

Impact of vaping and water pipe on Total antioxidant and IL-6, TNF- α

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Abstract

To evaluate the effect of vaping and water pipe smoking on total antioxidant, IL-6 and TNF- α in men, the present study has been carried out at college of sciences, Al-Qadisiyah University in cooperation with central lab of Al-Dewaniyah Hospital in Al-Dewaniyah city during the period extended from June-December 2022. One Hundred fifty samples of blood were collected from men were divided in to 3 groups, first group 50 healthy, second group 50 smoking with Argila and third group 50 smoking with Vape. Venous blood (5ml) were collected from all sample for measuring total antioxidants, IL-6 and TNF- α . Results shown clarified the total antioxidants decrease of the smoking groups (Argila and Vape). It has been found that total antioxidants recorder a significant decrease ($p < 0.05$) in smoking groups (Argila and Vape) when compared with Non-Smoking group (13.78 ± 0.13) and (5.64 ± 0.07 ; 3.68 ± 0.18) respectively. And the IL-6 increase of the smoking groups (Argila and Vape). It has been found that IL-6 recorder a significant increase ($p < 0.05$) in smoking groups (Argila and Vape) when compared with Non-Smoking group (43.10 ± 0.17) and (79.96 ± 1.26 ; 87.73 ± 0.91) respectively. Also results shown clarified the TNF- α increase of the smoking groups (Argila and Vape). It has been found that TNF- α recorder a significant increase ($p < 0.05$) in smoking groups (Argila and Vape) when compared with Non-Smoking group (134.7 ± 0.37) and (204.82 ± 1.75 ; 185.24 ± 0.65) respectively.

Introduction

Smoking dates back to 5,000 BC and has been found in many different cultures around the world. Smoking was necessary in the past for religious ceremonies; such as making offerings to the gods, ritual purification, or to enable shamans and priests to change their minds for the purposes of divination and spiritual enlightenment. With the European exploration and conquest of the Americas, tobacco smoking spread rapidly throughout the world. In regions such as India and sub-Saharan Africa, tobacco smoking has merged with the smoking processes common in these countries, of which cannabis is the most common. In Europe, smoking introduced a new social activity and a previously unknown form of drug use (Jha *et al.*, 2002).

Smoking is one of the most common addictions of modern times. It has been implicated as an etiological agent for various chronic diseases including variety of infections, cancers, heart diseases, and chronic lung diseases which put together are the leading causes of morbidity and mortality in today's society (Liu *et al.*, 2008).

Smoking leads to many diseases and health crises, such as heart attack, stroke, respiratory diseases, and cancer (lung cancer in particular), in addition to other health problems, and thus premature death. In addition, the symptoms that result from infection with a disease resulting from smoking lead to an increase in nervous and psychological stress and thus negatively affect the quality of life from an early age (WHO, 2005).

The jar at the bottom of the hookah is filled with water sufficient to submerge a few inches of the body tube, which is sealed tightly to it (Shane, 2011). Deeper water will only increase the inhalation force needed to use it (Rudolph and Matthee, 2005). In February 2020, the Centers for Disease Control and Prevention (CDC) confirmed 2,807 cases of e-cigarette or vaping use-associated lung injury (EVALI) and 68 deaths attributed to that condition (Orellana-Barrios *et al.*, 2015). Cigarette smoke has been shown to affect a wide range of host defence mechanisms (Shapiro, 2004), findings between studies can be controversial and

sometimes contradictory, probably because of differences in smoking history, genetic susceptibility and socioeconomic status (such as exercise, nutrition, occupation and ambient air quality, which can modify disease).

This study was conducted for the purpose of verifying the effect of smoking (hookah and electronic cigarettes) on some of the criteria chosen in the current study.

Material and methods

Collection of blood samples

Blood samples collection by gel tube, Blood serum samples were separated (by centrifugation at 3000 rpm for 5 minutes) and kept at -20 °C until assessment of total antioxidant, IL-6 and TNF-α concentrations.

Results

Total Antioxidants

Results showed in figure (1) the total antioxidant (μmol/ml) of the study groups at the end of the study. It has been found that smoking (WP, Vape) recorded significant differences decreased (p<0.05) when compared with control group (13.78±0.13) and (5.64±0.07; 3.68±0.18) respectively.

