A Study of Volunteer and Career Firefighter Fitness in a Rural Setting

College of Osteopathic Medicine of the Pacific
COMP-Northwest

Robin Faulkner*, OMS-II, Cailin Johnson*, OMS-II, Max Jette**, OMS-II, Adam Hall*, OMS-III,
Dr. Elisabeth Guenther, MD
Western University of Health Sciences COMP-Northwest, Lebanon, OR
*Equally contributing authors

ABSTRACT

Lebanon, Oregon is a rural town served by the Lebanon Fire District. Within the district, there are 36 career firefighters and 64 volunteer firefighters. There are double the amount of volunteer compared to career firefighters, which led us to question the difference in health risks that exist between the two groups. We hypothesize that volunteer firefighters will have higher health risks compared to career firefighters.

This study was conducted with a randomly selected sample of volunteer and career firefighters. A questionnaire was developed to assess personal health, such as exercise, flexibility and diet. After completing the survey each participant was asked to participate in a fitness assessment that was proctored by a trained medical student or career firefighter in order to measure BMI, muscle strength, flexibility and aerobic capacity. Data points were collected and the participants' scores were evaluated in comparison with the answers provided on the survey.

Out of the 100 career and volunteers employed by the Lebanon Fire District 55 were included in this study. We compared three main fitness test results, BMI, VO2 max, and sit and reach between both volunteers and career firefighters with their corresponding answers to the survey questions, which was “number of sugary snacks consumed” for BMI, “hours of exercise per week“ with VO2 max, and “hours of flexibility and balance exercise” with sit and reach flexibility. The difference between career and volunteer VO2 max was 2 with a P value of 0.07. This P value was not statistically significant, demonstrating that there was no significant difference in VO2 max scores between career and volunteer firefighters.

In our small pilot study, we found that career firefighters had better flexibility and VO2 max compared to volunteer firefighters, but volunteers had lower BMIs compared to career firefighters. Further study is indicated

OBJECTIVE

Our study was designed to determine the difference in health risks, if any, that exist between career and volunteer firefighters in a rural community

INTRODUCTION

Lebanon, Oregon is a rural town served by the Lebanon Fire District, which relies on both career and volunteer firefighters. Within the Lebanon Fire District there are approximately 36 career firefighters and 64 volunteer firefighters. The volunteers are supplemented by a cohort of medical students through the WesternU Lebanon Emergency Alliance, or WLEA for short, who were presented with a unique opportunity to assess the physical fitness and health of both career and volunteer firefighters. In the literature reviewed, a self-reported study of 230 firefighters, volunteer members were seen to have higher rates of obesity compared to career firefighters which calls for better preventative care and health screenings for volunteers (Yoo et al., 2009). The Lebanon Fire District employs double the amount of volunteers compared to careers spread over a large rural region, which led us to question the difference in health risks, if any, that exist between the two groups. We hypothesize that volunteer firefighters will have higher health risks compared to career firefighters, based on a self-reported survey and fitness assessment.

STUDY DESIGN

Lebanon, Oregon is a rural town in Linn County with a population of 17,973 people per the most recent 2020 census.The Lebanon Fire District consists of five stations that serve 30,000 people over 134 square miles around the city of Lebanon. A randomly selected sample of volunteer and career firefighters employed by the Lebanon Fire District were given a questionnaire developed to assess self-reported personal health measures including exercise frequency, flexibility, and diet. After completing the survey, each participant took part in a fitness assessment that was proctored by a trained medical student or career firefighter. Data collected included BMI, muscle strength, flexibility, and aerobic capacity. Participants' scores were paired with survey responses. Inclusion criteria were all fire-fighters in Lebanon, Oregon. Any high-risk participant, defined as an individual with any one of the following conditions: COPD, asthma, diabetes, angina, renal disease, shortness of breath with mild exertion, palpitations, tachycardia and known heart murmur, required physician or paramedic supervision during their fitness assessment. This study was approved by the Western University of Health Sciences Institutional Review Board.

RESULTS

We analyzed the data using SPSS software and compared the results using an independent T test. This was used to compare the means between the volunteer and career firefighters to evaluate if there is significance between the two groups.
The overall mean career firefighter age was 35.12 and weight was 214.50.. The overall mean career volunteer firefighter age was 31.00 and weight of 189.06.The mean career VO2 max was 44.07 (figure 2) while the mean volunteer VO2 max was 41.99 (figure 1). The mean difference between career and volunteer VO2 max was 2.08 with a P value of 0.07. The mean career BMI was 30.04 (figure 2) while the mean volunteer BMI was 27.10 (figure 1). The mean difference between career and volunteers was 2.94 with a P value of 0.78.

