**Alqalam Journal of Medical and Applied Sciences**. 2025;8(2):780-786
https://doi.org/10.54361/ajmas.258233

*Original article*

# Evaluation of the Health and Environmental Impacts of Smoking on Individuals and Society in Sebha City

**Fatima Al-Imam[1]*, Mona Alasagir[2], Tarek Belkasm[1]**

[1]*Department of Biotechnology, Faculty of Science, Wadi Al-Shatti University, Brak, Libya*
[2]*Department of Biology, Faculty of Education, Wadi Al-Shatti University, Brak, Libya*
***Corresponding email***. fa.alemam@wau.edu.ly

**Abstract**
Smoking is one of the most important environmental pollutants that negatively impacts the health of smokers and non-smokers and the environment. This study aimed to evaluate the impact of smoking (cigarettes and hookah) on health and the environment in the city of Sabha. Blood samples were taken from 100 men (90 smokers and 10 non-smokers) aged 17-60 at the central reference laboratory in Sabha. The study included questionnaires and blood tests using a CBC machine. The results showed that the most commonly used type of cigarette was Marlboro, and the least was Retmen. The highest rate of cigarette smoking was recorded in the 28-38 age group, at 45.6%, and the highest rate of hookah smoking was recorded in the 17-27 age group at 44.4%. The analysis showed no significant differences in white blood cell and platelet counts between smokers and nonsmokers. All cigarette smokers suffered from health problems, such as poor physical fitness (60-67.5%), and oral health problems (70% of hookah smokers). The study also indicated that smoking negatively impacted nonsmokers, leading to increased blood pressure. It was found that smoking residues constitute 38% of the solid waste in the city of Sabha. The results indicated that the waste resulting from smoking: cigarette butts, are disposed of in the main landfill by incomplete burning, which leaves a long-term negative environmental impact on the soil, microorganisms, and groundwater in the future, especially since the plastic fibers in cigarette butts gradually decompose under the influence of environmental factors.
**Keywords**: Smoking, Cigarettes, Health Problems, Environment.

## Introduction

Smoking is one of the most significant environmental pollutants contributing to chronic diseases and premature mortality worldwide. Its toxic components exert physiological effects on various bodily systems. The World Health Organization (WHO, 2023) has confirmed that smoking is responsible for over 8 million deaths annually, including approximately 1.2 million deaths attributed to secondhand smoke exposure [1]. The most commonly used forms of smoking—cigarettes and hookah—differ in their chemical composition and their impact on health, society, and the environment. Tobacco smoke contains around 4,000 toxic substances, including 43 known carcinogens. Common cigarette brands include Carilla, Marlboro, Rotmann, URS, Royal, and Americana [2]. Recent studies indicate that smoking induces significant hematological changes, such as leukocytosis (elevated white blood cell count) and thrombocytopenia (reduced platelet count) in smokers compared to non-smokers [3]. Cigarette smoke contains numerous harmful chemicals, including nicotine, carbon monoxide, nitrogen oxides, tar, dyes, sugars, and polonium-210, which contribute to increased white blood cell counts [4,5].

Hookah smoking has become increasingly prevalent among youth populations. Due to its high concentrations of carbon monoxide and carcinogenic compounds, it poses severe long-term health risks [6]. Smoking also adversely affects oral health, causing gum recession, tooth decay, and discoloration. Furthermore, scientific evidence confirms that smoking damages the eyes, potentially leading to vision impairment or blindness due to retinal vasoconstriction [7].

A study by Mohy El-Din et al. (2025) on the effects of cigarette smoking on blood coagulation tests and platelet counts among patients at Sebha Medical Hospital and Tsaweh Rural Hospital found a correlation between smoking duration and white blood cell counts, noting that chronic smokers exhibited lower WBC counts than non-smokers [8]. Conversely, Al-Wahishi (2021) reported significant increases in total WBC and lymphocyte counts among smokers in Al-Jumail city, though no statistically significant differences were observed in mean WBC and platelet counts between smokers and non-smokers [9]. This study aims to identify the most prevalent smoking methods across different age groups. It also aimed to assess the health effects of smoking by comparing WBC and platelet counts among cigarette smokers, hookah smokers, and non-smokers, and examine the association between smoking and its adverse effects on non-smokers.

## Methods

### *Study Population*

A randomized sample of 100 male participants (90 smokers and 10 non-smokers) aged 17–60 years was recruited from visitors to the Sebha Medical Reference Laboratory. Blood samples (4–10 per day) were collected over a specified period.


***Received***: *02-03-2025* - ***Accepted***: *25-04-2025* - ***Published***: *03-05-2025*

***Sample Collection and Analysis***

A 3 mL sample of venous blood was drawn from fasting participants and stored in EDTA-coated tubes to prevent coagulation. A Mindray CB-2800* automated hematology analyzer was used at Sebha Central Medical Laboratory to measure white Blood Cells (WBC) and platelets.

