

CIGARETTE SMOKING AND HYPERTENSION: ANY CAUSAL RELATIONSHIP ⁺

التدخين وارتفاع ضغط الدم: أي علاقة سببية

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Abstract:

The blood vessel is one of the organs that are adversely influenced by smoking. The aim of this work is to study the relationship between cigarette smoking (dose and duration) with the hypertension. Two hundred subjects were included in this study, classified into control group (100 subjects healthy normotensive males), their age range was between 20-50 years (age mean was 35.72 ± 8.97 years) and patients group (100 male hypertensive patients) of similar age range, their age mean was 43.64 ± 63 years, Each individual included in this study was asked about cigarette smoking habit, number of cigarettes per day, and number of years they smoke. Manual auscultator measurement of systolic and diastolic arterial blood pressure was carried out for all subjects. The study shows a significant increase of systolic blood pressure in hypertensive patients smoking more than 10 year duration, while diastolic blood pressure significantly increases before 5 year duration of smoking and became highly significant above 10 years. On other hand, the systolic and diastolic blood pressure show a significant increase in those smoke less than 20 cigarettes per day, and highly significant in people smoke more than 20 cigarettes per day at $P < 0.001$.

In conclusion, there are a significant relationship between the smoking (duration and dose) with hypertension, particularly in those who smoke more than 20 cigarettes per day for more than 10 years.

المستخلص:

تعد الأوعية الدموية إحدى الأعضاء التي تتأثر سلباً بالتدخين. الهدف من هذا البحث هو دراسة العلاقة بين التدخين (جرعته ومدته) وارتفاع ضغط الدم.

إن مجموع الأشخاص المشمولين بهذه الدراسة مائتي شخص، معدل أعمارهم بين ٢٠-٥٠ سنة، تم تصنيفهم إلى مجموعة السيطرة المتضمنة مائة شخص من الأصحاء الذكور ذوي الضغط الطبيعي (معدل العمر $\pm$ الانحراف المعياري = 35.72 ± 8.97)، ومائة شخص لمجموعة الذكور المصابين بارتفاع ضغط الدم (معدل العمر $\pm$ الانحراف المعياري = 43.64 ± 63)، كل الأشخاص سنلوا عن عادة التدخين، عدد السجائر في اليوم ومدته بالسنوات فيما يخص المدخنين. تم قياس ضغط الدم الشرياني الانقباضي والانبساطي لجميع الأشخاص الأصحاء والمرضى بالطريقة البدوية السمعية.

أظهرت الدراسة زيادة ذات دلالة إحصائية لضغط الدم الشرياني الانقباضي لدى المدخنين الذين تتجاوز مدة التدخين عشر سنوات ضمن مجموعة المرضى المصابين بارتفاع ضغط الدم. في حين أن زيادة ضغط الدم

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الشرياني الانبساطي ظهرت في فترة التدخين لأقل من خمسة سنوات وازدادت بوضوح بعد العشر سنوات. فضلا عن ذلك سجلت مجموعة المرضى زيادة ذات دلالة إحصائية في ضغط الدم الشرياني الانقباضي و الانبساطي لدى المدخنين لأقل من ٢٠ سيجارة يوميا وازدادت بوضوح لدى المدخنين لأكثر من ٢٠ سيجارة يوميا. نستنتج من كل هذه النتائج بوجود علاقة ذات دلالة إحصائية بين التدخين (مدته و جرعته) وارتفاع ضغط الدم وخاصة للمدخنين الذين تتجاوز مدة تدخينهم عشر سنوات ولأكثر من ٢٠ سيجارة باليوم .

Introduction:

Many teenagers and adults think that there are no effects of smoking on their bodies until they reach middle age. In fact, smoking has numerous immediate health effects on the brain , respiratory, immune, cardiovascular and other systems. While these immediate effects do not all produce noticeable symptoms, most begin to damage the body with the first cigarette, sometimes irreversibly ,and rapidly produce serious medical conditions and health consequences[1,2].

