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The Factors Relating To Smoking And diabetes Mellitus Which Is Associated To increased mortality And Morbidity: A Study In Guandong, China

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Abstract

When compared to the rest of the world, the prevalence of diabetes and cigarette smoking was much higher in China. In Guangdong Province, 34.08% of the population smokes, compared to 34.17% nationally. More than 20.8% of the Chinese population is diabetic as of today. The projected global population growth by 2030 is 42.3 million. The increasing number of people smoking, and the devastating number of people diagnosed with diabetes are two of the biggest issues in China's public health system. There have been few case control studies in China investigating the link between cigarette smoking and diabetes (Ko GT. et al., Hong Kong; Chan AM. et al., Jiangxi). Both studies demonstrated a correlation between smoking and diabetes, and the case control study also discovered a dose-response relationship between daily cigarette use and DM; however, further investigation into the long-term effects of smoking exposure and the relationship between smoking and other risk factors is necessary. This study aims to determine whether cigarette smoking is a risk factor for developing diabetes. Cigarette smoking is associated with an increased risk of getting diabetes, according to many studies.

Keywords: *Prevalence, Diabetes, Control study, Smoking.*

1. INTRODUCTION

Cigarette smoking is a primary cause of death and a major risk factor for disease, making it a major concern for public health. In China, the prevalence of diabetes mellitus has skyrocketed in the last decade. Furthermore, younger generations are being struck by diabetes at an earlier stage than prior generations (Attard R, 2017). An increased risk of cardiovascular disease, renal failure, and retinopathy is associated with this syndrome. The exact causal relationship between smoking and diabetes mellitus remains debatable, however there is some evidence linking the two" .(Hu Y, 2018). As per the researcher who searched for "smoking and diabetes" in PubMed, several large-scale prospective studies on the prevalence of diabetes (19/9867 results) identified cigarette smoking as a potential risk factor. Due to the lack of consensus on what constitutes diabetes mellitus (DM), the vast majority of these research failed to draw any conclusions on the relationship between smoking and the disease. However, a small number of these studies did discover that DM was more common in men and women who smoked cigarettes.

2. BACKGROUND OF THE STUDY

There is a correlation between cigarette smoking and impaired glucose and lipid metabolism in both diabetics and non-diabetics (Nakamura M, 2021). A more than ten-year period of study has been conducted to explore the metabolic effects of smoking. Researchers discovered for the first time that young men who were otherwise healthy had a lower insulin sensitivity after they had smoked for a short period of time (Walicka M, 2022). In a study that compared the insulin sensitivity of smokers and non-smokers, Facchini and colleagues discovered that smokers had significantly lower insulin sensitivity readings, ranging from 10% to 40% at the time of the study. Eliasson et al. shown that the level of insulin resistance that is linked with cigarette usage is related to the quantity of cigarettes that are consumed. Additionally, Eliasson and colleagues discovered that eight weeks after quitting smoking, the insulin resistance of smokers restored to normal levels.

3. PURPOSE OF THE RESEARCH

Cigarette smoking and diabetes were two conditions that were much more prevalent among the Chinese population compared to the rest of the globe. In Guangdong Province, 34.08 percent of individuals have reported that they smoke, which is higher than the national average of 34.17 percent, according to studies conducted throughout the country (Feodoroff M, 2016) . There are now more than 20.8 million individuals in China who are diagnosed with diabetes. The population of the world is projected to reach 42.3 million by the year 2030. In China, diabetes and tobacco smoking are quickly becoming two of the most critical public health issues the country now faces. A very small number of research have investigated the relationship between smoking cigarettes and developing diabetes in the Chinese community (Ko GT. et al., Hong Kong) or in case control (Chan AM. et al., Jiangxi and other studies). Despite the fact that both studies discovered a connection between smoking cigarettes and diabetes, the case control study discovered a dose-response relationship between daily cigarette use and diabetes. However, additional research is required to determine the long-term effects of smoking exposure and the connection between smoking and other risk factors (Xia J, 2017). Our research aims to establish whether or not smoking is a factor that contributes to the development of diabetes. At different degrees of smoking exposure, it was discovered that there was a correlation between the quantity of cigarettes smoked and the chance of developing diabetes.

