



DOI: 10.14744/eer.2023.54154  
Eur Eye Res 2024;4(1):37–41

EUROPEAN  
**EYE**  
RESEARCH

ORIGINAL ARTICLE

# A retrospective overview of the scientific researches of Turkish female ophthalmologist scholars: Is there any gender discrimination?

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## Abstract

**Purpose:** The purpose of the study is to determine how male and female authors are represented in academic ophthalmology publications in Türkiye, as well as how publishing types have evolved over time.

**Methods:** Online available Turkish articles (6416 articles from 40 journals) published by the Scientific and Technological Research Council of Türkiye, Turkish Academic and Information Center, between 1995 and 2022 were retrospectively assessed. The following parameters were retrieved and recorded: Article type, publication year, gender of the first and last author, gender of the corresponding author, and total female and male authors.

**Results:** The publications were grouped over a 5-year period, from 1995 to 2022, and there was a statistically significant rise in female authors per publication over time ( $P = 0.023$ ). The majority of publications were research articles (75%), followed by case reports (18.3%) and reviews (3.1%). Gender disparities in publication types were statistically non-significant ( $P > 0.005$ ). Compared to males, females made up 42.6% and 34.2% of the first and last authors, respectively. Moreover, 42.4% of the corresponding authors were female.

**Conclusion:** Gender imbalance appears to be diminishing among Turkish Ophthalmology academics, and a surge in female academic productivity is encouraging.

**Keywords:** Discrimination; gender; ophthalmology; research; scientific article.

Gender establishes social norms determined by biological sex. Given that physicians are not isolated from their communities, they may harbor sexist beliefs both professionally and personally, potentially resulting in an imbalance in employment opportunities for male and female physicians. Gender disparities have been a barrier to females' professional and personal advancement for decades. Despite the fact that a similar number of female and male students obtain Ph.D. degrees, the vast majority

of faculty members are males, even in developed countries, including the United States of America.<sup>[1]</sup> Similarly, women make up 47% of non-professor academic personnel in the United Kingdom (UK), yet only 20% of employed professors are female. Furthermore, female academicians are paid less than their male counterparts.<sup>[2]</sup> Although gender disparity in academic fields has shrunk in Türkiye over the years, the conditions remain relatively unchanged. For example, 20% of professors among faculty members were female



**Cite this article as:** Er A, Gobeka HH, Ethem Ay IE, Dogan M. A retrospective overview of the scientific researches of Turkish female ophthalmologist scholars: Is there any gender discrimination? Eur Eye Res 2024;4:37–41.

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**Submitted Date:** 21.03.2023 **Revised Date:** 16.05.2023 **Accepted Date:** 26.07.2023 **Available Online Date:** 20.03.2024

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in 1990–1991, just increasing to 31.5% in 2018–2019.<sup>[3]</sup> Other global studies, on the other hand, reveal that female existence is growing, even while gender disparities in academic leadership roles persist.<sup>[4]</sup>

In general, gender disparities are increasingly pronounced, particularly in surgical specialties.<sup>[5]</sup> This is also true for academic jobs which are increasingly prevalent in ophthalmology and optometry globally.<sup>[6]</sup> In 2014, there were 1341 female residents enrolled in ophthalmology residency programs in the USA, accounting for 44.3% of total residents. However, compared to initially enrolled female ophthalmology residents, the proportion of female practicing ophthalmologists recorded in 2016, which was roughly 23% of all practicing ophthalmologists in the USA, reflects the majority of the drop in this statistic.<sup>[7]</sup> In addition, based on a 2019 survey conducted in the UK, 43% of ophthalmology residents were female, with only 26% of them being consultant ophthalmologists.<sup>[8]</sup> The proportion of female residents in Australia and New Zealand was 33%.<sup>[9]</sup>

As far as Türkiye is concerned, male physicians (58.5%) outnumber female physicians (41.5%) in medical school, according to data from 2021. The same is true for surgical specialties, where a higher proportion of male physicians exists (73.0%). In comparison to the general medical community, however, male dominance in ophthalmology is only slightly greater (57.7%).<sup>[10]</sup> Basically, equal female representation in scientific research is vital. Understanding inequality in these areas is critical, which could serve to raise awareness of societal gender inequality. Academic publications are significant byproducts of academic productivity. Although the ratio of female resident physicians in ophthalmology is increasing, female ophthalmologists in academic field are way behind their male counterparts.<sup>[11]</sup>

The present study sought to investigate how male and female authors are represented in academic ophthalmology publications, as well as how publishing types have evolved over time in Türkiye.

