Effect of Pack-Year of Cigarette Smoking on Erythrocyte Parameters and Glucose Level Among Healthy Males

Sağlıklı Erkeklerde Sigara İçiminin Eritrosit Parametreleri ve Glukoz Düzeyine olan Etkisi

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ABSTRACT

Objective: To evaluate the effect of cigarette smoking and pack-year of cigarette smoking on red blood cell counts and its related parameters, also glucose concentration.

Methods: Sixty consenting subjects of which 30 controls (non-smokers) and 30 cases (smokers) were studied. Smokers were divided into two groups based on pack-year of cigarettes smoked. The red blood cell parameters and glucose level were analyzed in smoker and non-smoker. Independent T-test was used to comparison of a smoker and also one way ANOVA was used to comparison pack-year of smoking groups.

Results: The present study showed no changes significantly in red blood cell parameter and glucose level between in smoker. The current result appeared alteration of red blood cells counts (RBC), hemoglobin level (HGB), hematocrit percent (HCT) and mean corpuscular hemoglobin concentration level (MCHC), while no difference of mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), red cell distribution width (RDW) and glucose level in duration of smoking.

Conclusions: This study revealed that cigarette smoking statistically no effect on RBC counts and its related parameters and glucose level among healthy. However, the duration of smoking statistically had the effect on RBC, HGB, HCT and MCHC while had no effect on MCV, MCH, RDW and glucose level.

Key Words: Cigarette smoking, pack-year of cigarette smoking, erythrocyte parameters, glucose level

ÖZET

Amaç: Sigara kullanımı ve paket/yıl değerlerinin kırmızı kan hücresi sayılarına ve buna bağlı parametrelere, ayrıca glukoz konsantrasyonuna olan etkisini değerlendirmektir.

Yöntem: Otuz kontrol (sigara içmeyen) ve 30 (sigara içen) olmak üzere toplam 60 hasta dahil edildi. Sigara içenler, paket/yıl değerine göre iki gruba ayrıldı. Kırmızı kan hücresi parametreleri ve glukoz düzeyi sigara içen ve sigara içmeyen kişilerde analiz edildi. Sigara içenlerin karşılaştırılmasında bağımsız T-testi, sigara içme gruplarının karşılaştırılması için tek yönlü ANOVA kullanıldı.

Bulgular: Bu çalışmada sigara içenler arasında kırmızı kan hücresi parametreleri ve glukoz düzeyleri açısından anlamlı bir değişiklik görülmedi. Elde edilen sonuçlar sigara kullanım süresine bağlı olarak; kırmızı küre sayısı (RBC), hemoglobin düzeyi (HGB), hematocrit yüzdesi (HCT) ve ortalama eritrosit hemoglobin konsantrasyonu (MCHC) açısından farklılık gösterirken; ortalama eritrosit birim hacimi (MCV), ortalama eritrosit hemoglobin miktarı (MCH) ve kırmızı küre dağılım genişliği (RDW) ve glukoz düzey, açısından farklılık saptanmamıştır.

Sonuç: Bu çalışma, sigara kullanımının sağlıklı kişiler üzerinde RBC sayıları ve buna bağlı parametreler ile glukoz seviyesi üzerine istatistiksel olarak etkisi olmadığını ortaya koymuştur. Bununla birlikte, sigara içme süresinin istatistiksel olarak RBC, HGB, HCT ve MCHC üzerinde etkili olduğu halde MCV, MCH, RDW ve glukoz düzeyini etkilemediği saptanmıştır.

Anahtar Sözcükler: Sigara kullanımı, paket/yıl sigara içimi, eritrosit parameterleri, glukoz düzeyi

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INTRODUCTION

Cigarette Smoking is the most important medical problem in the world. The deaths of smoking are more than else illness such as an acquired immune deficiency syndrome (AIDS) and an intestinal sickness (1). World health Organization (WHO) gauges those deaths of smoking will add up to 8.3 million in 2030 and one billion deaths during the 21st century (2). More than 4000 Chemicals substances were found in Cigarette tobacco (3).Various hurtful and Different vaporous items are presented in Tobacco Cigarette (4). Cigarette Smoking has an effect on organ systems mainly respiratory systems and cardiovascular systems (5). The study demonstrated the smokers have a higher risk for many diseases such as cardiovascular diseases, hypertension, inflammation, stroke, clotting disorder, and respiratory disease. (6-12). Cigarette Smoking quickens pathogenesis in different types of cancers in some organ such as lung, pancreas, breast, liver and kidney (7-8, 13). Also, Cigarette Smoking increases Acidic degree in a stomach that leaded peptic ulcers and gastric diseases (8-9, 14).

