

# Investigating the Association between Vape Use and Respiratory Symptoms in Adults in Riyadh, Saudi Arabia

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## ABSTRACT

**Background:** E-cigarettes, often referred to as vapes, have surged in popularity, especially among younger demographics, due to misconceptions about their safety compared to traditional tobacco products.

**Objective:** This study focused on the growing prevalence of vape use in Riyadh, Saudi Arabia, and its associated health impacts, specifically targeting respiratory symptoms in adult users.

**Methods:** A cross-sectional study included 100 adults aged 18 to 50 years in Riyadh, all of them had a history of e-cigarette use. Data were collected through online surveys, focusing on aspects such as income level, money spent on vapes, family smoking habits, and reported respiratory symptoms. Analysis was conducted using statistical tools to establish correlations between vaping habits and respiratory health outcomes.

**Results:** The study revealed that majority of the participants were young adult males mainly from middle and high-income brackets. A significant portion of the respondents experienced cough (58%) and shortness of breath (68%) during or after vaping, and 71% reported a rapid heart rate associated with vaping. Despite these symptoms, only a small fraction of the participants had attempted to quit vaping in the past 30 days, reflecting a lack of awareness or underestimation of the health risks associated with vaping.

**Conclusion:** The study underscored a strong association between vape use and adverse respiratory symptoms among adults in Riyadh. Despite the prevalence of respiratory symptoms, there was a notable gap in awareness or willingness to acknowledge the health risks associated with vaping.

**Keywords:** E-cigarette, Vape, Misinformation, Prevalence, Respiratory symptoms, Riyadh.

## INTRODUCTION

Wrongly thought that it is safer than other tobacco products, e-cigarettes, commonly known as vape, have gained popularity among users of different ages. The Food and Drug Administration (FDA) defined them as battery-operated products that can deliver nicotine and other chemicals<sup>(1)</sup>. Misconceptions have promoted its use as an alternative to cigarettes and a means for quitting. However, the assessment of vape use among American young adults demonstrated a prevalence of 5.66 million, with 2.21 million current users, 2.14 million former smokers, and more than 1.30 million who had never smoked<sup>(2)</sup>.

In Saudi Arabia, researchers have discovered a prevalence rate of 27.7% among university school students, posing a significant threat to future usage among adults. Such perturbing trends and fallacies threaten the health and social well-being of the Saudi population and the economy of the Kingdom of Saudi Arabia. With the increased use, researchers have gained interest in the health impacts of e-cigarettes and discovered their adverse consequences. While users report throat irritations and coughs, the chemicals cause more damage to the internal organs<sup>(3)</sup>.

In their study of “toxic constituents in e-cigarette aerosols, carcinogen biomarkers and the association with bladder cancer, oral health, the impact of e-cigarettes on pregnancy, and cardiovascular health”, **Alqhatani et al.**<sup>(2)</sup> established that vape use jeopardizes pulmonary health.

The rising prevalence of vape use among Saudi adults in Riyadh presents a significant health issue to the region, considering the respiratory damage caused by e-cigarettes.

### Problem Statement:

E-cigarette has received advocacy as a safer option than conventional cigarette and a path to quitting, leading to its prevalence. After interviewing Saudi adults above 18 years, **Alfaraj et al.**<sup>(4)</sup> noticed that many users “believe that e-cigarettes help them quit smoking and are less harmful than traditional cigarettes”. Consequently, vaping has gained popularity, with a 27.7% rate among university students and 12.2% among the adult population in Riyadh<sup>(3)</sup>.

According to **Figueredo et al.**<sup>(5)</sup> despite the reduction of nicotine in e-cigarettes, their burning produces other chemicals, such as aluminium, lead, and copper, leading to the risks of oral cancer and periodontitis. The health risk, rising prevalence, and misinformation demonstrated the urgency for research to educate the masses on healthy living and shift of habits.

**Purpose of the research:** The misconception concerning the relationship between vape use and respiratory diseases is the primary driver for this research. Surveys among young adults disclose their little awareness of the health risks of e-cigarettes. The research aimed to establish the

relationships between vaping and respiratory symptoms to promote awareness of dangers that adults unknowingly face.

