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Assessing the Impact of Female Ophthalmologists in the Leadership of Turkish Ophthalmology: A Cross-Sectional Study

Türk Oftalmolojisinde Kadın Oftalmologların Liderlikteki Etkisinin İncelenmesi: Kesitsel Araştırma

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ABSTRACT Objective: This study aimed to assess the gender distribution and bibliometric indices within the central and subspecialty administrative boards of the Turkish Ophthalmological Association (TOA). **Material and Methods:** Data on the TOA's administrative structure and role distribution were obtained from the association's official website. Bibliometric indices for each individual were retrieved from their publications indexed in Scopus. Gender distribution in the TOA's central and subspecialty boards was represented as percentages. Academic ranks were compared between genders using the chi-square test. The Student's t-test was used to compare bibliometric indices and total publication counts between genders. Pearson's correlation analysis was performed to evaluate the relationship between the h-index, academic ranks, and leadership positions in TOA. **Results:** A total of 101 individuals in TOA's central and subspecialty boards were analyzed, including 54 females (53.5%) and 47 males (46.5%). The TOA president was female, with women comprising 45.5% of the central administration and holding 60% of the presidency positions in subspecialty boards. There was no significant difference in academic ranks between genders (p=0.214), with 87% of female members holding professorships. Similarly, bibliometric indices did not significantly differ between genders. No significant correlation was found between the h-index and leadership positions within TOA (r=0.018, p=0.855). **Conclusion:** The TOA president was female, and women held the majority of leadership positions in its subspecialty boards. Female and male ophthalmologists demonstrated comparable academic publication quality. These findings highlight strong female representation in Turkish ophthalmology and indicate gender equality in academic achievement.

Keywords: Gender equity; index; bibliometrics

ÖZET Amaç: Bu çalışma, Türk Oftalmoloji Derneği (TOD) merkezi ve alt uzmanlık kurullarındaki cinsiyet dağılımını ve bibliyometrik indeksleri değerlendirmeyi amaçlamaktadır. **Gereç ve Yöntemler:** TOD'nin yönetim yapısı ve görev dağılımına ilişkin veriler, derneğin resmi web sitesinden elde edilmiştir. Bireylere ait bibliyometrik indeksler, Scopus veritabanındaki yayınlar temel alınarak hesaplanmıştır. TOD merkezi ve alt uzmanlık yönetim kurullarındaki cinsiyet dağılımı yüzdelik olarak ifade edilmiştir. Akademik rütbeler, cinsiyetler arasında ki-kare testi ile karşılaştırılmıştır. Bibliyometrik indeksler ve toplam yayın sayıları, bağımsız örneklem t-testi ile analiz edilmiştir. H-indeksi, akademik rütbeler ve TOD'daki yönetici pozisyonları arasındaki ilişki Pearson korelasyon analizi ile değerlendirilmiştir. **Bulgular:** TOD merkezi ve eğitim birimi yönetim kurullarında görev yapan toplam 101 kişi analiz edilmiştir; bunların 54'ü (%53,5) kadın, 47'si (%46,5) erkektir. TOD başkanı kadın olup, kadınlar merkezi yönetimin %45,5'ini ve alt uzmanlık kurullarındaki başkanlık pozisyonlarının %60'ını oluşturmaktadır. Akademik rütbeler cinsiyetler arasında anlamlı bir fark göstermemiştir (p=0,214) ve kadın üyelerin %87'si profesörlük unvanına sahiptir. Benzer şekilde, bibliyometrik indeksler cinsiyetler arasında anlamlı bir farklılık göstermemiştir. H-indeksi ile TOD'daki yönetici pozisyonları arasında anlamlı bir korelasyon saptanmamıştır (r=0,018, p=0,855). **Sonuç:** TOD başkanı bir kadındır ve kadınlar, TOD'un alt uzmanlık yönetim kurullarındaki liderlik pozisyonlarının çoğunu elinde bulundurmaktadır. Kadın ve erkek oftalmologlar, akademik yayın kalitesi açısından benzer düzeydedir. Bu bulgular, Türk oftalmolojisinde kadın temsiliyetinin güçlü olduğunu ve akademik başarı açısından cinsiyet eşitliğinin sağlandığını ortaya koymaktadır.

Anahtar Kelimeler: Cinsiyet eşitliği; indeks; bibliyometri

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Founded in 1928, the Turkish Ophthalmological Association (TOA) is the only professional organization in Türkiye dedicated to practicing ophthalmologists, with 5,704 members as of April 2023. Analyzing the structure of this association is essential for understanding the current state of Turkish ophthalmology. Women constitute 42.34% of TOA's membership.

