Does COPD differ by veteran status in males 50-79 years of age?

Kole P Knutson, Jordan M Stellato, Kelli R Vogler, Jourdan B Whorley, Vic Holmes and Jessica L Hartos*

Department of Physician Assistant Studies, University of North Texas Health Science Center, USA

Abstract

**Purpose:** With little research addressing veteran status as related to COPD, the purpose of this study is to assess whether COPD differs by veteran status in males ages 50-79 in the general population.

**Methods:** This study was a cross sectional analysis using 2016 BRFSS data for males ages 50-79 in Arkansas (N=1283), Montana (N=1586), New Jersey (N=1842), Tennessee (N=1473), and West Virginia (N=1854). Multiple logistic regression analyses were performed by state to determine whether COPD status differed by veteran status when controlling for age, ethnicity, tobacco use, weight status, general health, asthma, income, education, and employment.

**Results:** Across states, less than one-fifth of participants reported COPD (9-18%), and 25-40% reported veteran status. After controlling for socioeconomic, demographic, and health factors, results showed significant consistent relationships between COPD and veteran status in three out of five states. COPD was also consistently related to tobacco use, general health, and having ever been diagnosed with asthma in all 5 states.

**Conclusion:** The results of this study indicated that veteran males ages 50-79 are about two times more likely to have COPD when compared to non-veteran males of the same age in the general population. Due to the low prevalence of COPD overall, it is recommended that health care providers screen for COPD in this target population when patients present with symptoms, especially for current or ex-military personnel. In addition, COPD was highly related to smoking, general health, and asthma. Providers should identify and treat COPD and any other health conditions concurrently to make sure they are managed properly. Most importantly, as COPD is a disease of chronicity, providers should educate and refer smokers as early as possible for assistance with smoking cessation.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is defined as a progressive respiratory disease characterized by chronic airflow impedance [1-4]. COPD is not typically diagnosed until after lung function has already been nearly compromised [3] and it has been reported that an additional twelve million individuals are thought to be undiagnosed [5]. Past studies report that COPD could actually affect up to 16.8% of the population [4,6,7], and is a leading cause of death [2,3,8,9]. Additionally, several medical conditions have been reported as having a significant relationship with COPD including cardiovascular disease, ischemic heart disease, lung cancer, asthma, obesity, hypertension, diabetes, depression, anxiety, and obstructive sleep apnea [1,2,4,10,11].

Research has repeatedly indicated that COPD is highly related to tobacco use. Studies report that up to 90% of COPD patients identify as current or former smokers [1,2,4,5,9,12,13]. In addition, COPD patients are more likely to be white males [6-8,9,12] and have lower levels of income [7,12] and education [7,10].

COPD may also be related to veteran status. Several studies have determined the prevalence of COPD separately among the general population [6,12] and veteran population [13-16], but there is a lack of research comparing COPD status and veteran status [11,16]. One study, however, conducted at the Cincinnati Veterans Administration (VA) found that veterans had a higher rate of COPD when compared to the U.S. general population [16]. Furthermore, research has not adequately accounted for any age or gender differences in COPD status between these populations. Therefore, the purpose of this study was to assess whether COPD status differs by veteran status in males ages 50-79.

Methods

**Design**

This cross-sectional analysis used 2016 data from the Behavioral Risk Factor Surveillance System (BRFSS) conducted by the Center for Disease Control and Prevention (CDC) [17]. BRFSS collects health-related data annually through telephone interviews with adults in all fifty states, the District of Columbia, and three U.S. territories using random digit dialing techniques. The CDC compiles all BRFSS data and makes de-identified data available to researchers for secondary data analysis. This study was given exempt status by Institutional Review Board of The University of North Texas Health Science Center.

**Sample**

The samples for this study included males ages 50-79 from Arkansas (N=1,283), Montana (N=1,586), New Jersey (N=1,842), Tennessee (N=1,473), and West Virginia (N=1,854) with data for COPD. These states were chosen because they have a higher prevalence of veterans and reported COPD diagnosis when compared to other U.S. states [18].

*Correspondence to: Jessica L Hartos, Department of Physician Assistant Studies, University of North Texas Health Science Center, 3500 Camp Bowie Blvd, Fort Worth, Texas, 76107, USA, Tel: (817) 735-2454, Fax: (817) 7352529, E-mail: Jessica.hartos@unthsc.edu

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Data

The outcome, COPD status, was measured as ever/never diagnosed with "chronic obstructive pulmonary disease, chronic bronchitis, and/or emphysema" in the participant's lifetime. The factor of interest, veteran status, was measured as ever/never on active duty in the armed forces including "regular, Guard, and Reserve."

