










Current state of research on testicular microlithiasis: A five year bibliometric analysis (2018-2022)

Estado actual de la investigación sobre microlitiasis testicular: un análisis bibliométrico de cinco años (2018-2022)

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ABSTRACT

Introduction: testicular microlithiasis exhibits an incidence of up to 2 % in the pediatric population, with a higher occurrence in patients grappling with underlying tumor pathologies that adversely impact life quality. **Objective:** to characterize global scientific production on testicular microlithiasis between 2018 and 2022. **Method:** a retrospective cross-sectional bibliometric study was performed over the 2018-2022 period. ScienceDirect, Scopus and PubMed databases were reviewed, using the terms “testicular microlithiasis” and “child”. The following variables were considered: number of publications, database, year of publication, country, article type, and name of the journal. **Results:** over the past five years, 131 articles related to testicular microlithiasis were published in ScienceDirect (n=79), Scopus (n=35), and PubMed (n=17). The United States, Turkey, and China led in publications about testicular microlithiasis. Journals with the most publications in ScienceDirect included the Journal of Pediatric Urology, Journal of Pediatric Surgery, and Surgical Pathology. Book chapters were predominant in ScienceDirect, while original articles prevailed in PubMed and Scopus. **Conclusions:** research on testicular microlithiasis in Latin America has been limited and, globally, it lacks significance in terms of the number of studies published in indexed journals, despite its high incidence (10 %) in routine pediatric testicular ultrasounds.

RESUMEN

Introducción: la microlitiasis testicular presenta una incidencia de hasta el 2% en la población pediátrica, con una mayor ocurrencia en pacientes que enfrentan patologías tumorales subyacentes que afectan negativamente la calidad de vida. **Objetivo:** caracterizar la producción científica global sobre microlitiasis testicular entre 2018 y 2022. **Método:** se llevó a cabo un estudio bibliométrico retrospectivo transversal durante el periodo 2018-2022. Se revisaron las bases de datos de ScienceDirect, Scopus y PubMed, utilizando los términos “microlitiasis testicular” y “niño”. Se consideraron variables como el número de publicaciones, la fuente de la base de datos, el año de publicación, el país, el tipo de artículo y el nombre de la revista. **Resultados:** en los últimos cinco años, se publicaron 131 artículos relacionados con la microlitiasis testicular en ScienceDirect (n=79), Scopus (n=35) y PubMed (n=17). Estados Unidos, Turquía y China lideraron en publicaciones sobre microlitiasis testicular. Las revistas con más publicaciones en ScienceDirect incluyeron el Journal of Pediatric Urology, Journal of Pediatric Surgery y Surgical Pathology. Los capítulos de libros predominaron en ScienceDirect, mientras que los artículos originales prevalecieron en PubMed y Scopus. **Conclusiones:** la investigación sobre microlitiasis testicular en América Latina ha sido limitada y, a nivel global, carece de relevancia en cuanto al número de estudios publicados en revistas indexadas, a pesar de su alta incidencia (10%) en ecografías testiculares pediátricas de rutina.

Key words:

Bibliometrics; Child; Operative; Pediatrics; Research; Surgical Procedures; Urology.

Palabras clave:

Bibliométrico; Investigación; Niño; Operativo; Pediátrico; Procedimientos quirúrgicos; Urología.

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INTRODUCTION

Testicular microlithiasis (TM) is a rare condition of unknown etiology. Its diagnosis, that generally occurs incidentally, has been raising, as a result of the increment in the usage of ultrasonography in scrotal anomalies^(1,2). It is defined as the ultrasound presence of five or more diffuse hyperechoic foci, dotted, without acoustic shadow, with a diameter between 1-3 mm that are scattered in the testicular parenchyma^(3,6).

These microliths correspond to small calcium deposits surrounded by concentric layers of connective tissue or collagen fibers, that appears as a result of the intra-tubular accumulation of cellular debris with subsequent calcification. They may have an internal or external location to the seminiferous tubules, given by the presence of duct membrane rupture^(7,8). Currently there is an ultrasound classification for TM according to the number of microliths in each testis; Grade I (5-10), Grade II (10-20) and Grade III (>20)⁽⁴⁾.

As this condition occurs asymptotically, it is important to be aware about the diagnosis not being systematically reported but rather as an incidental finding, with an incidence of 0.6-10 % in the adult population and up to 2 % in the pediatric population, presented with higher frequency in patients with underlying pathologies such as Klinefelter Syndrome (17.5 %) and Down Syndrome (36 %)⁽⁹⁾. The importance of knowing this pathology relies on the need to identify and understand the findings, in order to make differential diagnoses with other pathologies that can be showing with similar patterns of testicular microcalcifications of benign origin such as vascular calcifications, hematomas, inflammatory granulomas and phleboliths⁽⁹⁾.