### Research questions

1. What are the health consequences of vape use?
2. What is the level of awareness of the health dangers of e-cigarette use among Saudi adults?

### Methodology

**Research design:** The research utilized a cross-sectional study design, where the participants responded to outcomes and exposure, specifically their lifestyle, including smoking habits. In this scientific exploration, the inclusion of numerical values necessitated an in-depth understanding of the relationships between various variables of interest. Critical variables of this research included income level, money spent on vapes, family smoking habits, and reported respiratory symptoms. Similarly, the numerical data necessitated the construction of graphs and charts to depict the relationship between vape use and respiratory symptoms and other social impacts. Moreover, the experimental methodology demonstrated the study's applicability to Riyadh by assessing their challenges and affirming the negative consequences of e-cigarette use. The research intended to break the misconceptions concerning the safety of vaping over cigarette smoking by demonstrating its health impacts. Ideally, this study established the facts regarding the risks through experimental and quantitative approaches.

**Sampling:** For comprehensive coverage, this research used a broad sample of 100 participants comprising males and females aged between 18 and 50. All respondents had a history of using e-cigarettes. Using a random sampling of the population within Riyadh, the collection of unbiased responses was possible due to a lack of control over the categories of participants. They reached the interviews through online surveys to enable quick access and responses.

**Data Collection:** The research relied on online surveys [specifically Google Forms (GF)] to obtain the required data. To ensure that the participants were from Riyadh, the online survey included fascinating quizzes on relatable facts about the city to exclude individuals from other regions whose responses would corrupt the intended reactions. The participants indicated their gender and age, and they commenced the survey. On completion, they received a token of appreciation for responding to the study. The research quickly upheld their anonymity since the participants never included their names or personal details. It also eliminated the need for consent since only

the willing participants accepted the online invitation to participate in the exercise.

**Ethical considerations:** This study adhered to strict ethical guidelines, ensuring informed consent from all participants and maintaining confidentiality of their responses. The research protocol was approved by the appropriate Ethics Committee in Riyadh, Saudi Arabia, and conducted in compliance with the Declaration of Helsinki.

### Statistical Analysis

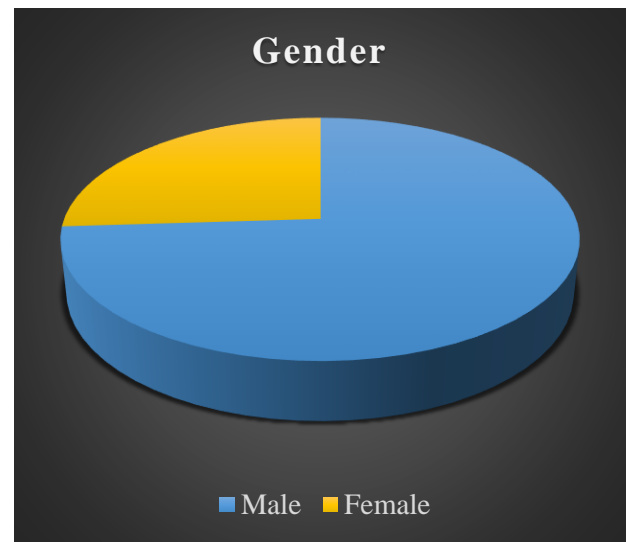
From the analytical records obtained by the online questionnaires, this study used Microsoft Excel to construct tables, graphs, and charts showing various attributes of the participants, providing statistics concerning e-cigarette use in Riyadh, Saudi Arabia. The recorded data included the respondents' gender, age, income level, and family smoking history. To investigate the impacts of vaping, the research collected data on vaping over the last month, among spent on e-cigarettes, other smoking methods, and symptoms of smoking, such as cough, shortness of breath, rapid heart rate, attempt to stop vaping, notable respiratory symptoms, and perceived ability to control it. While, the study design hardly allowed for distinct variables, constructing charts from the tabulated data provided sufficient information concerning the outcomes of vape use to educate the public on the possible dangers.