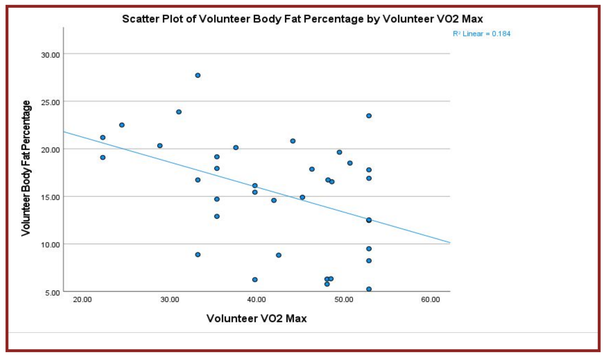


Figure 1. Volunteer VO2 Max vs Volunteer BMI.

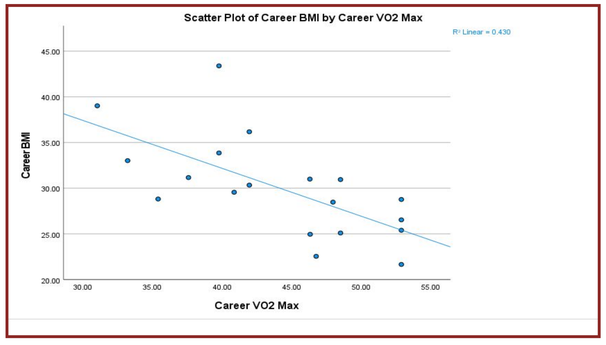
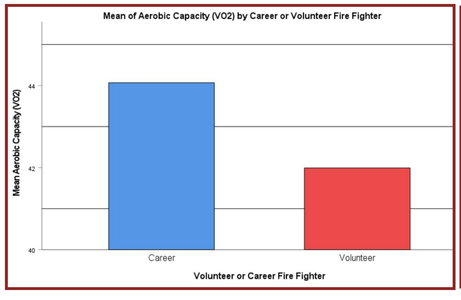
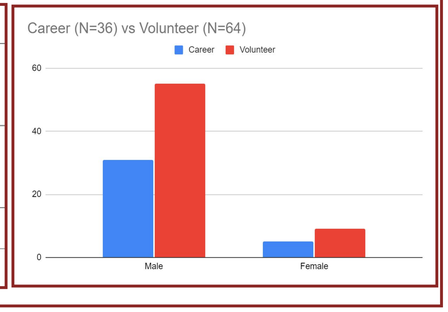


Figure 2. Career VO2 Max vs Career BMI.





DISCUSSION

When comparing career and volunteer firefighter BMI with sugary snacks consumed per week, as well as flexibility on a sit and reach test with reported hours of flexibility and balance exercise, and finally, VO2 max with hours of exercise, the data shows no statistically significant p-value. The closest statistically significant data is between VO2 max of career and volunteer firefighters and hours of exercise per week.

VO2 max is a representation of how much oxygen your body is using during maximum exertion and is most indicative of cardiac and respiratory function for firefighters on the fireground. VO2 max can be variable depending on age, gender, and body composition. The maximum VO2 is less for females, and overall declining with age for both females and males. The International Association of Firefighters has recommended a VO2 max of >42 (Moore, Penry, and Gunter), where the mean in our study for career firefighters is 44.07 and volunteers is 41.99. Although the average age for career firefighters is higher than that of volunteers (35 to 31 respectively), the overall VO2 max is higher for careers compared to volunteers. These values may be affected by the breakdown of male to female career vs volunteer firefighters, as well as a larger overall number of volunteer firefighters included in the data set.

Especially interesting is the mean averages for flexibility during the sit and reach test between career and volunteer firefighters, due to the high presence of musculoskeletal injuries found within the fire service. Our mean is 26.33cm for careers on the sit and reach, and 24.71cm for volunteers, demonstrating that career firefighters have less flexibility compared to volunteers. Each of the above-discussed comparisons will require further research and testing as the department continues to grow and our sample size increases.

Poston et al., 2012 documented changes in behavior and body composition (BMI, waist circumference, and body fat %) in a population-based cohort of 2500 male career firefighters. It was found that those who reported making diet or exercise changes experienced weight loss, while those who did not reported weight gain on average. Griffin et al., 2016 followed a cohort of new firefighters for 12 months and found that implementation of a fitness program within the department lead to lower rates of injury versus a control of previous classes of incoming firefighters, as well as net cost savings for the department. In a rural department that relies heavily on its volunteer firefighters, prioritizing health and fitness is of utmost importance. There is remarkable potential to decrease overall injury in the department with the implementation of stretching exercises and increased emphasis on cardiovascular exercise for improving VO2 max, which will be the focus of upcoming studies.

CONCLUSION

In our small pilot study, we found that career firefighters overall had better flexibility and VO2 max as compared to volunteer firefighters, but volunteer firefighters had lower BMIs compared to career firefighters. This study may be limited in that it was primarily self-reported and there were twice as many volunteer firefighters tested compared to career firefighters. Further study with a greater number of participants is indicated.

ACKNOWLEDGEMENTS

We would like to thank Lebanon FD

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Full text needed--

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