The control variables included age, ethnicity/race, smoker status, BMI, general health, asthma, income level, education level, and employment status. Age was dichotomized as "50-64 years of age" versus "65-79 years of age." Since the majority of the participants reported their ethnicity as White, ethnicity/race was dichotomized as "white, non-Hispanic" versus "other." Smoker status was categorized as "never smoker," "former smoker," and "current smoker." BMI was dichotomized as "overweight or obese" versus "not overweight or obese." In BRFFS, general health is defined as "poor health," "fair health," "good health," "very good health," and "excellent health."; however, due to low frequencies of participants with very good health and excellent health, four categories were used: "poor health," "fair health," "good health," and "very good/excellent health." Asthma was measured as ever/never being diagnosed with asthma. Income level was measured as an annual income of "$0 to less than $25,000," "$25,000 to less than $50,000," and "$50,000 or more." Education level was measured as yes/no graduated from college or technical school. Employment status was categorized as "wages/self-employed," "retired," or "other."

Analysis

Frequency distributions were used to describe the sample as well as to assess any issues with the distributions of variables. Multiple logistic regression analysis was used to assess the relationship between COPD status and veteran status while controlling for demographic, health, and socioeconomic factors. All analyses were conducted separately by state (instead of combining the data) to determine patterns in variable frequencies and socioeconomic factors. All analyses were conducted separately by state to assess any issues with the distributions of variables. Multiple logistic regression analyses for males ages 50-79 indicated that after controlling for all other variables in the model, COPD status were significantly related to veteran status in 3 out of 5 states. Veterans were about 2 times more likely to report COPD than non-veterans. In addition, former smokers were about 3 times more likely, and current smokers were about 4.5 times more likely, to report COPD compared to never-smokers in all five states. Also, those with asthma were about 4.5 times more likely to report COPD compared to those without asthma in all 5 states. In contrast, compared to those with poor health, those who reported fair, good, or very good/excellent health were about 2 to 11 times less likely to report COPD across states.

Discussion

The purpose of this study was to assess whether COPD status differed by veteran status in males ages 50-79 in the general population when controlling for demographic, health, and socioeconomic factors that may be related to COPD. Across states, less than one-fifth of participants reported ever being diagnosed with COPD, and at least one-fourth reported being a veteran. The results of adjusted analyses revealed that COPD status was significantly related to veteran status across states. These results are consistent with a study indicating that veterans may have higher rates of COPD than the general population [16]. In addition, our study found that being a former or current smoker was also significantly related to COPD status across all states, which is similar to many other studies that have reported strong relations between smoking and COPD [1,2,4,5,9,12,13]. Furthermore, our study supports the findings of other studies that indicate that fair or better health is inversely related to COPD [11,12] and asthma is highly related to COPD [7].

Smoking may contribute to the relationship between COPD and veteran status [19]. According to the CDC [20] veteran males have a higher prevalence of smoking than non-veteran males. However, even after controlling for smoking, veteran status still had a significant relationship with COPD. This would suggest that although smoking is related to COPD and veterans may smoke more than civilians, other factors related to veteran status contribute to COPD. Indeed, another study comparing COPD in different occupations found that serving in the armed forces was related to higher COPD rates than other occupations [14]. One such related factor may be higher exposure to hazardous agents in the military versus other occupations [14,19]. Future studies may want to include data for hazardous exposures that could contribute to veteran and non-veteran COPD status. Knowing whether or not people with COPD were exposed and/or continue to be exposed to hazardous agents could help practitioners screen earlier, modify treatment plans, and educate about reducing such exposures.

Limitations

Using BRFFS data allowed us to use state data most relevant to our clinical question. The large sample sizes allowed us to analyze the data based on the age and gender of our target population. However, our study findings may be limited by not having data for the severity of COPD, treatment modalities being used, or compliance with treatment plans [21]. Future studies should include such information. In addition, COPD rates in this study may be underestimated given that millions of individuals in the US population may have COPD but no formal diagnosis [5]. Future studies may define COPD status by symptoms rather than diagnosis in order to incorporate patients living with undiagnosed COPD.
Table 1. Participant Characteristics by State