### RESULTS

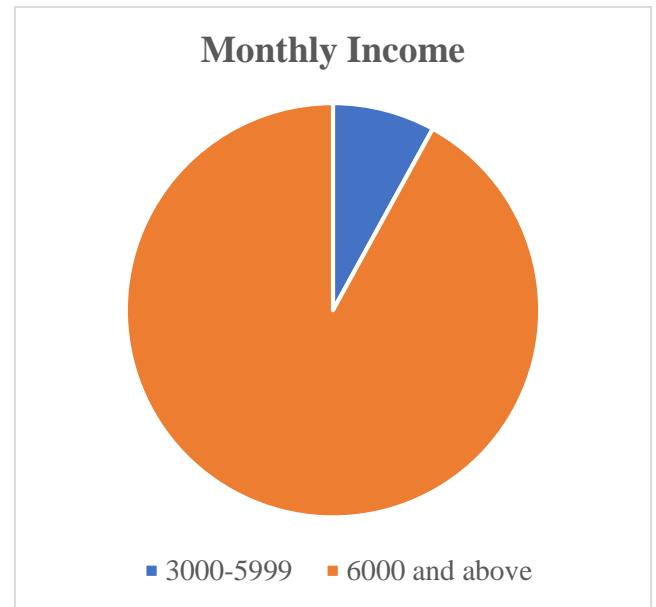
Based on the survey data from online responses, the research realized profound insights on e-cigarette use in Riyadh, Saudi Arabia, depicting its prevalence across various demographic populations and varying impacts on individuals and families. The online data collection facilitated randomization since the study allowed any individual with the invite link to engage in the research after passing the test and stopped after 100 participants responded. Most participants (74) in the survey were males, possibly suggesting a higher prevalence of vaping among males than females (Fig. 1). However, the response rates might not accurately portray the measurements since the answers depended on access to the link, willingness to participate, and passing the test. Demographically, most participants were young adults aged between 18 and 30. Only 14 of the 100 respondents were above 30 years old (Fig. 2). Moreover, most participants (92%) earned more than 6,000 Saudi Riyal, depicting its widespread usage among middle and high-income earners (Fig. 3). Remarkably, the family dynamics influenced many participants' smoking habits, considering 81% of them came from families where at least a member had a smoking habit (Table 1).

**Table (1):** Demographic characteristics of the population

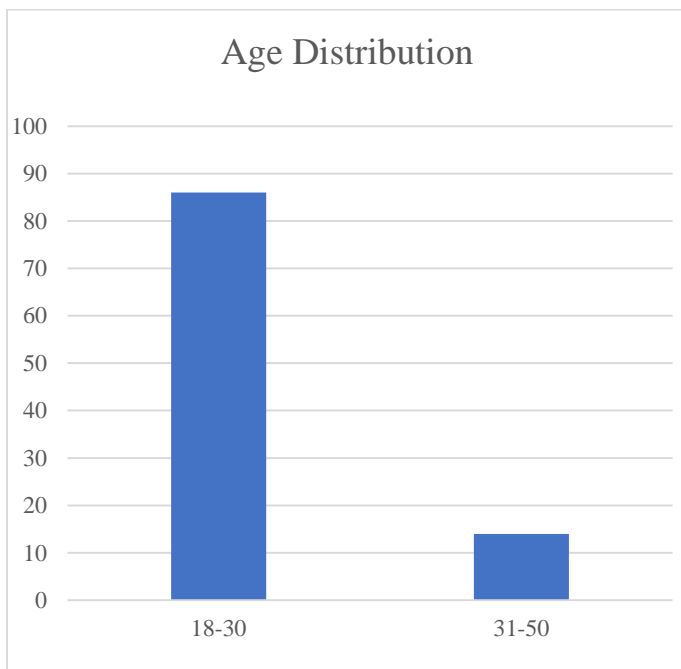
Characteristics	n (count) total sample is 100
<b>Gender</b>	
Male	74
Female	26
<b>Age</b>	
18-30	86
31-50	14
<b>Monthly Income</b>	
3000-5999	8
6000 and above	92
<b>Family smoking history</b>	
Yes	81
No	19
<b>Last month vaping</b>	
Yes	97
No	3



**Figure (2):** Distribution by age.



**Figure (3):** Distribution by monthly income.



**Figure (1):** Distribution by gender.

From the study population, there were exciting and eye-opening facts concerning e-cigarette usage in Saudi Arabia, demonstrated the urgent need to emancipate the public and reduce use. For instance, the research showed that 69% of the respondents spent more than 200 Saudi Riyals in a month on vape, depicting the considerable financial impact of long-term substance use. Additionally, the research disclosed that 83% of the people who used vaping incorporated other smoking methods, showing concurrent vaping and combustion smoking. It also demonstrated a small portion of e-cigarette smokers who either attempt to quit or become long-term users due to curiosity about the flavor.

