

Association of Cigarette Smoking with Dyslipidemia and Abdominal Obesity as Cardiovascular Risk Factors among Young Adults

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ABSTRACT

OBJECTIVE: To determine the effect of cigarette smoking on lipid profile and anthropometric variables among young adults.

METHODOLOGY: This comparative cross-sectional study was accomplished on young adult cigarette smokers of age 22-39 years at the University of Sindh in collaboration with Indus Medical college laboratory, Tando Muhammad Khan from March 2019 to February 2020 after the approval from the Advance Research Board and Ethical Committee, University of Sindh, Jamshoro. Intravenous blood samples were drawn to determine the lipid profile. Arterial blood pressure measured using aneroid mercury sphygmomanometer Kenzmedico co. limited Japan. Their weight in kilograms and height in cm were measured on the BMI scale. Waist and hip circumferences were measured by inch measuring tape. The data was filled in self-structured Performa and analyzed on IBM, SPSS version 22.0.

RESULTS: Mean age of study population (n=247) was 27.41 years±5.509. Cholesterol, triglycerides, HDL, LDL and VLDL levels among cigarette smokers versus non-smokers were 223.11±45.30 versus 164.06±49.4 mg/dl (p-value <0.01), 235.85±99.507 versus 135.13±81.6 mg/dl (p-value <0.01), 31.42±6.578 vs 34.88±8.8mg/dl (p-value <0.01), 197.59±54.5 vs 139.20±49.02 mg/dl (p-value <0.01) and 47.169±19.9 vs 27.025±16.3 mg/dl (p-value <0.01) respectively. Mean±SD of anthropometric variables compared between cigarette smokers and non-smokers (p-value <0.01). Fasting blood glucose (FBG mg/dl), arterial blood pressure (mmHg) & lipid profile were compared by logistic regression with AOR adjusted for age and BMI.

CONCLUSION: That there are significant alterations in anthropometric variables reflecting abdominal obesity, fasting blood glucose, arterial blood pressure, and lipid profile reflecting dyslipidemia among young cigarette smokers as compared to nonsmokers.

KEYWORDS: Cigarette smokers, lipid profile, abdominal obesity, young age

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INTRODUCTION

Cigarette smoking is one of the serious health risk factors that might lead to grave health consequences. For several years, smoking is one of the most important as well as upsetting confronts for community health. Globally, approximately 1.3 billion natives are implicated in cigarette smoking and most of them are found residing in developing and decreased income countries i.e., Pakistan, Nepal, India, Bangladesh, Sri Lanka, Indonesia, and many others. Consequently, cigarette smoking has been found implicated as big socio-economical trouble to the health of the community mainly families of smokers¹. Smoking, being the modifiable risk factor leads to increased rates of morbidity as well as mortality globally and this has been observed as leading to deaths of five million individuals annually. If these trends and patterns continued, then cigarette smoking might destroy the health of > 8 million individuals per year at the global level by 2030, including eighty percent of deaths in those living in developing countries². Age, occupation, marital status, as well as education, had been found

tough factors allied with smoking in Pakistan³. Similar to most of the countries, smoking is not illegal in Pakistan and has been found mostly in young age group adults as well as farmers and is responsible for serious health-related issues and even deaths. Eight percent of women and forty percent of men are habitual smokers. In the South Asia region, augmented expenditure of tobacco has been observed continuously in Pakistan. Also, the tobacco industry is rising fast in Pakistan i.e., five percent/year. Instead, because of the lower dispensation of tobacco in Pakistan, the cigarettes that are obtainable in Pakistan possess an increased proportion of tar and nicotine in the world⁴. Numerous cigarette smoking-related diseases have been recognized, including respiratory diseases, cardiovascular dysfunctions, and ten various forms of carcinomas⁵. The prevalence of smoking among the young age group is a basis for distress, and inclination indicates an elevated preponderance among students attributing the initiation of smoking found linked with smoking behavior of their colleagues⁶. Numerous studies report

that cigarette smoking is allied with abdominal obesity that might support the progression to metabolic syndrome that is the basis of developing cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM)⁷⁻⁹. Cigarette smoking is the modifiable risk factor for dyslipidemia, hypertension, diabetes mellitus, ischemic stroke, and other diseases^{10,11}.

