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Discussion Points: This study reveals the evolving gender dynamics in dermatology research within India, offering valuable insights into authorship trends in a field predominantly occupied by female practitioners. Notably, female authors now outnumber their male counterparts in original articles and case reports, highlighting changing gender roles in the profession. However, review articles still maintain a male majority, suggesting the need for further examination of the factors influencing these trends. While progress is evident, the study underscores the importance of addressing gender disparities, ensuring equitable opportunities, and maintaining diversity in the field for a more inclusive and equitable medical research community.

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ABSTRACT

Objective: Historically, research authorship has been male-dominated, particularly in dermatology. Gender equity in medical research is vital for diverse perspectives and rigorous science. In India, gender trends in dermatology research among first authors remain understudied, limiting our understanding of gender inequalities in the field.

Methods: This study analyzed Original Articles, Review Articles, and Case Reports in three prominent Indian Dermatology journals from January 2017 to May 2023. First authors' genders were determined using Namsor V.2, cross-verified with social media profiles, and authors with undetermined genders were excluded. The authors' countries were identified based on their affiliated institutions. The data was analyzed using Microsoft Excel, with a predictive analysis using the FORECAST function.

Results: Among 1,600 authors, 840 were female and 760 male. Male authors outnumbered female authors only in 2017. Female authors surpassed male authors in original articles and case reports, while fewer appeared in review articles. Predictive analysis revealed an increasing trend in female authors from 2023 to 2028, indicating evolving gender dynamics in dermatology research.

Conclusion: While the rise in female representation in medical research is promising, concerns arise when fields become predominantly female, raising questions about their perceived value. Gender disparities in compensation further underscore these concerns, as male dermatologists earn more. Addressing such disparities is crucial and recognizing these issues and actively pursuing gender equality is essential for a more inclusive and equitable future in medicine.

Keywords: *gender trends, dermatology, India, research, authorship*

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INTRODUCTION

Gender equality in medical research and academia ensures diverse perspectives, scientific progress and improved health outcomes for the community. Historically, research has often focused on male subjects, leading to a limited understanding of how health conditions, treatments, and interventions impact women differently.¹ Furthermore, authorship in research has also always been male-dominated, with a very small proportion of women serving as first authors for research papers.

While the number of women practicing in medicine is improving, there are still significant disparities such as equality in leadership positions and in research. In research, the significance of authorship in a paper may vary based on discipline, culture norms, and field of research. But, the first and last authorship positions are generally considered to be most significant. The first authorship position is generally occupied by the one who contributes the most to the paper, while the last authorship is reserved for senior or principal investigator of the project, and signifies the researcher's seniority, leadership role, and responsibility for overseeing the research project. Studies by Bernardi et al., which examined papers from 2000-2107, and Baobeid et al., which examined papers from 2014-2016, found a higher percentage of men in both first and last authorship positions.^{2,3}

However, there is minimal research regarding gender trends in dermatology research in India. Furthermore, given that in many research fields, it is common practice for the first author to be typically regarded as the individual who made the most significant contributions to the research project in many research fields and represents early-career researchers, serving as an indicator of their scientific productivity and potential². Thus the present paper aims to identify the gender trends among the first authors in dermatology research published in 3 Indian journals, from 2017 to 2023, to identify any gender inequality and offer a predictive analysis of these trends.

Aims and Objectives:

The aim of this study is to analyze gender trends among first authors in dermatology research published in three prominent Indian dermatology journals from 2017 to 2023 and identify any gender inequality and offer a predictive analysis of these trends. The paper also aims to determine the gender distribution among first authors of dermatology research published in three Indian dermatology journals from 2017 to 2023, and analyze the trends in gender representation based on the year of publication and the type of articles (original articles, review articles, and case reports), and to conduct a predictive analysis to identify anticipated gender trends in dermatology research publishing from 2023 to 2028.

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METHODOLOGY

Initial Compilation of Articles

Articles published in 3 Indian dermatology journals, i.e., Indian Journal of Dermatology, Venereology and Leprology (IJDVL), Indian Dermatology Online Journal (IDOJ) and Indian Journal of Dermatology (IJD), which were chosen based on their prominence, wide readership, and reputation for publishing high-quality research in the field of dermatology. These journals have a significant impact on shaping the knowledge and practice of dermatology in India and serve as important platforms for scientific communication and collaboration among dermatologists and researchers and were analyzed with the following criteria:

- Articles published from January 2017 to May 2023, including ahead of print articles available on the journal websites.
- Only Original Research Articles, Review Articles and Case Reports were included in the study.
- Only First Authors of each article were analyzed.
- Country of the first authors was also collected, based on their affiliated institutes.