***Statistical Analysis***

Data were analyzed using SPSS software. Group comparisons (smokers vs. non-smokers) were performed using an independent t-test ($p \leq 0.05$) for WBC and platelet counts. ANOVA was used to compare mean WBC and platelet counts across subgroups.

## Results and discussion

The results revealed the percentage distribution of smokers across the studied age groups (Figure 1). The highest smoking prevalence was observed in the 28–38 age group (45.6%), while the lowest was in the 50–60 age group (5.6%). This decline can be attributed to the heightened susceptibility of older individuals to thrombosis, cardiovascular diseases, hypertension, and vascular occlusion due to prolonged nicotine and tar exposure. Consequently, healthcare professionals strongly advise individuals in this age group to abstain from smoking. These findings align with Nasser et al., who conducted a statistical study on age-specific smoking trends in Egypt (2003), reporting the highest smoking rate (46.7%) among individuals aged 28–40.

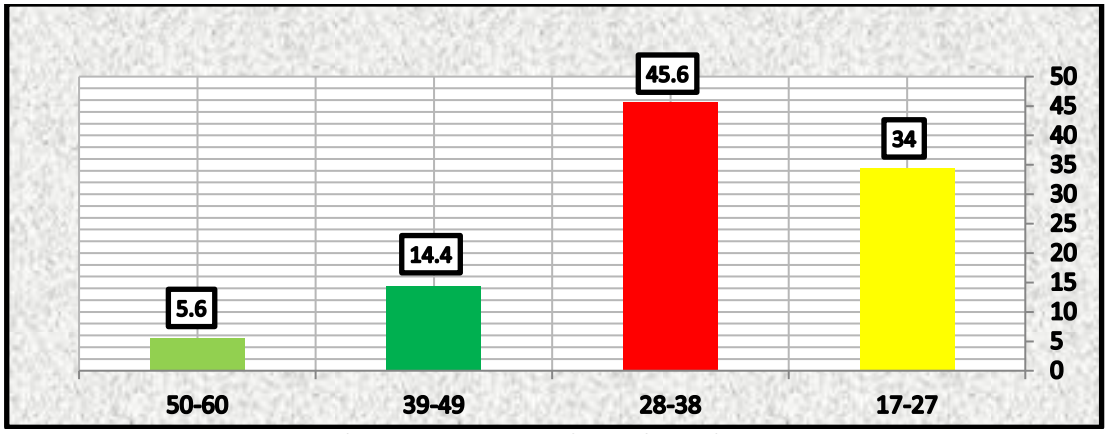


***Figure 1. The percentage of smokers by age group***

Regarding smoking preferences (Figure 2), Marlboro cigarettes were the most commonly used (18.9%) due to their favorable taste, whereas Rotmann cigarettes were the least preferred (7.8%) owing to their unpleasant flavor. This variation in consumption can be attributed to differences in environmental growing conditions (e.g., climate, soil quality), tobacco cultivation practices (e.g., exposure to specific agrochemicals), and the plant-specific biochemical composition, leading to quantitative variations in chemical constituents within the same plant species.

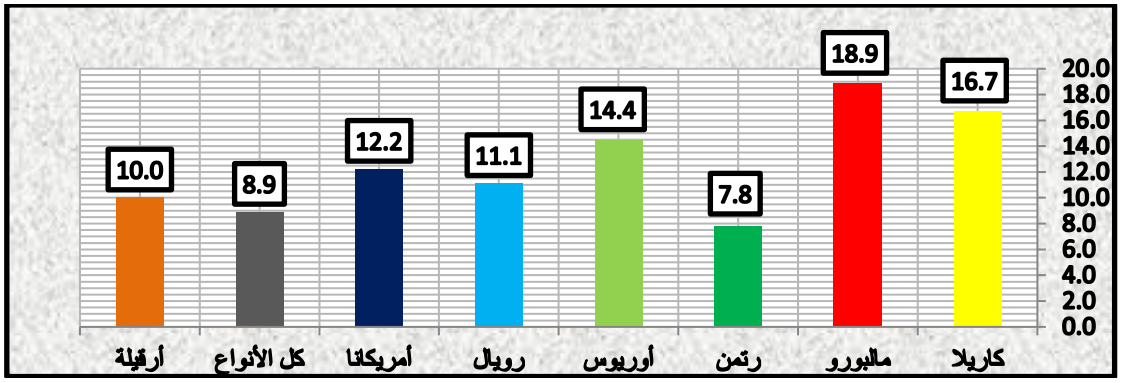


***Figure 2. The percentage of smoking types used by smokers.***

The study recorded mean white blood cell (WBC) counts among smokers based on tobacco type (Figure 3). The highest WBC levels were observed in Rotmann cigarette smokers, while the lowest were found in hookah smokers.