TM has been shown to be associated with the presence of malignant tumors such as seminomas, teratomas, and mixed germ cell tumors^(6,9). Other pathologies that are also associated with TM are: infertility, varicocele, cryptorchidism, and genetic disorders. It should be noticed that although TM is associated with the presence of testicular tumors, it is not considered an independent risk factor for the development of this pathology^(4,9,10).

Knowing the incidence of testicular microlithiasis in the pediatric population and its association with different pathologies, both tumor and genetic, that affect the quality of life of patients, a bibliometric analysis was carried out using the available information in three databases to characterize the current state of research on testicular microlithiasis worldwide. ScienceDirect, Scopus and PubMed were reviewed, using the terms "testicular microlithiasis" and "child", combined with Boolean operators, in articles published from 2018 until 2022; with particular attention to the quality and diversity of publications in indexed journals. This investigation seeks to advance the understanding of this condition and its impact on the quality of life and prognosis of pediatric patients.

Bibliometrics is a discipline that deals with quantifying and analyzing scientific and academic production through measures and statistics. It employs quantitative methods to assess the productivity, impact, and visibility of research, as well as to identify patterns and trends in scientific literature. One of the main focuses of bibliometrics is citation analysis, which involves tracking bibliographic references among scientific articles to evaluate the influence and relevance of a work in the context of a discipline or research area⁽¹¹⁾.

Bibliometrics, as observed in the context of the analysis on testicular microlithiasis, becomes an essential tool for systematically and quantitatively examining scientific research. In this case, bibliometrics is employed to conduct a comprehensive study of knowledge production related to testicular microlithiasis and its impact on the quality of life of pediatric patients. By utilizing data sources such as ScienceDirect, Scopus, and PubMed, the aim is to identify patterns, trends, and the quality of scientific publications regarding this specific topic⁽¹¹⁾.

METHOD

A retrospective cross-sectional bibliometric study was performed during the first half of 2023. ScienceDirect, Scopus and PubMed databases were reviewed, using the terms "testicular microlithiasis" and "child", combined with Boolean operators. All articles related to testicular microlithiasis which were published over the last five years (2018-2022) were selected without sampling.

The following variables were considered: number of publications, database, year of publication, country, article type (Original, Case Reports, Reviews, Letters, Book Chapters, and others), and name of the journal.

This research was carried out in conformance with current Colombian regulations and is governed by the Helsinki principles⁽¹²⁾. However, this project does not require evaluation by a bioethics committee, since it involves scientometrics, analysis of articles published in scientific databases. Instruments will not be applied to individuals, there will be no contact with patients or caregivers, the research will not be carried out in any health institution. The project is considered "without risk" in accordance with Resolution 8430 of 1993⁽¹³⁾.

RESULTS

The study revealed that over the past 5 years, Scopus indexed 35 articles on testicular microlithiasis, PubMed featured 17, and ScienceDirect included 79. In Scopus, 2019 and 2020 had the fewest publications with 2 and 5 articles, respectively, while 2018 marked the peak with 13. Similarly, ScienceDirect exhibited a dip in 2019 (n=12) with the highest publication count in 2018 at 20 articles. For PubMed, the zenith occurred in 2018 with 9 publications (Figure 1).