Research on gender disparities in ophthalmology has highlighted significant differences, with studies indicating a predominance of men in the field.[1] Findings suggest that male ophthalmologists generally have higher h-indices than their female counterparts, and exhibit greater academic productivity, particularly in the early stages of their careers. However, at later career stages, women tend to match or even surpass men in academic success.[1] Despite these advancements, women remain underrepresented in leadership roles within ophthalmology societies and senior academic positions.[2]

Bibliometrics, a statistical method for the quantitative analysis of scientific publications, serves as an important measure of academic success.[3,4] Academic productivity is particularly significant in academic ophthalmology and can be assessed through various bibliometric indices, most notably the h-index.[5] The h-index represents a researcher's scholarly impact by quantifying the number of publications that have received at least h citations, thus reflecting individual scientific achievement.[6] However, the h-index has inherent limitations, leading to the use of additional indices such as the m-index, e-index, i10-index, and i20-index.[4] The m-index accounts for career duration by dividing the h-index by the number of years since the researcher's first publication. The e-index provides insight into the impact of highly cited papers by considering excess citations beyond the h-index threshold.[4] The i10-index and i20-index measure the number of publications with at least 10 and 20 citations, respectively.[5]

This study aims to investigate gender differences and research productivity among ophthalmologists serving on the central and subspecialty boards of the TOA.

MATERIAL AND METHODS

This study was designed as an observational, cross-sectional study. Since the data used were publicly accessible on the internet, ethics committee approval was not required. Information regarding the management and role distribution of the TOA was obtained from the association's website (https://www.todnet.org) between October 1-15, 2024. The members of the TOA administrative board, the chairs, and the executive boards of its subspecialties were identified.

Demographic and academic information, including age, gender, and academic position, was collected from the TOA website. In cases where information was uncertain, it was verified through the websites of the respective institutions to which the individuals were affiliated.

Bibliometric indices, including the h-index, m-index, e-index, i10-index, and i20-index, were retrieved from Scopus (https://www.scopus.com) based on each individual's publications. The h-index is defined as the highest number of an author's publications that have received at least that same number of citations when arranged in descending order. The m-index is calculated by dividing the h-index by the number of years since the author's first publication. The e-index is determined by taking the square root of the difference between the citation count of the publication at the h-index threshold and the square of the h-index. The i10-index represents the number of publications with 10 or more citations, while the i20-index reflects the number of publications with 20 or more citations.

STATISTICAL ANALYSIS

Descriptive statistics for continuous variables were presented as mean±standard deviation or median, depending on the data distribution. The gender distribution of the TOA central administration and subspecialty executive boards was expressed in frequencies and percentages.

Academic positions were compared by gender using the independent samples chi-square association test. After assessing normality with the Shapiro-Wilk test, bibliometric indices and total publication counts were compared between genders using Student's t-test.

Pearson's correlation analysis was conducted to examine the relationship between the h-index, academic positions, and leadership roles within TOA. A p value of <0.05 was considered statistically significant.

All statistical analyses were performed using Jamovi statistical software version 2.3.26.0 (The Jamovi Project, Australia), an internationally developed open-source platform.

RESULTS

A total of 107 individuals were part of the TOA headquarters and subspecialty administrative boards. However, 6 individuals were excluded from the study due to missing data or uncertainty regarding the accuracy of their information.

As a result, 101 individuals were included in the analysis, comprising 47 men (46.5%) and 54 women (53.5%). The mean ages of men and women were 55.06±6.82 years (range: 42-67) and 55.22±6.37 years (range: 43-66), respectively (p=0.61).

The president of the TOA was female, and women constituted 45.46% of the TOA headquarters. Among the 15 subspecialty boards, 9 (60%) had female presidents. In 9 out of 15 subspecialty boards, the majority of executive members were women. The subspecialty with the highest percentage of female executive members was the Society of Uveitis and Behçet's Disease (100%), while the subspecialty with the lowest percentage of female executive members was the society of cataract and refractive surgery (11%) (Table 1).

There was no significant difference in academic positions between men and women (p=0.214). Among the female participants, 87% held the rank of professor, 9.3% were associate professors, and 3.7% were assistant professors. A positive correlation was observed between academic rank and h-index (r=0.331, p<0.001). However, there was no statistically significant relationship between the h-index and leadership positions within TOA (r=0.018, p=0.855).

