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The 100 most-cited articles in turkish ophthalmology: A bibliometric analysis of research trends and scientific impact

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Abstract

Purpose: This bibliometric study analyzed the characteristics, citation patterns, and scientific impact of the 100 most-cited articles in Turkish ophthalmology journals from 2010 to 2023.

Methods: A comprehensive bibliometric analysis was conducted using the Dimensions.ai database between October 20 and 25, 2024. The analysis included citation metrics (total citations, recent patterns, Relative Citation Ratio [RCR], Field Citation Ratio [FCR], and Altmetric scores), content characteristics (study design, subspecialty categorization, keyword analysis), and institutional contributions. We evaluated the temporal distribution of publications, mapped collaboration networks, and analyzed the evolution of research themes. Study designs were categorized as reviews, original research, or case reports, while institutional analysis identified leading research centers and their collaborative patterns.

Results: The *Turkish Journal of Ophthalmology* dominated the highly cited publications, most of which were review articles published between 2015 and 2021. The most cited article, focused on thyroid-associated ophthalmopathy, received 105 citations (RCR: 4.03, FCR: 27.8). Ege University, Ankara University, and Başkent University were among the leading institutions, with significant contributions from Sait Eğrilmez and Melis Palamar. Main research areas included retinal diseases, corneal/ocular surface disorders, and cataract/refractive surgery. Recent publications (2020–2021) demonstrated notable citation momentum in the fields of artificial intelligence and allergic conjunctivitis.

Conclusion: This study provides an updated profile of ophthalmology research in Türkiye, highlighting prevalent topics, influential institutions, and publication trends. While aligning with global trends, Turkish research also focuses on regional interests such as thyroid-associated ophthalmopathy. Enhancing international collaboration and diversifying research topics may further increase the global impact and visibility of Turkish ophthalmology literature.

Keywords: Bibliometric analysis, citation, Dimensions database, Turkish ophthalmology articles.

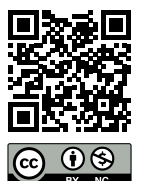


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Bibliometric analysis has emerged as a valuable tool for evaluating research impacts and identifying trends within scientific disciplines.^[1] In the field of ophthalmology, such analyses provide crucial insights into the evolution of research priorities, methodological approaches, and the scientific impact of published works.^[2] These studies serve as important indicators of research quality and influence, helping to guide future investigations and resource allocation.^[3]

The field of ophthalmology has witnessed significant worldwide growth in research output, with various national and regional journals contributing to the advancement of knowledge in the field.^[4] Analysis of country-specific research output and impact has become increasingly important for understanding the international landscape as it pertains to ophthalmology research. Regional journals serve as important platforms for disseminating local research findings while contributing to the global body of knowledge.^[5] Analysis of citation patterns in national journals yields valuable insights into research priorities, institutional contributions, and the evolution of clinical practice within specific geographic contexts.^[6] This is particularly relevant for countries with established ophthalmology traditions and growing research output, such as Türkiye, where understanding publication patterns and impacts can provide valuable insights into research priorities and scientific contributions.

The Dimensions database has emerged as a powerful tool for bibliometric research, offering comprehensive coverage of the scientific literature and enhanced citation tracking capabilities.^[7] In contrast to traditional citation databases, Dimensions provides additional metrics such as the Field Citation Ratio (FCR) and Relative Citation Ratio (RCR), which yield more nuanced insights into research impact within specific disciplines.^[8] These metrics are particularly valuable in ophthalmology research, in which subspecialty impacts may vary significantly. The database's ability to track both traditional citations and alternative metrics provides a more comprehensive understanding of research influence across different platforms and contexts.^[9]

This study leveraged the advanced analytic capabilities of the Dimensions database to conduct a comprehensive bibliometric analysis of Turkish ophthalmology publications. By examining citation patterns, institutional collaborations, and research impact metrics, we sought to obtain a detailed understanding of the most influential articles in Turkish ophthalmology journals. Our focus on citation metrics,

research themes, and methodological approaches is intended to elucidate the evolution and impact of Turkish ophthalmology research within the global scientific community.