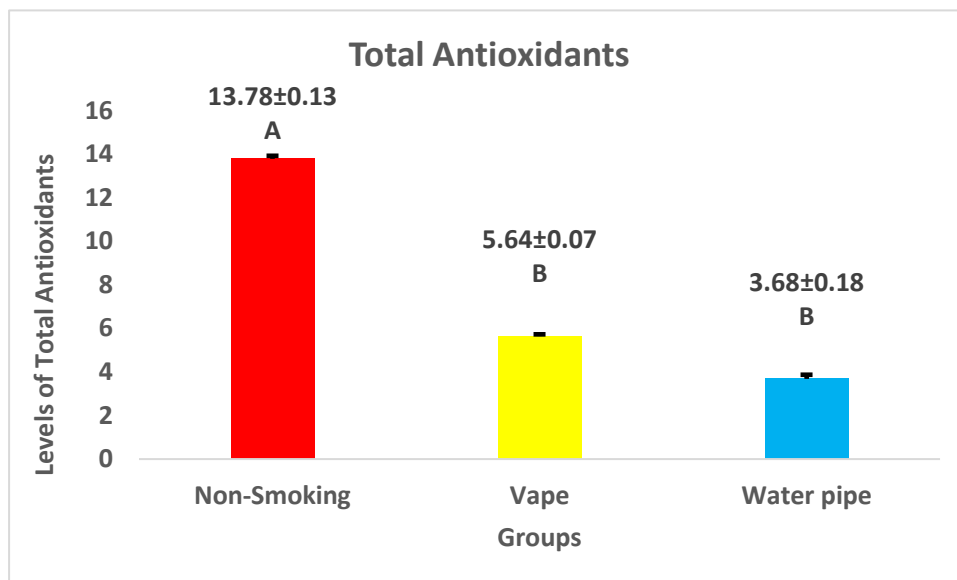


Figure (1): Total Antioxidants between non-Smoking and smoking groups (Argila and Vape).

The results represented as mean ± SE.

Different capital letters denotes a significant differences (P<0.05) between periods.

Similar capital letters denotes non-significant differences (P<0.05) between periods.

IL-6 Concentration

Results showed in figure (2) the IL-6 of the study groups at the end of the study. It has been found that smoking (WP, Vape) recorded significant differences increased (p<0.05) when compared with control group (43.10±0.17) and (79.96±1.26; 87.73±0.91) respectively.

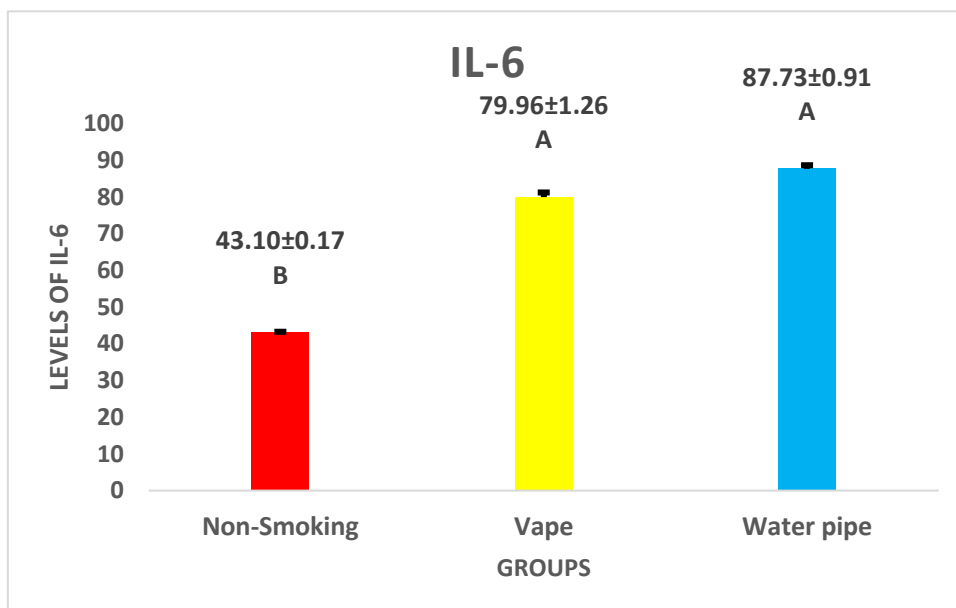


Figure (2): IL-6 Concentration between non-Smoking and smoking groups (Argila and Vape).

The results represented as mean ± SE.

Different capital letters denotes a significant differences (P<0.05) between periods.

Similar capital letters denotes non-significant differences (P<0.05) between periods.

TNF-α Concentration

Results showed in figure (3) the TNF-α of the study groups at the end of the study. It has been found that smoking (WP, Vape) recorded significant differences increased (p<0.05) when compared with control group (134.7±0.37) and (204.82±1.75; 185.24±0.65) respectively.

