

CORRELATION OF CIGARETTE SMOKING WITH SYSTEMIC BLOOD PRESSURE, SERUM CHOLESTEROL AND BILIRUBIN LEVELS

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ABSTRACT

Objective: Correlation of cigarette smoking and cigarette smoke pack years with systemic blood pressure, serum cholesterol and serum bilirubin. **Study Design:** Cross sectional study **Place & Duration:** Indus Medical College, Tando Muhammad Khan from June 2016 to October 2017. **Subjects & Methods:** A sample of 100 smokers (cases) and 100 non- smokers (control) were selected for study protocol. Sample was selected according to criteria. Cases and control were age and body weight matched. Systemic blood pressure, serum bilirubin and cholesterol levels were estimated in cases and control and results were analysed and compared statistically by SPSS (ver 22.0) at 95% confidence interval. **Results:** Smokers showed total mean \pm SD pack years of 4.77 ± 2.87 . Duration and cigarettes smoked were noted as 3.95 ± 0.56 years and 20.5 ± 5.56 respectively. Smokers showed statistically high systolic and diastolic blood pressure and serum cholesterol compared to control ($P = 0.0001$). Serum bilirubin was found low in cases compared to control ($P = 0.0001$). Cigarette pack years showed positive correlation with systolic BP, diastolic BP and serum cholesterol but negative correlation with serum bilirubin. **Conclusion:** Smoking is a risk factor for high systemic blood pressure and serum cholesterol and showed positive correlation.

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INTRODUCTION

Cigarette smoking is a social practice of tobacco use by inhalation. Tobacco is a proved cause of cardio respiratory and cancer related problems. Hence it is a preventable cause of morbidity and mortality. Tobacco is an etiological agent of lung cancer, renal cancer and coronary artery disease.^{1,2} Tobacco related morbidity and mortality may be decreased by quitting of tobacco smoking. A previous study¹ reported that the tobacco use is increasing and tobacco related mortality is estimated multiply many times over the next 4- 5 decades.¹ Tobacco related morbidity of cigarette smoking is an established fact. Research proved a decrease in life by tobacco use. Smokers die a decade earlier than non-smokers, this has been reported by previous

studies.² Tobacco is an addicting habit. It produces craving for its use in addicted persons. Once tobacco is used, slowly and gradually it habituates the person leading to addiction and craving. Youngsters are at high risk for developing addition and tobacco related complications. Youngsters have more life span for developing grave complication such as those related to cardio respiratory systems and pulmonary malignancies. Hence it is more dangerous for the young population.³ Now the tobacco is an established cause of cardio respiratory disease and cancer. Coronary artery disease (CAD) is leading cause of death globally.⁴ The estimates show tobacco use accounts for 1/3 cases of CAD globally. CAD is a leading cause of morbidity and mortality in developing and developed countries.⁵

Tobacco use is preventable and its disuse in turn decreases the CAD related mortality. Systemic blood pressure is a prominent cardiovascular related complication of tobacco smoking.

A high than normal systemic blood pressure is a risk factor for target organ damage and is termed as the 'systemic hypertension'. Now the systemic hypertension is a hyper endemic health problem of the globe. Again the systemic hypertension is a preventable cause of CAD^{6,7} Target organs which are at risk of damage by systemic hypertension include the kidneys, brain arteries, and coronary arteries. The tobacco smoking is a preventable risk factor and its cessation may remove the target organ damage. This may reduce the disease burden and economical loss in particular for the developing countries.⁷ Previous studies^{8,9} established the fact of tobacco use and occurrence of hyperlipidemia, hypercholesterolemia and systemic hypertension. This scenario shows the problem needs analysis to reach to the depth of health problem for making prevention strategies. The present cross sectional study was planned to determine the cigarette smoking maladies. The present study determined the systemic blood pressure, serum cholesterol and bilirubin levels in cigarette smokers and it was hypothesized that this linkage does not exist until proved otherwise.

SUBJECTS AND METHODS

The present cross sectional study was conducted at the Indus Medical College, Tando Muhammad Khan. Study covered duration of June 2016 to October 2017. The present study hypothesized that there is no effect of cigarette smoking on the systemic blood pressure, serum cholesterol and bilirubin levels in cigarette smokers until proved otherwise. Healthy attendants accompanying the patients in the outpatient and inpatient departments of hospital were interviewed and informed about the purpose of study. Willing volunteer participants were discussed in detail the study protocol and they were informed that entry to study protocol and there will neither get

an incentive nor bear any financial burden of laboratory investigation. Finally, a sample of one hundred smokers (case) and one hundred non-smokers (control) were enrolled for study purpose. Controls were age and body weight matched. Age (30- 60 years), health adults, male gender, and cigarette smoking duration of 3- 5 years were inclusion criteria.