| Variable                        | Arkansas N=1283 | Montana N = 1586 | New Jersey N=1842 | Tennessee N = 1473 | West Virginia N = 1854 |
|---------------------------------|-----------------|-----------------|-------------------|-------------------|----------------------|
| N                               | %               | N               | %                 | N                 | %                    |
| COPD diagnosis                  | 1274 99         | 1576 99         | 1842 100          | 1464 99           | 1842 99              |
| Yes                             | 166 13          | 151 10          | 171 9             | 166 11            | 324 18               |
| No                              | 1108 87         | 1425 90         | 1671 91           | 1300 88           | 1518 82              |
| Veteran status                  | 1274 99         | 1576 99         | 1841 100          | 1464 100          | 1854 100             |
| Yes                             | 516 40          | 590 37          | 452 25            | 533 36            | 615 33               |
| No                              | 766 60          | 988 63          | 1389 75           | 935 64            | 1239 67              |
| Age                             | 1283 100        | 1586 100        | 1842 100          | 1473 100          | 1854 100             |
| 50-64                           | 612 48          | 848 53          | 774 42            | 820 56            | 1047 56              |
| 65-79                           | 671 52          | 738 47          | 1068 58           | 653 44            | 807 44               |
| Ethnicity                       | 1266 99         | 1561 98         | 1778 97           | 1440 98           | 1825 98              |
| White, non-Hispanic             | 1019 80         | 1354 87         | 1391 78           | 1217 84           | 1,234 94             |
| Other                           | 247 20          | 207 13          | 387 22            | 234 16            | 106 6                |
| Tobacco use                     | 1241 97         | 1552 98         | 1782 97           | 1420 96           | 1814 98              |
| Never smoked                    | 502 41          | 683 44          | 873 49            | 577 41            | 704 39               |
| Former smoker                   | 511 41          | 632 41          | 656 37            | 564 40            | 735 41               |
| Current smoker                  | 228 19          | 237 16          | 253 14            | 279 20            | 375 21               |
| Weight status                   | 957 75          | 1199 76         | 1754 95           | 1099 75           | 1455 78              |
| Overweight or obese             | 957 77          | 1199 78         | 1373 78           | 1099 77           | 1455 78              |
| Not overweight or obese         | 278 23          | 344 22          | 381 22            | 325 23            | 338 19               |
| General Health                  | 1280 100        | 1581 100        | 1835 100          | 1471 100          | 1846 100             |
| Poor                            | 140 11           | 110 7           | 92 5              | 144 10            | 221 12               |
| Fair                            | 250 20           | 255 16          | 266 15            | 263 18            | 380 21               |
| Good                            | 446 35           | 497 31          | 584 32            | 500 34            | 600 33               |
| Very good/excellent             | 444 35           | 719 45          | 893 49            | 564 38            | 645 35               |
| Asthma                          | 1282 100        | 1580 100        | 1837 100          | 1466 100          | 1846 100             |
| Ever diagnosed                  | 126 10           | 163 10          | 150 8             | 166 11            | 211 11               |
| Never diagnosed                 | 1156 90         | 1417 90         | 1687 92           | 1300 89           | 1635 89              |
| Income                          | 1084 84         | 1391 88         | 1555 84           | 1255 85           | 1554 84              |
| S$0 to less than $25,000        | 294 27           | 348 25          | 293 19            | 353 28            | 469 30               |
| $25,000 to less than $50,000    | 274 25           | 403 29          | 289 19            | 360 29            | 460 30               |
| $50,000 or more                 | 516 48           | 640 46          | 973 63            | 542 43            | 625 40               |
| Education                       | 1278 100        | 1581 100        | 1833 100          | 1469 100          | 1850 100             |
| Did not graduate/technical school | 455 36         | 543 34          | 851 46            | 477 32            | 521 28               |
| Employment                      | 1281 100        | 1574 99         | 1823 99           | 1462 99           | 1851 100             |
| Wages/self-employed             | 469 37           | 802 51          | 917 50            | 637 44            | 688 37               |
| Other                           | 226 18           | 172 11          | 254 14            | 259 18            | 388 21               |
| Retired                         | 586 46           | 600 38          | 652 36            | 566 39            | 775 42               |