A total of 1,628 articles and their authors were thus compiled in Google Sheets and then transferred to Microsoft Excel for analysis. Basic statistical techniques were applied to examine various aspects of the dataset, such as determining the total number of occurrences and calculation of percentage ratios.

In addition to descriptive statistics, Excel's 'FORECAST' function was utilized to generate predictive analysis of the gender trends for the years 2023 to 2028. The year 2023 was also predicted, as the current data collected was only for the months from January to May. This function is used to calculate expected future y-values for a specific x- value, based on linear regression of the dataset and allows for the identification of potential future patterns and trends in gender representation among first authors, offering valuable insights into the trajectory of gender equality in the field.⁴

Gender Assignment of the Authors using Namsor V.2

The genders of the authors were analyzed using Namsor V.2, which is an application programming interface (API) that defines the gender of the authors as a binary variable (i.e., either man or woman) and considers the country of origin, ethnicity, both first and last names, and draws on linguistic and cultural information to determine gender.³ This API has been previously used in studies such as those by Baobeid et al. and Morgan et al., with satisfactory results.^{3,5}

Quality Check of the Gender Assignment

Namsor assigns genders to the given names in terms of binary variables and also offers probability of likelihood of the assigned gender (from 0 to 1). The authors whose gender probability was less than 0.7 were manually rechecked using their institutional web pages and professional social media (ResearchGate, LinkedIn, etc.), and re-corrected. After the quality check, the genders of 28 authors remained unidentified, and were excluded. Thus, the total number of authors analyzed from 2017-2023 were 1,600.

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RESULTS

A total of 1,600 first authors were analyzed, of which 840 were found to be female and 760 found to be male. Further analysis was done based on year of publication, type of article and country of author.

Gender Distribution According to Year of Publication

Table 1 shows the gender distribution of male and female first authors in each year. 2017 is the only year where the number of male first authors is greater than their female counterparts. The years from 2018 to 2023 have a slightly higher percentage of female authors.

Gender Distribution According to Type of Article

Of the types of articles analyzed, original articles were highest in number, followed by case reports and then review articles.

Review articles had a higher number of male first authors than females. Original articles and case reports had a higher percentage of female authors than males; however, in the latter, the difference is minimal (Table 2).

Analysis of the Trends - Both Current and Future

Based on the gender distribution along the years, a line chart was made to plot and analyze the trends.

Fig. 1 shows the gender trend from 2017-2022. Both genders have an increasing number over the years, with a greater number of female than male authors. Furthermore, the number of male authors has a steady increase, while the number of female authors appears to be fluctuating.

Table 3 shows the number of male and female authors per year, and also the numbers predicted for the years 2023 to 2028 (decimals were rounded to the nearest whole number). Fig. 2 shows the line chart depicting gender trends from 2017 to 2028. In the predictive analysis, a similar trend of increasing number of authors, but greater number of female authors, is observed.

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DISCUSSION

The present study aimed to analyze the gender trends among the first authors in dermatology research published from 2017 to 2023 in 3 Indian Dermatology Journals, while also offering a predictive analysis of future trends in the gender ratios.

A total of 1,600 authors were taken into consideration, of which 840 (52.5%) were found to be female and 760 (47.5%) male. This slightly higher ratio of female authors is similar to the findings of Zheng et al., Mitello et al., and Bernardi et al.^{2,6,7} This shift may be attributed to several factors, such as the growing emphasis on gender equality and diversity in academia, increased opportunities for female researchers, and the empowerment of women in the field of dermatology.

When examining the gender distribution by article type, it was found that overall, the study found that the number of female authors is more than males in original articles, less than males in review articles and almost equal for case reports. One hypothesis is that review papers, which often involve synthesizing information and collaboration between multiple authors, might favor male authors due to findings from studies such as Piper et al., suggesting a significant tendency for female physicians to publish with female senior physicians and for male physicians to publish with male senior physicians.⁸ This preference for same-gender collaborations may contribute to the observed higher male representation in review articles.

When analyzing the gender ratio according to the year of publication, female authors were found to be higher than males in all the years except 2017. The year 2021 had an almost equal number of publications, with male authors being 124 in number, and female authors being 125 in number. This positive shift over time suggests an evolving landscape in dermatology research, with increasing opportunities and recognition for female researchers.