Materials and Methods

This bibliometric analysis evaluated the most-cited articles published in seven Turkish ophthalmology journals: *Turkish Journal of Ophthalmology*, *Journal of Retina-Vitreous*, *Beyoglu Eye Journal*, *Current Retina Journal*, *Journal of Glaucoma and Cataract*, *Türkiye Klinikleri Journal of Ophthalmology*, and *European Eye Research*. Data collection was performed between 20 and 25 October 2024, using the Dimensions.ai database.^[10] English-language articles published in the selected journals between 2010 and 2023 were ranked in terms of citation counts, with the 100 most-cited articles selected for analysis. Two independent ophthalmologists conducted cross-blind reviews to ensure data accuracy and consistency. This study followed the principles outlined in the Declaration of Helsinki. Ethical committee approval and informed consent were not necessary.

The analysis included the study design distribution among the 100 most-cited articles. The evaluation included metrics such as *Times Cited*, *Recent Citations*, *Relative Citation Ratio (RCR)*, *Field Citation Ratio (FCR)*, and *Altmetric* scores for the most-cited articles. Articles were categorized according to their ophthalmological subunits, thus permitting the identification of predominant research areas and subspecialty distributions. Institutional analysis focused on quantifying and ranking institutional contributions, examining collaboration patterns, and categorizing institutions by type, including university hospitals and research centers. Additionally, the temporal distribution of the articles was analyzed across the years of publication.

Author-related metrics were examined through a detailed analysis of contributor profiles, identifying the most prolific authors and analyzing collaboration networks. The study incorporated keyword analysis to identify major research themes and trends. Statistical methodology assessment was conducted to evaluate the analytical approaches employed in the articles. Geographic distribution analysis mapped the spatial patterns of research output, including the distribution of research activities by cities and the spatial distribution of research outputs on a nationwide basis.

Results

One hundred most-cited articles were identified from a total of 2,956 papers published in ophthalmology journals based in Türkiye, as sourced from the Dimensions database.

Table 1 provides a detailed analysis of the 10 most-cited ophthalmology articles. Bibliometric analysis revealed that 90% of the articles consisted of reviews published in the *Turkish Journal of Ophthalmology* between 2015 and 2021. The most influential paper, focusing on thyroid-associated ophthalmopathy, attracted 105 citations (RCR=4.03, FCR=27.8), while the highest RCR was observed in a study examining factors affecting compliance with intravitreal anti-VEGF therapy in patients with age-related macular degeneration (RCR=4.49). Recent publications (2020–2021) demonstrated strong citation momentum, particularly in the fields of artificial intelligence (32 recent citations) and allergic conjunctivitis (34 recent citations). With a median RCR of 2.24, these articles exhibited above-average citation rates compared to others in their field. *Altmetric* scores ranged from 0 to 20, with the thyroid-associated ophthalmopathy paper achieving the highest social media impact.

Table 2 presents a comprehensive analysis of the most-cited ophthalmology articles, highlighting key institutional affiliations, author contributions, keyword frequency, and statistical methods. The Ege University Faculty of Medicine headed the table with 12 articles, followed by the Ankara University Faculty of Medicine with 11, and the Başkent University Faculty of Medicine with 10. In terms of author contributions, Sait Eğrilmez and Melis Palamar emerged as the most prolific contributors, each with five publications, followed by Kaan Gündüz and Ayşe Yağcı with four publications each. Six authors—Esra Şahlı, Özge Yanık, Şengül Özdek, Pelin Yılmazbaş, Banu Bozkurt, and Tomris Şengör—each contributed to three publications, underscoring their significant impact in the field. The keyword frequency distribution identified *optical coherence tomography* as the most prevalent term (n=8), followed by *phacoemulsification* and *glaucoma* (n=5 each), indicating primary research interests. The distribution of statistical methods revealed a preference for the Chi-square test (n=43) and t-test (n=36), with the Mann–Whitney U test and Pearson correlation analysis (n=23 each) also being frequently employed, reflecting the prevalent use of non-parametric analyses in ophthalmology research.

