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The Overview of Smoking on Clotting Time Results Among Students of Politeknik Piksi Ganesha

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Abstract

The World Health Organization (WHO) in 2019 stated that smoking is one of the biggest challenges in global health, as it causes approximately 6 million deaths worldwide each year. One of the effects of smoking is an increase in plasma homocysteine levels. This study is an analytical study with a cross-sectional design using quota sampling technique. The research sample consisted of students from Politeknik Piksi Ganesha aged 20-25 years who were active smokers. The study used the Lee-White method to measure blood clotting time. According to the results, it can be concluded that the blood clotting time among smoking students at Politeknik Piksi Ganesha tends to be shorter, with 18 out of 30 samples (60%) showing a shortened clotting time, while the remaining 12 samples (40%) exhibited normal clotting times. This study emphasizes that smoking is a major factor that can affect the body's hemostatic system, potentially leading to prolonged clotting time.

Keywords: *Clotting time, smoking, blood, plasma homocysteime, hemostatic*

1. Introduction

The smoking habit practiced by society has detrimental effects on both smokers and those exposed to secondhand smoke. According to the World Health Organization (WHO) in 2019, smoking is considered one of the most significant health challenges today, causing 6 million deaths worldwide annually. Data released by the Indonesian Ministry of Health in 2015 reported that smoking causes approximately 57,000 deaths annually in Indonesia. If this trend continues and persists, it is estimated that by 2030, smoking-related deaths will reach approximately 10 million per year globally, accounting for around 70% of all smoking-related deaths, including those in developing countries like Indonesia.

F.A. Moeloek, the National Tobacco Control Commission Chair, stated that Indonesia has the highest number of smokers in the ASEAN region. According to the ASEAN Tobacco Control Report in 2007, the total number of smokers in ASEAN was recorded at 124.691 million, with Indonesia contributing the largest portion, amounting to 57.563 million people or approximately 46.16% of all smokers in the region (Sundari S. Wijaya, 2015).

This study found that active smokers have shorter blood clotting times during coronary angiography. This alteration is attributed to increased pro-coagulant activity triggered by nicotine and other toxic substances in cigarettes. The findings highlight that

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smoking directly affects blood coagulation mechanisms, potentially increasing the risk of vascular complications (Smith, 2020).

This study identified that smokers have higher levels of LDL cholesterol and triglycerides, as well as increased blood pressure. These factors worsen blood lipid profiles and elevate the likelihood of hemostatic disorders, particularly faster blood clotting. Furthermore, smokers are at a higher risk of thrombotic complications compared to non-smokers (Brown, 2019).

Smoking is known to increase arterial plaque formation and accelerate platelet aggregation, which results in faster blood clotting times. This article emphasizes that the cumulative effects of long-term smoking significantly heighten the risk of atherosclerosis and severe thrombotic complications (Johnson, 2018). This study found that the chemicals in cigarette smoke cause significant changes in coagulation factor activity, including increased fibrinogen and thrombin levels. These effects result in shorter blood clotting times among active smokers, elevating the risk of coagulation disorders (Williams, 2021).

This study demonstrates that quitting smoking significantly reduces fibrinogen levels in the blood, which can help normalize blood clotting time. This highlights the substantial benefits of smoking cessation in lowering the risk of thrombotic complications (Taylor, 2019). Additionally, similar findings have been noted in other studies, which emphasize that cessation can improve coagulation profiles and reduce overall cardiovascular risks (Adams, 2020).

Exposure to cigarette smoke among passive smokers increases the risk of thrombosis by disrupting coagulation parameters. This effect shows that not only active smokers but also those exposed to secondhand smoke can experience hemostatic disturbances. Studies indicate that passive smoking can alter blood coagulation factors, similar to the impacts observed in tactive smokers (Davis et al., 2020; Brown et al., 2019). This highlights the broader impact of smoke exposure on cardiovascular health and coagulation processes in non-smokers as well.

This article shows that smoking accelerates platelet aggregation, leading to faster blood clotting times and an increased risk of thromboembolism. The exposure to chemicals in cigarette smoke also affects endothelial function, worsening hemostatic disorders. Studies have demonstrated that cigarette smoke's toxic components directly influence coagulation processes by altering the balance of coagulation factors, which can predispose individuals to clotting disorders and cardiovascular complications (Clark et al., 2016; Williams et al., 2021). This underscores the significant impact of smoking on both blood coagulation and endothelial health, contributing to the overall risk of thrombotic events.

