**ORIGINAL ARTICLE**

# Association of Smoking with Serum Homocysteine Level in Healthy Adults: A Cross Sectional study

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## ABSTRACT

**Background:** Smoking is known to be associated with an elevated serum homocysteine level. Both are associated with an increased risk of cardiovascular disease.
**Objective:** To find out the association of smoking with serum homocysteine levels in healthy aults.
**Study Design:** Cross sectional study
**Setting:** Department of Internal Medicine, King Edward Medical University/ Mayo Hospital, Lahore.
**Duration:** 1st January 2010 to 30th June 2010.
**Subjects and methods:** After informed consent, thirty healthy adults from nearby community area of Mayo Hospital, Lahore were included. Smoking as a conventional risk factor was recorded. Blood samples for fasting homocysteine levels of the subjects were collected on next day of interview. Standard laboratory protocol was followed for transportation and laboratory analysis of blood samples. Data was entered in SPSS 14. Chi square test was applied to find out the association of smoking with serum homocysteine levels.
**Results:** Study population consisted of 30 thirty healthy individuals. Majority (50%) of individuals belonged to 46-55 years of age. Mean age was 51.1 years. There was male predominance. Out of total, 57% participants were smoker while 43% were non-smoker. There was statistically significant association of smoking with elevated serum homocysteine levels ($p<0.05$).
**Conclusions:** Smoking appeared to be strongly associated with elevated serum homocysteine levels in healthy individuals.
**Keywords:** Homocysteine, smoking, healthy adults, cardiovascular disease

## INTRODUCTION

Smoking is strongly and independently associated with cardiovascular disease and is the biggest single avoidable health habit contributing to chronic diseases in the western world. Up to 50% of avoidable deaths in the industrialized world have been attributed to smoking.[1] Smoking is known to be associated with an elevated serum homocysteine level. Despite of the observations, little information is available on the direct and positive relation of smoking with homocysteine.[2] Therefore, this study was planned to find out the association of smoking with serum homocysteine levels in healthy adults in our population.

## PATIENTS AND METHODS

This study was conducted in the Department of Internal Medicine, South Medical ward, King Edward Medical University/ Mayo Hospital, Lahore. This study was conducted in six months duration (January 01, 2010 to June 30, 2010). It was a cross sectional study and non-probability convenience sampling was adopted. Thirty healthy adults from attendants of different patients were enrolled who consented to participate in study. Smoking history was taken. Blood samples for fasting homocysteine levels were collected on next day of interview (after an approximate 12 hours fast). All samples were taken onto ice, protected from light and centrifuged within one hour for analysis. Laboratory facilities were incorporated from local laboratory in collaboration with Abbott's diagnostics Lahore. Classification of homocysteine levels described by Kang SS[3] (moderate15-30 µmol/liter, intermediate30-100µmol/liter, severe>100 µmol/liter) was followed**.** SPSS 14 software was used for the data analysis. Demographic variables of age, sex and smoking status were presented as bar and pie charts. Chi-square test was applied to find out the association between smoking and serum homocysteine level.

## RESULTS

The study population consisted of 30 healthy adults. Majority (50%) belonged to 46-55 years of age. Mean age was 51.1 years. (Figure I) There was male predominance (63%) (Figure II). Out of total, 57%

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participants were current smoker while 43% were non-smoker. (Figure III)

Figure I: Age in years (n = 30

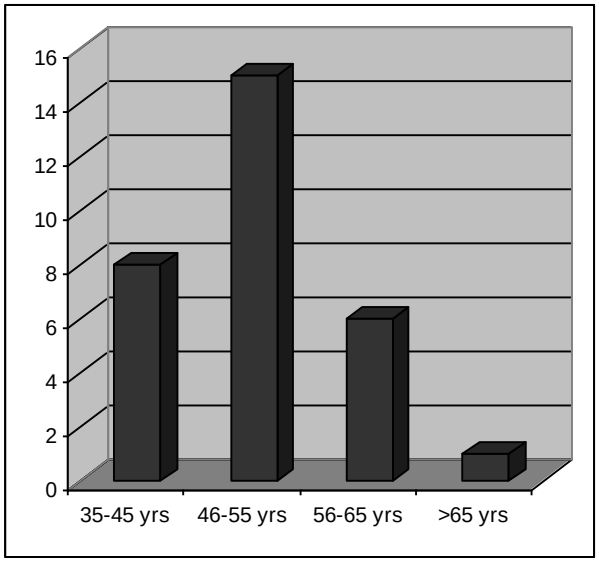
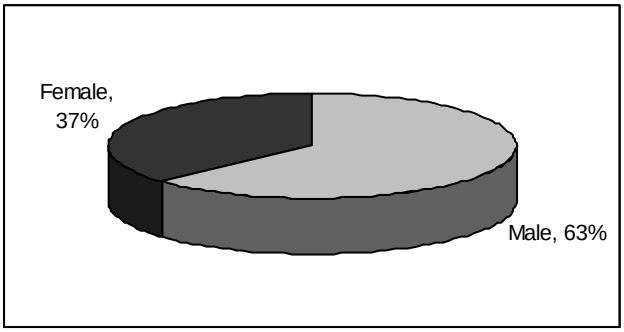



