

ASSOCIATION BETWEEN SMOKING STATUS AND RANDOM BLOOD GLUCOSE LEVELS AMONG EMPLOYEES IN GADING SUBDISTRICT

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ABSTRAK

Prevalensi perokok di Indonesia terus mengalami peningkatan setiap tahunnya, yang berdampak pada meningkatnya risiko berbagai penyakit akibat kebiasaan merokok. Salah satu penyakit yang berkaitan dengan rokok adalah diabetes melitus. Kandungan nikotin dalam rokok diketahui dapat mengganggu kerja insulin sehingga memicu peningkatan kadar glukosa darah. Selain itu, nikotin juga dapat menekan nafsu makan sehingga berpotensi menurunkan kadar glukosa darah atau menyebabkan hipoglikemia. Penelitian ini bertujuan untuk mengetahui hubungan antara status merokok dengan kadar glukosa darah sewaktu pada pegawai di Kelurahan Gading, Tambaksari, Surabaya. Penelitian menggunakan desain observasional analitik dengan pendekatan *cross sectional*. Data primer diperoleh melalui kuesioner Fagerström Test for Nicotine Dependence dan pemeriksaan kadar glukosa darah menggunakan alat *Accu-Chek*. Teknik pengambilan sampel adalah *consecutive sampling* dengan jumlah responden sebanyak 100 orang. Uji normalitas dilakukan dengan Kolmogorov-Smirnov, sedangkan analisis bivariat menggunakan uji *Spearman rank correlation* dengan tingkat signifikansi $\leq 0,05$. Hasil penelitian menunjukkan nilai *p-value* 0,004 dengan koefisien korelasi 0,28, yang mengindikasikan adanya hubungan positif dan cukup antara status merokok dengan kadar glukosa darah sewaktu. Temuan ini menegaskan bahwa kebiasaan merokok berkontribusi terhadap peningkatan kadar glukosa darah pada pegawai di Kelurahan Gading.

Kata Kunci: Hipoglikemia, Hiperglikemia, Merokok

ABSTRACT

*Smoking prevalence in Indonesia continues to increase annually, contributing to a higher incidence of smoking-related diseases. One condition associated with smoking is diabetes mellitus, as nicotine interferes with insulin function and may elevate blood glucose levels. Conversely, nicotine can also suppress appetite, potentially leading to hypoglycemia. This study aimed to examine the association between smoking status and random blood glucose levels among employees in Gading Subdistrict, Tambaksari, Surabaya. An analytical observational study with a cross-sectional design was conducted. Primary data were collected using the Fagerström Test for Nicotine Dependence and random blood glucose measurement with an Accu-Chek device. Sampling was performed using consecutive sampling, involving 100 respondents. Normality testing was conducted with the Kolmogorov-Smirnov test, and bivariate analysis was performed using Spearman's rank correlation with a significance level of ≤ 0.05 . The results showed a *p-value* of 0.004 and a correlation coefficient of 0.28, indicating a positive and moderate relationship between smoking status and random blood glucose levels. These findings suggest that smoking behavior contributes to increased blood glucose levels among employees in Gading Subdistrict. The study highlights the importance of smoking cessation*

programs and workplace health interventions to reduce the metabolic risks associated with smoking.

Keywords: *Hypoglycemia, Hyperglycemia, Smoking*

INTRODUCTION

The prevalence of smoking among men worldwide remains high, and tobacco consumption continues to pose serious health risks to both smokers and individuals exposed to secondhand smoke¹. National surveys in Indonesia have consistently reported substantial smoking prevalence: 34.2% in 2007, 34.7% in 2010, 36.3% in 2013, and 33.8% in 2018². Smoking is associated with multiple health problems, including disturbances in blood glucose regulation. Nicotine suppresses appetite, leading to reduced food intake and irregular eating patterns, which may result in hypoglycemia^{3,4}. Hypoglycemia, defined as blood glucose levels below 70 mg/dL, is a clinical emergency that can cause severe complications and even death if untreated. Conversely, smoking has also been linked to hyperglycemia and diabetes mellitus, with random blood glucose levels ≥ 200 mg/dL serving as diagnostic criteria^{5,6}. Previous studies have demonstrated that smoking increases the risk of diabetes through oxidative stress, impaired glucose homeostasis, and insulin resistance^{7,8}. Obesity further amplifies this risk, with individuals having a 47.4% higher likelihood of developing diabetes mellitus⁹.

Employees represent a vulnerable group, as smoking prevalence among Indonesian workers was reported at 33.6%². Smoking-related alterations in blood glucose may impair employee performance, potentially disrupting economic productivity¹⁰. Gading Subdistrict, Tambaksari, Surabaya, is the most densely populated area in the city, where social interactions may reinforce smoking behavior¹¹.

Unlike previous studies that focused broadly on smoking and diabetes risk, this research specifically investigates the association between smoking status and random blood glucose levels among employees in Gading Subdistrict, a high-density urban area. The hypothesis proposed is that smoking status is positively associated with elevated random blood glucose levels.

The objective of this study is to determine the relationship between smoking status and random blood glucose levels among employees in Gading Subdistrict. The findings are expected to provide evidence-based information for health education, workplace interventions, and smoking cessation programs, thereby contributing to improved employee health and economic productivity.