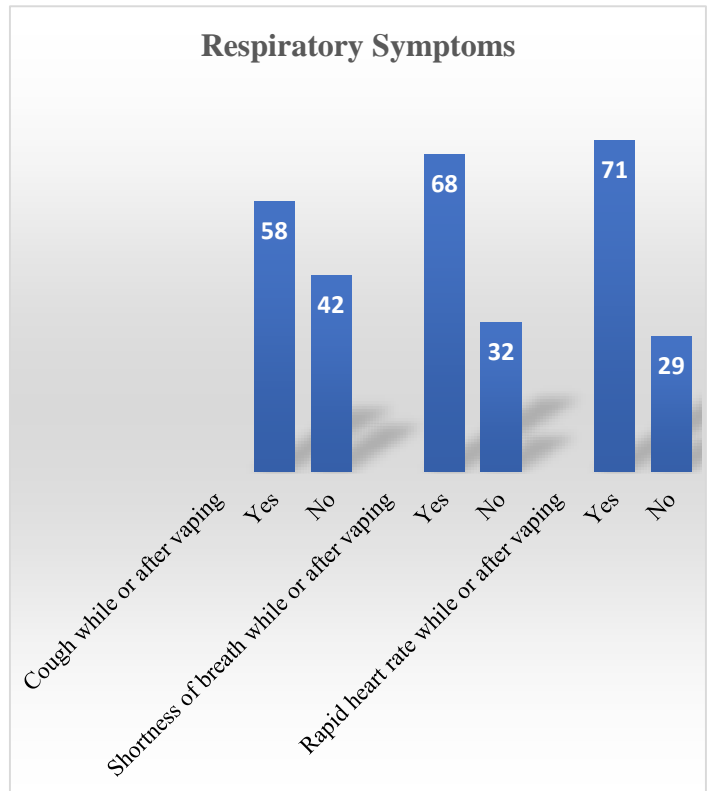
Table (2) below illustrated the economic impact of vaping based on the number of individuals spending more than 200 Saudi Riyals monthly, among other health consequences. To investigate the consequences of e-

**Table (2):** Impacts of e-cigarette use

Characteristics	n (count) total sample is 100
<b>Puffs count</b>	
less than 100	66
more than 100	34
<b>Cash spent on vaping a month</b>	
less than 200 Saudi riyal	31
more than 200 Saudi riyal	69
<b>Other smoking methods</b>	
Yes	83
No	17
<b>Cough while or after vaping</b>	
Yes	58
No	42
<b>Shortness of breath while or after vaping</b>	
Yes	68
No	32
<b>Rapid heart rate while or after vaping</b>	
Yes	71
No	29
<b>Try to stop vaping in the past 30 days.</b>	
Yes	2
No	98
<b>Vaping is associated with respiratory symptoms.</b>	
Yes	17
No	83
<b>Believe that you can stop vaping easily.</b>	
Yes	94
No	6

Assessing of the respiratory symptoms confirmed the relationship between vaping and harmful smoking impacts. For instance, more than half of the respondents (58%) reported coughs during or after vaping. Besides the cough, more significant numbers (68%) experienced shortness of breath, which impaired multiple physiological functions (Fig. 4). Primarily, the brain relies on oxygen, depicting significant health consequences for incidents of breath shortness. The coughs and shortness of