4. LITERATURE REVIEW

Tobacco use compromises glucose and lipid metabolism in people with and without diabetes. Researchers have been looking at the metabolic effects of smoking for over ten years. Acute smoking decreased insulin sensitivity in otherwise healthy young men, according to experts. This is the first time this has been reported. Researchers Facchini et al. discovered that insulin sensitivity was 10% to 40% lower in smokers compared to non-smokers. Eliasson et al. also shown that the insulin resistance level linked to cigarette smoking varied with dosage. Additionally, Eliasson et al. discovered that insulin resistance in smokers normalised eight weeks after they stopped smoking (Ohkuma T 2016). Multiple biological mechanisms account for the association between cigarette smoking and insulin resistance. Rimm et al. found that cigarette smoking causes direct harm to pancreatic cells and changes the distribution of body fat. Research conducted by Shepherd et al. suggests that the chemical components found in tobacco smoke have the potential to influence intracellular glucose transport in both direct and indirect ways. Finally, research indicated that triglyceride and free fatty acid levels in the blood were both increased in cigarette smokers (Kondo T, 2019). But the bulk of studies have shown no link

between smoking and insulin sensitivity. Because women use less tobacco, Godsland and Walton were able to determine that insulin sensitivity was unaffected by smoking compared to nonsmoking women.

5. RESEARCH QUESTIONS

• Is there a correlation between cigarette smoking and type 2 diabetes in Guangdong, China, among males and females?

6. RESEARCH METHODOLOGY

Participating in general hospitals in Guangdong (Guangzhou, Foshan, Dongguan, Zhanjiang, and Maoming) will be part of a case-control study. The goal of the three-year study, which will begin in 2020, is to gather as much data as possible. To evaluate the "relative risk" of acquiring diabetes for lifetime smokers, the odds ratio (OR) will be used, because the main objective of this study is to find out whether cigarette smoking increases the likelihood of developing diabetes.

7. RESEARCH DESIGN

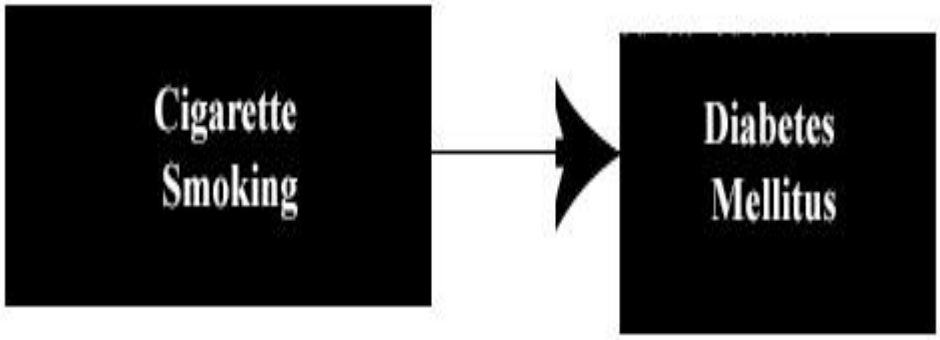
Participants must have a recent diagnosis of diabetes mellitus (within the previous two years) in order for the study to be valid. To identify instances, use the World Health Organization's 1998 criteria, which are FPG 7.0 mmol/L and/or OGTT 11.1 mmol/L. Everyone who needed it had their fasting plasma glucose levels checked. The existence of new patients was confirmed by repeated fasting plasma glucose or 75-gram oral glucose tolerance tests (OGTTs). Patients who had already confirmed their diagnosis prior to the commencement of the present study did not need these tests

8. DATA ANALYSIS

Researchers found that cigarette smokers were more likely to get diabetes mellitus, regardless of gender. A person's chance of acquiring diabetes mellitus increases with the number of pack-years of exposure, the number of cigarettes smoked daily, and the length of time a person has smoked. Age, BMI, diastolic blood pressure, gender, activity level, family history of diabetes, and alcohol consumption were all considered as modifiers, but these correlations persisted even after their removal.