Figure II: Sex distribution (n = 30)




When data was analyzed to find out association of smoking with serum homocysteine levels, smoking appeared to have statistically significant association with elevated total homocysteine levels in healthy adults ($p<0.05$). (Table I)

Figure III: Smoking habit (n = 30)

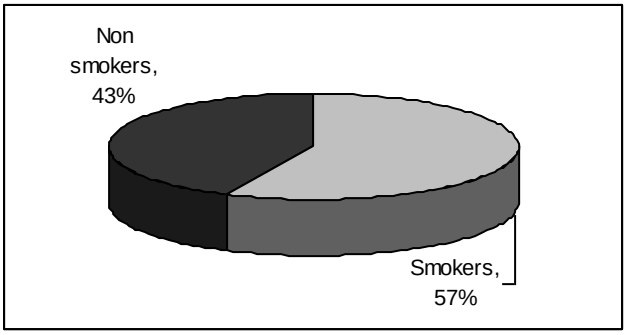



Table 1: Association of smoking with serum homocysteine level (n = 30)

| Serum total homocysteine level | Smokers | Non-Smokers | Total |
|---|---|---|---|
| >15 µmol/liter | 9 | 1 | 10 |
| ≤15 µmol/liter | 8 | 12 | 20 |
| Total | 17 | 13 | 30($p<0.05$) |

## DISCUSSION

Smoking has a direct and positive relation with homocysteine[1]. In present study, we observed increased level of serum homocysteine in healthy adult smokers. Bazzano and colleagues analyzed more than seventeen thousand adults in third national health and nutritional examination survey and declared a positive and dose response relationship between measures of cigarette smoking and elevated homocysteine levels. This elevation was concomitant with rise in C-reactive proteins.[2] These findings were extended to risk of coronary heart disease by O'Callaghan P et al who showed in a case control study that presence of smoking significantly elevated the risk of coronary artery disease associated with hyperhomocysteinemia.[4] In present study, frequency of hyperhomocysteinemia (as defined by value >15 µmol/liter) was lower (33%) in healthy population than reported by Akhtar N et al[12] (66%). Present study has mean age group of patients was 51.4 years while that of control group was 51.1 years. Also there was male predominance in our study. These results are in accordance with international and local data[2,5,6].

Several mechanisms might explain further increased risk of atherosclerosis in smokers with raised serum homocysteine levels. Smoking affects vasoocclusive factors such as platelet aggregation, plasma viscosity and fibrinogen levels.[7] Hyperhomocysteinemia has been associated with impaired endothelial function and abnormal flow mediated vasodilatation has been demonstrated with mild hyperhomocysteinemia.[8] The fact that both of these risk factors can exert similar effects would suggest strong potential for interaction between them to produce vascular damage. The Hordaland[9,10,11] and other studies[1] have also shown higher homocysteine levels in smokers.

The limitations of the present study should be appreciated. Present study had small sample size. This observation however needs further evaluation owing to the small sample size of this study.

## CONCLUSIONS

We conclude from our study that smoking is significantly associated with elevated homocysteine levels in healthy asymptomatic adults .

## RECOMMENDATIONS

There is a substantially increased serum homocysteine level in asymptomatic smokers. Evaluation of this risk in case control and cohort studies is required. If our findings of an increased risk in asymptomatic smokers with elevated serum homocysteine level are confirmed, the public health implications are substantial. Serum homocysteine levels should be estimated in smokers and intensive counseling should be offered to cease smoking.

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