cigarette usage, the research obtained data on the frequency of cough, shortness of breath during or after vaping, rapid heart rate, associated respiratory symptoms, and belief in the ability to quit smoking. breath highlight the devastating health effects of vaping. Moreover, the high heart rate depicts vulnerability to high blood pressure or damage to vital organs. Specifically, 71% of the participants confirmed raised heartbeat rates during and after vaping (Fig. 4). However, based on table (2) most respondents never noticed respiratory infection symptoms, demonstrating their lack of manifestation. Only 17% of people who participated in the study had observable symptoms, encouraging misconceptions about the fewer or no health implications of vaping. Another worrying data involved the small number of individuals who attempted to stop using vape. Of the 100 respondents, 98 never contemplated quitting, implying their comfort with the behaviour and the overall population’s perceptions of the few health concerns. Despite the few people attempting to quit, 94% believe they could stop if they tried. The responses might be false due to their unawareness. Besides, they did not attempt to confirm their ability to break from the behaviour.



**Figure (4):** The respiratory symptoms of e-cigarette use.

**DISCUSSION**

The demographic data demonstrated that most adult e-cigarette users in Riyadh are males below 30 years old. The individuals have been just graduated from the university, confirming the association between peer

influence and vape usage. **Qanash et al.** <sup>(6)</sup> highlighted the influence of the university lifestyle and experiences of young adulthood as a considerable trigger for drug and substance abuse. **Althobaiti and Mahfouz** <sup>(1)</sup> added that “e-cigarette smoking was significantly higher among males with higher educational levels and age group between 18 and 24 years old” <sup>(1)</sup>. The distribution confirmed the prevalence among college students who eventually graduated but uphold unhealthy behaviours. Misinformation is prevalent among the age, as peers effortlessly sway their colleagues into unhealthy behaviours for short-lasting fun. According to **Al-Haman and Hopkins** <sup>(7)</sup>, young adults commence using vapes for fun, experimentation, and entertainment value. Such environments are ideal for misinformation since the company easily sways one’s stand. Peer influence is evident in the responses concerning willingness to stop and the perceived ability to quit. While 94% of the respondents believed that they were capable of ceasing to use drugs, only 2% were willing to try. Overall, fallacies concerning vape use have prevailed among young adults, promoting drug use to middle and late adulthood.

The study also confirmed the association between e-cigarette use and respiratory symptoms, such as cough, shortness of breath, and rapid heart rate. Considering all the issues that impact the respiratory tract, one confirmed the association between vaping and negative health impacts. **Alqahtani et al.** <sup>(2)</sup> mentioned cough as the most common and immediate respiratory symptom of vaping. Depending on the frequency of usage, some smokers can produce phlegm. From their meta-analysis, **Alqahtani et al.** <sup>(2)</sup> indicated that people who used e-cigarettes reported “coughing, phlegm production, breathing difficulties, wheezing, dry mouth, chest discomfort, and irritation in the throat”. **Farsalinos et al.** <sup>(8)</sup> followed laboratory studies and emphasized the significant damage caused to the cells in the respiratory tract, causing irritation of the throat, coughs, and cancers on prolonged exposure. Investigating the health consequences of vape use among Saudi adults depicted a worrying trend of increasing prevalence, misinformation, peer influence, and devastating health consequences. Promoting public address in the universities where the behaviour major commences is a vital approach.

## CONCLUSION

While, most e-cigarette users believe the markets’ information concerning its safety and role in reducing nicotine dependence, the experimental study and content analysis of previous scholarly materials demonstrated worrying respiratory health issues,

including cough and breath shortness. Researchers criticized the aggressive marketing of vapes by manufacturers and media houses, leading to the expansion of the industry at the expense of the affected youth and young adults. Although some studies confirmed the contribution of vaping in reducing drug dependence, not all scenarios lead to smoking cessation. The rising number of new users also refutes the claims of its role in encouraging users to quit. Moreover, the risks of inhaling poisonous metals and purchasing vapes with higher concentrations than conventional tobacco present the urgency to stop vaping. Overall, e-cigarettes could present some benefits over combustible cigarettes, but the respiratory damage persists. Their usage among youths in Riyadh is likely to continue due to the misconceptions and high prevalence among high-income earners and educated individuals. Persuading the population to avoid e-cigarettes is challenging since they consider it a safe alternative to tobacco.

**Funding:** No fund was received for this study.

**Conflict of interest:** None to be declared.

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