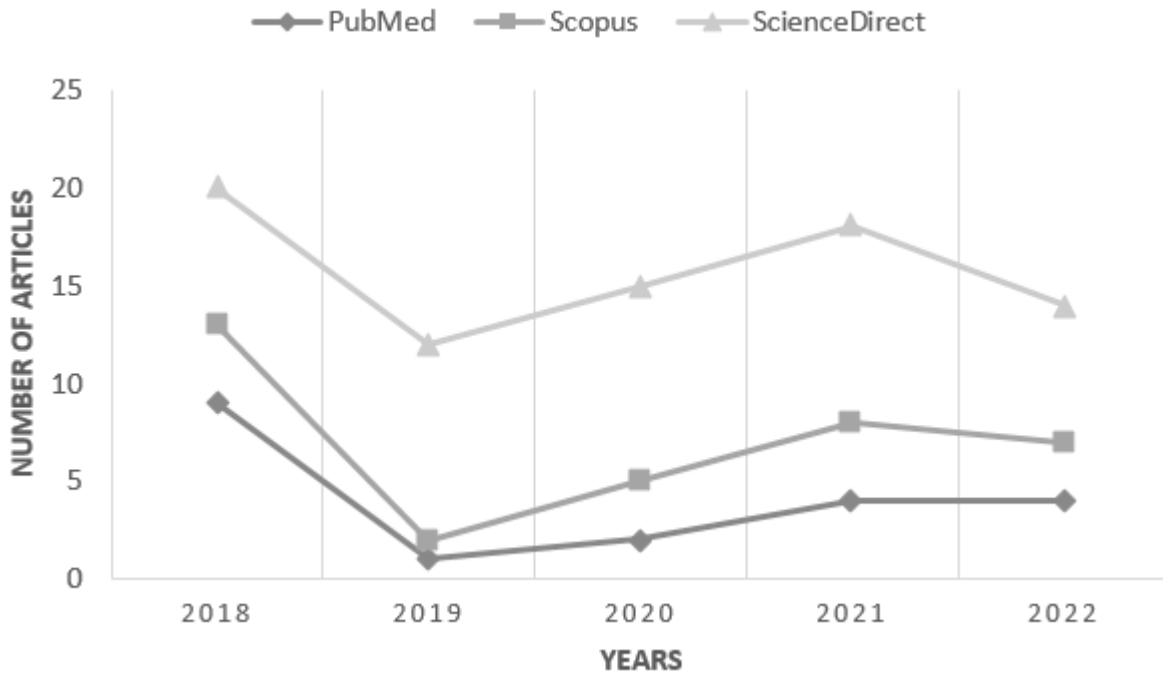


Figure 1. Articles published per year in PubMed, Scopus, and ScienceDirect.

Furthermore, the findings revealed that the predominant format for articles on testicular microlithiasis in ScienceDirect was book chapters (n=25), whereas in PubMed (n=11) and Scopus (n=26), original articles were the most frequently published (Figure 2).

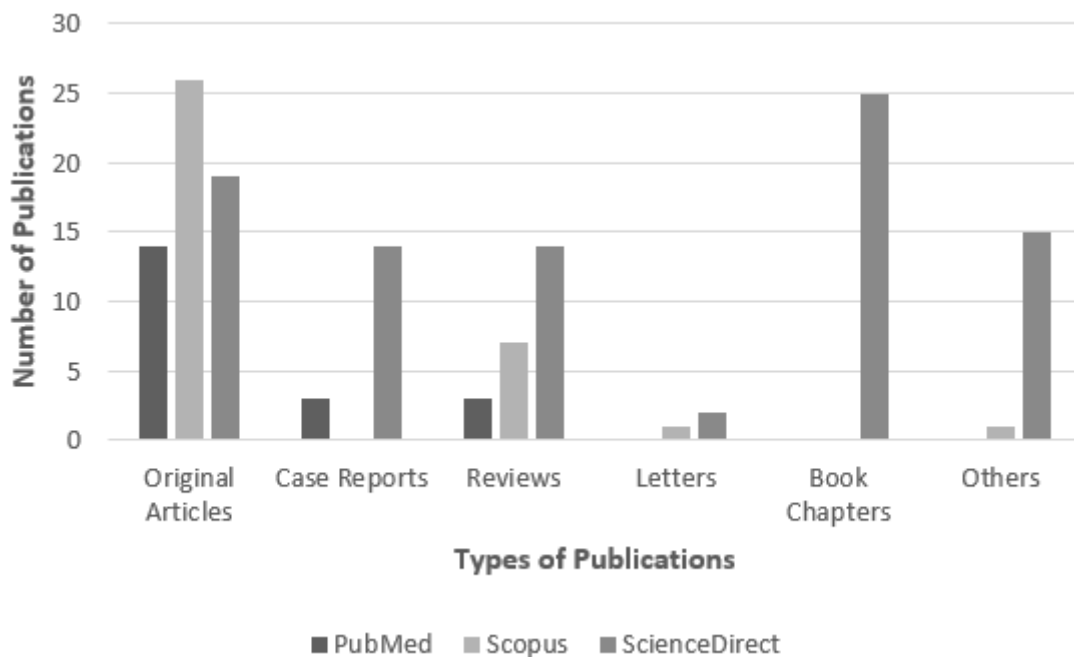


Figure 2. Articles published in PubMed, Scopus, and ScienceDirect by type.

The analysis identified the United States, Turkey, and China as the top countries with the highest publications on testicular microlithiasis, contributing 37, 13, and 7 articles, respectively (Figure 3).