Smokers with asthma, full blown chronic obstructive pulmonary disease (COPD), diabetes mellitus, female, occasional smokers and overweight subjects (BMI >30.9 kg/m²) were excluded. Subjects taking concomitant drugs (naswar chars, etc), anti- oxidant and multivitamin and multi mineral pills were also excluded. Volunteers were asked to sign the consent form. They were further examined by a senior medical officer for morbidity. Volunteers were asked for biodata, physical examination and blood sampling. They were informed that the data will be confidential. Confidentiality was maintained strictly. They were informed that the results will be published that never disclose the personal information of volunteers. Body weight was measured on electronic weight machine. Systemic blood pressure was measured with sphygmomanometer as per standards of JNC-VIII protocol. Ante cubital fossa was examined for a prominent vein. Area was clean with alcohol swab. 5 ml blood was collected in a disposable syringe. Area was covered by a Saniplast.

A person who never smoked a tobacco cigarette was defined as the non- smoker. "Pack- years" of cigarette smoke was estimated by formula as; "Total of cigarettes smoked each day × Total smoking years/20".¹⁰ Blood was centrifuged and separated sera were preserved for serum cholesterol and serum bilirubin. Data was saved in a pre structured proforma. Study protocol was approved by the ethics committee. Software SPSS (ver 22.0) was used for the data analysis (IBM Corporation, USA). Continuous data was typed on SPSS sheet and analyzed by student's t test. Results were presented in table as mean and

standard deviation (SD). Categorical variables were typed on SPSS sheet and analyzed by Chi-square test. Results were presented in table as frequency and %. Pearson`s correlation was used for the linear correlation of cigarette pack years with systolic and diastolic BP, serum bilirubin and cholesterol. Correlation co-efficient (r-value) and its significance (P-value) were noted. Data was analyzed at 95% confidence interval ($P \leq 0.05$).

RESULTS

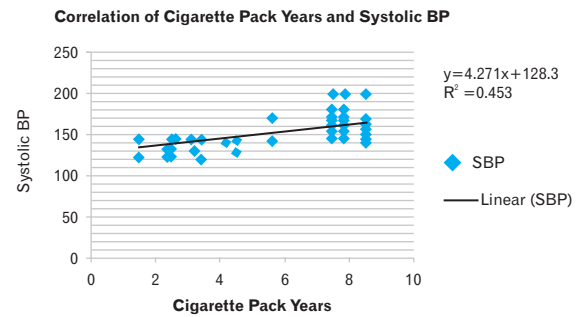
Age, body weight, cigarette smoke pack years, blood pressure are shown in table 1. Smokers and non- smokers were age and body matched ($p > 0.05$). Smokers showed total mean \pm SD pack years of 4.77 ± 2.87 . Duration and cigarettes smoked were noted as 3.95 ± 0.56 years and 20.5 ± 5.56 respectively ($p = 0.0001$). Smokers revealed high systolic and diastolic BP ($P = 0.0001$). Serum bilirubin was found low in smokers 0.94 ± 0.34 compared to 1.13 ± 0.21 in non- smokers ($p = 0.001$). Similarly serum cholesterol was noted as 178.76 ± 41.72 mg/dl in smoker compared to low cholesterol 133.21 ± 40.76 mg/dl in non- smokers ($p = 0.0001$). Correlation co-efficient (r-value) and its significance (P-value) of cigarette pack years with systolic and diastolic BP, serum bilirubin and cholesterol are shown in table 2 and Scatter plot 1-4.

Table 1. Demography and biochemical findings of study subjects (n=200)

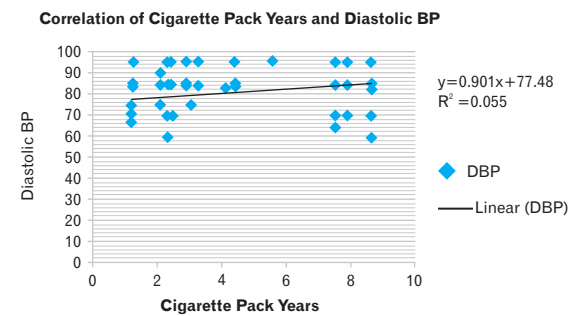
	Smokers		Non-smokers		P-value
	Mean	SD	Mean	SD	
Age (years)	54.57	5.11	54.08	4.88	0.489
Body weight (kg)	76.69	10.13	78.35	10.44	0.0
Cigarette Packs Years	4.77	2.87	0.00	0.00	-
Systolic BP (mmHg)	148.72	18.22	125.65	15.08	0.0001
Diastolic BP (mmHg)	81.59	10.21	69.58	7.05	0.0001
S. Bilirubin (mg/dl)	0.94	0.34	1.13	0.21	0.0001
S. Cholesterol (mg/dl)	178.76	41.72	133.21	40.76	0.0001

Table 2. Correlation of Cigarette Smoke "Pack Years" with different variables in Cigarette Smokers

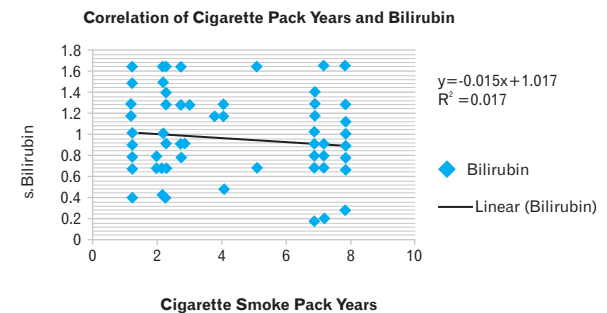
	Systolic BP	Diastolic BP	Bilirubin	Cholesterol
R-value	0.591	0.399	- 0.308	0.503
P-value	0.0001	0.0001	0.0001	0.0001
N	100	100	100	100



