Gender gaps in National Institutes of Health dermatology grant recipients

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\textbf{A B S T R A C T}

\textbf{Background:} Understanding the demographics and scholarly merit among National Institutes of Health (NIH) award recipients can help guide future applicants in the field of dermatology.

\textbf{Objective:} Herein, we aimed to explore gender gaps in NIH award recipient demographics and scholarly merits for dermatology-related projects.

\textbf{Methods:} Projects funded by the National Institutes of Arthritis and Musculoskeletal and Skin Diseases between 2015 and 2019 related to dermatology were extracted using the NIH Research Portfolio Online Reporting Tools database. The number of publications and h-index of each award recipient were collected using the Scopus database. The 2019 Blue Ridge Institute for Medical Research report was used to determine the top 20 NIH-funded dermatology departments/divisions.

\textbf{Results:} Between 2015 and 2019, there were 35.1\% more unique male than unique female recipients. Award recipients had an average of 116.7 total publications and an average h-index of 37.1. However, men also had more than half as many publications and a >37\% higher average h-index. Gender gaps in research merit, as well as number and type of awards, are reduced among recipients affiliated with a top 20 NIH-funded institution.

\textbf{Conclusion:} A higher number of awards were granted to male recipients. Men had a higher mean publication number and h-index compared with their female counterparts. Increased support, resources, and mentorship opportunities to women in research may help mitigate these gaps.

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\textbf{Introduction}

The National Institutes of Health (NIH) invests >$32 billion annually, making it the largest public biomedical research funder in the world (NIH, 2020b). NIH funding is pivotal to advancements in science and medicine, fostering research, and catapulting researchers into innovative opportunities that promote career development. Prior reports have highlighted trends in NIH funding, salary, and leadership appointment among dermatologists (Price et al., 2021; Sachdeva et al., 2020; Thompson et al., 2021). Currently, there is a paucity of information regarding gender differences in recent NIH award recipient characteristics and achievements. Herein, we aimed to explore gender gaps in NIH award recipient demographics and scholarly merits for dermatology-related projects.

\textbf{Methods}

Using the NIH Research Portfolio Online Reporting Tools database, all projects funded by the National Institutes of Arthritis and Musculoskeletal and Skin Diseases from 2015 to 2019 were extracted. Projects awarded to dermatology departments and projects with dermatologic keywords in the title were included in this study. The award types included research grants (R), career development awards (K), research training and fellowships (T&F), institutional training and director program projects (DP1), program project/center grants (P), small business research projects (SB1), and cooperative agreements (U; NIH, 2020a).
Demographic information for each award recipient, including gender, degree, and affiliation, was collected using the recipients’ respective institutional websites and the internet. Affiliations were categorized as academic or nonprofit, which denotes organizations that use revenue to further their mission. All other organizations were classified as private. The Scopus database was used to determine the cumulative number of publications and h-index, which is a number that represents a researcher’s productivity and impact of work, among the award recipients for the year that they won (Hirsch, 2005). The top 20 NIH-funded dermatology departments/divisions were determined from the 2019 Blue Ridge Institute for Medical Research report (Blue Ridge Institute for Medical Research, 2019).

Results

Demographics

A total of 1764 dermatology-related projects (1014 male, 723 female) were awarded to 529 unique award recipients between 2015 and 2019. Recipient characteristics are outlined in Table 1. There were 35.1% more unique male recipients (n = 304) than unique female recipients (n = 225). There were a total of 1264 R awards (790 male, 474 female), 276 K awards (123 male, 153 female), 107 T&F awards (75 male, 32 female), 62 U awards (23 male, 39 female), 51 P awards (26 male, 25 female), three SB1 awards (all awarded to male recipients), and one DP1 award (awarded to a male recipient; Fig. 1). Among the top 20 NIH-funded institutions, women received 15.9% fewer awards than men (477 men, 401 women) versus 42.9% fewer when not affiliated with the top 20 (564 men, 322 women).

Among award recipients, 49.1% (n = 866; 421 men, 445 women) were PhDs, 24.0% (n = 423; 249 men, 174 women) were MDs, and 25.6% (n = 452; 367 men, 85 women) were MD/PhDs. Among the 304 unique male award recipients and 225 unique female award recipients, 81 men (26.6%) and 50 women (22.1%) received five or more awards and 14 men (4.6%) and 12 women (5.3%) received ≥ 10 awards. Of the awarded projects, 88.5% (n = 1562; 927 men, 635 women) were granted to recipients from academic institutions, 7.6% (n = 134; 65 men, 69 women) from nonprofits, and 3.9% (n = 68; 49 men, 19 women) from private organizations. There was a smaller gender gap among the top 20 NIH-funded programs (477 men [54.3%], 401 women [45.7%]) compared with programs that were not in the top 20 (564 men [63.7%], 322 women [36.3%]).

