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The Impact of Cigarette Smoking On Cardiovascular Risk (Cvr) Among Middle-Aged Adults

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Abstract

The current study is focused on identifying the relation between cigarette smoking and cardiovascular risk among middle aged adults (30 to 60 years). A cross-sectional survey was utilized to collect data from 200 patients with cardiac issues seeking treatment at various cardiac preventive unit of twin cities (Rawalpindi & Islamabad) of Pakistan. Cigarette dependence was evaluated with the Cigarette Dependence Scale-12 (Jean-François Etter, Thanh Vu Duc & Thomas V. Perneger, 2003) and the Framingham Risk Score (Peter et al., 1998) assessed the risk of cardiovascular diseases of the study participants. The results revealed that a significant correlation exist between smoking cigarette and cardiovascular risk ($r = 0.866$, $p < 0.001$). The level of dependence on cigarettes strongly predicted a person's cardiovascular risk score ($\beta = 0.059$, $p < 0.01$). Cigarette smoking was found to play a significant part in heightening cardiovascular risk for middle-aged adults. To lower burden of CVD in this group, tobacco cessation programs are needed. Public health plans should link smoking cessation with standard cardiac checkups.

Keywords: Cigarette smoking, cardiovascular risk, Framingham Risk Score, smoking cessation, middle-aged adults.

Introduction

Smoking cigarettes is considerably a preventable reason for deaths all around the globe, affecting cardiovascular health severely (Rawat & Hivre, 2023). There are still vast numbers of smokers worldwide, and their risk for CVD is very high. Among middle-aged adults, smoking plays a significant role in the development of atherosclerosis, myocardial infarction, and stroke (World Health Organization, 2018). Middle life is when the combined effects of smoking and diseases such as hypertension and dyslipidemia most strongly increase the risk of heart disease and death (Erhardt, 2009). Even though there is plenty of research on how smoking affects the heart, there are fewer investigations that target middle-aged adults, who might face the effects of smoking and other heart risks more seriously. Studies so far have essentially paid little attention to how smoking relates to common health issues like metabolic syndrome and hypertension. This gap in our knowledge indicates the necessity for detailed research into how smoking behaves as a cardiovascular risk (CVR) factor in middle-aged adults and the effect of quitting (Sullivan & Raghavan, 2022).

One of the major risk factors for cardiovascular disease (CVD) is cigarette smoking which significantly resulted in 1.9 million deaths due to cardiovascular issues over the year (World Health Organization [WHO], 2021). Universally, smoking leads to coronary artery disease, hypertension, and stroke by mechanisms such as endothelial dysfunction and inflammation (Ambrose & Barua, 2004). Extensive studies like the Framingham Heart Study and the Interheart study claim a strengthened relation between myocardial infarction and cigarette smoking, particularly in adults aging from 35–65 (Lloyd-Jones et al., 2010; Yusuf et al., 2004). Even cardiovascular risk (CVR) is significantly increased by light smoking (Bjartveit & Tverdal, 2005), with low rates of cessation particularly obvious in low as well as middle-income countries (Patel et al., 2016).

The consumption of tobacco in Pakistan is about 19.1% among adults, with cigarette smoking being more prevalent among middle-aged men (Global Adult Tobacco Survey, 2015). According to various researches smoking is strongly associated to hypertension, atherosclerosis, and coronary artery disease in this group (Jafar et al., 2007; Khan et al., 2013). Moreover, this issue is worsened by the socioeconomic challenges such as early smoking initiation, and weak public health policies (Nishtar et al., 2013). Some of the traditional types such as hookah and beedi are also very common but require attention. Low-education and labor-class group show higher smoking prevalence as they often lack awareness regarding cardiovascular risks (Raza et al., 2019). Over 30% cases of acute coronary syndrome share a history of smoking according to data from urban hospitals (Saleheen et al., 2009).

This study is designed to look at how cigarette smoking relates to cardiovascular risk (CVR) in middle-aged adults and how quitting smoking could impact these risks. The importance of this study is that it could guide public health efforts to lower cardiovascular disease risk from smoking among middle-aged individuals. Results from this study are significant for public health efforts in places such as Pakistan, where smoking levels are high. Cardiovascular risk (CVR) can be decreased by providing programs to quit smoking and regularly checking people's heart health.