A predictive analysis was done to determine the future trends from the years 2023 to 2028. 2023 was also included as the number of publications taken into consideration from the year 2023 was only from January to May. The analysis found an increasing proportion of submissions from female authors than males. This is consistent with the observations made in the paper by Feramisco et al., which analyzed trends from 1976 to 2006 and found a steady increase in female authors.⁹ Our finding is slightly different from the observation by Bernardi et al., however, who observed that the gender gap will be narrowed and likely further reduced in the future.²

The variations among article types could be a reflection of the differences in research interests, career preferences, or the influence of mentorship and collaborative networks within specific areas of dermatology. Further research is thus warranted to explore these factors in more depth and gain a better understanding of the dynamics behind gender disparities across different article types.

Limitations

The present study has several limitations:

- Gender trends were only analyzed from 2017 to 2023, where 2017 was the only year where male authors were more. By going further back, we might have gotten a better insight as to when and how the gender gap started to change from higher males to higher females.
- We only analyzed original articles, review articles and case reports; all three journals had a significant number of Letters to the Editors, and analyzing them would have also offered better insight regarding the gender trends.
- Only first authors were taken into consideration; by also analyzing the last authors, we would have been able to offer analysis regarding senior and leadership positions in dermatology.
- Only three Indian journals were taken into consideration; hence a more inclusive analysis regarding geographical gender trends could not be offered.

Conclusion:

While it is reassuring to see the increasing number of women in medical research, the dominance of women in a certain field creates the doubt as to whether the value of the field will remain the same. Historically, it has been observed that women dominated fields have been undervalued and given lesser importance by society. This can be demonstrated by the large differences in pay, as reported by C. Miller for the New York Times.⁹ This is also demonstrated by the fact that dermatology is one of the female dominated medical professions, with 61% of the dermatologists in the USA in 2019 being female, in spite of which, male dermatologists were found to have higher pay than their female counterparts^{11,12}. The observed increase in female authorship in dermatology research is a positive development, suggesting progress in promoting diversity and gender equality. This shift may be attributed to several factors, including supportive institutional policies, mentorship programs, increased visibility of successful female role models, and the recognition of the importance of diverse perspectives in advancing scientific knowledge. However, it is essential to challenge and overcome these biases to ensure that all fields within medicine receive equal recognition, resources, and opportunities. Efforts should be made to acknowledge and appreciate the contributions of professionals in women-dominated fields, such as dermatology, and to promote gender equality across all specialties.

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1 **TABLES AND FIGURES**

2

3 Table 1. *Gender Distribution of First Authors According to Year of Publication*

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Year of Publication (n)	Male Authors (%)	Female Authors (%)
2017 (175)	91 (52)	84 (48)
2018 (196)	95 (48)	101 (52)
2019 (244)	112 (45.9)	132 (54.1)
2020 (246)	119 (48.3)	127 (51.7)
2021 (249)	124 (49.7)	125 (50.3)
2022 (313)	135 (43.1)	178 (56.9)
2023 (Jan-May) (177)	82 (46.3)	95 (53.7)

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Table 2. Gender Distribution of First Authors According to Type of Article

Type of Article (n)	No. of Male Authors (%)	No. of Female Authors (%)
Original Article (891)	399 (44.7)	492 (45.3)
Review Article (177)	96 (54.3)	81 (45.7)
Case Report (532)	263 (49.4)	269 (50.6)