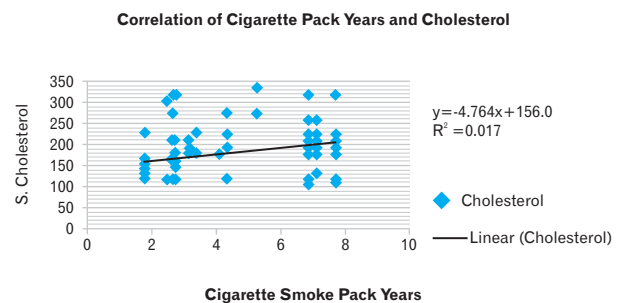
Graph 1. Positive correlation of Cigarette Pack Years and Systolic BP



Graph 2. Positive correlation of Cigarette Pack Years and Diastolic BP



Graph 3. Scatter plot of negative correlation of Cigarette Pack Years and Bilirubin



Graph 4. Positive correlation of Cigarette Pack Years and Cholesterol

DISCUSSION

The present research is the first study conducted on normal healthy adult smokers. The researchers investigated the effect of cigarette smoking on the systemic blood pressure, serum cholesterol and bilirubin levels. Null hypothesis was rejected and alternative hypothesis was accepted as the cigarette smokers statistically significant differences in systemic blood pressure, serum cholesterol and serum bilirubin in cases compared to control ($P > 0.05$). This shows the correlation does exist of the cigarette smoking and systemic blood pressure, serum bilirubin and cholesterol.

The present research is significant for the clinicians and public health providers as smoking is preventable cause of cardio- respiratory diseases. Triangle of clinicians, health sector and public should highlight the issue for the prevention of future of community members who are at risk of cigarette related cardio- respiratory morbidity and mortality. Currently, the society members are under stress due to financial constraints and joblessness and they want freedom from anxiety and worries. They think smoking as tool of joy for temporary freedom from anxiety and worries, but they are not aware of its hazards. The present study provides a bird's eye view of health hazards of smoking in a limited sample of population. Age shows the majority of smokers belonged to not elderly population. Systemic blood pressure was elevated in smokers compared to non- smokers ($P = 0.0001$).

The findings are supported with previous studies.^{11,12} Jena et al¹³ reported both systolic and diastolic blood pressure were elevated in the cigarette smokers, this supports our finding. We also found low serum bilirubin which is an anti oxidant³ and high serum cholesterol that plays role in atherosclerosis and vascular disorders.¹¹⁻¹³ In present study, the cigarette smoke pack years showed positive association with the systemic blood pressure and serum cholesterol but negative association with serum bilirubin. This

indicates the dyslipidemia in the present of low anti oxidant (serum bilirubin) are sufficient to speed up the process of pathogenic atherosclerosis and cardiovascular diseases. These findings are in agreement with previous studies.¹¹⁻¹³

These studies have found similar results of rise in systemic blood pressure and serum cholesterol by cigarette smoking. However, few studies^{14,15} had reported conflicting results of no association of cigarette smoking with systemic blood pressure and elevated serum cholesterol. This is in contrast to present and previous.¹¹⁻¹³ These controversies may be due to different study population and sample size. Still other previous studies^{17,18} reported paradoxical results of low systemic blood pressure in the cigarette smokers. This finding is highly controversial. There could be multiple reasons of such controversies right from the study sample collection to the statistical analysis. Researcher bias is major contributing factor for such controversial results.

Smokers showed low serum bilirubin that is in keeping with previous studies.^{19,20} This is because the serum bilirubin is a natural anti oxidant that neutralizes smoke related free radicals and become consumed resulting in its low serum levels. High serum cholesterol in smokers of present study is supported by previous studies.²¹⁻²³ The present study has limitation of; first- small sample size, second- cause effect relation cannot be established due to cross sectional study design, and third- specific race and ethnical group studied. These show the results cannot be generalized to other settings and cannot be interpreted for other populations. However, the strength of study lays in its prospective study design, inclusion and exclusion criteria, age and gender matched smokers and non- smokers. Further studies are recommended to prevent cardio- respiratory related complications of smoking. Anti smoking campaigns should be arranged from time to time for prevention of health problems.

CONCLUSION

Cigarette smoking shows positive correlation with systemic blood pressure and serum cholesterol and inverse correlation with serum bilirubin. Further studies are recommended to conduct large scale studies for prevention of cigarette smoking related cardio- respiratory related complications of smoking. Anti smoking campaigns should be arranged from time to time for prevention of health problems.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Shagufta Shaheen Qureshi	Concept, materials handing, manuscript write up, Biochemical analysis and laboratory testing, compilation of results, Proof reading	
3	Asadullah Yousfani Palli	Materials handing Collection of compilation of result, statistical analysis, Manuscript write up, Proof Reading, Literature review, Biochemical analysis	