## Materials and Methods

This retrospective study included online available Turkish publications in the Turkish Journal Index in the year 2022, as set off by The Scientific and Technological Research Council of Türkiye and the Turkish Academic and Information Center. All academic journals found by entering “subject area” as “ophthalmology” into the search engine on <https://app.trdizin.gov.tr/istatistikler/dergi-listesi.xhtml> were evaluated. The University Ethics Board ruled that the

present study did not require ethics approval because no human participants were involved (2022/527).

The following parameters were retrieved and recorded: Publishing year, gender of the first and the last author, gender of the corresponding author, total number of female authors in the article, as well as total number of male authors in the article. Non-ophthalmology articles were not eligible. During the analysis, the gender of the author and unisex female and male names were directly coded into the database. To avoid gender ambiguity, unisex names of authors were searched using the faculty's website or the author's profile picture on social media sites such as ResearchGate or LinkedIn. For the authors whose gender information could not be retrieved, a website called <https://genderize.io> was used to research and determine what gender the name was at most, and the name was coded accordingly.

## Statistical Analysis

PASW Statistics 18.0 package program (SPSS, Inc., Chicago, Illinois, USA) was used for statistical analysis. Categorical variables of the descriptive statistics were shown in percentage frequency. Relationship between ordinal changes of the categorical variables was manifested by linear-by-linear association and in conditions where nominal variables were manifested by Chi-square.  $P < 0.005$  was accepted as statistically significant.

## Results

The Turkish Journal Index produced 40 ophthalmology-related scientific journals; however, scientific publications from two of the scientific journals were unavailable, leaving 38 journals to be analyzed. Thus, 6416 scientific publications were investigated in 5-year intervals from 1995 to 2022, revealing a statistically significant increase in female authors per publication over time ( $P = 0.023$ ). Furthermore, 75.5% of scientific publications were classified as research articles, 3.1% as reviews, 0.3% as editorial, 0.2% as editorial letter, 18.3% as case reports, and 2.6% as other. Gender subgroup differences were not statistically significant ( $P = 0.044$ ).

Females accounted for 42.6% of the first authors, 34.2% of the last authors, and 42.4% of the corresponding authors. Unfortunately, 17.4% of the articles' corresponding authors could not be found due to a lack of full-text manuscripts for some of the articles. Despite this, female first and corresponding authorship increased statistically considerably in each 5-year interval from 1995 to 2022, whereas female last authors fell ( $P < 0.001$ ) (Table 1).

**Table 1.** Distribution chart of authors in studies by gender and year of publication

Author/Role	Gender	Period						Chi-square	P-value
		1995–1999 (%)	2000–2004 (%)	2005–2009 (%)	2010–2014 (%)	2015–2019 (%)	2020–2022 (%)		
First author	Female	32.8	39.2	43.0	43.3	44.8	48.7	32.945	<0.001
	Male	67.2	60.8	60.6	55.7	55.2	51.2		
Last author	Female	27.4	32.9	28.4	35.0	38.9	42.0	57.992	<0.001
	Male	72.6	67.1	71.6	65.0	61.1	58.0		
Correspondence	Female	30.9	37.3	42.6	44.3	45.4	49.3	43.912	<0.001
	Male	69.1	62.7	57.4	55.7	54.6	50.7		

## Discussion

In the present study, academic publications that included works in the ophthalmology field since 1995 were analyzed in 5-year intervals to determine females' academic status in ophthalmology, conclusively indicating the existence of female inequality in first, last, and corresponding authorships. Literally, gender discrepancy in academia and publishing has been extensively documented. Matter of fact, one metric of academic output and clout is the shareability of discoveries in publications with the academic community. In addition, publications are an important determinant for academic standing. One study released in 2004 discovered a gender disparity in academic publications, with females being represented as a minority.<sup>[12]</sup>

Actually, contrary to the last authorship, female ophthalmologists have been reported to increase in first authorship in the USA, as has a substantial association between the genders in first and last authorships, a finding that contrasts with the current study.<sup>[13]</sup> However, over the previous 20 years, the female proportion of first and last writers in the USA has increased. Besides, compared to other subspecialties, female predominance in cataract and refractive surgery articles has increased significantly. Yet, the female proportion in review articles, in particular, has not increased, presumably due to male preponderance among senior academics.<sup>[14]</sup> In the meantime, as the editorials are written on the invitation by a pioneer, the male proportion has remained constant over a decade.<sup>[15]</sup> In addition, since 1969, 5-year data from the ophthalmic literature demonstrated a rise in female authors but not in their predominance as editors.<sup>[16]</sup>

In general, compared to other medical fields, female ophthalmologists' involvement in academic research is deemed average. There is also a gender disparity in the last authorship in international research, which may be

indicative of previous disparities relevant to the present study findings.<sup>[17]</sup> Given the challenges in ophthalmic research, there is not a non-significant difference between males and females in terms of time consumption, research support, and talents in Türkiye. Females in Türkiye are also more motivated to conduct research than males.<sup>[18]</sup>