Last ten years, a reviewer was recommended that Cigarette Smoking influence the Parameters of the cell in blood. Some reviews discovered a relationship between the Cigarette Smoking and erythrocytes count (15). Also, A few researchers recommended the Cigarette Smoking has an effect on hemoglobin. While some of reviewer noted the Cigarette Smoking has no effect on hemoglobin. Besides, a long winded length of tobacco may alter unfavorable impacts on blood qualities of a person.

However, the studies evaluated the effect of Cigarette Smoking on Red Blood Cell Parameters (16, 17, 18, 19) and Glucose levels (20-25) but they are not incontrovertible. In another hand, data on smoker characteristics, such as Pack-Year of Cigarette Smoking, a number of Cigarettes Smoking, intensity smoking and their relationship with Red Blood Cells Parameters and the Glucose level is scanty. Also, the studies on these biomarkers in University are few. Therefore, this study aims evaluation effect of cigarette smoking and Pack-Year of cigarette smoking on the Red Blood Cell Parameters and Glucose level among males in Raprin University – Iraq.

METHODOLOGY

The study was conducted in the 2nd half of the year 2016 in Raprin University in Iraq. The study purpose 30 Cigarette Smokers as the case study and 30 non-smokers as control group were taken according to the following inclusion and exclusion criteria.

Inclusion Criteria: Control group are males, age range from 18-24 years and apparently healthy individuals. Smokers were smoking ten Cigarettes per day at least, males, and age range from 18-24 years otherwise apparently healthy individuals.

Exclusion Criteria: the subject of both groups has any disease like diabetes, hypertension, metabolic disorders or genetic disease. Also, the subjects drink alcohol, passive smokers, ex

Smokers underwent recent hospitalization, surgery, and radiotherapy. Subjects of control study have a history of Cigarette smoking. Since smoking is extremely rare among women in this area due to cultural reasons, women were not included

The method of data collection: Predesigned and pretested questioner was used to obtain biosocial information of participants like age, smoking dose, smoking duration and other diseases related to it.

The Pack-Year: - The Pack-Year is a unit for measuring the amount a person has smoked over a long period of time and was calculated by using the following formula: Pack-Year = (number of Cigarettes smoked per day × number of years smoked)/20 (26).

The smokers were divided into two group according pack-years
First group: - Smokers (smoking1-5 Pack-Year)
Second group: - Smokers (smoking 6-10 Pack-Year)

Estimation of Sample: Under sterile conditions, 3 ml of blood were drowned from Vein by using 5 ml disposable syringe for one time of each member of both groups put first 2.5 ml of blood immediately at test tube contain K2EDTA as an anticoagulant. To estimation Red Blood Cells Counts and its related parameter, all samples were checked for clots and hemolysis and mixed well before analysis. These samples were then subjected to apparatus analysis; 50µl from each sample was sucked by apparatus needle to analyzed immediately (not more than one hour) by Swelab-Alfa automated hematology analyzer. Immediately the result of each sample was obtained, results were kept until they were statistically analyzed. The estimation of Glucose level was by putting one drop on strip of Glucose meters (ACCU-CHEK)

Ethical consideration: The study protocol was approved by the Ethical Committees of College of Nursing, University of Raparin, Iraq. Before collecting the sample, written informed consent was taken from the participants and ideal blood collection procedure was order to safe them.