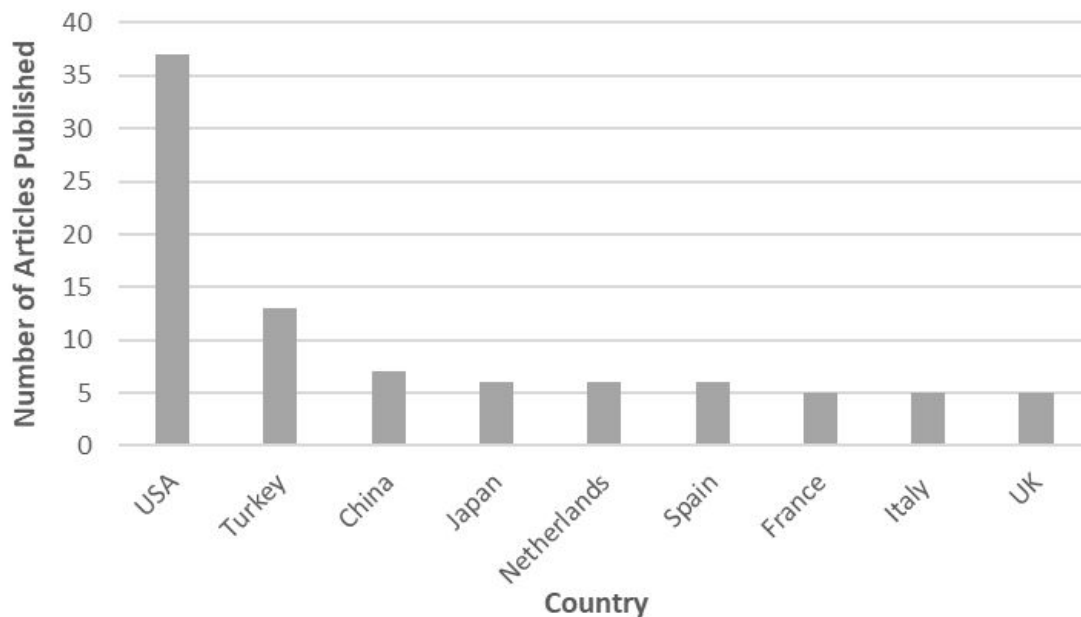


Figure 3. Countries with the highest number of publications.

Moreover, in ScienceDirect, the journals that exhibited the highest number of publications were the Journal of Pediatric Urology, the Journal of Pediatric Surgery, and Urology Surgical Pathology, featuring 16, 7, and 3 articles, respectively (Figure 4).

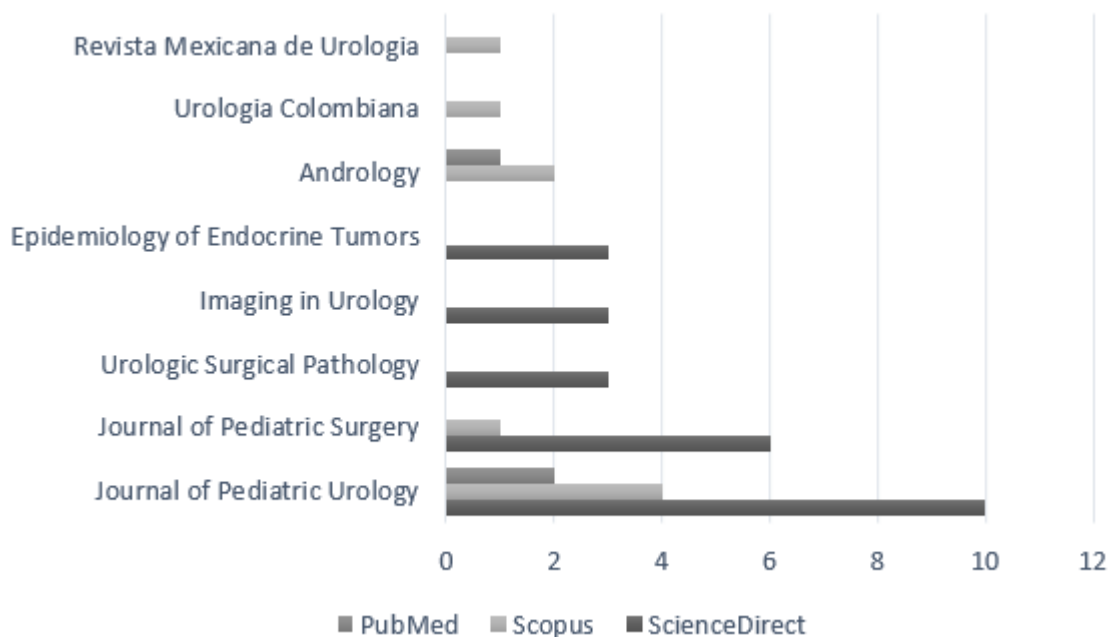


Figure 4. Journals with the highest number of publications in PubMed, Scopus, and ScienceDirect.