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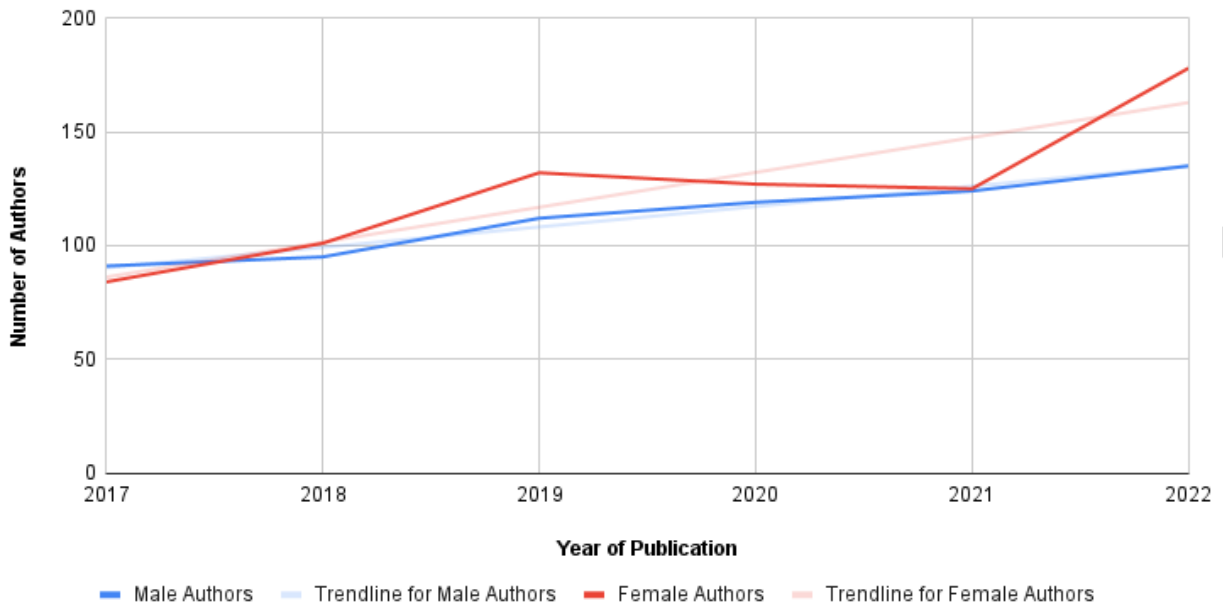
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Table 3. *Predictive Analysis of Gender Distribution until 2028*

Year of Publication	Male Authors (n)	Female Authors (n)
2017	91	84
2018	95	101
2019	112	132
2020	119	127
2021	124	125
2022	135	178
2023	144	178
2024	153	194
2025	162	209
2026	171	224
2027	180	240
2028	189	255

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Fig 1. Gender Distribution among First Authors from 2017 to 2022

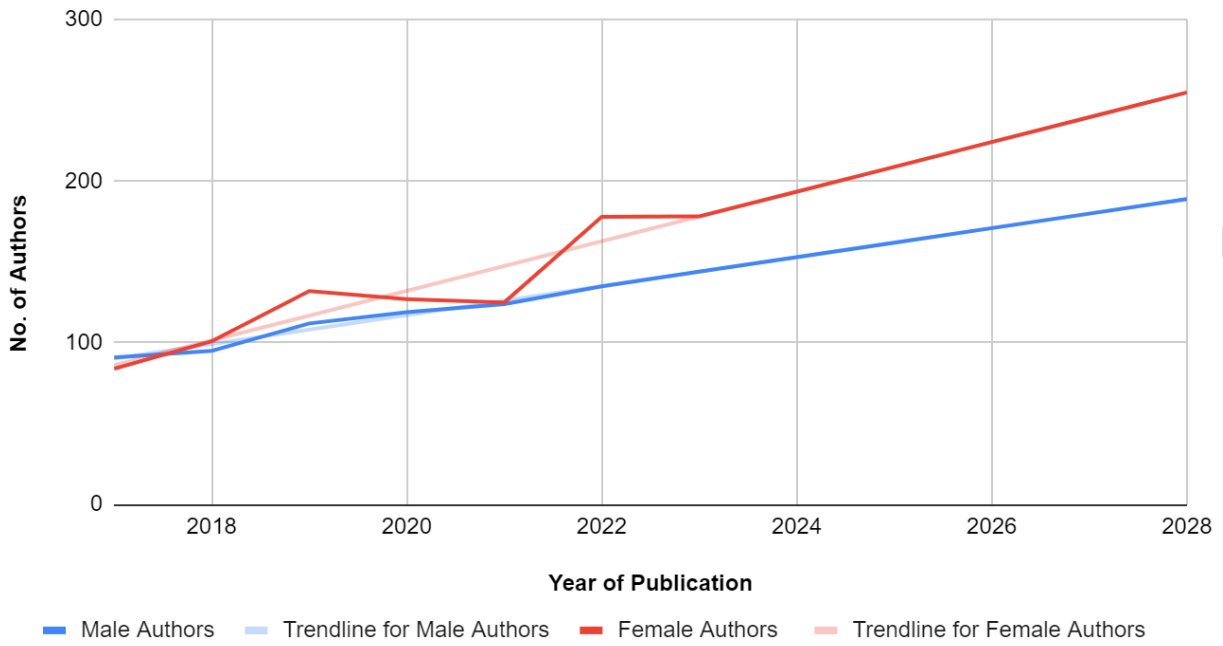


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Fig 2. Predictive Analysis of Gender Trends until 2028



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