***Received***: *02-03-2025* - ***Accepted***: *25-04-2025* - ***Published***: *03-05-2025*

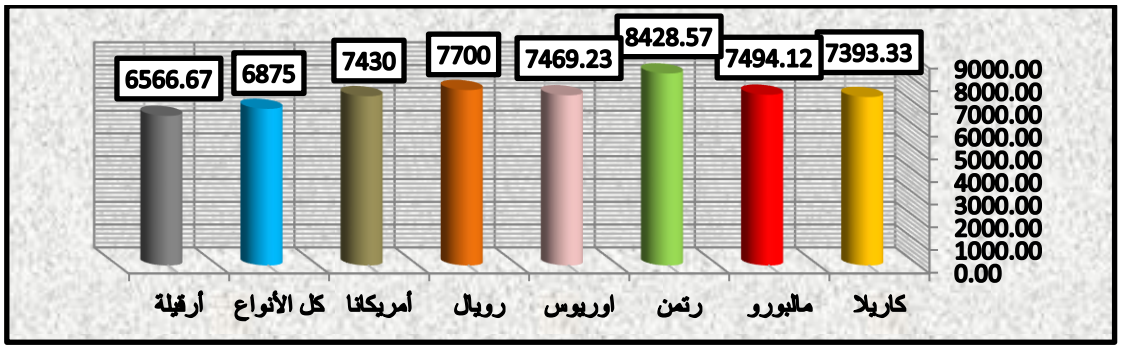


***Figure 3. The average WBC (white blood cell) counts in blood are based on the types of smoking used***

Similarly, mean platelet counts varied significantly across smoking groups (Figure 4). The highest platelet counts were detected in hookah smokers, whereas the lowest were observed in Royal cigarette smokers.

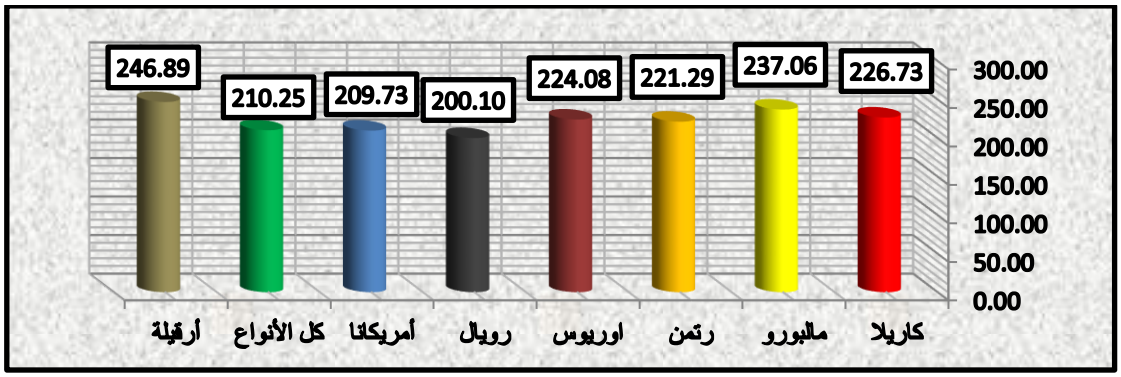


***Figure 4. The average platelet count in blood is based on the types of smoking used.***

The study findings (Figure 5) indicate that 90% of smokers prefer cigarettes due to their compact size, lightweight nature, and widespread availability of various brands. In contrast, only 10% opt for hookah smoking, primarily limited by its bulkier size, which restricts daily usage frequency.

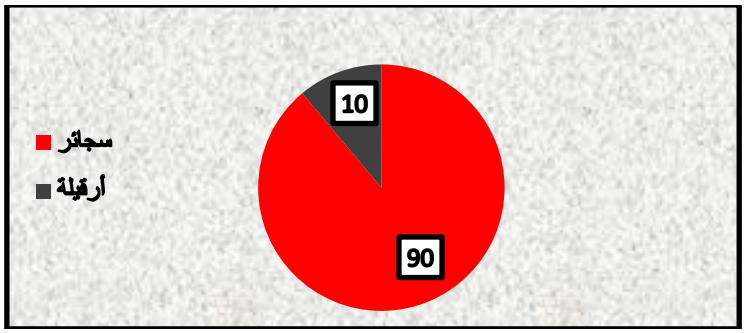


***Figure 5. The percentage distribution of smokers and the percentage of cigarette and hookah smokers across different age groups.***

In terms of age-specific smoking patterns, the study showed that the highest prevalence (45.6%) was observed in the 28–38 age group (Figure 6). A notable decline (14.8%) occurred in the 39–49 age group, attributed to increased health awareness, manifestation of smoking-related complications (e.g., cardiovascular diseases, physical debilitation), and the long-term addiction consequences.

