira de Ortopedia by level of evidence.

Regarding discussed topics, the most discussed was present in 64 (21.6% of the total) articles, being related to different types of fractures of the foot and ankle (i.e., 21 on calcaneus fractures, 14 on the talus, 13 on the ankle, 9 on Lisfranc dislocation fracture, 5 on fractures of the base of the fifth metatarsal, 1 on

peritalar dislocation, and 1 on stress fractures in children). The second most discussed topic was hallux valgus, with 32 (10.8%) articles, while pathologies of the calcaneus tendon (tendinopathies and ruptures) were studied in 19 (6.4%) articles. Moreover, 13 articles (4.6%) were related to ligament injuries of the ankle and 13 to the treatment of clubfoot. Nonetheless, there were articles on flat feet in adults and children, rigid hallux, metatarsalgia, plantar fasciitis, tarsal coalition, varus and cavus feet in the Charcot Marie Tooth disease, diabetic foot problems, and ankle arthrodesis.

Regarding institution of origin of the research, 31 articles were from the University of São Paulo, 28 from the Federal University of São Paulo, 19 from the Faculty of Medicine of Santa Casa de São Paulo, and 15 from the University of Taubaté. There were other institutions, but they published fewer articles.

4. Discussion

The analysis revealed a significant number of publications in foot and ankle medicine; specifically, Revista Abtpé was responsible for most publications, while Acta Ortopédica Brasileira and Revista Brasileira de Ortopedia accounted for 18.2% and 23.9%, respectively, of the articles dedicated to the topic. When analyzing the period of 2010 to 2019, there was a predominance of publications coming from institutions in the state of São Paulo, accounting for 51.3% of the total; meanwhile, we found published articles from only 11 Brazilian states, denoting that there were no published articles from the other 16 Brazilian states. On the topic, a survey conducted on February 24, 2018, on the website of the Brazilian Society of Orthopedics, showed that there were 521 specialists in foot and ankle medicine in Brazil at that period. Of these, 202 (38.7%) were in the state of São Paulo. By comparing our results with the percentages depicted in the cited survey, we found that 8.5% of the published articles came from Minas Gerais, which accounted for 10.7% of the Brazilian specialists in foot and ankle medicine in 2018; 6.7% of the articles came from Paraná, accounting for 7.1% of the specialists; 4.2% of the articles came from Rio Grande do Sul, accounting for 7.6% of the specialists; 4.2% of the articles came from Goiás, accounting for 2.8% of the specialists; 3.9% of the articles came from Bahia, accounting for 4.8% of the specialists; 3.5% of the studies came from Santa Catarina, accounting for 4.9% of the specialists; 2.8% of the articles came from Rio de Janeiro, accounting for 7.8% of the specialists; 1.0% of the articles came from Pernambuco, accounting for 1.5% of the specialists; 0.7% of the articles came from Brasília, accounting for 2.5% of the specialists; and 0.3% of the articles came from Sergipe, accounting for 0.7% of the specialists. The comparison depicts that even among the states that presented publications, most were underrepresented when considering the percentage of publications in relation to the number of specialists; specifically, only São Paulo and Goiás had a higher percentage of articles compared with the percentage of specialists.

Another relevant fact was the number of international articles, showing a great interest from foreign authors in publishing in these renowned national journals; specifically, 33 articles were identified, corresponding to 11% of the total. Veiga et al., when analyzing

articles on knee surgery published by foreigners in national journals within a decade, found that they accounted for only 1.6% of the total of articles reviewed.

Additionally, the classification by level of evidence of articles according to the OCEBM showed a predominance of articles with levels 4 and 5 of evidence across the three evaluated journals. This predominance of articles with a lower level of evidence finds consonance in the literature for international journals; according to Baumhauer, research on the foot and ankle is composed mainly of retrospective case series studies of level 4 of evidence [6]. In 2013, Hunt and Hurwit analyzed level of evidence for scientific literature regarding foot and ankle medicine, finding that 70% of the studies were of level 4, 12% of level 3, 9% of level 2, and 9% of level 1 [7]. Thus, although these studies utilized a classification for the level of evidence other than the one we utilized, they still demonstrate that articles with a lower level of evidence are predominant in this field of research, concurring with our findings. Still, despite the search of editors for authors with research that have levels 1 and 2 of evidence, the history of medicine shows several studies of level 4 of evidence that have changed the way we understand the health/disease process. In the 1980s, Conant and Volverg recognized a single tumor, Kaposi's sarcoma, in eight homosexual men, with the recognition of this link (i.e., different homosexual mean had the same tumor) later leading to the recognition of the transmission of the HIV virus [8]. Furthermore, the work of Mann and Thompson [9] describing the surgical treatment of the adult flat foot caused by posterior tibial dysfunction was a significant series of cases for the literature, despite its lack of critical evidence; this cited study incited a series of higher-level evidence studies with control groups comparing different treatment options for posterior tibial tendon dysfunction.

Another factor that may have influenced our results is that the present study exclusively evaluated publications in national journals; thus, we cannot rule out the possibility that Brazilian authors publish their articles with a better level of evidence in foreign journals that have a greater impact factor. Given this limitation, it is not possible to generalize our results regarding level of evidence for the whole scientific production in Brazil regarding foot and ankle medicine, with our results being, rather, more confined to the three studied journals. Regarding the most discussed topics, there is a relationship with the diseases or conditions that are commonly found in clinical practice. Trauma, hallux valgus, pathologies of the calcaneus tendon, and ligament injuries are frequent complaints in foot and ankle medicine outpatients within Brazil. Summarizing, our results demonstrate the need for the development of initiatives that stimulate the increase in the number of foot and ankle medicine research, the popularization of scientific production in this field nationwide, and the improvement of the level of evidence of publications on the topic in Brazil.

5. Conclusions

Between 2010 and 2019, 296 articles on foot and ankle medicine were published in the journals Acta Ortopédica Brasileira, Revista Brasileira de

Ortopedia, and Revista Abtpé. Most articles originated in the state of São Paulo and were classified, according to the OCEBM, at levels 4 and 5 of evidence. Finally, the most discussed topics were foot and ankle trauma, hallux valgus, pathologies of the calcaneus tendon, and ligament injuries.

Declaration of Interest

No conflict of interest to declare.

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