It is known that cigarette smoking leads to cardiovascular risk (CVR) and is among the leading risk factors that can be improved for heart disease, stroke, and other cardiovascular illnesses (Erhardt, 2009). The risk of cardiovascular disease from smoking comes from factors like damaged endothelial tissue, rising oxidative stress, high blood pressure, and an increased risk of clotting (Ambrose & Barua, 2004). Through these effects, the risk of atherosclerosis increases, a situation where fatty deposits form in the arteries and may cause CAD, stroke, and myocardial infarction (Buttar et al., 2005).

Numerous researches have looked into the impact of cigarette smoking on cardiovascular health and have found that it changes the body's cardiovascular system. Yanbaeva et al.'s (2007) study noted that smoking produces systemic inflammation that is a major contributor to atherosclerosis. Smoking-related endothelial dysfunction leads to narrowed arteries and a higher risk of clotting, which can result in blocked arteries and cardiovascular problems (Benowitz, 2003). Therefore, smoking causes fibrinogen to increase, a blood-clotting protein that raises the chance of having a thrombus and cardiovascular complications (Buttar et al., 2005).

Studies show that smoking makes these existing risk factors e.g. hypertension and high cholesterol worse and dramatically raises the chance of having cardiovascular diseases (Henningfield et al., 2024). The results from the Framingham Heart Study on how smoking affects cardiovascular disease are used by clinicians to evaluate cardiovascular risk (Kannel et al., 1976).

Although smoking is a significant reason behind cardiovascular disease, scientists are also studying whether this risk can be turned around by giving up smoking. The American Heart Association (2018) notes that stopping smoking results in better cardiovascular health and can lower the likelihood of a heart attack, stroke, or other cardiovascular diseases. The Framingham Risk Score considers smoking, age, cholesterol, and blood pressure to determine a person's risk of

heart disease in the next decade (Rajinder Singh et al., 2004). Research has found that stopping smoking can improve cardiovascular risk scores, especially in people who quit when they are young (Critchley & Capewell, 2003).

Most of the research on smoking and cardiovascular risk has concentrated on wider age groups, instead of middle-aged adults (Macek, & Zak, 2020). The findings of this study will help us understand how smoking speeds up heart disease risk among middle-aged adults and help public health responses to smoking-related cardiovascular problems (Teo, & Rafiq, 2021).

By exploring the scientific literature, this review lays out the key elements of the relation among smoking and cardiac issues, particularly for adults in middle age and the role that quitting smoking can play. This investigation's findings are expected to guide interventions and policies designed to control cardiovascular issues caused by smoking in this age group (Krist, & Davidson, 2020).

The prevalence of cardiovascular risk (CVR) is a raising health concern internationally which involves cigarette smoking as a main contributing risk factor especially among middle-aged adults, population which seems quite overlooked in researches relevant to determine relation among cigarette smoking and cardiovascular risk (CVR) (Adhikary, 2022). In the light of this aspect, addressing this gap will help to improve pre-existing interventions and promote their effectiveness, moreover it will aid in developing new strategies to gain a control over cigarette smoking behavior as well as cardiovascular risk (CVR) and maintaining their prevention. Presently, this study is being conducted for following reasons;

Cigarette smoking is a social evil and major health hazard with adverse effect on quality of life and wellbeing of an individual. The result of this study can provide support in understanding higher chance of developing cardiovascular disease because of cigarette smoking, which can help in analyzing the dependency on cigarettes and motivations to reduce this behavior in middle-aged adults (Hargreaves, 2021).

Although there is a lot of available research on the overall connection between cigarette smoking, the cardiovascular disease (CVD), there are few studies that solely concentrate on the adult population (30-60 years old). The majority of the existing literature tends to focus on broader age groups or older populations while neglecting the way in which smoking is distinctive to cardiovascular risk in middle-aged people (Tolstrup, 2014). This age-specific evidence gap is an obstacle for the creation of focused prevention strategies for this vulnerable group. There is a lack of region-specific data especially from low- and middle-income countries such as Pakistan. Methodologically, there exist a gap for longitudinal and intervention-based research that could follow the impacts of smoking cessation on cardiovascular outcomes over time (Amin & Pokhrel, 2023). There is a lack of theoretical development of how smoking co-exists with other risk-enhancing health conditions among adults in middle age. This gap limits our knowledge about the complicated mechanisms in which smoking leads to risk of cardiovascular disease in middle-aged populations (Antypas, & Wangberg, 2014).