Peak usage for hookah smokers (44.4%) was recorded among 17–27-year-olds, likely due to adolescent hormonal fluctuations and social experimentation during developmental stages. The 39–49 age group showed an 11.1% reduction rate, consistent with health-conscious behavioral changes. The observed 11.1% hookah smoking rate in this study contrasts with earlier findings of comparable smoking rates across most age groups [11]. Moreover, a significantly higher prevalence (27.3%) was observed specifically in the 40–49 age cohort. This discrepancy may reflect temporal shifts in smoking trends, regional variations in tobacco use patterns, and differences in sample demographics between studies.


***Received****: 02-03-2025 -* ***Accepted****: 25-04-2025 -* ***Published****: 03-05-2025*

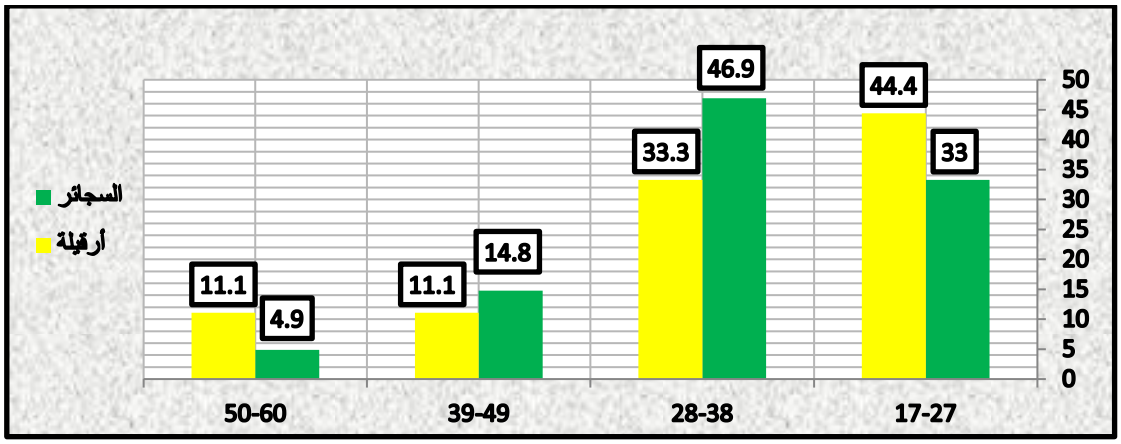


***Figure 6. The percentage of cigarette and hookah smokers across different age groups.***

The study results recorded higher average WBC counts (Figure 7) in the blood of cigarette smokers compared to hookah smokers (7507.8 ± 6566.7, respectively). The study confirmed no significant differences between them. This aligns with Al-Wahishi's 2021 study, which indicated that smoking is a contributing factor to many diseases and inflammations [9]. The study also agreed with De Heens et al. (2009), who confirmed that cigarette smoking affects blood properties and causes an increase in WBC count [12]. This is evidence of an immune system disorder that leads to contamination of essential blood components, stimulating an increase in WBCs [13].

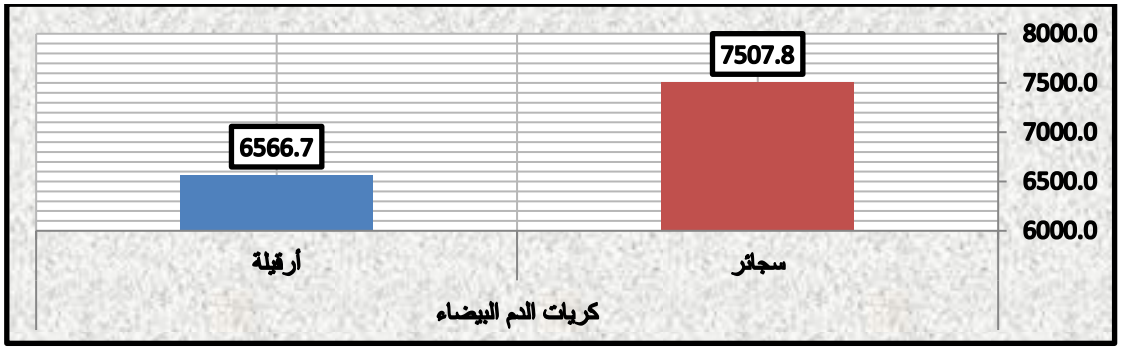


***Figure 7. The averages of WBC count for cigarette and hookah smokers.***

Figure 8 shows higher average platelet counts in the blood of hookah smokers compared to cigarette smokers (246.9 ± 220.9, respectively), exceeding the normal range. This is attributed to the type of moist tobacco used in hookah, which contains a large amount of nicotine (8-4% of the hookah tobacco's weight), compared to the small amount of nicotine in cigarette smoke (3-1% of its weight). Meanwhile, during hookah smoking, a signal is produced that causes platelets to adhere to each other, aiding in the secretion of substances that promote aggregation and sedimentation.