Data analysis: All results are expressed as mean ± Std. Error (Standard Error).Statistical analysis was done by using independent T-test for comparing between smoker and non-smoker, also one way of analysis of variance (ANOVA) was used for comparing Pack-Year groups of the smoker with the non-smoker. A significant value was taken $P < 0.05$ and $P < 0.01$ for all results. All statistical analyses were performed statistical Package for Social Science (SPSS) V20.

RESULT

The current study of Red Blood Cells Counts (RBC) Hemoglobin Concentration (Hb), hematocrit (HCT), Red Cell Distribution Width (R.D.W) and Glucose were not significant higher in Smoker while Mean Corpuscular Volume (M.C.V), Mean Corpuscular Hemoglobin (M.C.H.),Mean Corpuscular Hemoglobin Concentration (M.C.H.C) were reduced non-significantly in Cigarette Smoking. (Table1).

Table 1. Demonstrated comparative RBC parameter and Glucose level between smoker and non-smoker.

Parameter	unit	type	N	Mean	Std. Error	F	Sig.
Red Blood cells counts (RBC)	10^{12}/1	Control	30	5.1907	0.07388	0.040	0.842
		Case	30	5.6637	0.06634		
Hemoglobin (Hb)	(g/dl)	Control	30	14.5800	0.24609	0.212	0.647
		Case	30	15.5600	0.22553		
Hematocrit (HCT)	(%)	Control	30	45.8967	0.75844	0.504	0.481
		Case	30	49.8533	0.64088		
Mean Corpuscular Volume (M.C.V)	(fl)	Control	30	88.3600	0.77233	1.210	0.276
		Case	30	88.1167	1.03207		
Mean Corpuscular Hemoglobin (M.C.H.)	(pg)	Control	30	28.1233	0.29524	1.429	0.237
		Case	30	27.5333	0.39871		
Mean Corpuscular Hemoglobin Concentration (M.C.H.C)	(g/dl)	Control	30	31.8133	0.11624	0.515	0.476
		Case	30	31.2133	0.15401		
Red Cell Distribution Width (R.D.W)	(%)	Control	30	12.9900	0.16674	0.023	0.880
		Case	30	13.1000	0.11919		
Glucose levels	(mg/dl)	Control	30	95.1667	2.51254	2.510	0.119
		Case	30	97.0667	3.59308		

Std. Error: standard Error, * $P < 0.05$, **$P < 0.01$.

The result was revealed that RBC, HGB, HCT were elevation as increase Pack-Year in smoker while MCHC were reduced as an increase of Pack-Year smokers. The study shows that MCV and MCH were reduced with higher of Pack-Year smokers but non-significant while RDW and Glucose level were an increase as increase Pack-Year in the smoker but it is insignificant (Table 2).

Table 2. Comparison of Erythrocyte Parameters during pack years of cigarette smokers with non-smokers

Parameter	unit	Case	N	Mean	Std. Error	F	Sig.
Red Blood cells count (RBC)	$10^{12}/1$	Control	30	5.1907	0.07388		
		Case (pack years1–5)	15	5.6487	0.10102	11.182	0.000**
		Case (pack years 6–10)	15	5.6787	0.08940		
Hemoglobin (Hb)	(g/dl)	Control	30	14.5800	0.24609		
		Case (pack years1–5)	15	15.5133	0.40022	4.257	0.019*
		Case (pack years 6–10)	15	15.6067	0.22413		
Hematocrit (HCT)	(%)	Control	30	45.8967	0.75844		
		Case (pack years1–5)	15	49.5733	1.13227	7.902	0.001**
		Case (pack years 6–10)	15	50.1333	0.63902		
Mean Corpuscular Volume (M.C.V)	(fl)	Control	30	88.3600	0.77233		
		Case (pack years1–5)	15	87.8067	1.66200	.074	0.928
		Case (pack years 6–10)	15	88.4267	1.27941		
Mean Corpuscular Hemoglobin (M.C.H.)	(pg)	Control	30	28.1233	0.29524		
		Case (pack years1–5)	15	27.4800	0.64196	0.707	0.498
		Case (pack years 6–10)	15	27.5867	0.49607		
Mean Corpuscular Hemoglobin Concentration (M.C.H.C)	(g/dl)	Control	30	31.8133	0.11624		
		Case (pack years1–5)	15	31.2533	0.22905	4.801	0.012*
		Case (pack years 6–10)	15	31.1733	0.21347		
Red Cell Distribution Width (R.D.W)	(%)	Control	30	12.9900	0.16674		
		Case (pack years1–5)	15	13.0600	0.09943	.179	0.836
		Case (pack years 6–10)	15	13.1400	0.22078		
Glucose level	(mg/dl)	Control	30	95.1667	2.51254		
		Case (pack years1–5)	15	90.5333	3.26871	2.463	0.094
		Case (pack years 6–10)	15	103.6000	6.05829		