Additionally, no statistically significant differences were found between genders in the h-index, m-index, e-index, i10-index, i20-index, or total number of publications (p=0.10, p=0.87, p=0.11, p=0.39, p=0.20, p=0.39, respectively) (Table 2). Although the subspecialty with the highest median h-index among

TABLE 1: Gender distribution of chairs and executive members in the subspecialties of the Turkish Ophthalmological Association

Subspecialty	Chief	Number and percantage of female executive members
Uveitis and Behçet's disease	Female	5/5 (100%)
Contact lens	Female	4/5 (80%)
Neuro-ophthalmology	Female	4/5 (80%)
Strabismus	Male	5/7 (71%)
Glaucoma	Male	6/9 (66%)
Medical retina	Female	6/9 (66%)
Optics refraction and low vision rehabilitation	Female	3/5 (60%)
Electrodiagnostic	Male	3/5 (60%)
Ophthalmic plastic and reconstructive surgery	Female	4/7 (57%)
Cornea and ocular surface	Female	4/9 (44%)
Ocular infection	Male	2/5 (40%)
Ergophthalmology and medicolegal ophthalmology	Female	2/5 (40%)
Vitreoretinal surgery	Male	2/9 (22%)
Ocular oncology	Female	1/5 (20%)
Cataract and refractive surgery	Male	1/9 (11%)

TABLE 2: Comparison of h-index, m-index, e-index, i-20 index, i-10 index and total number of publications between the genders

	h-index (minimum-maximum)	m-index (minimum-maximum)	e-index (minimum-maximum)	i-20 (minimum-maximum)	i-10 (minimum-maximum)	Number of publications (minimum-maximum)
Male	15.11±6.03 (0-35)	0.65±0.27 (0-1.46)	14.47±6.06 (0-34.5)	13.62±12.99 (0-69)	24.64±19.41 (0-100)	62.77±41.19 (0-205)
Female	13.07±6.27 (0-34)	0.64±0.28 (0-1.54)	12.45±6.30 (0-33.5)	10.39±11.90 (0-69)	21.11±21.23 (0-125)	54.94±48.20 (4-224)
p value	0.10*	0.87*	0.11*	0.20*	0.39*	0.39*

*Independent samples student's t-test

TABLE 3: Median bibliometric indices and publication counts of female and male executive members in Turkish Ophthalmological Association subspecialties

Subspecialty	Gender	h-index	m-index	e-index	i10-index	i20-index	Publications
Strabismus	Male	11.0	0.340	10.3	13.5	7.50	58.0
	Female	15.0	0.510	14.5	18.0	9.00	43.0
Ophthalmic plastic and reconstructive surgery	Male	14.0	0.700	13.5	21.0	10.0	54.0
	Female	10.0	0.495	9.46	11.5	3.00	27.0
Neuro-ophthalmology	Male	15.0	0.710	14.5	22.0	7.00	44.0
	Female	6.50	0.520	5.93	5.00	1.00	23.5
Medical retina	Male	17.0	0.890	16.5	29.0	15.0	72.0
	Female	15.0	0.725	13.7	25.0	10.5	66.0
Glaucoma	Male	14.0	0.640	13.4	21.0	8.00	65.0
	Female	14.5	0.630	13.9	22.0	12.5	59.5
Electrodiagnostics	Male	5.00	0.185	4.76	5.00	3.00	10.0
	Female	14.0	0.740	13.5	15.0	12.0	39.0
Ergophthalmology and medicolegal ophthalmology	Male	13.0	0.570	12.5	17.0	7.00	44.0
	Female	13.0	0.860	12.5	17.0	4.00	51.0
Ocular infection	Male	14.0	0.760	13.8	18.0	10.0	60.0
	Female	9.00	0.625	8.60	9.50	3.50	35.5
Cataract and refractive surgery	Male	16.5	0.680	15.0	23.0	12.0	59.5
	Female	34.0	1.000	33.5	125.0	69.0	204.0
Contact lens	Male	20.0	0.640	19.5	39.0	20.0	79.0
	Female	13.0	0.500	12.4	16.0	8.00	45.0
Cornea and ocular surface	Male	18.5	0.740	18.0	26.0	20.5	74.0
	Female	17.0	0.840	16.4	27.0	14.0	60.0
Ocular oncology	Male	14.5	0.675	14.0	19.0	10.5	54.5
	Female	8.00	0.290	7.48	7.00	7.00	11.0
Optics, refraction and low vision rehabilitation	Male	12.5	0.610	11.9	15.5	7.00	52.5
	Female	4.00	0.280	3.16	2.00	0.00	4.0
Uveitis and Behçet's disease	Male	—	—	—	—	—	—
	Female	14.0	0.720	13.5	17.0	9.00	43.0
Vitreoretinal surgery	Male	14.0	0.650	13.4	25.0	12.0	49.0
	Female	20.0	0.765	19.5	42.5	26.0	126.0

female executive members was the Society of Cataract and Refractive Surgery, the lowest median h-index was observed in the Society of Optics, Refraction, and Low Vision Rehabilitation (Table 3).

DISCUSSION

The aim of this study was to provide essential data on gender equality and academic success by examining the gender distribution and academic achievements of ophthalmologists serving as executive members in the central and subspecialty boards of the TOA. Our findings indicate that the number of male and female ophthalmologists in TOA administration is generally balanced, with women slightly outnumbering men (53%). Notably, the appointment of a female president in TOA represents a significant step toward gender equality in leadership roles.

