"Complementary and alternative asthma treatments and their association with asthma control"

Austin Hieb

Dr. Zeynep Teymuroglu

Biostatistics

27 November 2016

"On my honor, I have not given, nor received, nor witnessed any unauthorized assistance on this

work."

Objective:

The objective of this study was to find relationships about asthma from the data. I wanted to find if there was significant data for a linear relationship and correlation between age and forced expiratory volume. I also wanted to see if there was a statistically significant difference in the population means of FEV1 between males and females. Finally, I sought to see if there is strong evidence to support that there is a difference in CAM usage between males and females.

Literature Review:

Asthma plagues the lives of millions of people. This disease can be controlled, but often time is expensive and time consuming. Conventionally, anti-inflammatory medicines, such as corticosteroids that are inhaled, are used to help control asthma (Chen et al. 2013). Recently, people have started to use complementary and alternative medicines (CAM) to help control their asthma. These CAMs include but are not limited to herbal medicines, breathing techniques, and acupuncture (Chen et al. 2013).

This study was conducted to see the relationship between asthma control, CAM use, and conventional controller medications (Chen et al. 2013). The study was conducted as a population based, cross sectional study, in which individuals self-reported their answers to questions about CAM usage, level of asthma control, race, and level of income. The researchers used the answers to the questions to provide data for statistical analysis. CAM usage was applicable only if it was within the past 12 months.

The study found that the most common CAMs used were breathing exercises, vitamins, and herbal medicines (Chen et al. 2013). It illustrated that females with uncontrolled asthma were most likely to use CAMs to aid in controlling their asthma. It suggests, when combined

with lower forced expiratory volume (FEV1), that users who try CAMs have more severe asthma (Chen et al. 2013). They also found that 37% of their subjects have tried CAMs.

This study, although comprehensive, had a few limitations. First, it only studied a small sample of the population of Canada. This does not give a large picture perspective to the population of asthma sufferers. Second, the subjects self-reported their results, so there could be bias in their answers. Since the study asked about CAM usage in the past 12 months, people could possibly forget if they have used them in that time period. Overall, even with the limitations, the study made substantial findings for how people control their asthma, and how alternative medicine has impacted the lives of people with asthma.
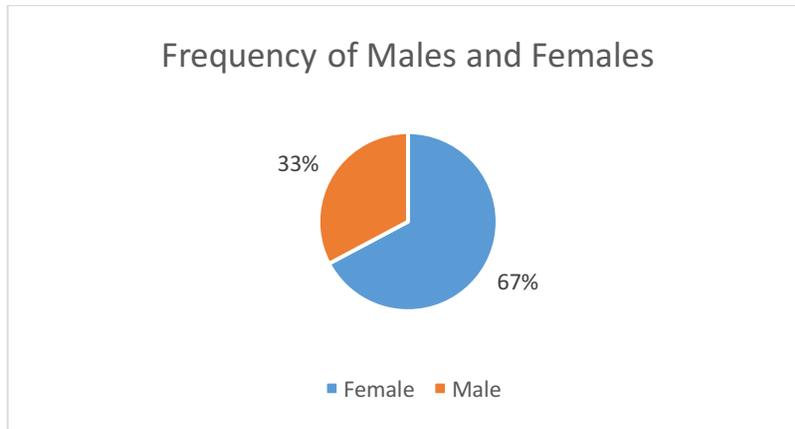
Statistics:

For this dataset, the continuous variables are age and forced expiratory volume (FEV1), and the categorical variables are alternative medicine usage (CAM) and gender. There are 485 observations in the data set. From the data collected, 327 were females and 159 were males. There was one outlier in the dataset, which was taken out before the tests were run.

The five number summary for the continuous variables are shown below.

|	Fev1 5 # summary	Age 5 # Summary
min	0.62	18.99247
q1	1.935	42.1204675
median	2.6	51.726215
q3	3.205	63.1724875
max	5.07	97.28131

From this chart, you can see that the median age of the study is about 52 years, which means that 50% of the people tested were younger, and 50% were older. The median FEV1 was 2.6, which again means that 50% had an FEV1 above 2.6, and 50% had and FEV1 below 2.6. The

minimum age tested was 19 years old and the max tested was 97 years old. The lowest FEV1

was 0.62, while the highest FEV1 was 5.07.

The graph above illustrates the frequency of males and females tested in the study. Females

made up 67%, while males made up 33% of total people tested.