Tobacco smoke contains over 4000 different types of chemicals[2]. Many of these chemicals, nicotine and other toxic substances, are absorbed through the lungs into the blood stream to circulate throughout the body[3]. Inhaling tobacco smoke causes several immediate responses within the heart and the blood vessels. Within one minute of starting to smoke, the heart rate begins to rise: it may increase by as much as 30 percent during the first 10 minutes of smoking. Nicotine stimulates the body to produce adrenaline which makes the heart beat faster and raises blood pressure, causing the heart to work harder. Meanwhile, carbon monoxide in tobacco smoke exerts a negative effect on the heart by reducing the blood's ability to carry oxygen[4,5,6].

Blood pressure is a measure of tension upon the walls of arteries by the blood. It is reported as a fraction, systolic over diastolic pressure. Systolic blood pressure is the highest arterial pressure reached during contraction of the heart. Diastolic blood pressure is the lowest pressure, found during the heart's relaxation phase[7] A normal blood pressure is 120/80 or lower. High blood pressure (also called hypertension) is 140/90 or higher. Pre-hypertension is a systolic blood pressure of 120-139 mmHg or diastolic blood pressure of 80-89 mmHg, it is not a disease category ; rather , it is a designation chosen to identify individuals at high risk of developing hypertension and that lifestyle modifications are important preventive strategies [8,9].

Hypertension is a common, chronic condition, and an improved understanding of its etiology could lead to new prevention and treatment efforts [8,10].Although cigarette smoking is a strong risk factor for cardiovascular disease , its relationship with hypertension remains unclear [11,12].So that, the aim of the present work, is to study the relationship between cigarette smoking (dose and duration) with the hypertension.

Subjects and Method:

Subjects

This study was performed during the period of February-April, 2010. The sample of this study included one hundred apparently healthy normotensive (blood pressure was within the range 120/80 mmHg or less) males, were taken as a control group; their age range was between 20-50 years (age mean was 35.72 ± 8.97 years) from various regions of Mosul and one hundred hypertensive male patients of similar age range, their age mean was 43.64 ± 6.24 years. Each individual included in this study was asked about cigarette smoking habit , how many cigarettes per day they smoke, and for how many years.

Blood pressure measurement

The manual non invasive auscultatory measurement was used with sphygmomanometer and stethoscope. When the participant in the resting sitting position, a suitable cuff wrapped snugly around bare upper arm (one inch above the elbow bend) and the diaphragm of the stethoscope was placed free below the cuff. The cuff was inflated above anticipated systolic pressure which is identified by palpation the radial pulse, at a rate of 2-3 mmHg / second. Once the radial pulse was felt, the systolic pressure was the pressure reading at the onset of the sounds described by Korotkoff (phase one) (K1). Diastolic pressure was then recorded as the pressure at which the sound disappeared (K5). Two measurements were done at least 5 minutes apart[13], and the second reading was recorded.

Hypertension was considered when systolic blood pressure measurement was equal or above 140 mmHg and diastolic blood pressure measurement was equal or above 90 mmHg [8].

Results:

Table (1) show a significant difference of systolic, diastolic blood pressure and duration of smoking between hypertensive patients and controls at $p < 0.001$. Additionally, hypertensive patients recorded a significant increase in the numbers of smokers in comparison with control (Table 2).

Table (1) Comparison of systolic, diastolic blood pressure and duration of smoking between hypertensive patients and controls.

smoking	Patients		Control		p-value
	No.	%	No.	%	
smokers	72	72.0	37	37.0	<0.001
Non-smokers	28	28.0	63	63.0	
Total	100	100	100	100	

Table (2) Comparison of number of smokers between hypertensive patients and controls.

Parameters	Mean $\pm$ SD		p-value
	Patients (n=100)	Control (n=100)	
Systolic BP (mm Hg)	151.15 $\pm$ 15.32	113.00 $\pm$ 6.28	<0.001
Diastolic BP (mm Hg)	100.00 $\pm$ 9.40	74.35 $\pm$ 5.11	<0.001
Duration of smoking (years)	7.12 $\pm$ 5.97	1.48 $\pm$ 2.19	<0.001

Tables (3) shows a significant increase of systolic blood pressure in hypertensive patients of more than 5 year duration of smoking, while diastolic blood pressure shows a significant differences before 5 year duration of smoking, and became highly significant for both parameters above 10 years.

