

THE EFFECT OF SMOKING ON PACKED CELL VOLUME (PCV)

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ABSTRACT

Smoking is considered one of the most important factors that harm human health, Cigarette smoking causes significant health problems including an increase in the number and severity of respiratory illnesses, decreased physical fitness and potential effects on lung growth and function. 196 samples were studied on a group of smokers and non-smokers who were within the age group of (16-75) years. Out of 192, there were 96 Smokers and 96 non-smokers. $p \geq 0.05$ The p values indicate a very significant difference in both smokers and non-smokers, and our results showed p values for both PCV and Hb < 0.003 , indicating a very significant difference compared to non-smokers. This study aimed to determine the effect of smoking and its effects on the volume of packed cells (PCV) and hemoglobin Hb.

KEYWORDS: Packed Cell Volume (PCV)

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INTRODUCTION

Smoking is very dangerous to human health, Smoking has become widespread among all segments of society, including males, females, teenagers, adults and the elderly, Smoking can cause diseases of the heart, arteries, and respiratory system. In addition, it can lead to the risk of stroke, cancer and this can lead to death. [1,2,3].

The packed cell volume (PCV) is the measure of the ratio of the volume occupied by the red cells to the volume of whole blood in a sample of capillary, venous, or arterial blood, the packed cell volume is higher in the smoking people than in non-smokers, Chronic hypoxaemia, from whatever, cause tends to cause a rise in the packed cell volume invoke hypoxaemia, resulting from lung disease induced by smoking, to explain the high values found in smokers[4].

Smoking is one of the most common causes of increased hemoglobin concentration in the blood, Carbonmonoxide binds to hemoglobin to form carboxyhemoglobin, an inactive form of hemoglobin having no oxygen carrying capacity and smokers having a higher hemoglobin level than non-smokers [5,6,7]. Hemoglobin is a protein molecule present in the red blood cells that carries oxygen from the lungs to the body's tissues and returns carbon dioxide from the body tissues to the lungs. The normal Hemoglobin level for males is 13.5 - 17.5 -grams per deciliter and for females is 12.0 - 15.5[8], The mean haemoglobin (Hb) concentration in men and women is higher in the smokers than in the non-smokers [9]. The mean haemoglobin levels and the carboxyhaemoglobin levels increase progressively with the number of cigarettes which are consumed per day[10]. Hemoglobin values in female smokers are much higher than non-smokers, while hemoglobin values in male smokers are slightly higher than non-smokers [11]. Hemoglobin level is associated with increased cardiovascular mortality and chronic kidney disease (CKD) in patients with diabetes mellitus [12].

The increase of consumption of cigarette lead to a make influence on the hemoglobin and PCV concentration and There is appositve relationship between hemoglobin and PCV this may reflect the normal correlation between them since both parameters indirectly represent the Hb concentration in blood especially that all Hb in blood is contained with erythrocytes, and In Individuals who smoke frequently and continuously Hb levels increase and produces a progressive of hypoxia which result from CO bind with Hb which lead to functional anemia and this causes the impaired oxygenation of tissues and hemoglobin parameters [13,14,15].

MATERIALS AND METHODS

The study was conducted on 192 healthy male and female volunteers, smokers and non-smokers.

Number of smokers (96), and non-smokers (96)

Collect blood by pricking the thumb with a scalpel, The capillaries are about three-quarters filled with blood .He took a drop of blood from one end of the test tube, closed the empty end of the test tube with Vatrex [16], then used a centrifuge at 13,000 rpm for 5 minutes to separate red blood cells and plasma [17]. The 12 samples are placed in numbered slots inside the small centrifuge, and the packed cell volume is calculated using a hammer. The samples are collected under sterile conditions and analyzed in the laboratory. We extract the hemoglobin value from the packed cell volume according to this equation: $HB = \frac{pcv-2}{3}$.

Pcv% HB g/L

Male 42-50 Male 13-17

Female 37-45 Female 12-14

RESULTS AND DISCUSSION

A total 192 samples were collected from a group of smokers and non-smokers in Babylon province. The study was conducted on ages between 16-75 years, They were all in good health and did not suffer from diseases.

Table 1 shows that the lowest age group under the study was 16 years, while the largest age group was 75 years for smokers and non-smokers.

Table 1: Descriptive Statistic of Age

N	Valid	192
	Missing	0
Minimum		16.00
Maximum		75.00

Cigarette smoking is a known risk factor for cardiovascular disease (CVD) [18], Cigarette smoking is associated with development and progression of numerous chronic diseases worldwide [19].Cigarette smoking is one of the 10 leading health indicators that reflect the major health concerns in the USA , During the last 20 years the amount of tar and Nicotine content delivered by cigarette made by United States has decreased more than 50% [20]. 1.3 billion people are regular smokers worldwide and every day between 8,200 and 9,900 young people start to smoke[21].

In Figure 1 the result shows the number of samples of smokers was equal to the number of samples of non-smokers, males and females, as the number of samples of male smokers was 48samples, while the number of samples of female smokers was 48 samples, while the number of samples of non-smokers was 48samples of males and 48 samples of females.