However, the study found no significant differences in the blood of smokers between platelets and white blood cells. This is because white blood cells are part of the body's immune system, and due to the high tobacco intake, they balance with the elevated platelet levels in smokers' blood, leading to clotting, sedimentation, and vascular blockages. The study agreed with a previous study [14], which clarified that nicotine increases platelets' ability to adhere, clot, and aggregate while also raising lymphocyte counts in the blood.

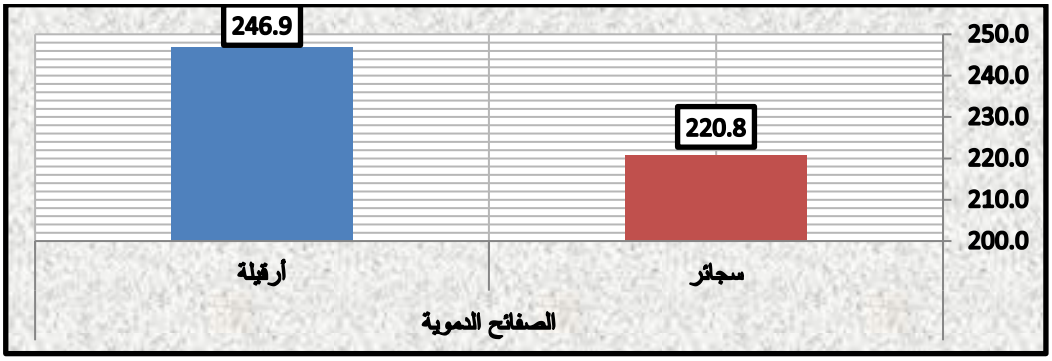


***Figure 8. The average platelet counts for cigarette and hookah smokers.***


***Received****: 02-03-2025 -* ***Accepted****: 25-04-2025 -* ***Published****: 03-05-2025*

The study showed similar rates among cigarette and hookah smokers who suffer from poor physical condition, as nicotine suppresses appetite by reducing stomach contractions, leading to a decreased feeling of hunger. It also dulls the sense of taste on the tongue, reducing the enjoyment of food (Figure 9).

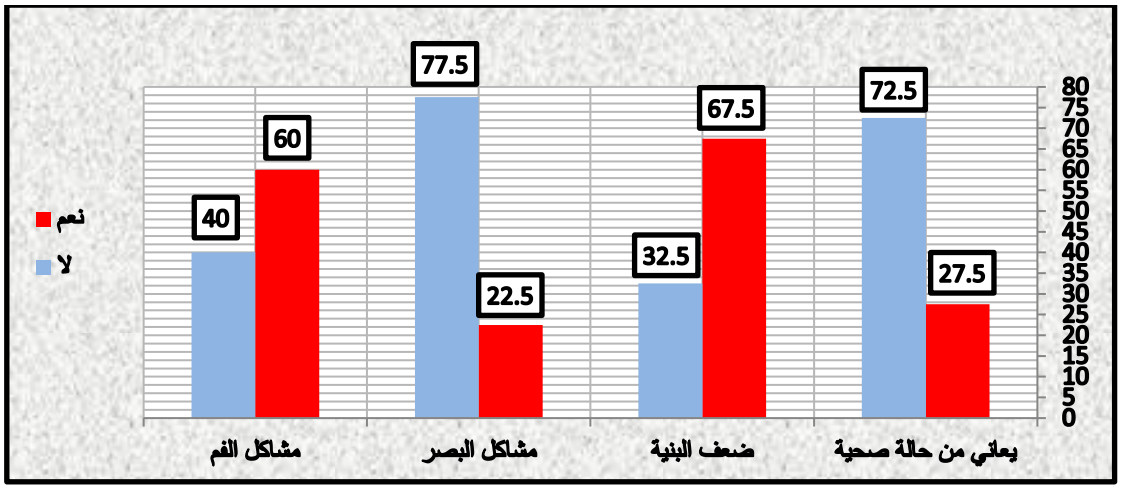


***Figure 9. Health problems among cigarette smokers***

The percentage of individuals suffering from vision problems was similar among both cigarette and hookah smokers. This aligns with Samir's 2009 findings, which determined that smoking affects the eyes either directly through contact with external eye parts or indirectly by allowing toxic smoking substances to reach blood vessels. This causes allergic conjunctivitis and retinal diseases, which are two to three times more common in smokers.