Table(3) Mean of systolic and diastolic blood pressure parameters in hypertensive patients according to duration of smoking.

Parameters \ Duration (year)	Mean				P-value
	Non-smoker (n=28)	<5 (n=15)	5-10 (n=33)	>10 (n=24)	
Systolic BP (mm Hg)	141.79 (C)	143.00 (C)	150.49 (B)	166.87 (A)	0.001
Diastolic BP (mm Hg)	91.96 (C)	97.00 (B)	98.49 (B)	112.71 (A)	0.001

The numbers that carry a different letters mean a significant differences at $P < 0.001$.

Tables (4) show a significant increase of systolic blood pressure and diastolic blood pressure in hypertensive patients in all dose depending groups, but more clearly in those smoke more than 20 cigarettes per day at $P < 0.001$.

Table(4)Mean of systolic and diastolic blood pressure in hypertensive patients according to dose of smoking cigarette per day.

Parameters \ Dose of smoking (cigarette/day)	Mean			P-value
	Non-smoker (n=28)	<20 (n=39)	>20 (n=33)	
Systolic BP (mm Hg)	141.79 (C)	149.10 (B)	161.52 (A)	0.001
Diastolic BP (mm Hg)	91.96 (C)	97.95 (B)	109.24 (A)	0.001

The numbers that carry a different letters mean a significant differences at $P < 0.001$.

Discussion:

The high systolic blood pressure and diastolic blood pressure in hypertensive patients is naturally expected as shown in (Table 1) .

This increase can be explained by hemodynamic basis of hypertension . Regardless of the origin of hypertension the actual increase in arterial blood pressure is caused by either an increase in systemic vascular resistance or an increase in cardiac output. The former is determined by the vascular tone (i.e. state of constriction) of systemic resistance vessels, whereas the later is determined by heart rate and stroke volume. In recent years, considerable evidence has suggested that changes in vascular endothelial function may cause the increase in vascular tone, in addition to sympathetic activity and increased circulating levels of angiotensin II [14].

There is an increase in the number of smokers in hypertensive patients in comparison with those normotensive individuals (Table 2), in addition to a significant increase of systolic blood pressure and diastolic blood pressure in hypertensive patients in all different smoker's groups whether related to durations or doses of smoking , but the significant differences are prominent in smoker above 10 years duration and more than 20 cigarettes per day at $P < 0.001$, as shown in (Tables 3and 4) respectively.All these findings strengthen the relationships between smoking and elevated blood pressure, which are in agreement with other studies [15,16,17,18,19,20].

The cigarette smoking causes sympathetic activation, oxidative stress, and acute vasopressor effects [15]that are associated with increased markers of inflammation [21,22] that are linked with hypertension [17].

There are several other potential biological mechanisms through which exposure to cigarette smoke may lead to high blood pressure. Long-term smoking leads to abnormalities of myocardial blood flow, which may be due to impairment of the vascular endothelium [18,23]. Cigarette smoking also increases blood pressure through stiffening arteries, with particularly deleterious effects on chronic smokers [19], that leads to the development of hypertension [24].

Smoking in youth is associated with arterial changes and increased common carotid artery intima-media thickness in adulthood [20]. Smoking in adults is also associated with progression of atherosclerosis, vascular injury, plaque progression and these adverse effects may be cumulative and irreversible [23,25].

Conclusions and Recommendations:

In conclusion, there are a significant relationship between the smoking (duration and dose) with hypertension, particularly in those who smoke more than 20 cigarettes per day for more than 10 years.

I suggest future research works to display the ill effects of smoking on other body organs in order to satisfy the smokers to quit. All doctors should make determined efforts to convince their patients to stop smoking. Also the authorities must ban smoking in general public places, work places and friends places will decrease the deleterious effects of long-term exposure to nicotine and to prevent passive smoking.

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