This study has been designed to determine the effect of cigarette smoking on lipid profile and anthropometric variables among young adults.

METHODOLOGY

This cross-sectional comparative study has been conducted at the University of Sindh in collaboration with Indus Medical college hospital and laboratory, Tando Muhammad Khan from March 2019 to February 2020 after the approval from the Advance Research Board and Ethical Committee, University of Sindh, Jamshoro. The sampling technique was nonprobability purposive sampling. Inclusion criteria were young adult males and females in the age group 22-39 years smoking cigarettes for one year or more. Age and gender-matched nonsmokers added who never smoked tobacco.

The subjects with diabetes, hypertension, obesity, endocrine disorders, renal diseases, lipid metabolism disorders, and coronary diseases were excluded. People with a history of Drug intake like β- blockers, lipid-lowering drugs, steroids; and history of alcohol intake/drug abuse are also excluded. This study was conducted on a total of 247 volunteers, i.e., 143 cigarette smokers (n=143) and a comparative group of 104 non-smokers (n=104).

After informing and taking written consent, arterial blood pressure was measured using aneroid mercury sphygmomanometer Kenzmedico co. limited Japan

Their weight in kilograms and height in cm were measured on the BMI scale. The BMI was measured on formula BMI= weight in kilograms/height in meters². The circumferences of waist and hip were measured with the inch measuring tape and the waist-hip ratio was determined according to WHO guidelines. According to the World Health Organization (WHO), a healthy WHR is 0.9 or less in men while 0.85 or less for women.

The blood samples were collected after overnight fasting under all aseptic precautions to determine the lipid profile. The blood samples were centrifuged at 2000rpm (revolutions per minute) for one minute. Lipid

profile estimation which included serum cholesterol, serum triglyceride (TG), High-density lipoprotein (HDL), and low-density lipoprotein (LDL) were done on a BS-240 Clinical chemistry analyzer by Mindray. It works on the spectrophotometric /colorimetric principle.

RESULTS

The mean age of the study population (n=247) was 27.41 years±5.509 and Mean ± SD of height (cm), weight (kg), fat, visceral fat, body mass index, hip circumference (cm), waist circumference (cm), and the waist-hip ratio of the study population (n= 247) were 160.49±9.60, 68.97±15.41, 26.715±5.03, 30.191±11.84, 7.34±4.223, 87.04±13.54, 96.57±10.61 and 0.89± 0.07 respectively.

Lipid profile was compared among cigarette smokers (n= 143) and non-smokers (n=104) by applying independent t test and p- value < 0.05 was taken as significant with 95% confidence interval (CI). Cholesterol, triglycerides, HDL, LDL and VLDL levels among cigarette smokers versus non-smokers were 223.11±45.30 versus 164.06±49.4 mg/dl (p value <0.01), 235.85±99.507versus 135.13±81.6 mg/dl (p-value <0.01), 31.42±6.578 vs 34.88±8.8mg/dl (p-value <0.01), 197.59±54.5 vs 139.20±49.02 mg/dl (p-value <0.01) and 47.169±19.9 vs 27.025±16.3 mg/dl (p-value <0.01) respectively. **Table I.**

Mean ± standard deviation of anthropometric variables such as waist circumference, waist-hip ratio, and body mass index of the study population (n=247) compared among cigarette smokers (n=143) and non-smokers (n=104) by applying an independent t-test. **Table II.**

TABLE I: ASSOCIATION OF CIGARETTE SMOKING WITH DYSLIPIDEMIA (n=247)

	Smoker Mean± Std. Deviation	Non-Smoker Mean±Std. Deviation	P-value
Cholesterol	223.11±45.30	164.06±49.4	.000**
Triglycerides	235.85±99.507	135.13±81.6	.000**
HDL	31.42±6.578	34.88±8.8	.001**
LDL	197.59 ± 54.5	139.20±49.020	.000**
VLDL	47.169±19.9	27.025±16.3	.000**

** shows highly significant statistically if <0.01

TABLE II: ASSOCIATION OF CIGARETTE SMOKING WITH ABDOMINAL OBESITY (n=247)