Despite the knowledge that smoking increases the cardiovascular risk, there is not much known about the way different levels of cigarette dependence could modify this risk and cessation at the different levels of this dependence at the middle age impacts heart health (Homko, 2008).

Method

The research sought to investigate the relation between cigarette smoking and cardiovascular risk (CVR) in adults of middle age. Relevant information was gathered using a cross-sectional survey.

Objectives

1. To investigate the relationship between cigarette smoking and cardiovascular risk (CVR) among middle-aged adults.

2. To determine whether there a significant difference among cigarette smoking and frequency in different cardiovascular conditions.

Hypotheses

1. There is a significant positive relationship between cigarette smoking and cardiovascular risk (CVR).
2. There is a significant difference in cigarette smoking among middle-aged adults with different cardiovascular conditions.

Sample

The research sample will include 200 participants. The sample will be collected from different cardiac preventive care units of Rawalpindi and Islamabad. The sampling technique used will be purposive sampling.

Inclusion Criteria

The research involved 200 participants from different cardiac preventive care units in Rawalpindi, Pakistan. Purposive sampling was used to pick participants who were already at risk for cardiovascular diseases or had experienced such health problems. The study involved only individuals who had ever smoked in order to keep the primary focus on smoking.

Exclusion Criteria

The participants who never smoked and who were not able to read and understand English as well as the participants who do not exhibit any cardiac complains were lied under the exclusion criteria.

Instruments

Following were the two key instruments utilized for this study:

1. **Cigarette Dependence Scale** (CDS-12; Etter et al., 2003) was used to measure how addicted the participants were to cigarettes. The 12 items on this scale assess different aspects of cigarette addiction, for example, the craving to smoke, controlling the urge to smoke, and choosing smoking over other things. It was rated with a five-point Likert scale and found acceptable reliability, as shown by a Cronbach's alpha of 0.78 and validity of 0.60 (Etter, Vu Duc, & Perneger, 2003).
2. **Framingham Risk Score** (FRS; Wilson et al., 1998) was utilized to assesses the risk of cardiovascular diseases by considering factors such as age, gender, cholesterol, blood pressure, smoking, and diabetes. Many studies have shown that the Framingham Risk Score is a proven and accurate way to predict the likelihood of cardiovascular disease occurring in the next ten years (Kannel et al., 1976). The researchers found the FRS in this study to have a reliability coefficient of 0.79 and validity of 0.76 for men and 0.79 for women.

After participants agreed to participate, they provided information on a demographic sheet and took the primary measures. CDS-12 and FRS. The demographic form included participant's age, gender, smoking status, how long they had smoked, and current heart disease. Participants were informed regarding purpose of the study when the assessment finished, and their responses stayed private. The data analyses were then performed in SPSS to explore if there were strong associations between cigarette use and heart risk.

Procedure

The research procedure focuses on determining the impact of cigarette smoking on probability of developing cardiovascular risk (CVR) among middle-aged adults. The study included informed consent that was taken by the participants before proceeding to the demographic sheet and administration of scales, cigarette dependence scale (CDS-12) to identify cigarette smoking behavior and framingham risk score (FRS) for cardiovascular risk (CVR). The participants took

approximately five to seven minutes to fill the questionnaire and they were assured of confidentiality. However, all the respondents were cooperative and they participated willingly and actively. Ethical clearance was obtained, and participants were informed about the goals of study. Confidentiality and anonymity were ensured from the beginning to the end of the study. Participants were told that they could leave the research without facing any consequences. We followed the university's ethics committee's standards in this study.

Results

The data of the 200 participants was analyzed using descriptive statistics, Pearson correlation, and regression analysis. The study reveals new information on the interaction between smoking cigarettes and cardiovascular risk in middle-aged adults. The study sample had 145 males (72.5%) and 55 females (27.5%), aged 30 to 54 years. Participants were separated into groups depending on their smoking habits: There were 34.5% current smokers, 36.5% former smokers, and 29% occasional smokers. The study included people who had been smoking for anywhere from less than a year to more than 20 years. Furthermore, those taking part in the study were part of cardiac preventive care programs, so they were either at risk or had been diagnosed with cardiovascular diseases.