This study notes that toxic substances in cigarettes, such as cadmium and lead, affect blood parameters, including coagulation. These substances worsen the risk of hypercoagulability by altering the structure of fibrinogen and enhancing platelet aggregation. This disruption to the blood's hemostatic system can lead to an increased tendency for clot formation, contributing to cardiovascular risks and thrombotic complications (Wilson et al., 2015; Clark et al., 2016). The accumulation of these toxic elements in the bloodstream is a critical factor in the development of cardiovascular diseases related to smoking.

This study explains that smoking directly causes endothelial dysfunction, increased oxidative stress, and alterations in blood coagulation mechanisms. As a result, there is a shorter blood clotting time and an increased risk of thrombosis. Smoking-induced changes in

the endothelial cells and the disruption of the normal balance in coagulation factors accelerate clot formation, making smokers more susceptible to thrombotic events (Mitchell, 2020). These findings align with earlier research on how smoking accelerates thrombus formation and exacerbates cardiovascular risk (Clark et al., 2016; Brown et al., 2019).

This study shows that smokers have higher plasma homocysteine levels, which accelerate blood clotting time and increase the risk of thrombotic complications. This effect contributes to a greater cardiovascular health risk for active smokers (Evans, 2018). Elevated homocysteine levels are associated with endothelial dysfunction and platelet aggregation, which can lead to faster clot formation and a higher likelihood of cardiovascular events. These findings align with other studies linking smoking to increased thrombosis risk and poor cardiovascular outcomes (Wilson et al., 2015; Mitchell et al., 2020).

This study found that gradually quitting smoking restores coagulation parameters such as fibrinogen and platelet aggregation. Blood clotting time (clotting time) shows improvement within several months after smoking cessation, with a significant change in thrombotic risk compared to active smokers (Adams, 2019). The results suggest that smoking cessation has a positive impact on the body's hemostatic system, reducing the risk of complications like thrombosis. These findings are consistent with other studies that show that quitting smoking can lead to improved cardiovascular health and a lower risk of thrombotic events (Taylor et al., 2019; Wilson et al., 2018).

This article discusses how smoking increases the risk of thrombosis by reducing antithrombin activity, stimulating platelet aggregation, and raising fibrinogen levels. These effects result in a shorter blood clotting time in active smokers compared to non-smokers (Carter, 2020). These findings align with other research indicating that smoking accelerates clot formation and disrupts normal hemostatic balance, increasing susceptibility to thrombotic complications (Evans et al., 2018; Mitchell et al., 2020). The alterations in coagulation factors caused by smoking contribute to a higher risk of cardiovascular and vascular diseases.

This study shows that exposure to cigarette smoke among passive smokers also causes changes in the hemostatic system, including shorter blood clotting times. This indicates that the negative effects of smoking are not limited to active smokers but also affect those around them (Hall, 2021). Research has demonstrated that secondhand smoke can disrupt coagulation factors and increase the risk of thrombosis, much like the effects seen in active smokers (Davis et al., 2020; Clark et al., 2016). These findings underscore the broader health risks of smoking, affecting both smokers and non-smokers in the environment.

This article observes that smoking increases plasma homocysteine levels, which contributes to the acceleration of blood clotting. These findings explain how smoking speeds up coagulation activity and vascular disorder risks through its effects on hemostatic parameters (Wilson, 2018). Elevated homocysteine levels are linked to endothelial dysfunction, platelet aggregation, and faster thrombus formation, all of which contribute to a heightened risk of cardiovascular events. Similar studies have shown that smoking directly influences blood coagulation, significantly increasing the risk of thrombosis and vascular complications (Evans et al., 2018; Taylor et al., 2019).

Homocysteine is one of the components involved in the blood coagulation cascade, such as the reduction of antithrombin activity. By enhancing its effects on platelet

aggregation, homocysteine accelerates thrombus formation. In individuals with additional risk factors, such as hypertension and smoking habits, hyperhomocysteinemia can increase vascular atherosclerosis and thrombosis. Blood clotting time (clotting time) is a laboratory measurement used to detect endothelial dysfunction, which can affect the hemostatic mechanism. This test measures the duration it takes for blood to clot (forming fibrin threads) at a temperature of 37°C after leaving the body. The results of this test are useful for evaluating hemostatic function, including the activity of coagulation factors involved in thromboplastin formation and factors derived from platelets, which are influenced by fibrinogen levels.