Table 1. The 10 Most-Cited Ophthalmology Articles Published in Türkiye: Citation Metrics and Impact Analysis

Rank	Article	Years	First Author	Journal	Study Design	Times Cited	Recent Citations	RCR	FCR	Altmetric Score
1	Thyroid-associated Ophthalmopathy	2017	Şahlı E	TJO	Review	105	37	4,03	27,8	20
2	Factors Affecting Compliance to Intravitreal Anti-Vascular Endothelial Growth Factor Therapy in Patients with Age-Related Macular Degeneration	2017	Polat O	TJO	Retrospective	75	13	4,49	17,74	0
3	Uveal Melanoma; Current Trends in The Diagnosis and Management	2016	Tarlan B	TJO	Review	73	21	2,89	15,11	3
4	The Choroid and Optical Coherence Tomography	2016	Sezer T	TJO	Review	60	19	2,21	12,42	0
5	Stem Cell Treatment in Retinal Diseases: Recent Developments	2018	Öner A	TJO	Review	58	14	2,11	9,59	10
6	Current Management and Treatment of Dry Eye Disease	2018	Şimşek C	TJO	Review	49	15	2,27	12,46	11
7	Chemotherapy in Retinoblastoma: Current Approaches	2015	Yanık Ö	TJO	Review	47	8	1,45	8,72	0
8	Artificial Intelligence and Ophthalmology	2020	Keskinbora K	TJO	Review	46	32	1,99	14,69	0
9	Biocompatibility of Intraocular Lenses	2017	Özyol P	TJO	Review	44	14	1,55	10,41	1
10	Current Knowledge in Allergic Conjunctivitis	2021	Villegas B	TJO	Review	39	34	3,47	18,13	11

Table 2. Analysis of the 100 Most-Cited Articles in Turkish Ophthalmology Journals: Institutional, Authorial, Keyword, and Statistical Method Insights

Rank	Institution	No. of Articles
1	Ege University Faculty of Medicine	12
2	Ankara University Faculty of Medicine	11
3	Başkent University Faculty of Medicine	10
4	Hacettepe University Faculty of Medicine	7
5	Ulucanlar Eye Training and Research Hospital	6
6	Bahçeşehir University Faculty of Medicine	5
7	Selçuk University Faculty of Medicine	5
8	Gazi University Faculty of Medicine	4
9	Istanbul University Istanbul Faculty of Medicine	3
10	Istanbul University Cerrahpaşa Faculty of Medicine	3
Author		
1	Sait Eğrilmez	5
2	Melis Palamar	4
3	Kaan Gündüz	4
4	Ayşe Yağcı	3
5	Esra Şahlı	3
6	Özge Yanık	3
7	Şengül Özdek	3
8	Pelin Yılmazbaş	3
9	Banu Bozkurt	3
10	Tomris Şengör	5
Keywords		
1	Optical coherence tomography	8
2	Phacoemulsification	5
3	Glaucoma	5
4	Age-related macular degeneration	4
5	Dry eye	4
6	Keratoconus	4
7	Cataract	3
8	Primary open-angle glaucoma	3
9	Rheumatoid arthritis	3
10	Uveitis	3
11	Cataract surgery	3
12	Strabismus	3
13	Corneal thickness	3
Statistical Method		
1	Chi-square test	43
2	T-test	36
3	Mann-Whitney U test	23
4	Pearson correlation analysis	23
5	Spearman Correlation	10
6	Kruskal-Wallis test	10
7	Kolmogorov-Smirnov test	7
8	Wilcoxon test	7
9	ANOVA	6
10	Fisher's exact test	5

Analysis of the most-cited ophthalmology articles revealed significant insights into the institutional distribution and publication patterns within the field, as shown in Figure 1. Ankara emerged as the leading city, contributing 29.8% of the most-cited articles, followed by Istanbul with

19.7%, and Izmir with 11.1%. International collaboration was predominantly centered around Turkish institutions, which accounted for 90.5% of affiliations, with the USA contributing 2.4%, and India and Spain each contributing 1.4%, while several other countries contributed 0.5% each. In terms of publication content, *retinal diseases* (24.0%), *cornea/ocular surface* (23.0%), and *cataract/refractive surgery* (18.0%) were identified as the primary subspecialties, indicating a concentrated research effort in these critical areas of ophthalmology. Analysis of article types identified *reviews* (27.0%), *retrospective studies* (25.0%), and *cross-sectional studies* (15.0%) as appearing most frequently, with *case reports* comprising 13.0% of the publications.