The study recorded that 70% of hookah smokers and 60% of cigarette smokers suffer from oral health issues. This is due to the type of tobacco used in hookah, which is mixed with flavored, aromatic, chemical, and artificial additives that contribute to bad breath and promote bacterial growth in the mouth. Smoking also significantly affects the efficiency of taste buds and gums, with worsened effects due to poor hygiene and lack of dental care. Additionally, hookah smoking causes tartar buildup beneath the teeth, allowing tobacco to seep in, damaging tooth tissues, and causing undesirable discoloration. Given the health risks associated with smoking, this study was conducted to examine the impact of smoking on health.

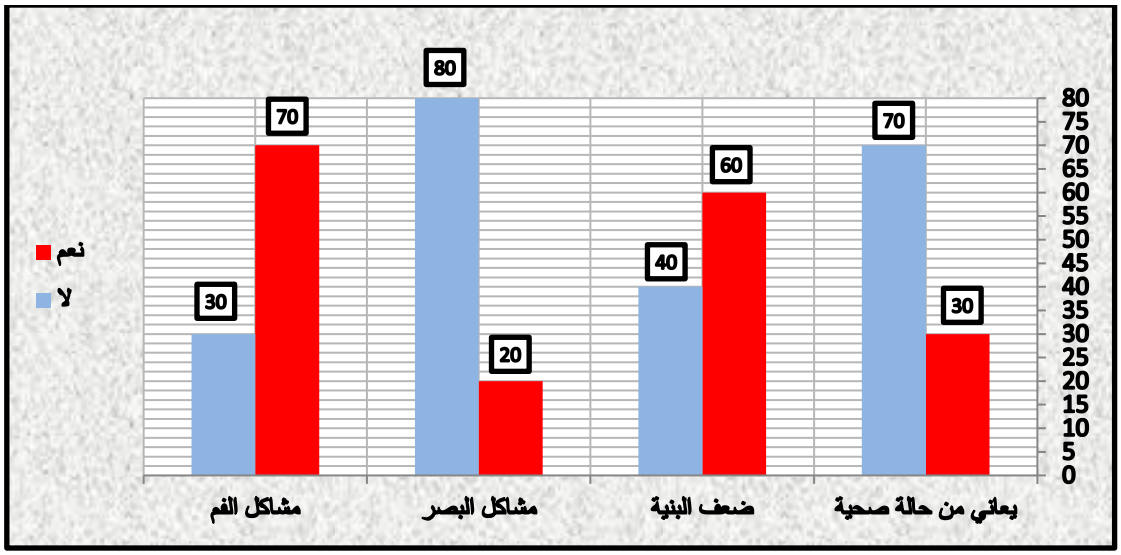


***Figure 10. Health problems among hookah smokers***

The study confirmed the adverse effects of smoking on non-smokers in the community, recording higher average white blood cell (WBC) and platelet counts in their blood compared to smokers. The results showed increased WBC counts in non-smokers (Figure 11), attributed to secondhand smoke exposure. Non-smokers are more severely affected than active smokers because smokers inhale only about 15% of the cigarette contents (nicotine and CO), while the remaining 85% is released into the air, exposing non-smokers to greater harm. This aligns with Al-Arusi's 1993 findings, which indicated that the faster a person smokes, the more nicotine enters their body—only about one-third of the cigarette's nicotine content, while the remaining two-thirds linger in the room's air, passively inhaled by both the smoker and those around them.


***Received***: *02-03-2025* - ***Accepted***: *25-04-2025* - ***Published***: *03-05-2025*

Thus, non-smokers are exposed to more nicotine-related harm than smokers themselves. The study also agreed with a previous study, which found elevated platelet counts in non-smokers due to direct exposure to secondhand smoke [15].

