Effect of Smoking on Heart Rate and Blood Pressure During Exercise Test and Recovery Period in Patients with Angina Pectoris

Prof.Dr.Hakemia S. Hassan

Adult Health Nursing Department, University of Baghdad - College of Nursing

Email: drhakimashakir@gmail.com

Abstract

There is an established link between smoking abnormal heart rate; blood pressure and impaired cardiovascular health in middle aged or older population .Objective of the study to evaluate the effectiveness of smoking on heart rate and blood pressure during exercise test and recovery period in angina pectoris' patients.

Method :The sample consisted of (50) patients with Angina Pectoris who were systematically selected one by one from those attend to medical clinic for exercise test in Baghdad teaching hospital. The study was carried out during the period between September2016 to March 2017. Their age range was (20-70) with a mean age (53.54) years. They were divided into two groups, smokers group who had smoked 20 or more cigarettes per day for at least three smoking years. Non-smokers had never smoked.

Results: Leg pain and fatigue was the main for the early stopping of the test. There is our results of this study also showed that increased in mean for the systolic blood pressure from (151.67 to173.33) and heart rate from (97.08 to125.50) were significant increase in the patients who were smoking between the rest and maximum exercise test.

Conclusion: It has been found that smoking affects patients with angina pectoris, decreasing the capacity of their circulatory system. Therefore, it is recommended that cigarette smokers should be given strong encouragement to stop smoking as part of any effort to improve physical fitness

Keyword: Effect, Smoking, Exercise Test, Angina Pectoris.

الخلاصة

هناك صلة ثابتة بين التدخين ومعدل ضربات القلب الغير الطبيعية. ضغط الدم وضعف صحة القلب والأوعية الدموية في منتصف العمر أو كبار السن من السكان.الهدف من الدراسة: تقييم فاعلية التدخين على معدل ضربات القلب وضغط الدم أثناء تمارين الاجهاد وفترة الشفاء لدى مرضى الذبحة الصدرية. طريقة العمل : تكونت العينة من (50) مريض مصاب بالذبحة الصدرية تم اختيار هم بشكل متتابع واحداً تلو الآخر من بين أولئك الذين يراجعون العبادة الخارجية الباطنية لتمارين الاجهاد للفترة ما بين سبتمبر 2014 إلى مارس 2017. كان متوسط أعمار هم (20-70) بمتوسط عمر (53.54) سنة. تم تقسيمهم إلى مجموعتين ، مجموعة المدخنين الذين كانوا يدخنون 20 سيجارة أو أكثر يوميًا على الأقل لثلاث سنوات تدخين . غير المدخنين لم يسبق لهم التدخين.النتائج :ألم الساق والإر هاق هو السبب الرئيسي في الإيقاف المبكر للاختبار بنتائج الدراسة كدلك اشارة الى زيادة في متوسط ضغط الدم الانقباضي من (151.67 إلى 173.33) ومعدل ضربات القلب من (97.08 إلى 125.50) زيادة معنوية في المرضى الذين كانوا يدخنون. بين فترة الراحة وفترة تمارين الإجهاد القصوى

الاستنتاج : وجد أن التدخين يؤثر على مرضى الذبحة الصدرية ، يقلل من قدرة جهاز الدورة الدموية لديهم توصي الدراسة بتشجيع مدخني السجائر بشدة على التوقف عن التدخين كجزء من أي جهد لتحسين اللياقة البدنية

الكلمات المفتاحية :فاعلية التدخين تمارين الرياضية الذبحة الصدرية.

Introduction

Every major illness, including a cardiac event, carries with it potential of physical disability. Rehabilitation an integrate a part of nursing is a dynamic health oriented process that helps individuals who have survived a cardiac event to achieve that greatest possible level of physical, mental, social and economic functioning [1].

Smoking is a major risk factor for cardiovascular morbidity and mortality, and is considered to be the leading preventable cause of death in the world. Based on WHO estimates, tobacco continues to kill nearly 6 million people each year, including more than 600,000 passive smokers, through heart disease, lung cancer, and other illnesses; that is one and a half million more than the corresponding estimate for 1990 If current trends continue, the death toll is projected to reach more than 8 million per year by 2030[2].A more recent investigation demonstrated that the acute effect of smoking a single cigarette reduced the oxygen delivery to the lower extremity for up to an hour [1]..Consequently, patients who smoke at least one cigarette per hour may have more severe claudication pain than non-smoking claudicate [2].