Our results are consistent with those of most prior prospective epidemiological research that defined smoking exposure as daily tobacco or cigarette usage. 1-8 In 1989, Feskens EJ. and Kromhout D. found that the incidence of diabetes was four times greater in men who smoked twenty cigarettes or more per day. 1 There was a 1.42 (95% CI: 1.18 - 1.72) relative risk between nonsmokers and women who smoked 25 cigarettes daily among the 114,247 women who were followed for 8 years in the Nurses' Health Study. 2 Subsequently, the results for both sexes were consistent in a cross-sectional analysis that compared EPIC-Norfolk cohort 6 with the Cancer Prevention analysis I 5. A positive connection between cigarette smoking and type 2 diabetes was reported in four investigations (7-10), including two cohort studies, one case control study, and one cross-sectional examination; however, data on the Asian population is sparse. There was a dose-response relationship between total cigarette smoking and diabetes risk in three of these investigations (7, 8, 10). Case-control research was one of them. It was carried out in Jiangxi, China.

Conceptual Framework of the Study



9. RESULTS

During the course of the research, there were a total of 438 individuals, including 220 controls and 218 cases. All of the people who served as controls did not suffer from any of the conditions that may be associated with smoking, such as chronic bronchitis, heart disease (including hypertension), or cancer. It was determined by medical authorities that hypertension was present in sixty-two of the cases. Based on the data shown in Table 3.1, it can be seen that the controls and the cases had similar demographic characteristics, including gender, mean age, and level of education. Over sixty percent of the people that took part in the study were male. According to the standard deviation, the average age of the controls was 54.35 years old, whereas the average age of the cases was 54.75 years old. At least one year of high school education was completed by the vast majority of those who took the examination. However, as compared to controls who did not have diabetes, individuals who had diabetes mellitus had a significantly higher likelihood of becoming smokers (57.8% vs 42.2%). Furthermore, the patients had a greater frequency of both drinking and diabetes in their families (22.2% vs 5.5%). This was the case across the whole population. In comparison to persons who did not have diabetes, those who did have diabetes had a significantly higher body mass index (mean: 23.8kg/m2 against 22.6kg/m2) and participated in much less physical activity on a daily basis (36.7% versus 20.0% during the first thirty minutes of the day). Furthermore, the average blood pressure of the subjects was substantially higher than that of the control group (135.5/83.2 mm Hg as opposed to 125.6/75.6 mm Hg). After excluding the 62 individuals who had been diagnosed with hypertension by a medical professional, the difference in blood pressure was no longer statistically significant.

"Table 1: Comparison of characteristics between controls and cases"

Characteristics	Controls		Cases		P-value
	N = 220		N = 218		t test or χ^2
Mean (SD)					
Age (years)	54.3	(5.8)	54.7	(6.6)	0.45
Body mass index (kg/m^2)	22.6	(1.8)	23.8	(2.6)	< 0.001
Blood pressure (mm Hg)					
Systolic	125.6	(6.2)	135.5	(16.0)	< 0.001
Diastolic	75.6	(5.0)	83.2	(12.8)	< 0.001
Blood pressure (mm Hg)†					
Systolic	125.6	(6.2)	126.3	(5.8)	0.23
Diastolic	75.6	(5.0)	75.9	(4.6)	0.59
Per cent (N)					
Gender					0.79
Female	36.4%	(80)	37.6%	(82)	
Male	63.6%	(140)	62.4%	(136)	
Education level					0.71
College or above	14.5%	(32)	16.5%	(36)	
Secondary school level	47.3%	(104)	43.6%	(95)	
Primary or below	38.2%	(84)	39.9%	(87)	
Physical activities					< 0.001
≤ 30 minutes/day	20.0%	(44)	36.7%	(80)	
31 to 180 minutes/day	43.6%	(96)	50.0%	(109)	
≥ 181 minutes/day	36.4%	(80)	13.3%	(29)	
Family History of DM					0.005
No	95.5%	(210)	88.1%	(192)	
Yes	4.5%	(10)	11.9%	(26)	
History of cigarette smoking					< 0.001
No	74.1%	(163)	42.2%	(92)	
Yes	25.9%	(57)	57.8%	(126)	
History of alcohol drinking					< 0.001
No	94.5%	(208)	78.8%	(170)	
Yes	5.5%	(12)	22.2%	(48)	