Analysis of departmental contributions revealed that ophthalmology departments were responsible for 83.4% of the total contributions, with pathology departments contributing 2.4%, and several other departments, including microbiology, radiology, and infectious diseases and clinical microbiology, each contributing 0.9%, while departments such as neurology, internal medicine, and nephrology each contributed 0.5%.

The 100 most-cited articles between 2015 and 2023 represented 4.45% of the total number of publications. The highest proportion of cited articles relative to the total number of publications was observed in 2016 (6.83%), followed by 2017 (6.58%) and 2015 (6.06%). A declining trend in this proportion emerged in recent years, with 2023 exhibiting the lowest ratio (1.74%) (Fig. 2).

Discussion

This study involved a bibliometric analysis of the 100 most-cited articles in Turkish ophthalmology journals. Bibliometric analyses serve as valuable tools for evaluating the evolution and impact of scientific disciplines, and our findings offer a systematic assessment of the current state of Turkish ophthalmology research. This investigation not only illuminates the predominant research themes and institutional contributions but also provides a framework for understanding the academic landscape as it pertains to ophthalmology in Türkiye within the broader context of the global ophthalmic literature. Through this analysis, we identified several significant patterns regarding publication characteristics, citation metrics, and research priorities that warrant detailed discussion.

Comparing our results with those of similar studies in the literature revealed both parallels and differences. Koh et al.^[6] analyzed the 100 most-cited ophthalmology