Smoking also appears to have rapid-onset negative effects on health and physiological functioning including acute respiratory disease and reduced lung capacity [3]. A related area of physiological functioning that is affected by cigarette smoking even among healthy young people is physical fitness [4, 5]. Results of those studies indicate that there is a negative relationship between smoking and several components of physical fitness, the objective of this study was to evaluate the effectiveness of smoking on heart rate and blood pressure during exercise test and

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recovery period in angina pectoris' patients

Methodology

In order to obtain accurate data and a representative sample, a random sampling technique was selected. The sample consisted of (50) patients with Angina Pectoris who were systematically selected one by one from those attend to medical clinic for treadmill exercise in Baghdad teaching hospital. The study was carried out during the period between September2016 to March 2017.Their age range was (20-69) with a mean age (53.54) years. They were divided into groups, smokers group who had smoked 20 or more cigarettes per day for at least three smoking years (figure -1, 2). Non-smokers had never smoked. The age and sex distribution of these patients are shown in table -1- The specific criteria for including patients in treadmill testing were 1-Aclinical diagnosis of angina pectoris for the last time.2-Absence of complication at the time of testing .3-Patient ability to walk.4-Patient agreement to participate in the study.

EOE Go 222 M model Marquette Helliga case 16 exercise testing provided the required speed and gradients .An electrocardiogram Marquette case 12leasd ECG and to continuously monitor lead II of the ECG during the treadmill exercise test and recovery period. Blood pressure measurements were obtained by cuff with an aneroid (Tyco's) manometer (snitch medical instrument, the motion tolerant blood pressure company). The same examiner of the research team obtained all HR measurements with the use of a 12-lead ECG. Blood pressure and heart rate at rest were obtained with the subjects lying supine, after 10 minutes of rest. During the Bruce test, blood pressure and heart rate values were recorded at the end of every minute. All patients exercised with the standard Bruce maximal treadmill test. The exercise testing procedures followed the guidelines set out by the American Heart Association. Patients abstained from heavy eating, coffee and alcohol, and smokers from smoking, for at least 6 hours before the exercise test. During testing, subjects were not using the handrails for support.

Those patients who were able to continue to the fourth stage of the Bruce protocol exercised in a running mode. Testing was terminated at maximal effort, when symptoms such as(1) intense exhaustion, fatigue, (2) dyspnea, (3) leg pain (4) chest pain (5) significant ST segment depression or elevation at least 0.1 Mv for 0.06second after J point during exercise compared to the resting ST segment (6) fall in systolic blood pressure of more than 10% below the peak blood pressure protocol period (7) ventricular tachycardia or high degree atrioventricular block All subjects were placed supine immediately after termination of the exercise test for a 5-min recovery period. The testing exercise was supervised by a doctor trained in the CCU .The exercise laboratory equipment were checked constantly by the investigator who organizes them for patient safety

Statistical analysis: Data analysis is performed using statistical procedures in the package of SPSS (Statistical Process for Social Sciences) version 20-application Statistical analysis system. Descriptive statistical procedures includes Frequency (F), Percentage (%), Mean, Standard Deviation (SD) and inferential statistical procedures includes, Pearson Correlation Coefficient, t-test

Results

Table (1): Comparison	of Socio	demographic	Characteristic	between	Smoking	and
Non-Smoking						

Socio demographic Characteristic		Smoking		Non-Smoking			
		F	%	F	%		
Condon	Male	12	100	16	42.10		
Gender	Female	0	0	22	57.89		
	20-29	1	8.33	0	0		
Age	30-39	1	8.33	1	2.63		
	40-49	3	25	11	28.94		
	50-59	5	41.66	15	39.47		
	60-69	2	16.66	11	28.94		
Mean		(53.54)					
Alaahaligm	Yes	2	16.66	0	0		
Alconolism	No	10	83.33	38	100		
Past Medical History	Hypertension	5	41.66	23	60.52		
	Diabetes Mellitus	1	8.33	9	23.68		
	Kidney Stone	1	8.33	4	10.52		

Our study revealed that the majority 5(41.66%) of smokers group are within the age group (50-59) while 15(39.47%) non-smokers group and also revealed that the majority 5(41.66%) of patients in the smokers group and 23(60.52%) of patients in



non-smokers group were Hypertension as Past-medical history.