Note: DM = diabetes mellitus

† 62 cases with doctor diagnosed hypertension excluded.

Table 2: contains a list of potential risk factors for diabetes mellitus, together with the odds ratios for each of these variables, both in their crude and adjusted forms. In order to determine the age ranges, the median age was set at 55 years old. For the purpose of categorising individuals in accordance with their desired level of physical activity, the World Health Organisation (WHO) set benchmarks of 120/80 mmHg for optimal blood pressure and 30 minutes per day of regular physical exercise.1/ 2 A body mass index (BMI) of 25.0 kg/m2 was determined to be the threshold for obesity among Asians.3) A crude odds ratio that was 3.92 times higher was related with smoking, with a 95% confidence interval ranging from 2.61 to 5.87. However, after all other risk factors were taken into consideration, the odds ratio for cigarette smoking climbed from 3.81 to 13.16. In addition, the following are some other important adjusted odds ratios: 2.18 (95% confidence interval: 1.28 – 3.69), for those aged 55 and older, and 0.28 (95% confidence interval: 0.12 – 0.62) for individuals with an education level comparable to a secondary school diploma. 3.66 (95% confidence interval: 1.83 – 7.33), for a body mass index of 25.0 and higher, and 1.95 (95% confidence interval: 1.13 – 3.36), with a diastolic blood pressure of 80 mmHg and higher. 2.9 (nine) It is possible that the observed link with blood pressure was caused by the fact that people with hypertension were not included in the control group. It was not shown that having diabetes in the family or having high systolic blood pressure was associated with the development of diabetes mellitus. Based on these data, it was determined that the observed link may have been caused by variables other than diabetes mellitus and smoking cigarettes. The following are some other parameters that were considered: gender, age, degree of education, body mass index, diastolic blood pressure, frequent physical activity, and alcohol use. On the other hand, there is no evidence

that can be linked to the use of tobacco-25. As a consequence of this, researchers investigated the effects that smoking had on smokers.

In accordance with the findings shown in Table 3.3, the odds ratio (OR) for smoking was 20.36, with a 95% confidence interval ranging from 10.77 to 38.46. Compared to those who did not smoke, smokers were often older, heavier, and less active than non-smokers. Individuals who had never smoked demonstrated higher diastolic blood pressure and a higher incidence of alcohol usage as compared to those who had never smoked. Furthermore, it was shown that a greater proportion of smokers (13.1% vs 4.7%) had a family who was diabetic. While there was a significant difference in systolic blood pressure, there was also no significant difference in the distribution of educational attainment between present smokers and past smokers.

These data provided support for the hypothesis that smoking was a confounding factor in the connection between diabetes mellitus (the outcome) and other factors such as age, weight, blood pressure, physical activity, diabetes in the family, and alcohol intake. According to the results of the logistic regression analysis, the updated final model is shown in Table 3.4. The adjusted odds ratio for smoking remained statistically significant at 6.16 (95% confidence interval: 3.39 – 11.19), despite the fact that it had decreased.