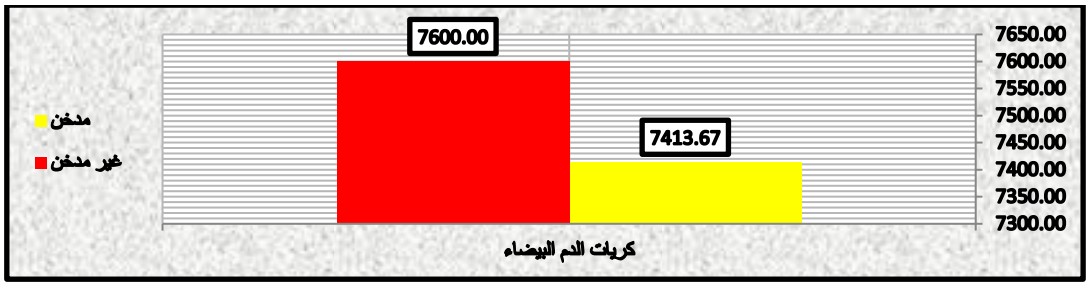


***Figure 11. Average White Blood Cell in Smokers vs. Non-Smokers***

Additionally, the study found no significant differences in WBC and platelet counts between smokers and non-smokers exposed to secondhand smoke. This is due to the high levels of nicotine, tar, carbon monoxide, nitrogen oxides, polonium, and other harmful substances in smokers' blood, which cause health complications. For non-smokers, the lack of significant differences is attributed to their exposure to secondhand smoke.

Cigarette butts are often discarded on streets, in cafes, farms, and household waste, which is then transported by public sanitation companies to Sebha's main landfill and disposed of through incomplete burning. This leaves harmful residues in the soil and negatively impacts microorganisms in the landfill. The study's findings align with Vanapalli et al., which confirmed that one-third of all collected litter consists of cigarette butts [16]. Since cigarette filters are made of non-biodegradable plastic fibers, they do not decompose naturally. Instead, they break down gradually depending on environmental conditions (rain, sunlight, etc.). Recent estimates suggest that a cigarette butt decomposes only about 38% after two years.

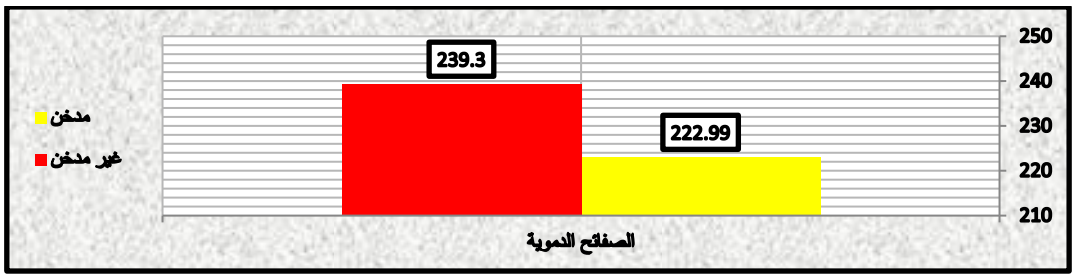


***Figure 12. Average Platelet Counts in Smokers vs. Non-Smokers***

## Conclusion

This study highlights the significant adverse effects of smoking, both cigarettes and hookah, on public health and the environment in Sabha. The findings reveal that smoking is prevalent across different age groups, with notable health consequences such as reduced physical fitness and oral health issues among smokers, as well as secondary effects like elevated blood pressure in non-smokers. Additionally, smoking-related waste contributes substantially to environmental pollution, with improper disposal methods posing long-term risks to soil quality, microbial life, and groundwater safety. Given these findings, it is crucial to implement stricter public health policies, enhance awareness campaigns on the dangers of smoking, and promote sustainable waste management practices to mitigate their environmental impact. Further research is recommended to explore additional health parameters and long-term ecological consequences, reinforcing the need for comprehensive anti-smoking initiatives in Sabha and beyond.

***Conflict of interest.*** Nil

## References

1. World Health Organization (WHO). Tobacco [Internet]. 2023 [cited 2024 Jun 20]. Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco
2. Momenabadi V, Kaveh MH, Hashemi SY, Borhaninejad VR. Factors Affecting Hookah Smoking Trend in the Society: A Review Article. Addict Health. 2016 Apr;8(2):123-35. PubMed PMID: 27882210; PubMed Central PMCID: PMC5115646.
3. Akbar F, Alam M, Smith J. Impact of smoking on hematological parameters: a comparative study. J Clin Med. 2022;11(3):245-58.
4. Office on Smoking and Health, Centers for Disease Control and Prevention (US). Chemistry and Toxicology of Cigarette Smoke and Biomarkers of Exposure and Harm. In: *How Tobacco Smoke Causes Disease: The Biology*


