RESEARCH LETTER

Representation of Females and Younger Adults in Studies Reporting Predictors of Readmission for Patients with Chronic Obstructive Pulmonary Disease (COPD)

James HB Im[1], Ronald Chow [2], Olivia W So[2], Robert Wu [2], Andrea S Gershon[3]

[1]The Hospital for Sick Children, Toronto, ON, Canada; [2]University Health Network, University of Toronto, Toronto, ON, Canada; [3]Sunnybrook Health Sciences Centre, University of Toronto, Toronto, ON, Canada

Correspondence: Ronald Chow, University Health Network, University of Toronto, Toronto, ON, Canada, Email ronald.chow@uhn.ca

Introduction

Over the past several years to decades, there has been an increasing interest in greater diversity, equity and inclusion of all patients afflicted with specific medical conditions, to be reported in the literature. It is no longer acceptable to, for example, conduct research on a sample of exclusively white and/or male patients.[1] It is highly desirable for patient samples to at minimum be representative of the diversity of patients afflicted with the medical condition, or predominantly report on historically underrepresented groups, with special funding and mandates encouraging the latter.[2,3]

In a systematic review conducted by our group,[4] we reported on significant predictors of readmission for patients with chronic obstructive pulmonary obstructive (COPD). Our review included 242 articles, published between 1997 and 2022. Of these, 3 studies reported no females in their sample, and another 52 (21%) studies reported on a sample with less than 20% of females. There seems to be a significant concern for underrepresentation of females in the literature, especially when pragmatic studies suggest a roughly equal distribution of males to females afflicted with COPD.[5]

The aim of this letter is to further assess the representation of conventionally underrepresented patients in COPD research, namely females and younger adults.

Methods

The 242 articles reported in our prior review[4] were reviewed. Review methodology is reported in-depth in the other publication. Briefly, four databases of Ovid MEDLINE, Ovid Embase, Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Trials were searched from database inception through to June 7, 2022, for the main concepts of COPD and hospital readmission. Articles were included if they reported on primary research, of patients with COPD and at least 40 years old, with readmission data within 1 year and predictors for readmission. Significant predictors for all-cause readmission and COPD-related readmission were recorded. In total, 242 articles were identified, reporting on over 16 million patients. Sixty-four predictors for all-cause readmission were identified, and 23 predictors for COPD-related readmission. Studies were also assessed for quality; there were no significant concerns for quality.

For each article, we extracted the following: year of publication, total sample size, percentage of females in sample, and mean/median age of sample. Histograms were used to descriptively visualize studies by percentage female and mean/median age of sample. To assess for any confounding effect on percentage females in studies, percentage was regressed separately to year of publication, log-transformed sample size and mean/median age of patients. Sample size was natural log-transformed, due to a few outlier studies with very large sample sizes. Test for slope was conducted, to assess for any significant relationship; type I error was set at 0.05. All analyses were conducted using StataBE 17.1.

Results

We observed a left-skew in distribution of percentage of females in study cohorts in studies of COPD exacerbations (Figure 1a). While most studies had roughly equal percentages (40–60%) of females to males, there were a noticeable handful of studies where females were underrepresented. As previously mentioned, 3 studies reported no females in their sample, and another 52 (21%) studies reported on a sample with less than 20% of females. This distribution remains pervasive throughout the 2+ decades of literature, where recent studies are no better than earlier studies (Figure 1b). However, there does seem to be better representation of females in larger-sample studies ($p = 0.001$), possibly suggesting that some of the underrepresentation may be due to natural sampling variation (Figure 1c). Future studies should strive for larger and therefore likely more-representative study samples.

It is also important to reflect that while COPD affects patients who are 35 years or older,[6] the majority of studies report on older adults (Figure 2a). While expected, given that age is a prognosticator for more advanced disease and poorer self-management and therefore also need for hospital admission,[7] it is important to remain cognisant that younger adults are not well-studied and study conclusions are not generalizable to them. There is a significant paucity of knowledge, about predictors for readmission in younger patients with COPD.