This figure indicated that (75%) of smoking patients were smoking (21-40) cigarettes per/day



Figure	(2)):	Duration	of	Smoking
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This figure indicated that (75%) of smoking patients had duration of smoking in between (21-30) years



Figure (3): Heart Rate; Systolic and Diastolic Blood pressure at Rest; Maximum Exercise Test and Recovery Period for Non-Smoking Patients with Angina Pectoris

figure-3-showed that there was increased in mean of the systolic blood pressure from (152.11 to170.53); mean of diastolic blood pressure was (93.16 to 96.67) and. mean of heart rate (92.61 to 124.87) during the period from the rest to maximum exercise test for Non-Smoking Patients with Angina Pectoris





Figure -4- showed that there is increased in mean for the systolic blood pressure from (151.67 to173.33);the mean of diastolic blood pressure from (96.67 to 97.37) and

mean of heart rate (97.08 to 125.5) during the period from the rest to maximum exercise test for Smoking Patients with Angina Pectoris





Figure-5- revealed that the more rapid development of leg pain and fatigue during exercise (37%) in the smoking group when comparing with nonsmoking group (11%).Our study revealed that smoking group (8%) had a higher ventilation (short of breathing) than nonsmoking group (3%) at maximum.





Figure(6) revealed that greater ischemia (ST-Segment depression) of the smokers (91%) occurred during maximum exercise than the non-smokers (29%).

Discussion

Smoking was associated with lower exercise levels and lower physical endurance--both cardiorespiratory and muscular. After controlling for exercise activity, smoking remained significantly associated with lower physical endurance. Our study revealed that between the rest and maximum exercise there is increased in mean for the systolic blood pressure from (151.67 to 173.33) was significantly increased in the patients who were smoking (figure-3-).Peak diastolic blood pressure was higher in the smoking group than non-smoking group(figures-3,4 -), suggesting that they may have had a higher peripheral vascular resistance Our findings also indicate that smokers had significantly higher HR rest than non-smokers (figures-3-4). These results are in line with previously published data [7] from young populations, where smoking has been associated with increased resting HR values.

Smoking is associated with autonomic dysfunction and with selective alterations in cardiac autonomic control. More specifically, smoking, acting at peripheral sympathetic sites, increases circulating levels of catecholamines, augments sympathetic outflow, and causes a long-term reduction in vagal drive. This sympathetic predominance, seen even in young heavy smokers, is also associated with impaired baroreflex function, leading to a marked increase in HRrest [7, 8].

Reported that the smokers had a higher submaximal heart rate (P=0.005), but the differences in heart rate between groups were reduced for smokers during exercise when compared to rest [9].Studied 298 young adults (159 men), aged 20-29 years old, were selected from a large population of health-science students based on health status, body mass index, physical activity, and smoking habit. All subjects underwent a maximal Bruce treadmill test and their HR was recorded during, at peak, and after termination of exercise. Results: Smokers had significantly higher resting HR values than non-smokers. Both female and male smokers showed a significantly slower HR increase during exercise.

Smoking was found to affect young smokers' HR, increasing HR at rest, slowing HR increase during exercise and impairing their ability to reach the agepredicted HRmax. In addition, smoking was associated with an attenuated HR decline during recovery, but only in females. All these studies showed that patients with angina pectoris were able to perform certain amount of physical activities and that exercise testing is safe when symptoms are carefully monitored and test could be stopped at the onset of any adverse effect

Our study revealed that the more rapid development of leg pain and fatigue during exercise (37%) in the smoking group and the slower relief of pain following exercise when comparing with non- smoking group (11%) (Figure-5-), indicates that they have a more limited ability to perform and recover from physical activity than non-smoking pain. This supports a previous study [2].in which patients who quit smoking had a significant 40% increase in maximum treadmill walking distance from 215 to 301 m, whereas a group of patients who continued to smoke had a non-significant 1% increase from 230 to 254 m.

Of particular interest, the. Smoking group (8%) had a higher ventilation (short of breathing) than non-smoking group (3%) at maximum exercise figure-5. The greater relative ventilator stress during exercise may be a possible explanation for why the smoking group had a lower exercise capacity than the non-smoking group (figure-3-)

It is interesting to note that greater ischemia (ST-Segment depression) of the smokers (91%) occurred during maximum exercise than the non-smokers (29%). (Figure-6-)

These results are in line with previously published data [9].showed that smoking increases HR at rest, while it blunts HR elevation during progressive exercise and lowers the maximum HR that can be achieved. In parallel, the smoking-induced CO binds with hemoglobin and myoglobin, reduces arterial O_2 blood saturation, and compromises the efficiency of respiratory enzymes, resulting in dysfunction of the O_2 production, transportation and delivery system, especially during exercise; this can substantially reduce the functional capacity and the performance of the circulatory system

Conclusion from the study cigarette smokers with angina pectoris had more leg pain and fatigue; Smoking was found to affect angina pectoris patient' HR, increasing HR at rest, slowing HR increase during exercise; smoking group had a higher ventilation (short of Breathing) than non-smoking group at maximum exercise.Our study recommendation that cigarette smokers should be given strong encouragement to stop smoking as part of any effort to improve physical fitness.

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