Moreover, the proportion of female academics in ophthalmology climbed from 37% in 2017 to 40% in 2019 in the USA. Nonetheless, compared to other clinical departments, ophthalmology lags behind in female gender dominance. Obstetrics and gynecology had the most female academics (64%), whereas orthopedic surgery had the fewest (20%). In addition, the proportion of female academics in surgical specialties has been reported to be 34%, lower than the average proportion of female academics in ophthalmology (39%) and non-surgical specialties (45%). Based on the analysis of residency applications in the US, the proportion of female ophthalmology residents decreased by 2.5% between 2011 and 2019.<sup>[10]</sup>

Certainly, evidence on gender disparity in other medical subspecialties is scarce. This could be attributed to the fact that females are underrepresented in surgical subspecialties. Despite this, recent studies have shown an increase in female academic authorship in ear-nose-throat,<sup>[19]</sup> orthopedics,<sup>[20]</sup> urology,<sup>[21]</sup> and obstetrics/gynecology.<sup>[22]</sup> Regardless of their credentials, most females complain about being promoted less than their male counterparts. Males have, of course, historically been active in social life and held crucial roles, prompting females to complain about discrimination on occasion. Interestingly, in spite of their efforts, some females feel that they are falling short of the top. The phrase "glass ceiling syndrome" refers to an invisible barrier that males build against females and society as a whole,<sup>[23]</sup> meaning that females are barred from advancing to senior positions due to social and personal prejudices. An income inequality has also been experienced by undeservedly positioned females in the

hierarchy, widening the social gap between genders.<sup>[24]</sup>

Essentially, males are not the source of the “glass ceiling syndrome” that females experience at work. Other female executives frequently emphasize how they overcame obstacles to achieve their current status quo. They do nothing to alleviate the difficulties that new colleagues face as a result of discrimination. Furthermore, top-managing females’ positions, which are seen as a success sign and are referred to as “Queen Bee Syndrome,” reflect a load on female ascendants.<sup>[25]</sup> This phrase has been applied to female executives who attain career success by disparaging other females to highlight their advancement in career and masculinity.<sup>[26,27]</sup> Female executives have a tendency to distance themselves from and compare themselves to other successful females. Moreover, some females develop a glass ceiling by themselves due to their low self-esteem.<sup>[28]</sup>

The current study findings should be interpreted with caution within the context of its limitations. Fundamentally, it was based on retrospective records that researchers concluded by coding the unisex common names. This approach has a certain amount of tolerance. However, the potential error is considered to remain within acceptable limits because it is inappropriate to specify the gender of the author. Another limitation was that not all of the articles could be accessed. Because data on average age and author institutions fluctuate over time, specific information could not be obtained. Moreover, gender disparities were raised in this investigation. However, in an ideal study, all authors, including homosexual, bisexual, transgender, and non-binary people, would be adequately represented in scholarly articles, which the present study did not uncover.

Despite its limitations, this is the first study to identify gender disparities among Turkish ophthalmology academics. Matter of fact, numerous measures are required to attain gender equality. Evidence-based strategies, including positive social climate change, must be addressed to overcome the challenges.<sup>[29]</sup> Nonetheless, there has undoubtedly been increased awareness as well as tremendous progress in ophthalmology.

## Conclusion

It is critical to balance the workforce between male and females to reduce knowledge disparities and improve health-care quality. Recent support for females in education, mentoring, and leadership is expected to be among the initiatives done to address the gender disparity issue. Female ophthalmologists’ greater output over time

is encouraging. Most importantly, statistical studies are an important tool for many various disciplines; as a result, it is apparent that this study will aid in understanding trends in this particular area.

**Ethics Committee Approval:** This study was approved by Faculty Of Medicine, Afyonkarahisar Health Sciences University Ethics Committee (27.01.2023 date; number 2023-2).

**Peer-review:** Externally peer-reviewed.

**Authorship Contributions:** Concept: A.E., M.D.; Design: H.H.G., M.D.; Supervision: H.H.G., M.D.; Resource: A.E.; Materials: A.E., İ.E.A.; Data Collection and/or Processing: A.E.; Analysis and/or Interpretation: A.E., H.H.G., İ.E.A., M.D.; Literature Search: A.E.; Writing: A.E., M.D.; Critical Reviews: H.H.G., İ.E.A., M.D.

**Conflict of Interest:** None declared.

**Use of AI for Writing Assistance:** Not declared.

**Financial Disclosure:** The authors declared that this study received no financial support.

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