Effects of asthma on lung function, aerobic fitness, and physical activity in young adults

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INTRODUCTION

- Asthma is one of the most commonly diagnosed conditions in the United States, affecting 25 million individuals (NHLBI, 2018)
- 90% of individuals with asthma will experience exercise-induced bronchoconstriction while performing physical activity (AAFA, 2015)
- In one study, 70% of the participants in the asthma group were classified as "predominantly sedentary" (Hul et al., 2016)
- In one survey, 20% of parents of children with asthma stated they believed exercise is dangerous for their child (Lang, Butz, Duggan, and Serwint, 2004)

OBJECTIVES

- To determine if physical activity differs between those with or without asthma
- To determine if fitness or physical activity is associated with FVC/FEV1 measures

HYPOTHESES

- Participants with asthma will have lower levels of physical activity compared to those without the condition
- Physical activity will have a correlation with FVC/FEV1 measures

METHODS

- Participants
  - University of Arkansas students ages 18-25 recruited through EIM
  - Completed the International Physical Activity Questionnaire, as well as a standardized fitness assessment
- Measures
  - Participants self-reported data regarding physical activity on the survey
  - Participants took a standardized spirometry test
    - Asked to deeply inhale, then exhale as long as they possibly could
    - This test provided our FVC/FEV1 data
  - Actigraph GT9x accelerometers worn on the non-dominant wrist for one week to track physical activity
    - Data used to calculate counts/minute and steps/day
- Physical activity between groups compared using Wilcoxan Rank Sum test
- Associations between fitness and physical activity made using Spearman Correlations

RESULTS

Table 1- Comparing physical activity from IPAQ between those with and without asthma, mean (SD)

	No Asthma (n=759)	Asthma (n=140)	p-value
Vigorous mins/day	44.8 (68.5)	36.8 (65.5)	.068
Moderate mins/day	96.6 (114.0)	99.4 (131.6)	.464
Walking mins/day	100.0 (104.6)	93.5 (116.3)	.164
Total METMIN/week	4850.3 (4917.4)	4513.0 (6037.7)	.059

Table 2- Description of participants who completed fitness assessment, mean (SD)

	Males (n=14)	Females (n=14)
Age (years)	21.4 (1.1)	21.1 (0.9)
VO2max (mL/kg/min)	42.7 (6.8)	36.0 (4.3)
FVC (L)	4.51 (0.57)	3.24 (0.83)
FEV1 (L)	3.56 (0.86)	2.71 (0.76)
Counts/Min	2080.4 (457.1)	1922.1 (388.9)
Steps/Day	11944.5 (3635.3)	11846.1 (2359.0)

Table 3- Spearman correlation associations between spirometry and fitness/physical activity

	FVC		FEV1	
	Spearman Rho	p-value	Spearman Rho	p-value
VO2max	.35	.11	.10	.665
Accelerometer counts per min	.08	.73	-.02	.923
Accelerometer steps per day	.18	.43	.24	.28

- No significant difference when comparing physical activity levels between those with asthma and those without
- Slightly positive, but not stastically significant correlation between FVC and VO2max, counts/minute, and steps/day
- Slightly positive, but not statistically significant correlation between FEV1 and VO2max and steps/day; Slightly negative, but not statistically correlation between FEV1 and counts/minute

DISCUSSION

- No statistically significant difference in physical activity levels between participants with asthma and those without
- Fitness and physical activity has no association with spirometry
- Contradicts Netherlands study that found participants with asthma to be significantly less active than others (Hut et al., 2016)
- Study was limited by small number of fitness assessment participants with asthma
- Future studies could include larger sample size and potentially a larger age range, as this study focused on young adults

CONCLUSIONS

- This study suggests that physical activity levels do not differ between participants with asthma and those without
- The study suggests there is no association between fitness/physical activity and FVC/FEV1

ACKNOWLEDGEMENTS

The study was funded by Honors Team Grant and Honors Equipment Grant. We thank all the participants of this study for their time and dedication throughout the study.

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