Std. Error: standard Error, * $P < 0.05$, **$P < 0.01$.

DISCUSSION

The Cigarette Smoking has been associated with achieve numerous significant diseases in subjects. It is critical to do, for instance, this review to give information and to highlight the effect of Cigarette Smoking on Red Blood Cells Parameters and Glucose level.

There are reviews evaluations of a change of Red Blood Cells Parameters in smokers (16, 17, 18, 19) and also the Glucose levels (20,21,22,23,24,25).However, the literature reporting the effects of Pack-Year of Cigarettes Smoking on Red Blood Cells Parameters and also Glucose levels is limited.

The propose of this study in adult male subjects to show the effect of smoking Cigarette and Pack-Year smoked a Cigarette on Red Blood Cells Parameters and also Glucose level to understand the changes in Red Blood Cells Parameters and also Glucose level in the smoker and pack-year smoking.

There were no statistical difference RBC levels between smokers and non-smoker while significant higher RBC counts as an elevation of Pack-Year in a smoker. However, some researcher reported higher RBC count like Nadia with colleagues and Asif with colleagues (18,19). The higher RBC counts as an elevation of Pack-Year in a smoker may be because of carbon monoxide in tobacco join with Hb in Red Blood Cells and lead to carboxyhemoglobin, the carboxyhemoglobin impacts on oxygen level in tissue, which catalyzes the bone marrow to produce more Red Blood Cells (27).

The study revealed an insignificant change of Hemoglobin (Hb) and Hematocrit (HCT) levels in a smoker than a non-smoker. On another hand, the Hemoglobin (Hb) and Hematocrit (HCT) were high significantly as an increase of Pack-Year smoker. The past research discovered significant expanding of HCT and Hb level in a smoker than a non-smoker (16,17) may be, different types of Cigarettes. However, analysts reported higher of HCT and Hb level among smokers may be compensatory for oxygen (27).

Researchers proposed the smokers, higher Hb and PCV level may add to polycythemia state (28). This result did not appear statistically any change in Mean Corpuscular Volume (M.C.V), Mean Corpuscular Hemoglobin (M.C.H.) and Mean Corpuscular Hemoglobin Concentration (M.C.H.C) in smoker while statistically increase of MCHC as increasing Pack-Year smoker. The outcomes are concurrence with results of another review (29). The low estimation of MCHC in smokers indicating hypochromic anemia and might be due to the paucity of folic acid or vitamin B12 or thyroid problems (30-31). the finding of this study clarified RDW values was no change insignificant in the smoker, and also in pack-year smoking levels. The result of RDW level is very similar to Asif et al (2013) (19).The present review found slight expanding Glucose level in the smoker and expanding in higher Pack-Year but both outcomes were not significant. The present result is concurrence with results of other reviews (20-21). Another study found Glucose level for smokers was significantly lower than that of the non-smokers (22). In another hand, other studies revealed an increase in serum Glucose concentration (23, 24, 25). The effect of Cigarette Smoking on blood Glucose remained contradictory. Scientist proposed smoking freely has an association with raised danger of Diabetes type II (32). The researchers discovered that nicotine has been exhibited to expand plasma levels of norepinephrine and epinephrine. This expansion in catecholamines which has a connection with a height of hepatic glycolysis and gluconeogenesis and lessened pancreatic insulin emission in people causes higher plasma Glucose in the smoker (15). The Glucose levels in smoking Maybe alteration due to the style nutrition change.

Conflict of interest

No conflict of interest was declared by the authors.

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