DISCUSSION

This study undertook a comprehensive investigation into testicular microlithiasis, acknowledging the limited existing literature on the subject. The research was conducted by thoroughly examining various articles sourced from databases such as ScienceDirect, Scopus, and PubMed. Surprisingly, the findings revealed a scarcity of similar studies, highlighting the novelty and uniqueness of our bibliometric approach. Despite

the increasing interest in testicular microlithiasis, the literature remains limited, particularly in terms of the global scope and diverse associations with other pathologies.

Testicular microlithiasis has emerged as a topic of growing interest in medical research. Its incidence, particularly in the pediatric population, has led to increased exploration of clinical implications and associations with other pathologies.

In this context, our bibliometric study stands as an innovative contribution to this evolving field. We have thoroughly examined articles from recent years, utilizing databases such as ScienceDirect, Scopus, and PubMed, to provide a comprehensive overview of testicular microlithiasis research. This pioneering approach not only highlights current trends and the geographic distribution of research but also reveals specific publication patterns in specialized journals, contributing to the global understanding of this condition and its associations with other pathologies.

Testicular microlithiasis is an entity found with relative frequency both in the adult population (0.6 – 10 %) and in the pediatric population (2 %) during ultrasound examinations to evaluate testicular anomalies. The connection between the presence of testicular microlithiasis and both benign and malignant testicular neoplasms has given place to several discussions and different consensus regarding its association with these.

Various studies carried out by Heller et al. ^(4,5) have shown that there is a direct relationship between the finding of microliths and the development of malignant pathologies with a prevalence of up to 12 % in patients with TM. Therefore, it is important to count with adequate and well-timed studies to report these findings and make an early diagnosis, thus favoring the quality of life of patients, reducing the number of interventions and complications by the patient.

Currently, different authors such as Kocaoğlu et al. and Cheng-Jun et al ⁽¹³⁾ have taken as a starting point for carrying out systematic reviews, meta-analyses, and original studies, respectively, in order to understand the association between the presence of microliths in the testicular examination and the evolution to malignant testicular pathologies in a more precise way.

Although the international evidence on this subject is low, this study has shown that the countries with the highest number of publications were the United States, Turkey and China, and only one was carried out in Colombia as well as in Latin America with very low participation in the last 5 years. In 2019 Knight et al. ⁽¹⁵⁾, carried out a systematic review that shows an exponential increase in research in the last 10 years in low-income countries such as Colombia, which suggests being related to the limited resources and infrastructure when collecting patient data. Therefore, it is a new challenge from where to do a contribution to the generation of new scientific knowledge at Latin American and worldwide level, considering that the knowledge derived from a greater scientific production in this field will be essential for the development of preventive and therapeutic alternatives.

It is important to take into account that bibliometric reviews such as the one carried out can present limitations in terms of the selection of databases, since the search is limited to three databases (Scopus, ScienceDirect and PubMed), which could exclude some important sources that are not included in these

databases. Since the data collected is from only the 5 previous years, this could affect the representativeness and timeliness of the results obtained. Furthermore, statistical analysis does not always get a review about the quality or importance of individual studies.

CONCLUSIONS

This bibliometric analysis of testicular microlithiasis publications over the past 5 years presents a varying research landscape with dynamic publication trends across the following databases: Scopus, PubMed, and ScienceDirect. The yearly fluctuations in outputs made by these platforms suggests that there is an evolving interest in the topic. Furthermore, there were notable gaps in article formats among databases, with ScienceDirect featuring more book chapters than the others, highlights the diverse approaches to disseminating knowledge. Following the geographical trends, it was found that the United States, Turkey, and China are current leading contributors, emphasizing the global nature of research on testicular microlithiasis, but distinctively showing that there is room for more research on this topic in Latin America. The identification of key journals in ScienceDirect provides valuable insights into the dissemination of research findings. Overall, this analysis enhances our understanding of the current research landscape, offering valuable information for researchers and clinicians, and leaves space for future analysis of data in Latin American countries to broaden the representation.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have not conflicts of interest.

AUTHORS' CONTRIBUTION

SNM: Administration of the Project, Resources, Methodology, Conceptualization, Revision and Edition.

SCM: Administration of the Project, Software, Drafting, Edition and translation, Revision and Edition.

DAOB: Resources, Methodology.

DMGC: Resources, Methodology and Supervision.

JADV: Resources, Supervision, Edition and Revision.

WDCG: Administration of the Project, Conceptualization Resource and Revision.

IAM: Resources, Supervision and Revision.



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