However, our findings contrast with global trends reported in the literature. In the United States, gender inequality in the medical profession has been extensively researched. In 2001, 55.7% of medical graduates in the U.S. were male, but this figure declined to 52.2% by 2012.[7] Similarly, in 2011, 56.9% of ophthalmology residents in the U.S. were male.[1] Although these studies suggest that the gender gap in ophthalmology is narrowing, men continue to dominate leadership positions in the field.[1]

Leadership roles in medicine, particularly in surgical specialties, are predominantly occupied by men.[8] Research has shown that men receive more National Institutes of Health funding awards in otolaryngology and ophthalmology, which may contribute to their higher representation in leadership positions.[9] Academic productivity plays a critical role in career advancement in medicine, potentially explaining why men hold more senior positions. Moreover, the lack of female role models in academic societies can act as a barrier for young female researchers, limiting their professional progression.

However, our study presents a more optimistic outlook on gender representation in Turkish ophthalmology. Women lead 60% of the subspecialty boards (9 out of 15), highlighting a significant level of female leadership in TOA. Given that ophthalmology has traditionally been a male-dominated field, this high female representation is an encouraging finding. However, this gender balance is not uniform across all subspecialties. For instance, the Society of Cataract and Refractive Surgery had the lowest female representation (11%), indicating persistent gender disparities in certain areas. Over time, as the proportion of female physicians increases, their representation in academic settings and leadership positions is also expected to improve.

When comparing age and academic achievements between male and female ophthalmologists in TOA, no statistically significant differences were found. This suggests that gender does not influence academic progression within the association. Similarly, no significant differences were observed between male and female TOA executive members in terms of academic positions and bibliometric indices (h-index, m-index, e-index, i10-index, i20-index, and total publication count). Collectively, these findings indicate that women in TOA administration are equally represented in leadership positions and demonstrate comparable academic success to their male counterparts.

Furthermore, our study identified a positive correlation between the h-index and academic rank, supporting findings from previous studies showing that the h-index is a reliable indicator of both academic productivity and research impact.[10,11] Consistently, prior research has also demonstrated a strong relationship between academic rank and the h-index.[12]

An interesting finding in our study was the 100% female representation in the Uveitis and Behçet's Disease Society. The literature suggests that female physicians are more likely to adhere to clinical guidelines, provide more preventive care, communicate in a more patient-centered manner, and perform equally or better than men in standardized evaluations.[13] Our findings may reflect a tendency for female physicians to take on intensive roles in the management of chronic diseases, such as uveitis and Behçet's disease, which require long-term patient follow-up.

Additionally, we observed that the median h-index was lowest in the Optical Refraction and Low Vision Rehabilitation subspecialty. This may be due to the fact that research in this field often focuses on niche patient populations, resulting in fewer high-impact publications.[14] Moreover, access to research funding and institutional support for specialized fields such as low vision rehabilitation may be more limited compared to high-profile subspecialties like cataract and refractive surgery or medical retina. Consequently, the h-index in these fields may be lower.

This study has some limitations. First, bibliometric indices used to assess academic success (h-index, m-index, e-index, i10-index, and i20-index) were obtained exclusively from Scopus. Publications indexed in other databases were not included, which may have affected the completeness of the data. Second, due to the cross-sectional design of this study, the observed gender distribution and academic productivity represent a snapshot in time, rather than long-term trends. Future longitudinal studies could provide a more comprehensive understanding of gender dynamics in Turkish ophthalmology.

CONCLUSION

In conclusion, this study highlights the strong leadership presence and academic achievements of women within TOA administration and its subspecialties. No significant differences were found between genders in terms of academic success and

productivity, suggesting that gender equality in TOA administration is at a satisfactory level. However, the underrepresentation of women in certain subspecialties suggests that further efforts are needed to achieve greater gender balance across all fields of ophthalmology. Future research should explore the underlying factors contributing to gender disparities in specific subspecialties and identify strategies to promote greater inclusivity and equity in ophthalmology leadership.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Bedia Kesimal, Sücattin İlker Kocamış;* ***Design:*** *Bedia Kesimal, Sücattin İlker Kocamış;* ***Control/Supervision:*** *Bedia Kesimal, Sücattin İlker Kocamış;* ***Data Collection and/or Processing:*** *Bedia Kesimal;* ***Analysis and/or Interpretation:*** *Bedia Kesimal, Sücattin İlker Kocamış;* ***Literature Review:*** *Bedia Kesimal;* ***Writing the Article:*** *Bedia Kesimal, Sücattin İlker Kocamış;* ***Critical Review:*** *Bedia Kesimal, Sücattin İlker Kocamış;* ***References and Fundings:*** *Bedia Kesimal, Sücattin İlker Kocamış.*

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