Risk Factors	Number (controls/ cases)		Crude OR (95% CI)	Adjusted OR* (95% CI)
Gender				
Female	80/	82	1.00	1.00
Male	140/	136	0.95 (0.64 – 1.40)	0.17 (0.09 – 0.32) [b]
Age (years)				
< 55	113/	92	1.00	1.00
≥ 55	107/	126	1.45 (0.99 – 2.11)	2.18 (1.28 – 3.69) *
Education level				
College or above	32/	36	1.00	1.00
Secondary school level	104/	95	0.92 (0.52 – 1.62)	0.28 (0.12 – 0.62) *
Primary or below	84/	87	0.81 (0.47 – 1.41)	0.53 (0.26 – 1.05)
Body mass index (kg/m2)				
< 25.0	205/	159	1.00	1.00
≥ 25.0	15/	59	5.07 (2.77 – 9.27)*	3.66 (1.83 – 7.33) [b]
Systolic blood pressure (mm Hg)				
< 120	34/	19	1.00	1.00
≥ 120	186/	199	1.91 (1.06 – 3.47) *	1.48 (0.75 – 2.95)
Diastolic blood pressure (mm Hg)				
< 80	180/	131	1.00	1.00
≥ 80	40/	87	2.99 (1.93 – 4.63) [b]	1.95 (1.13 – 3.36) *
Physical activities (min/day)				
≥ 30	201/	169	1.00	1.00
< 30	19/	49	3.07 (1.74 – 5.41) [b]	2.10 (1.05 – 4.18) *
Family history of DM				
No	210/	192	1.00	1.00
Yes	10/	26	2.84 (1.34 – 6.05)*	1.77 (0.74 – 4.20)
History of cigarette smoking				
No	163/	92	1.00	1.00
Yes	57/	126	3.92 (2.61 – 5.87) [b]	7.08 (3.81 – 13.16) [b]
History of alcohol drinking				
No	208/	170	1.00	1.00
Yes	12/	48	4.89 (2.52 – 9.51) [b]	4.90 (2.19 – 10.95) [b]

Note: CI = confidence interval; DM = diabetes mellitus.

* All factors were mutually adjusted in the model.a p value < 0.05

b p value < 0.001

Table 3: Association between risk factors and diabetes mellitus" (" Crude and adjusted odds ratios")

10. DISCUSSION

Research has shown that cigarette smoking increases the chance of acquiring diabetes mellitus in both men and women. A person's chance of acquiring diabetes mellitus increases with the number of pack-years of exposure, the number of cigarettes smoked daily, and the length of time a person has smoked. Consideration of possible modifiers, including participants' genders, ages, BMIs, diastolic blood pressures, levels of physical activity, family history of diabetes, and alcohol consumption, did not alleviate these correlations.

Consistent with previous large prospective epidemiological studies, our results show that smoking exposure is defined as daily tobacco or cigarette use.1–8 Researchers Feskens EJ. and Kromhout D. found in 1989 that men who smoked twenty cigarettes or more per day were four times as likely to develop diabetes.1 Among 114,247 women followed for 8 years in the Nurses' Health Study, the relative risk for those who smoked 25 cigarettes daily was 1.42 (95% CI: 1.18 – 1.72) as compared to nonsmokers.2 Consistent with subsequent cross-sectional studies in the Cancer Prevention Study I–5 and EPIC-Norfolk cohort 6, the results were similar for both sexes. Two cohort investigations, a case control study, and a cross-sectional inquiry all found a positive association between cigarette smoking and diabetes mellitus (7–10). Three of them, including a case-control study in Jiangxi, Mainland China, found a dose-response relationship between exposure and risk (7, 8, 10).

11. CONCLUSION

The risk of diabetes in men and women who smoke cigarettes in Guangdong Province. The research demonstrated that the risk of developing diabetes mellitus was dose-dependently enhanced by smoking cigarettes. These associations are too strong to be explained by random chance. They continued even after accounting for potential confounding demographic variables such as age, gender, BMI, blood pressure, level of physical activity, and alcohol use. Optimal diabetes care requires a multi-faceted approach, one of which is the support of smoking cessation. (Hu Y, 2018)

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