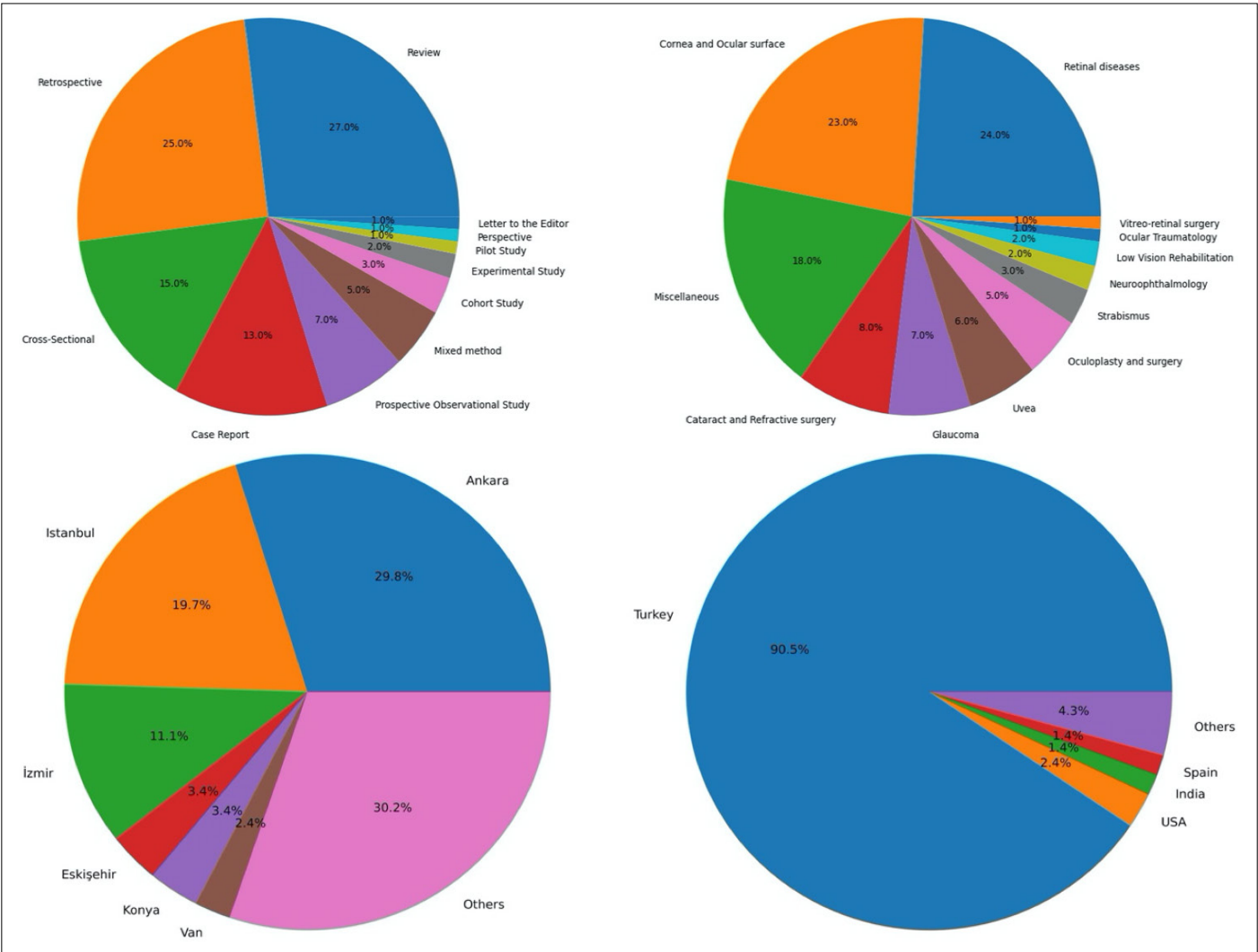


Fig. 1. Distribution analysis of the 100 most-cited Turkish ophthalmology articles. Top left: The distribution of study designs demonstrates the predominance of retrospective studies. Top right: The distribution by subspecialty shows that most publications focus on retinal diseases and cornea/ocular surface research. Bottom left: The geographic distribution across Turkish cities highlights Ankara, Istanbul, and Izmir as the leading centers of publication. Bottom right: The distribution by country demonstrates Turkey's predominant role in these highly-cited publications.

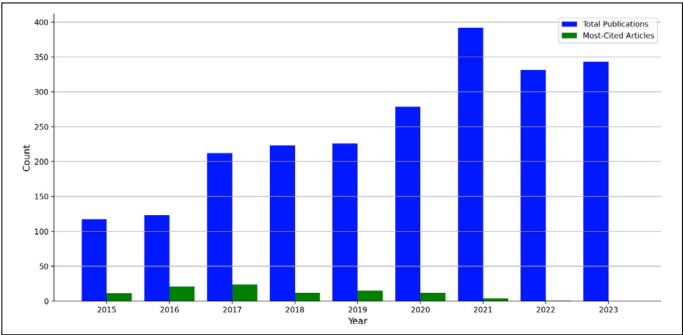


Fig. 2. Temporal Distribution Analysis of the 100 Most-Cited Articles and Total Publication Volume in Turkish Ophthalmology Journals (2015-2023). The graph presents two metrics: blue bars show the total number of published articles per year, while green bars represent the number of articles that received citations in the corresponding years.

articles in Asia, reporting that the majority were published in journals such as *Ophthalmology*, *Investigative Ophthalmology and Visual Science*, and the *American Journal of Ophthalmology*. That study identified myopia and age-related macular degeneration as the most researched topics. In contrast, the present study identified thyroid-associated ophthalmopathy and retinal diseases as the leading subjects in the Turkish ophthalmology literature. This discrepancy may reflect regional differences in clinical priorities and disease prevalences.

Pham et al.^[11] focused on the 100 most-cited articles concerning ophthalmic trauma, reporting that the majority appeared in *Ophthalmology*, *Archives of Ophthalmology*,

and the *American Journal of Ophthalmology*, with a significant proportion originating from the USA (67%). The most frequent topics were pathological conditions secondary to trauma, particularly endophthalmitis and optic neuropathy. In contrast, trauma-related articles were not particularly prominent among the most frequently cited works in the present study. Specific conditions such as thyroid-associated ophthalmopathy were more frequent in this research, possibly due to differing patient demographics and research interests in Türkiye.