Of final note, it is interesting that studies with younger patients also generally have a higher percentage of females ($p = 0.001$; Figure 2b). This relationship is unlikely to be clinically meaningful, as all studies are still reporting on older adult patients. While larger-sample studies may help to improve representation of females, different study methodology with different eligibility criteria restricting to younger patients will be needed if studies are to be generalizable to younger patients with COPD.
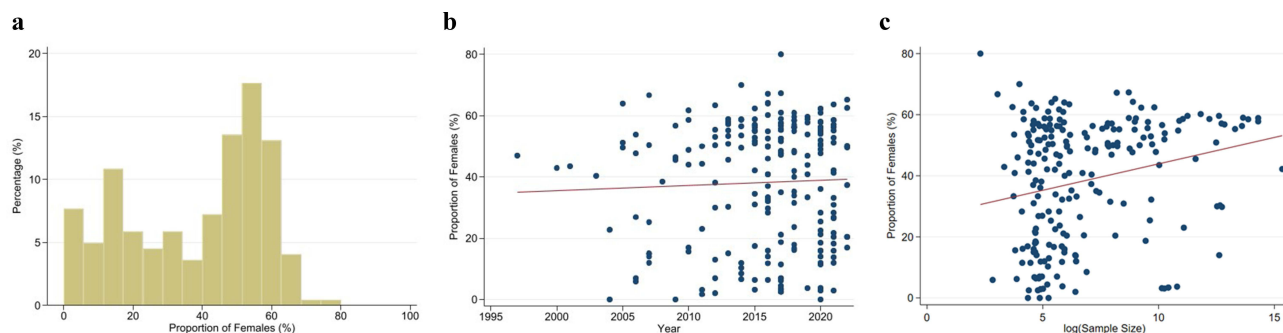

Figure 1 Representation of females in studies: (**a**) proportion of females in studies, (**b**) proportion of females by study publication year ($\beta_1 = 0.002$, $p = 0.554$), (**c**) proportion of females by study sample size ($\beta_1 = 0.017$, $p = 0.001$).
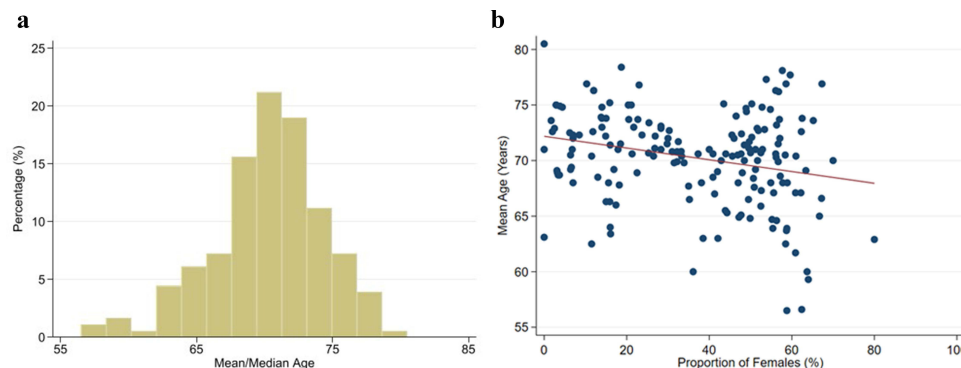

Figure 2 Representation of younger adults in studies: (**a**) average age of patients (years) across studies, (**b**) average age of participants by proportion of females in sample ($\beta_1 = -0.053$, $p = 0.001$).

Discussion

In conclusion, there seems to be an underrepresentation of females and younger adults, in the literature space of studies reporting on significant predictors of COPD readmission. Although underrepresentation does not appear to be a problem in the majority of studies, there are still some studies where there are concerns, including studies that were published in recent years. We would caution against applying these predictors to younger patients with COPD, as there is no research reporting on this age demographic.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Wanted Single DR. White male for medical research. *Hastings Cent Rep*. 1992;22(1):24–29. doi:10.2307/3562720
2. Bernard MA, Johnson AC, Hopkins-Laboy T, Tabak LA. The US national institutes of health approach to inclusive excellence. *Nat Med*. 2021;27 (11):1861–1864. doi:10.1038/s41591-021-01532-1
3. Odedina FT, Stern MC. Role of funders in addressing the continued lack of diversity in science and medicine. *Nat Med*. 2021;27(11):1859–1861. doi:10.1038/s41591-021-01555-8
4. Chow R, So OW, Im JHB, et al. Predictors of readmission, for patients with chronic obstructive pulmonary disease (COPD) - A systematic review. *Int J Chron Obstruct Pulmon Dis*. 2023;18:2581–2617.
5. Han MK, Postma D, Mannino DM, et al. Gender and chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*. 2007;176(12):1179–1184. doi:10.1164/rccm.200704-553CC
6. Raherison C, Girodet PO. Epidemiology of COPD. *Europ Respirat Rev*. 2009;18(114):213. doi:10.1183/09059180.00003609
7. Stone RA, Lowe D, Potter JM, Buckingham RJ, Roberts CM, Pursey NJ. Managing patients with COPD exacerbation: does age matter? *Age Ageing*. 2012;41(4):461–468. doi:10.1093/ageing/afs039