Anthropometric variables	Smoker (Mean±Sd)	Non-smoker (Mean±Sd)	Total (Mean±Sd)	P value
Body Mass Index(BMI)	29.55±3.91	24.65±4.75	26.71±5.03	<0.0001**
Waist Circumference (WC)	93.66±11.46	82.22±12.93	87.04±13.55	<0.0001**
Waist hip ratio(WHR)	0.91±0.08	.88±.07	0.89±0.078	<0.0001**

**shows highly significant statistically p-value <0.05

Fasting blood glucose (FBG mg/dl), systolic and diastolic arterial pressure (mmHg) & lipid profile were compared by logistic regression with AOR adjusted for age and BMI. **Table III.**

TABLE III: LOGISTIC REGRESSION FOR FASTING BLOOD GLUCOSE (FBG MG/DL), SYSTOLIC AND DIASTOLIC ARTERIAL PRESSURE (MMHG), AND LIPID PROFILE

	COR	P-Value	AOR	P-Value
FBG(mg/dl)	5.93 (3.38-10.43)	<.0001	2.58 (1.34-4.97)	.005
Systolic arterial pressure (mmHg)	8.17 (4.59-14.54)	<.0001	4.21 (2.07-8.56)	<.000
Diastolic arterial pressure (mmHg)	16.48 (4.96-54.73)	<.0001	5.37 (1.40-20.59)	.014
Cholesterol (mg/dl)	6.76 (3.49-13.09)	<.0001	3.71 (1.81-7.59)	<.0001
Triglycerides (mg/dl)	10.94 (5.76-20.75)	<.0001	6.88 (3.36-14.08)	<.0001
HDL(mg/dl)	3.83 (1.26-11.62)	.018	2.70 (.79-9.22)	.1
LDL(mg/dl)	11.90 (6.33-22.36)	<.0001	4.82 (2.30-10.03)	<.0001
VLDL(mg/dl)	16.16 (8.05-32.34)	<.0001	7.15 (3.21-15.98)	<.0001

AOR adjusted with age and BMI

DISCUSSION

The tendency of cigarette smoking has been observed to be augmented among young adults. This research study revealed that there are noteworthy alterations in waist-hip ratio, fasting blood glucose, arterial blood pressure along with lipid profile among young cigarette smokers in age and BMI matched nonsmokers. Similar to this study, Asif HM et al¹², revealed eighty-two young cigarette smokers out of three hundred four students with a mean age of participants as 21.2±0.211 years that are in the young age group. The frequency of smoking was 26.9 percent. Similarly, Shin DY 2017¹³ revealed the relationship between smoking and dyslipidemia in Korean adults. Cigarette smoking is found in direct proportion with dyslipidemia, especially in high triglyceride and LDL cholesterol in both genders and the risk of high triglyceride and LDL cholesterol is higher in females than males. A survey conducted in Brazil on a nationwide sample of 38,813 young adults, revealed an augmented prevalence of abdominal obesity in cigarette smokers than nonsmokers¹⁴, inconsistencies with results of the current research study. Similar to this study, Bassej IE 2020¹⁵ concluded significant alteration in lipid profile, waist circumference, arterial blood pressure, waist-hip ratio,

and fasting blood sugar as higher risk factors for cardiovascular disease in smokers but in contrast to this study, they found negative relation of BMI with cigarette smoking. According to Goswami D 2021¹⁶ increased BMI, WHR, hypertension, diabetes mellitus, consumption of alcohol, total cholesterol, serum triglycerides, LDL, Non-HDL cholesterol, serum uric acid, cigarette smoking, and decrease in HDL levels are associated with acute coronary syndrome. Nicotine is present in tobacco smoke that augments an individual's secretion of catecholamine & cortisol. Elevated catecholamine and cortisol can alter carbohydrate and lipid metabolism in such a person^{17,18}. Modification in the metabolism of lipids might lead to dyslipidemic changes which may lead to atherosclerosis and coronary heart disease.

CONCLUSION

It is concluded from this research study that there are significant changes in anthropometric variables, fasting blood glucose, arterial blood pressure, and lipid profile among young cigarette smokers as compared to age-matched nonsmokers. Both are modifiable cardiovascular risk factors. Policies and programs are required which train and make awareness among the young generation about the cardiovascular risk factors associated with cigarette smoking i.e., abdominal obesity and dyslipidemia.

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AUTHOR CONTRIBUTIONS

Memon MA: Drafting, statistics
Laghari Z: Review, drafting
Warsi J: Review, statistics

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