METHODS

This study employed an analytical observational design with a cross-sectional approach. The sampling technique used was consecutive sampling, in which all subjects who met the inclusion criteria and were willing to participate were enrolled until the required sample size was achieved. Data collection was conducted in Gading Subdistrict, Surabaya, and the study protocol was approved by the Ethics Committee of the University of Surabaya (Approval No. 114/KE/X/22).

The study population consisted of employees residing in Gading Subdistrict who met the inclusion and exclusion criteria. Inclusion criteria included employees domiciled in Gading Subdistrict who were smokers and provided informed consent by signing the approval form. Exclusion criteria were female gender, ongoing medical treatment with drugs affecting blood glucose

levels, chronic alcohol consumption, history of diabetes mellitus, chronic liver or kidney disease, eating frequency less than three times per day, and obesity (BMI > 30).

Random blood glucose levels were measured using an *Accu-Chek* device, and smoking status was assessed using the Fagerström Test for Nicotine Dependence. Data analysis began with the Kolmogorov-Smirnov test to assess normality. If the data were normally distributed, Pearson's correlation test was applied; otherwise, Spearman's rank correlation was used. Bivariate analysis was performed with a significance level of ≤ 0.05 to determine the association between smoking status and random blood glucose levels.

RESULTS AND DISCUSSION

RESULTS

Table 1. Smoking Status and Age of Respondents

Smoker type	Age (Mean $\pm$ SD)	p*)
Light smoker	28.95 $\pm$ 6.54	0.432
Moderate smoker	30.73 $\pm$ 6.31	
Heavy smoker	30.5 $\pm$ 8.67	

*)Uji Anova

Based on Table 1, it is shown that regarding the age factor among the three smoking groups, after conducting ANOVA testing, a *p-value* greater than 0.05 was obtained. This indicates that the three groups are homogeneous in terms of age.

Table 2. Analysis of Smoking Status and Random Blood Glucose Levels Among Employees in Gading Subdistrict

Smoker type	Blood Glucose (Mean $\pm$ SD)	p**)
Light smoker	92.28 $\pm$ 13.79	0.017
Moderate smoker	103.25 $\pm$ 25.56	
Heavy smoker	147.13 $\pm$ 86.24	

**) Uji Kruskal Wallis

Based on Table 2, it is shown that regarding blood glucose levels among the three groups, the Kruskal-Wallis test revealed a significant difference ($p = 0.017$). The heavy smoker group had the highest mean blood glucose level.

Table 3. Spearman's Correlation Test Between Smoking Status and Random Blood Glucose Levels

Smoker type	Random Blood Glucose Level (Mean $\pm$ SD)	p	Correlation Coefficient
Light smoker	92.28 $\pm$ 13.79	0.004	0.28
Moderate smoker	103.25 $\pm$ 25.56		
Heavy smoker	147.12 $\pm$ 8		

The statistical test results in Table 3 (with a significance level of 0.05 or 5%) indicate the presence of a significant relationship. It can therefore be concluded that there is an association between smoking status and random blood glucose levels among employees in Gading Subdistrict. The correlation coefficient of 0.28 suggests a moderate relationship with a positive direction.

DISCUSSION

Based on Table 1, the majority of respondents categorized as smokers were within the age range of 25–34 years. This finding indicates that most employees belong to the productive age group, which is part of the workforce that directly influences productivity and health. This result is consistent with data from the Central Bureau of Statistics of East Java Province, which reported that the largest proportion of respondents was in the early adulthood

category (34.6%)¹¹. According to Asmara (2018), several factors explain why individuals aged 26–35 years have the highest smoking prevalence (53%). At this age, individuals begin working and earning independently, while psychological factors such as work-related stress and adaptation to new social environments may encourage the initiation of smoking habits¹².

Table 2 shows that heavy smokers had the highest mean random blood glucose levels. This finding aligns with studies conducted by Pelle, Pondaag, & Bataha (2013) and Soewondo (2011), both of which used cross-sectional designs in Indonesia and demonstrated that smoking status influences blood glucose levels¹³. Cigarettes contain numerous harmful substances, with nicotine being the most abundant. Nicotine has been shown to damage pancreatic beta cells, leading to insulin resistance⁷.

Table 3 presents the results of Spearman's correlation analysis, which revealed a *p-value* of 0.004, indicating a significant relationship between smoking status and random blood glucose levels. The correlation coefficient of 0.28 suggests a moderate positive association. This finding is consistent with research conducted in Mataram, which reported a significant relationship between smoking and blood glucose levels¹⁴. Similarly, Alpionita (2017), using the GOD-PAP method and Spearman's test, found a weak but significant correlation ($p = 0.012$, $r = 0.461$)¹⁵.

Taken together, these findings and supporting literature confirm that smoking contributes to elevated blood glucose levels. Continuous smoking behavior increases the risk of developing diabetes mellitus. The final conclusion of this study is that smoking status is significantly associated with random blood glucose levels among employees residing in Gading Subdistrict, Tambaksari, Surabaya.

CONCLUSION

There is a relationship between smoking status and random blood glucose levels, with the results showing that the higher the level of smoking intensity, the higher the random blood glucose levels.

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