***Received****: 02-03-2025 -* ***Accepted****: 25-04-2025 -* ***Published****: 03-05-2025*

*and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General*. Atlanta (GA): Centers for Disease Control and Prevention (US); 2010.
5. United States. Public Health Service. Office of the Surgeon General. *How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the Surgeon General*. Rockville (MD): US Department of Health and Human Services; 2010.
6. Kumar R, Patel A, Singh P. Hookah smoking and its health consequences: a systematic review. Int J Public Health. 2023;68(4):789-803.
7. Al-Shdefat MM. *Addiction (tobacco, alcohol, drugs)*. 1st ed. Amman: Al-Tareeq Foundation for Publishing and Distribution; 2005.
8. Mohy El-Din AM, Arhouma T, Hashem T, Hamza FA. The Impact of Cigarette Smoking on Blood Clotting Tests and Platelet Count Among Patients at Sebha Medical Hospital and Tisawah Rural Hospital. J Beni Walid Univ Appl Hum Sci. 2025;10(1):222-30.
9. Al-Wahishi RMAM. The Effect of Cigarette Smoking on White Blood Cells and Platelet Count Among Smokers in Al-Jumail City. Al-Qirtas J Appl Hum Sci. 2021;14.
10. Nasser AMA, Geng Y, Al-Wesabi SA. The Prevalence of Smoking (Cigarette and Waterpipe) among University Students in Some Arab Countries: A Systematic Review. Asian Pac J Cancer Prev. 2020 Mar 1;21(3):583-91. doi: 10.31557/APJCP.2020.21.3.583. PubMed PMID: 32212782; PubMed Central PMCID: PMC7437327.
11. Castañeda G, Barnett TE, Soule EK, Young ME. Hookah smoking behavior initiation in the context of Millennials. Public Health. 2016 Aug;137:124-30. doi: 10.1016/j.puhe.2016.02.013. PubMed PMID: 27003670; PubMed Central PMCID: PMC4983476.
12. De Heens GL, Kikkert R, Aarden LA, van der Velden U, Loos BG. Effects of smoking on the ex vivo cytokine production in periodontitis. J Periodontal Res. 2009;44:28-34.
13. Alotiby A. Immunology of Stress: A Review Article. J Clin Med. 2024 Oct 25;13(21):6394. doi: 10.3390/jcm13216394. PubMed PMID: 39518533; PubMed Central PMCID: PMC11546738.
14. Pujani M, Chauhan V, Singh K, Rastogi S, Agarwal C, Gera K. The effect and correlation of smoking with platelet indices, neutrophil lymphocyte ratio and platelet lymphocyte ratio. Hematol Transfus Cell Ther. 2021 Nov 29;43:424-9.
15. Sivagangailakshmi V, Rajkumar DJ. Effects of cigarette smoking on coagulation profile among smokers. Int J Res Med Sci. 2017;4(8):116-20.
16. Vanapalli KR, Sharma HB, Anand S, Ranjan VP, Singh H, Dubey BK, Mohanty B. Cigarettes butt littering: The story of the world's most littered item from the perspective of pollution, remedial actions, and policy measures. J Hazard Mater. 2023 Jul 5;453:131387.

**الملخص**

يعتبر التدخين من أكثر الملوثات البيئة التي تؤثر سلبيا على صحة المدخنين وغير المدخنين وعلى البيئية. تهدف هذه الدراسة الى تقييم تأثير التدخين: السجائر والارقيلة على الصحة والبيئة بمدينة سبها ، لقد أجريت على عينات دم 100 رجل (90مدخنا و10 غير مدخنين) تراوحت أعمارهم 17-60 سنة في المختبر المرجعي الطبي سبها. شملت الدراسة تعبئة استبيانات وتحاليل دم باستخدام جهاز CBC. أظهرت النتائج ان أكثر أنواع السجائر استخدما هو المالبورو وأقلها هو الرتمين .بينما سجلت أعلى نسبة تدخين للسجائر، بينما سجلت أعلى نسبة تدخين للسجائر في الفئة العمرية 28-38 سنة بنسبة 45.6%، وللإرقيلة في الفئة 17-27 سنة بنسبة 44.4% .بينت التحليل عدم وجود فروقا معنوية في أعداد كريات الدم البيضاء والصفائح الدموية بين المدخنين وغير المدخنين .ان جميع مدخنون السجائر يعانون من مشاكل صحية مثل ضعف البنية الجسمية بنسبة 67.5- 60% ومشاكل الفم بنسبة 70% بين مدخني الإرقيلة. كما أشارت الدراسة إلى أن التدخين يؤثر سلبي على الأفراد غير المدخنين بارتفاع مؤشرات الدم لديهم. تبين ان مخلفات التدخين تشكل 38% من النفايات الصلبة بمدينة سبها أوضحت النتائج أن النفايات الناتجة عن التدخين: بقايا السجائر، يتم التخلص منها في مكب النفايات الرئيسي بحرق غير تام، مما يترك اثره بيئي السلبي طويل المدى على التربة والكائنات الدقيقة والمياه جوفية مستقبلا، خصوصا أن ألياف السجائر البلاستيكية في بقايا السجائر تتحلل تدرجيا تحت تأثير العوامل البيئية.


***Received****: 02-03-2025 -* ***Accepted****: 25-04-2025 -* ***Published****: 03-05-2025*