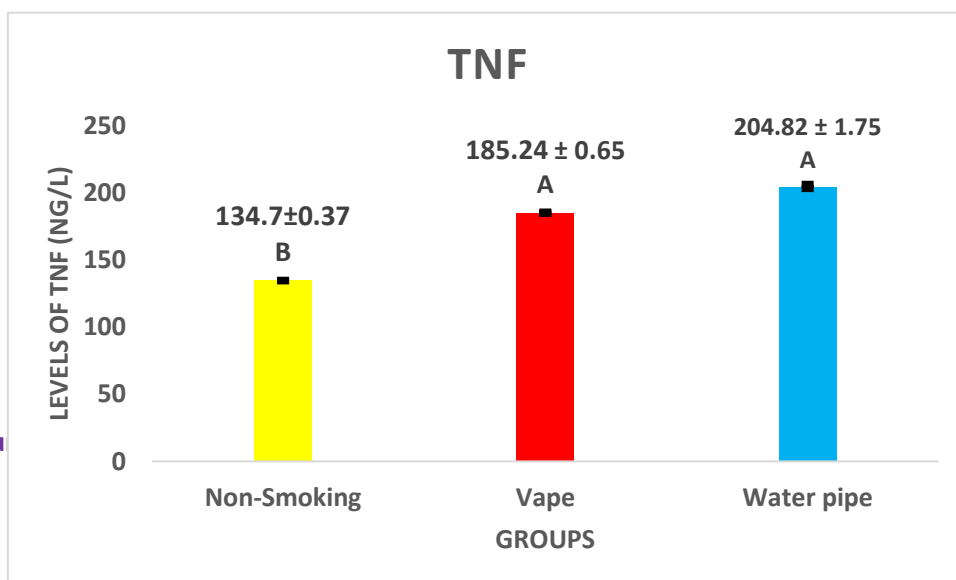


Figure (3): TNF- α Concentration between non-Smoking and smoking groups (Argila and Vape).

The results represented as mean \pm SE.

Different capital letters denotes a significant differences ($P < 0.05$) between periods.

Similar capital letters denotes non-significant differences ($P < 0.05$) between periods.

Discussion

Recent studies have examined the effect of e-cigarettes and WPS on antioxidant levels and IL-6, and TNF- α . The decrease in the total antioxidant in smoking groups (WP, Vape), registered in the present study may be as a results of significant lower vitamin C blood concentrations. This difference may be related to various factors, such as decreased vitamin C intake, inadequate vitamin C absorption, or increased vitamin C turnover. Recent studies have examined the effect of e-cigarettes and WPS on antioxidant levels. Individuals who smoked WPs showed a much lower overall antioxidant capacity than those who did not. These data suggest that WP smokers experience oxidative stress and a reduced oxidant defence mechanism (Caliriet *al.*, 2021). The results of the present study are consistent with previous studies reported decreased antioxidant enzymes in smokers (WP, Vape) (Churget *al.*, 2002). Caliri et al. (2021), suggested that even a single session of smoking a WP increase oxidative damage. Recent clinical and experimental studies have found that smoking from a WP is more harmful than cigarettes and can induce oxidative stress and inflammation. Smoking from a water pipe induces oxidative stress and inflammation, which are linked to cancer and other diseases (Badran & Laher, 2020). Ganapathy et al., (2017), stated that e-cigarette suppressed their cellular antioxidant defenses and led to significant DNA damage. One study (Vaart et al., 2004), has investigated the effects of smoking on markers of oxidative stress showing increased superoxide release from leucocytes and an increased trolox equivalent antioxidant capacity (TEAC). Paudel *et al.* (2022) shown that smoking (WP) increase the level of inflammatory cytokines TNF- α and IL-6 and macrophage chemoattractant protein. Several studies appear to support the association between E-cigarette and inflammatory cytokines IL-6 in large air way epithelial cells (Qasimet *al.*, 2019). Moreover E-cigarette exposure has been shown to increase air way mucin production in murine studies and clinical investigation (Qasimet *al.*, 2019). IL-6 and TNF-alpha are associated with liver cell injury, and nicotine increases their production. According to Paudel *et al.* (2022), IL-6 mediates disease-causing pathways in asthma and Chronic obstructive pulmonary disease (COPD). The results above revealed that WP and e-cigarettes influenced the levels of interleukin-6 (IL-6) throughout the study. When exposed to e-cigarette, pulmonary epithelium produced more reactive oxygen species and secreted more pro-inflammatory IL-6 (Qasim *et al.*, 2019). Our results showed high serum level of TNF- α in smokers group (WP, Vape) when compared with control. The high levels of TNF- α in the serum of smokers suggest an imbalance between the pro-inflammatory and anti-inflammatory factor (Jain *et al.*, 2021). Various studies suggest that TNF- α and its receptors could be useful biomarkers with a potential prognostic value in several diseases associated with local and systemic inflammation (Ayi, 2020). This observation might suggest that smoke-induced activation of inflammation usually requires a significant amount of exposure (Diabet *al.*, 2015). Our finding supported by the observation of Awan *et al.*, (2017), who reported an increased level of TNF- α in the gingival cervical fluid of smoker patients compared with non-smoker patients with periodontal disease. Here, we observe that higher TNF- and in WP and e-cigarette smokers are suggestive of the local inflammation generated by resident macrophages, which plays a significant role in liver insulin resistance due to the consumption of WP and e-cigarette (Diab *et al.*, 2015). The aerosol produced by electronic cigarettes

altered several inflammatory mediators. TNF, a pro-inflammatory cytokine, can activate multiple types of inflammation-causing cells (Jain et al., 2021).

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