Table 2. Adjusted Results by State

| Predicting COPD (diagnosis vs. no diagnosis) | Arkansas | Montana | New Jersey | Tennessee | West Virginia |
|---------------------------------------------|----------|---------|------------|-----------|---------------|
| AOR                                         | AOR      | AOR     | AOR        | AOR       | AOR           |
| 95% CI Low                                  | 95% CI High |        | 95% CI Low | 95% CI High | 95% CI Low | 95% CI High |
| Veteran Status                              |          |         |            |           |               |
| Non-veteran                                 | ref      | ref     | ref        | ref       | ref           |
| Veteran                                     | 1.88     | 1.21    | 2.38       | 1.48      | 3.81          |
| Age                                         |          |         |            |           |               |
| 50-64                                       | ref      | ref     | ref        | ref       | ref           |
| 65-79                                       | 0.87     | 0.75    | 2.26       | 1.45      | 2.54          |
| Ethnicity                                   |          |         |            |           |               |
| Other                                       |          |         |            |           |               |
| White, non-Hispanic                         | 1.31     | 0.75    | 2.19       | 1.17      | 4.13          |
| Tobacco Use                                 |          |         |            |           |               |
| Former                                      | 2.86     | 1.62    | 3.94       | 2.14      | 7.26          |
| Current                                     | 4.59     | 2.43    | 6.37       | 3.19      | 12.71         |
| Weight Status                               |          |         |            |           |               |
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| Not overweight or obese | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
|-------------------------|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| Overweight or obese     | 1.29| 0.8| 2.1 | 1.02| 0.6 | 1.72| 1.23 | 0.75| 2.02 | 1.07| 0.67| 1.7 |
|                         |     |   |     |   |     |   |     |   |     |   |     |   |
| General Health          |     |   |     |   |     |   |     |   |     |   |     |   |
| Poor                    | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
| Fair                    | 0.37| 0.2| 0.66| 0.5 | 0.26| 0.96| 0.78 | 0.41| 1.48 | 0.53| 0.3 | 0.95 |
| Good                    | 0.17| 0.09| 0.32| 0.32| 0.17| 0.63| 0.22 | 0.11| 0.43 | 0.35| 0.2 | 0.63 |
| Very good/excellent     | 0.09| 0.04| 0.19| 0.15| 0.07| 0.31| 0.14 | 0.07| 0.28 | 0.18| 0.09| 0.38 |

| Asthma                  |     |   |     |   |     |   |     |   |     |   |     |   |
| Never diagnosed         | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
| Ever diagnosed          | 4.62| 2.67| 7.99| 8.74| 5.22| 14.63| 9.78 | 5.86| 16.32| 4.72| 2.92| 7.61 |

| Income                  |     |   |     |   |     |   |     |   |     |   |     |   |
| $0 to less than $25,000 | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
| $25,000 to less than $50,000 | 1.03 | 0.6 | 1.78 | 0.51 | 0.29 | 0.89 | 0.52 | 0.29 | 0.94 | 0.72 | 0.44 | 1.17 |
| $50,000+                | 0.75| 0.41| 1.35| 0.69 | 0.38| 1.24| 0.61 | 0.35| 1.07 | 0.63 | 0.35 | 1.13 |

| Education               |     |   |     |   |     |   |     |   |     |   |     |   |
| Did not graduate college/tech school | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
| Graduated college/tech school | 1.05 | 0.62 | 1.77 | 0.99 | 0.6 | 1.65 | 0.53 | 0.32 | 0.88 | 0.95 | 0.55 | 1.64 |

| Employment              |     |   |     |   |     |   |     |   |     |   |     |   |
| Wages/self-employed     | ref | - | ref | - | ref | - | ref | - | ref | - | ref | - |
| Other                   | 1.27| 0.63| 2.58| 2.15| 1.1 | 4.18| 1.13 | 0.60| 2.12 | 3.52| 1.87| 6.63 |
| Retired                 | 1.51| 0.82| 2.78| 2.01| 1.1 | 3.67| 1.38 | 0.78| 2.42 | 2.45 | 1.32 | 4.56 |

Conclusion

Because this is a population-based study, the results may generalize to men between the ages of 50-79 in primary care settings. Different results may be found in the Veteran Administration or pulmonology settings. Primary care providers may expect less than one-fourth of their patients in this target population to have a COPD diagnosis, with higher prevalence related to (a) undiagnosed persons and (b) current or former military. Health care providers should screen for COPD if patients in this target population present with symptoms of COPD such as chronic cough, shortness of breath, fatigue, wheezing, and/or frequent respiratory infections, with particular consideration for veterans. Primary care providers should work closely with pulmonology specialists in treatment plans for COPD. In addition, because there is a moderate prevalence of smokers within the target population and there is a high relation between smoking and COPD, providers should screen for both when patients present with symptoms of either. Providers should encourage, and provide resources for, tobacco cessation to reduce severity or complications for COPD or other health issues related to smoking. Lastly, because few patients in this target population have asthma, but asthma and COPD are highly related, providers should screen for both when patients present with symptoms of either. Providers should determine whether the patient's asthma is properly managed or if better management strategies or referrals are needed.

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