Table 1

Descriptive Statistics for Cigarette Dependence Scale-12 and Framingham Risk Score

	A

Note: CDS-12 = Cigarette Dependence Scale-12; FRS = Framingham Risk Score; N = Number of participants; M = Mean; SD = Standard Deviation; α = Cronbach’s Alpha.

Table 1 gives the basic statistics for both key measures: the CDS-12 and the FRS variables were analyzed together. With an average of 42.12 (SD = 4.84) on the CDS-12, the participants displayed moderate to high cigarette dependence. The average FRS score of 39.61 (SD = 3.34) reveals the sample had a moderate level of cardiovascular risk. Both the CDS-12 and the FRS had Cronbach's alpha values of. The values of Cronbach's alpha, 0.78 for CDS-12 and 0.79 for FRS, mean that the measurement tools used were reliable for the research.

Table 2

Demographic Characteristics of Participants

Table 2 illustrates the demographic characteristics of the participants, including age, gender, smoking status, and cardiovascular health conditions. A majority of the participants were men (72.5%) with a significant portion in the 45-49 age group (30.0%). Smoking history was categorized as current smokers (34.5%), former smokers (36.5%), and occasional smokers (29.0%).

Table 3

Pearson Correlation between Cigarette Smoking and Cardiovascular Risk

Note: CDS-12 = Cigarette Dependence Scale-12; FRS = Framingham Risk Score; **p < 0.01.

The Pearson correlation between cigarette smoking (as measured by the CDS-12) and cardiovascular risk (as measured by the FRS) revealed a strong positive correlation ($r = 0.866$, $p < 0.01$). This indicates that cigarette dependence is strongly associated with higher cardiovascular risk, reinforcing the hypothesis that smoking exacerbates cardiovascular risk (CVR) in middle-aged adults.

Table 4

Regression Analysis for Cigarette Smoking and Cardiovascular Risk

Note: B = Unstandardized Beta; S.E = Standard Error; p = Significance Level; CI = Confidence Interval.

A linear regression analysis was conducted to examine the predictive relationship between cigarette smoking (CDS-12) and cardiovascular risk (FRS). The results indicated that smoking significantly predicted cardiovascular risk ($\beta = 0.059$, $p < 0.01$), confirming that higher levels of cigarette dependence correspond to higher cardiovascular risk.

Table 5

Mean Differences in Smoking Dependence and Cardiovascular Risk by Condition

	Men (n = 145)		Femen (n = 55)				95% CI	
Variables	M	SD	M	SD	P	T	UL	LL
CDS-12	42.06	4.70	42.32	5.24	.731	-0.34	1.25	-1.78
FRS	39.60	3.32	39.65	3.42	.918	-0.10	0.99	-1.10

Note: n = Total Number of Participants; M = Mean; SD = Standard deviation; p = Significance level i.e. <0.01; CI = Confidence interval; UL = Upper limit; LL = Lower limit; CDS-12 = Cigarette Dependence Scale; FRS = Framingham Risk Score.

An analysis of variance (ANOVA) was conducted to assess the differences in smoking dependence and cardiovascular risk across various cardiovascular conditions (arrhythmia, myocardial infarction, atherosclerosis, and coronary artery disease). The results indicated no significant differences between these groups for either the CDS-12 ($F = 0.15$, $p = 0.92$) or FRS ($F = 0.14$, $p = 0.93$), suggesting that smoking contributes similarly to cardiovascular risk across different conditions.

The results indicate that cigarette smoking is strongly associated with cardiovascular risk among middle-aged adults. Smoking cessation interventions are necessary to mitigate these risks and prevent the development of cardiovascular diseases in this population.

Discussion

The purpose of current study was to explore how cigarette smoking relates to cardiovascular risk (CVR) in middle-aged people. There is a strong relation found between cigarette smoking and cardiovascular risk (CVR), with a Pearson correlation of 0.866 ($p < 0.01$), which shows that smoking predicts higher cardiovascular risk. These results agree with previous studies that say smoking is a significant risk factor that can be changed to reduce the chance of cardiovascular risk (CVR) like myocardial infarction, stroke, and atherosclerosis (Ambrose & Barua, 2004; Buttar et al., 2005).