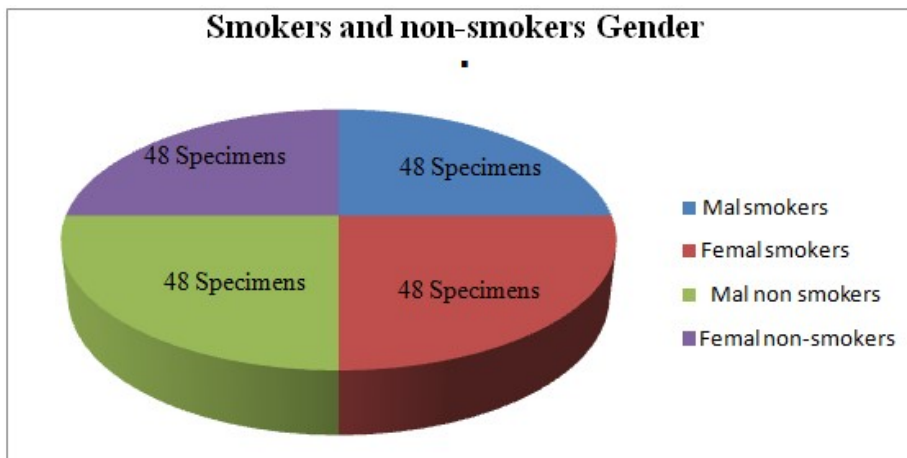


Figure 1: Distribution of Smokers Gender.

Smoking is a major cause of coronary heart disease for both men and women and a positive correlation between tobacco use and cerebrovascular disease has been also described. In addition, cigarette smoking is the most powerful risk factor predisposing to atherosclerotic peripheral artery disease [22]. After the rapid spread of tobacco smoking before the 1950s in the United States and Northern European countries among males, the prevalence of cigarette smoking among females started to rise as well. In the 1970s, smoking prevalence among males and females began to decrease, with a stronger decline in males [23].

A 2016 study of a group of male and female smokers combined indicates that when trying to quit smoking, women have more difficulty continuing over the long term [24].

Table 2 shows that the Distribution of PCV and Hb values for smokers and non-smokers with age ,Our results showed that the highest PCV and Hb values were found in the age group between 26-35 years, with a value of 56% for the PCV test and 18.0 g/dl for the Hb test. Our results indicate that this age group had values higher than the normal values specified by the World Health Organization.

Table 2: Distribution of PCV and Hb Values for Smokers and Non-Smokers with Age

Age	16-25	26-35	36-45	46-55	56-65	66-75
* ¹ PCV Maximum value	51%	56%	55%	50%	51%	47%
* ¹ PCV Minimum value	24%	30%	40%	39%	39%	41%
* ² Hb Maximum value	16.3 g/dl	18.0 g/dl	17.7 g/dl	16.0 g/dl	16.3 g/dl	15.0 g/dl
* ² Hb Minimum value	7.3 g/dl	9.3 g/dl	12.7 g/dl	12.3 g/dl	12.3 g/dl	13.0 g/dl
* ¹ Male Normal Value: 42-50 % , Female Normal Value 37-45%						
* ² Male Normal Value: 13-17 g/l Female Normal Value 12-14 g/l						

The results of our study are consistent with the study was conducted in 1971 and 2017 [25, 26] where a positive relationship was found between cigarette consumption and packed cell volume (PCV) in both genders. In women, we also found a statistically significant relationship between 4cigarette consumption and hemoglobin concentration. In male cigarette smokers, PCV and Hb values are higher than normal .Table (3) represents the evaluation of blood markers, specifically packed cell volume (PVC) and Hemoglobin (Hb), in a study groups. The packed cell volume (PCV) is a measurement of the proportion of blood that is made up of cells. Hemoglobin (Hb) is the protein contained in red blood cells that is responsible for delivery of oxygen to the tissues. To ensure adequate tissue oxygenation, a sufficient hemoglobin level must be maintained. The amount of hemoglobin in whole blood is expressed in grams per deciliter (g/dl).

Table3: Evaluation of Markers in Study Population

Population	N	Concentration of PCV %		Concentration of Hb g/dl	
		Mean	Std. Deviation	Mean	Std. Deviation
Smokers	96	44.9716	3.3963	14.2638	1.1321
Non-Smokers	96	37.2083	5.1909	11.7361	1.7303
Total	192	41.01	5.7958	13.0145	1.9698
P value (p≤0.05)		.003*		.003*	
*Highly Significant Difference Under (p≤0.05) by One-Way ANOVA					

The group of smokers had a mean PCV concentration of 44.9716 with a standard deviation of 3.3963. They also had a mean Hb concentration of 14.2638 with a standard deviation of 1.1321. The p-values for both PCV and Hb are < 0.003 (indicated by .003*), indicating a highly significant difference compared to the non-smokers. While the group of non-smokers had a mean PCV concentration of 37.2083 with a standard deviation of 5.1909. Their mean Hb concentration was 11.7361 with a standard deviation of 1.7303. The p-values for both PCV and Hb are < 0.003, again indicating a highly significant difference compared to the smoker.

The results of our study are consistent with the results of our study are consistent with The study was conducted in 2017[26], which found that cigarette consumption affects the packed cell values (PCV) in both sexes, as well as the hemoglobin values, and leads to an increase. In women, we also found a statistically significant relationship between consumption of 4 cigarettes and hemoglobin concentration. In male cigarette smokers, PCV and Hb values are higher than normal.

In summary, the table suggests that both PVC and Hb concentrations are significantly different between the smokers and non smokers ($p \leq 0.05$). The p-values indicate a highly significant difference in both smokers and non smokers markers in blood parameter in these two conditions.

CONCLUSION

The study found that the PCV and hemoglobin concentration were significantly higher in smokers compared to non-smokers. The increase in PCV in smokers may be due to chronic hypoxia resulting from lung disease induced by smoking. Smoking is considered a significant factor that harms human health, causing respiratory illnesses, decreased physical fitness, and potential effects on lung growth and function. The study suggests that smoking can lead to diseases of the heart, arteries, and respiratory system, as well as an increased risk of stroke and cancer. Further research with a larger population is needed to generalize these findings.

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