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Testing Differences in Vital Lung Capacity Between Long-Term Cigarette Smokers, Vapers, and Non-Smokers

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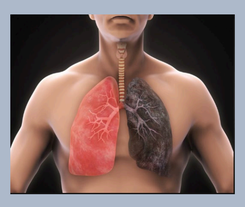

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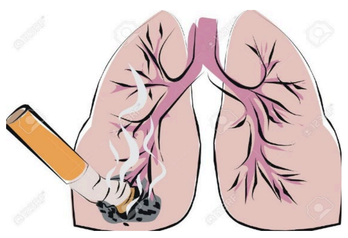
Introduction

- Tobacco use is the #1 leading cause of lung disease in the United States, killing 1.5 million people yearly[1]
- Cigarettes have been linked to major problems with the respiratory system[2]
- Studies show that aerosols in vapes cause dysregulation in lung function[3]
- Another study showed that the vaping industry is worth $2 billion as of 2013[4]



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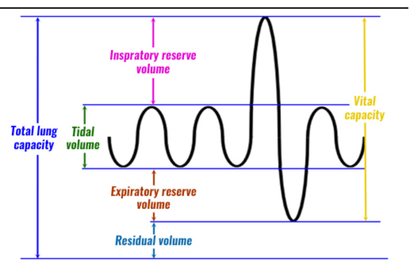


https://www.teachpe.com/anatomy-physiology/respiratory-volumes

Specific Aim

Scientific Question

- Will there be a significant difference between the vital lung capacity of cigarette smokers, vapers, and non-smokers?

Hypothesis

- The non-smokers lung capacity and lung volume would be significantly higher relative to cigarette smokers and vapers
- The lung capacity and lung volume for cigarette smokers and vapers will be relatively the same

Discussion

Data is not mathematically significant

Shows clear trend that would likely lead to significant data if larger sample size

Found that control group subjects were taller than other groups

•Vaping may not be a "better" alternative to cigarettes

Methods

Gather subjects (15) → Complete Questionnaire → Breathe normal for 5 breathes → Deep inhale and exhale → Biopac Student Lab to gather data

Importance

•Visually and scientifically show the damage that these tobacco products can have on lung capacity and lung volume

•Teenagers may rethink the idea that vaping is "better" and "not as bad" as smoking cigarettes

•One study showed that the higher the nicotine in a vape the more likely an adolescent user will start smoking cigarettes[5]

Results

Table 1. Data on 5 subjects that are non-smokers

	Age	Height	Gender	Weight	Duration	Time	Active	TV	VC	TV/ Height	VC/ Height
NA1	21	160 cm	F	180lb	N/A	N/A	No	0.8L	4.9L	0.500L	6.125L
NA2*	21	180 cm	F	185lb	N/A	N/A	No	0.8L	4.8L	0.444L	6.000L
NA3	21	183 cm	M	360lb	N/A	N/A	No	0.9L	4.7L	0.492L	5.222L
NA4	46	183 cm	M	205lb	N/A	N/A	No	0.9L	4.2L	0.492L	4.667L
NA5	36	178 cm	M	180lb	N/A	N/A	No	0.8L	4.8L	0.449L	6.000L

Data for the 5 subjects that do not smoke. The * represents a subject who was feeling sick in the past week. Height was removed because those that are taller typically have larger lungs. The N/A indicates that the subject never smoked.

Table 2. Data on 5 subjects that Smoke Cigarettes

	Age	Height	Gender	Weight	Duration	Time	Active	TV	VC	TV/ Height	VC/ Height
CA1	23	185 cm	M	210lb	Pack a day	8 months	Yes	0.8L	3.5L	0.432L	4.375L
CA2	38	183 cm	M	250lb	Pack a day	25 years	No	0.7L	2.8L	0.383L	4.000L
CA3	48	183 cm	M	225lb	Pack and a half a day	27 years	No	0.7L	3.7L	0.383L	5.286L
CA4	62	183 cm	M	215lb	Half a pack a day	40 years	Yes	0.5L	2.7L	0.273L	5.400L
CA5	21	162 cm	F	170lb	Half a pack a day	4 years	No	0.9L	3.2L	0.556L	3.556L

Data for the 5 subjects that smoked cigarettes. The * represents a subject who was feeling sick in the past week. Height was removed because those that are taller typically have larger lungs. The term "a pack" refers to a pack of cigarettes

Table 3. Data on 5 subjects that Vape

	Age	Height	Gender	Weight	Duration	Time	Active	TV	VC	TV/ Height	VC/ Height
VA1	22	175 cm	F	142lb	3 pods a week	2 years	No	0.8L	3.7L	0.457L	4.652L
VA2	21	162 cm	F	150lb	4 pods a week	2 years	No	0.7L	3.4L	0.432L	4.857L
VA3 *	21	173 cm	F	135lb	7 pods a week	1 and a half years	Yes	0.8L	3.8L	0.462L	4.750L
VA4 *	23	173 cm	M	180lb	7 pods a week	3 years	No	0.8L	3.4L	0.462L	4.250L
VA5	21	175 cm	M	100lb	7 pods a week	3 years	Yes	0.8L	3.4L	0.457L	4.250

Data for the 5 subjects that vape. The * represents a subject who was feeling sick in the past week. Height was removed because those that are taller typically have larger lungs. The term "pod" refers to a tiny container filled with vape juice that attaches to the device.

Figure 1. Average Tidal Volumes

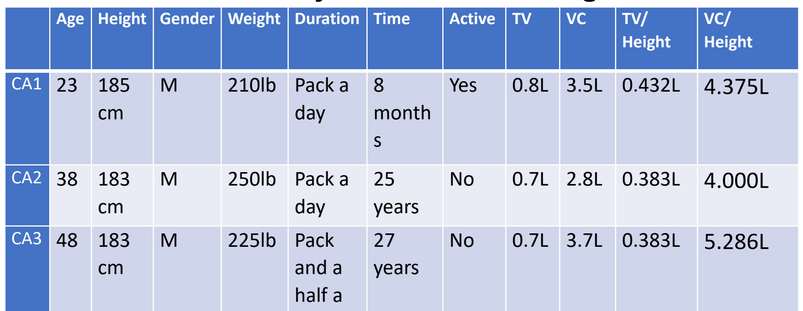
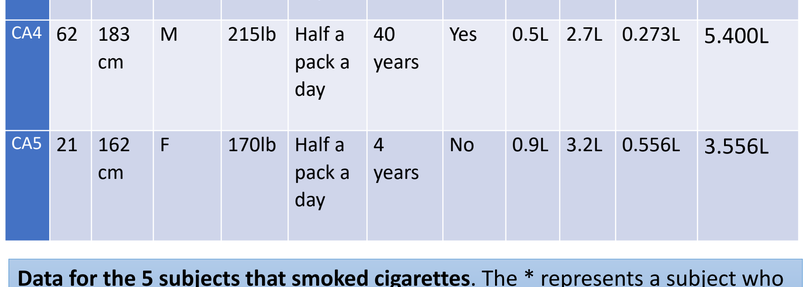


Figure 2. Average Vital Capacities



These figures shows the average tidal volumes for the 5 subjects in the control, vaping, and cigarette groups. It also shows the average vital capacities for the 5 subjects in the control, vaping, and cigarette groups. Standard error bars are shown in each category. Volumes were measured in Liters.

Potential Pitfalls

- Sample consisted of only 15 subjects
- Inconsistent testing area
- Delay on IRB approval
- Subjects only tested once

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Acknowledgments

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