Publications

Award recipients had an average of 116.7 publications (range, 0–938), with female recipients having 34.7% fewer publications than male recipients (136.1 men vs. 89.9 women). Female recipients had fewer cumulative publications on average than their male counterparts across all 5 years (Fig. 2). The average number of publications among award recipients associated with academic organizations was 33.8% fewer for women than men, 48.8% fewer for female recipients associated with nonprofit organizations, and 78.9% fewer for female recipients associated with private organizations (Fig. 3). The average number of publications for MDs was 16.2% fewer for female recipients than male recipients, 62.1% fewer for female MD/PhDs, 20.8% fewer for female PhDs, and 53.6% more for female recipients with an unknown degree (Fig. 4). On average, recipients affiliated with the top 20 NIH-funded institutions had 16.3% more publications (125.5 vs. 107.9). Among those affiliated with the top 20 NIH-funded institutions, female recipients had 14.6% fewer publications than male recipients (134.5 men, 114.9 women) versus 58.9% fewer when not affiliated with the top 20 (137.5 men, 56.5 women).

H-index

The h-index is a numerical value associated with researchers that represents their productivity and the impact of their published work. In 2016, the mean h-index among all academic dermatologists was 12.56 (standard deviation [SD]: 12.68) for men and 7.48 (SD: 9.41) for women (Shih et al., 2019). Award recipients had an average h-index of 37.1 (range, 0–135), with female recipients averaging 27.1% less than male recipients (41.7 men, 30.4 women). The annual average h-index for female recipients was lower than male recipients from 2015 to 2019 (Fig. 2). The average h-index among recipients affiliated with academic institutions was 26.3% less for female than male recipients, 42.2% less for female recipients associated with nonprofit organizations, and 50.0% less for female recipients associated with private organizations (Fig. 3). The average h-index for recipients with an MD was 20.5% less for female than male recipients, 42.9% less for female MD/PhDs, 15.2% less for female PhDs, and 6.2% more for female recipients with an unknown degree (Fig. 4). On average, award recipients affiliated with the top 20 NIH-funded institutions had a 17.6% higher h-index overall (40.1 vs. 34.1). Among those affiliated with the top 20 NIH-funded institutes, female recipients had 6.4% lower h-indices than male recipients (43.0 men, 36.6 women).
compared with 44.2% lower when not affiliated with the top 20 (40.7 men, 22.7 women).

Discussion

Our findings highlight the characteristics and achievements among NIH award recipients. Recipients excel in research merits, with an average of 116.7 total publications and an average h-index of 37.1. Private institutions are significantly less represented both in number of recipients and research merit when compared with academic and nonprofit institutions. Our study also highlights the vast gender discrepancy among the number of recipients. Furthermore, male recipients on average had 53.1% (136.1 men vs. 88.9 women) more publications and 37.2% (41.7 men vs. 30.4 women) higher h-indexes than their female counterparts. However, these gender gaps are reduced among recipients affiliated with a top 20 NIH-funded institution. The increased funding among the top 20 institutions likely results in more opportunities for all researchers, including women.

Despite women representing 60% of dermatology trainees and 51% of full-time faculty, there were more unique male than female
recipients, and more than half of the projects had male recipients (Association of American Medical Colleges, 2020). Male recipients also received more R awards, T&F awards, and P awards, as well as all SB1 awards and the only DPI award. Meanwhile, female recipients were awarded more K awards and U awards. Of note, U awards are for projects that require substantial NIH staff involvement in the oversight, coordination, or facilitation of the project, and K awards are designed to develop award recipients so they can conduct their research independently and increase their competitiveness for major grant support (National Institute of Allergy and Infectious Diseases, 2020; National Institute of Child Health and Human Development, 2020). Gender disparities in NIH dermatology awards have also been present and were expanding in prior years (2009–2014), which underscores the need to continue to analyze and bring attention to this gap (Cheng et al., 2016).

Gender disparities for female dermatology researchers are also evident in monetary award amounts. A study by Price et al. (2021) showed that, over the span of 2015 to 2019, male recipients received 60.9% of all NIH funding for dermatology-related projects, which was $121.3 million more funding than received by female recipients. Additionally, these equality gaps extend beyond research funding and are ubiquitous among leadership appointments and salaries. Studies by Sachdeva et al. (2020) and Thompson et al. (2021) showed that in 2020, there were twice as many male dermatology chairs/chiefs, and in 2018 men earned 19.9% more than their female counterparts among all academic positions. Increased support, funding, and opportunities are needed for female researchers to further mitigate gender inequalities.

Study limitations include the restriction of the NIH query search to only post-1985 fiscal years and the percentage of applicants to acceptances for each gender being unknown. Despite this limitation, overall, there is a smaller female award presence (304 vs. 225). Research merits do not fully encompass award recipients’ achievements and recipients may have diversified themselves by engaging in endeavors outside of the research arena. Furthermore, awards are not distributed solely based on research merits and instead involve a more holistic review. Future studies are needed to analyze the status of gender differences in NIH funding longevity.

Conclusion

NIH award recipients excel in the research arena with high publication counts and h-indexes. However, gender discrepancies are present, both in the higher number of awards granted to male recipients, as well as in standard research merit metrics, with men having increased publications and h-indexes compared with their female counterparts. Female award recipients have demonstrated that characteristics of strong research is not limited to quantitative research metrics; however, their underrepresentation highlights the need for award selection refinement and the promotion of equal opportunities. Potential avenues to mitigate gender inequalities include increasing the presence of women in health-related research in combination with increased NIH funding, mentorship, institutional support, diversity measures, and improved research inclusiveness.

Conflicts of interest

None.

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Study approval

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