Although associations between smoking and cardiovascular risk (CVR) among middle-aged adults are known, this research places more emphasis on the need to target smoking in this age group. There are multiple ways smoking harms the body, including poor endothelial function, elevated blood pressure, and an increase in oxidative stress, all of which are involved in the onset and worsening of atherosclerosis (Benowitz, 2003). Our results are in agreement with earlier studies that demonstrated how smoking leads to quicker development of cardiovascular disease by disrupting these mechanisms (Yanbaeva et al., 2007). Smoking damages the endothelium, so blood flow and clotting are not regulated well, making it easier for fatty plaques to form in the arteries (Buttar et al., 2005).

The regression analysis provides more evidence that smoking plays a direct role in cardiovascular risk. The study's regression analysis showed ($\beta = 0.059$, $p < 0.01$) that more dependence on

cigarettes, as measured by the CDS-12, leads to higher scores for cardiovascular risk on the FRS. These outcomes support the idea that smoking is a significant risk factor for heart disease, as other studies have found as well (Kannel et al., 1976; Critchley & Capewell, 2003).

It was surprising to find that the level of smoking dependence and cardiovascular risk did not differ across heart conditions such as arrhythmia, myocardial infarction, and atherosclerosis. Smoking influenced arrhythmia, myocardial infarction, and atherosclerosis in a similar fashion, despite how they are different. Such results are in line with the concept that smoking acts as a general risk factor for CVD by affecting various pathways, especially lipid oxidation, inflammation, and endothelial damage (Greenland et al., 2003). As a result, it shows that smoking cessation campaigns should aim at all at-risk individuals, instead of being designed for a particular condition. According to this study, supporting people to quit smoking as early as possible may reduce the long-term harm smoking causes to their hearts. Besides, the study suggests that specially designed cessation programs are needed for middle-aged adults. Earlier studies have found that quitting smoking can make a big difference in reducing heart disease, and this holds for people who quit at older ages (Critchley & Capewell, 2003).

Conclusion

It was found in this study that the study participants exhibited a range of cardiovascular conditions, including arrhythmia (23.0%), myocardial infarction (25.5%), atherosclerosis (23.5%), and coronary artery disease (28.0%). Smoking cigarettes raises the likelihood of cardiovascular problems in middle-aged adults. The results show that the more a person depends on cigarettes, the greater their chance of developing heart-related diseases. These findings also highlighted the significance of having programs relevant to smoking cessation designed for middle-aged adults to help lower their risk for cardiovascular diseases. Stopping smoking is an important way to boost cardiovascular health, regardless of how long someone has smoked. As smoking has a similar impact on different types of cardiovascular disease, it is necessary for interventions to target smoking reduction in everyone at risk.

Limitations

The sample in the study is predominantly composed of men, which introduces a gender imbalance and limits the generalizability of the findings to women. Additionally, the use of a cross-sectional design restricts the ability to draw conclusions about causality between the variables studied. The reliance on self-reported data also raises concerns about the potential influence of recall bias and social desirability bias, which can compromise the accuracy of the responses. Furthermore, the study did not utilize objective biomarkers to clinically confirm the reported diagnoses, which may affect the reliability of the findings.

Implications

The findings highlight the need for targeted public health programs aimed at addressing smoking among middle-aged populations. Implementing routine cardiovascular screening initiatives is essential, particularly by utilizing scalable tools such as the Framingham Risk Score to support smoking cessation efforts. It is important for physicians to avoid assuming that smoking is associated only with specific cardiovascular conditions. Instead, smoking habits should be carefully assessed in all individuals with any form of cardiac disease or those at risk, and they should be provided with evidence-based counseling or treatment options to support quitting.

Recommendations

Future studies should examine how stopping smoking affects cardiovascular risk over time, especially by including more diverse groups of people. This work adds to our insights of the cigarette smoking and heart disease relationship, giving public health policy-makers key evidence. To establish causality and track changes in risk over time, it is essential to conduct longitudinal

studies. Incorporating clinical diagnostics and objective biomarkers, such as coronary CT angiography, lipid profiles, and electrocardiograms (ECGs), would enhance the accuracy of findings. Future research should also aim to include samples that are demographically and gender-balanced to improve the generalizability of results. Additionally, it is important to explore the moderating effects of factors such as comorbidities, socioeconomic status, and levels of physical activity to gain a more comprehensive understanding of the variables influencing outcomes.

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