Ohba et al.^[12] investigated the 100 most frequently cited articles in ophthalmology journals and noted that the majority originated from the USA, covering topics such as age-related macular degeneration, glaucoma, and optical coherence tomography. While optical coherence tomography appeared as a frequently used keyword in our own analysis, topics such as glaucoma and age-related macular degeneration were not among the most-cited articles. This may indicate that research into these conditions in Türkiye is either less common or exhibits a lower citation impact than international studies.

Yeo et al.^[12] analyzed the 101 most frequently cited articles in ophthalmology journals from 1850 to 1949, finding that the majority were clinical studies on topics such as rubella cataract, retinopathy of prematurity, and keratoconjunctivitis sicca. While historically significant, these topics differ from the current research trends observed in the present study. Our findings suggest that Turkish ophthalmology research is more aligned with modern technological advancements and contemporary clinical issues, such as the incorporation of artificial intelligence and the emphasis on optical coherence tomography.

Huang et al.^[13] conducted a bibliometric analysis of the 100 most-cited articles on the subject of uveitis, revealing that the majority were published in *Ophthalmology* and originated from the USA, focusing primarily on the treatment of the condition. However, uveitis was not among the most frequently cited topics in the current study, with conditions such as thyroid-associated ophthalmopathy and retinal diseases being more prominent. This suggests that Turkish ophthalmology research may have unique areas of focus that diverge from global trends.

Oydanich et al.^[14] performed a bibliometric analysis of the 100 most-cited articles in pediatric ophthalmology. Those authors revealed that the most cited articles were published

between 2005 and 2012, with a significant increase in citations over the previous 15 years. The predominant topics were myopia, retinopathy of prematurity, and other refractive errors. Similarly to our own findings, their results highlighted a focus on prevalent conditions within a specific population and demonstrated the rapid advances being made in ophthalmic research. This parallel suggests that both general and pediatric ophthalmology prioritize research areas based on regional clinical needs and emerging health concerns.

The findings of the present study indicate that the Turkish ophthalmology literature shares a number of commonalities with international research but also exhibits its own distinct characteristics. The prominence of review articles among highly cited works underscores the importance of these in disseminating comprehensive knowledge and guiding clinical practice. The significant contributions identified from institutions such as Ege University, Ankara University, and Başkent University highlight the role of established academic centers in advancing ophthalmic research in Türkiye.

We encountered no previous studies analyzing the types of Turkish ophthalmology articles appearing in international journals. The incidence of prospective studies in the current research was 7%. The limited number of prospective studies serves as an important indicator of the direction of future research in this field. This may be attributed to various factors, such as the methodological challenges, resource requirements, and coordination needs involved in planning and conducting prospective and multicenter studies. Nevertheless, increasing the number of high-level evidence-based research studies should be considered a significant area for improvement, since it has the potential to strengthen the international impact of the Turkish ophthalmology literature.

Several limitations to this study need to be acknowledged. First, our analysis was confined to articles indexed in the Dimensions database and written in English, potentially excluding significant works published in Turkish or indexed in other databases. Second, citation counts can be influenced by factors such as publication age and accessibility, which may affect the representation of more recent studies. Finally, the dynamic nature of citation metrics means that our findings represent a snapshot in time and may be subject to modification as new publications emerge and existing works attract additional citations.

Conclusion

This study provides an updated profile of ophthalmology research in Türkiye, highlighting prevalent topics, influential institutions, and publication trends. The results demonstrate that while Turkish ophthalmology research aligns well with various global trends, it also focuses on areas of specific regional interest, such as thyroid-associated ophthalmopathy. Enhancing international collaborations and diversifying research topics may further improve the global impact and visibility of the Turkish ophthalmology literature.

Ethics Committee Approval: Ethical committee approval and informed consent were not necessary.

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Authorship Contributions: Concept: A.H.R., M.B., I.E.Y.; Design: A.H.R., M.B., I.E.Y.; Supervision: A.H.R., M.B., I.E.Y.; Data Collection and/or Processing: A.H.R.; Analysis and/or Interpretation: M.B.; Literature Search: A.H.R., I.E.Y.; Writing: A.H.R.; Critical Reviews: A.H.R., M.B., I.E.Y.

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