Question: Is there a statistically significant linear regression between age and FEV1 and is there

a statistically significant correlation between age and FEV1?
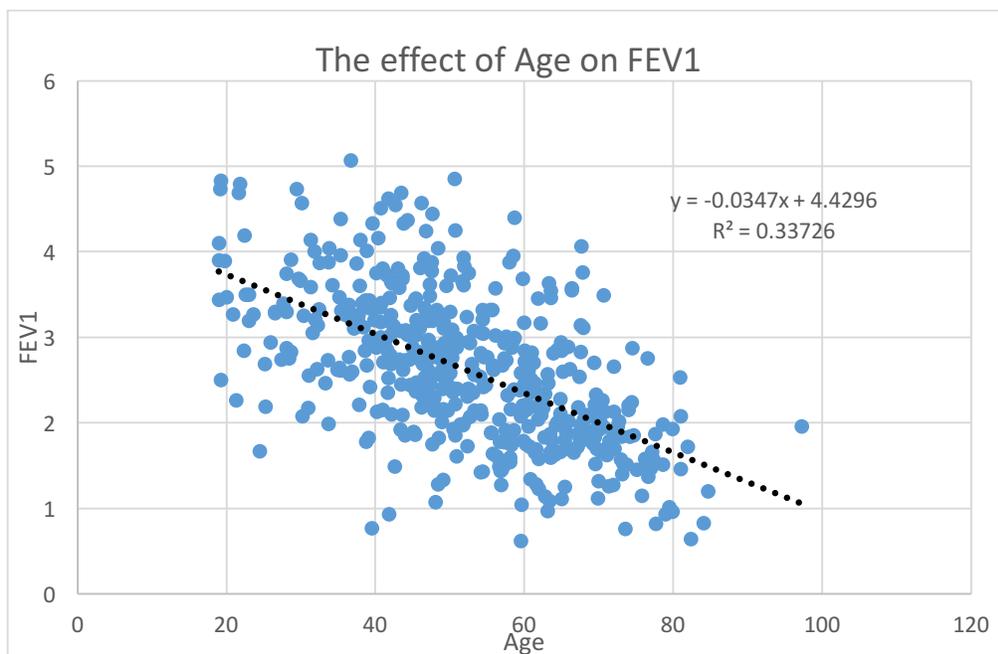
From the graph, it can be seen that there is a weak negative correlation between age and FEV1.
As Age increases, the data suggests that FEV1 decreases. The linear regression can be
interpreted to mean that for every 1-year increase in age, the FEV1 decreases by -0.0347. The
model is not good since only 34% of the variance in FEV1 can be explained by it.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	34576	34576	244.78	<.0001

The above chart indicates that the regression is statistically significant, and did not happen by

chance. This can be seen by the highlighted P-value, which is less than alpha (.05).

For correlation, the correlation value is -0.58074, which is highlighted in the table below.

	age	Fev1
age	1.00000 486	-0.58074 <.0001 483
Fev1	- 0.58074 <.0001 483	1.00000 483

From the table, the P-value is less than 0.05 (alpha) so there is statistically significant evidence

that there is correlation between age and FEV1, and it did not happen by chance.

Question: Is there a statistically significant difference in the population means of FEV1 between

males and females?

Ho: That gender does not have an effect on FEV1.

H$_A$: Gender has an effect on FEV1.

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	85.8953779	85.8953779	147.44	<.0001

From the data, there is significant evidence to reject the null hypothesis of gender does not have an effect on FEV1. The P-value given in the table is less than 0.05 (alpha). This means that for the population, gender does have an effect on FEV1.

Question: Is there strong evidence to support that there is a difference in CAM usage between males and females?

H_O: There is no difference in CAM usage between males and females

H_A: There is a difference in CAM usage between males and females

Chi-Square Test for Equal Proportions	
Chi-Square	58.0741
DF	1
Pr > ChiSq	<.0001

From the table above, there is statistically significant evidence to support the alternative hypothesis. This is illustrated through the P-value being less than 0.05. There is a statistically significant difference in CAM usage between males and females.

Conclusion:

Through the tests run, significant evidence was found to support every alternative hypothesis. The data illustrated that there was a weak negative correlation between age and FEV1, significant evidence to support that gender does have an effect on FEV1, and significant evidence to support that there is a significant difference in alternative medicine usage for males and females.

Literature Cited

Chen W, FitzGerald JM, Rousseau R, Lynd LD, Tan WC, Sadatsafavi M (2013) Complementary and alternative asthma treatments and their association with asthma control: a population-based study. BMJ Open 3(9): e003360. http://dx.doi.org/10.1136/bmjopen-2013-003360