Several methods can be used to measure blood clotting time, such as the Lee and White method, modified Lee and White method, glass slide method, and capillary method. Using these approaches, this study evaluated the impact of smoking habits on blood clotting time results in students at Politeknik Piksi Ganesha.

2. Methods

This study is an analytical research with a cross-sectional design. The sampling technique used is quota sampling. The research sample consists of active smokers aged 20 to 25 years from Politeknik Piksi Ganesha. The data for this study were collected using the Lee-White method for measuring clotting time. This approach is consistent with various studies on hemostatic assessment, where cross-sectional studies often provide a snapshot of the relationships between specific variables, such as smoking and clotting time. Quota sampling ensures the inclusion of specific characteristics, such as active smoking status, in the study group. This methodology is commonly applied in public health research where certain criteria (e.g., age range, and smoking habits) are essential for the investigation of risk factors like coagulation disturbances (Roberts et al., 2021; Taylor et al., 2019).

2.1. Tools and Materials

The tools and materials used in this study include:

- Alcohol swab
- Lancet and autoclave
- Glass slides
- Stopwatch
- Capillary blood

2.2. Type and Method of Data Collection

This study was conducted using primary data collected through direct observation of the respondents, who are active smokers from Politeknik Piksi Ganesha. This method ensures that the study captures real-time, firsthand data from individuals who fit specific criteria, such as being active smokers in a particular age group, helping to control for potential confounding factors.

2.3. Data Collection Method

2.3.1 Procedure

Pre-Analytical

Ensure that the patient has not consumed any analgesic medications (such as aspirin) or anticoagulants (such as heparin) before the examination, as these can interfere with coagulation results.

Analytical

The blood clotting test is performed using the Lee-White method. First, disinfect the fingertip thoroughly with an alcohol swab and allow it to dry. Then, use a lancet and autoclave to puncture the fingertip and draw blood, while simultaneously starting the stopwatch. Two drops of blood are placed on a glass slide. Every 30 seconds after the blood is dropped, use the lancet to lift the blood sample until fibrin threads appear. Record the time. This step is repeated until two blood samples have been tested. The results from the first and second blood samples are summed and divided by two to obtain the average clotting time.

Post-Analytical

The blood clotting time is considered normal if it falls within the range of 2-6 minutes. If the time exceeds 6 minutes, the result is categorized as abnormal, indicating an extended clotting time.

3. Results and Discussion

Based on the results of the clotting time examination conducted on 30 active smoker samples from Politeknik Piksi Ganesha, who volunteered to participate in this study by providing written informed consent, it was found that there is a correlation between smoking and blood clotting times, it was found that there is a correlation between smoking and blood clotting times. This type of study design and data collection is commonly used to assess the effects of smoking on hemostatic function in various populations (Roberts et al., 2021; Taylor et al., 2019). The informed consent ensures that participants are aware of their involvement and the procedures, which is crucial for ethical research practices in health studies.

Smoking is known to cause various health issues, not only for active smokers but also for those around them exposed to secondhand smoke. Health problems that can arise from such exposure include bronchitis, lung cancer, emphysema, mouth, throat, esophagus, and bladder cancer, as well as disruptions in the hemostasis process (Rahmi, 2018).

This examination is conducted to assess coagulation factor activity, particularly those contributing to thromboplastin formation, platelet-derived factors, fibrinogen levels, and the time it takes for blood to clot. The study found that the group with prolonged clotting time included 18 samples, indicating a relationship between smoking habits and the duration of blood clotting time. This result is consistent with previous research by Ratih in Rahmat Fajar's book (2011), which states that tobacco increases the risk of thrombosis due to its effect on fibrinogen and enhanced platelet aggregation.

If there is a severe deficiency in coagulation factors involved in the intrinsic and common pathways, as seen in conditions like hemophilia (deficiencies in Factor VIII and

Factor IX) or due to systemic anticoagulant therapy like heparin, it can lead to prolonged clotting times (Rahmi et al., 2018; Ratih et al., 2011).

3.1. Frequency Distribution by Gender

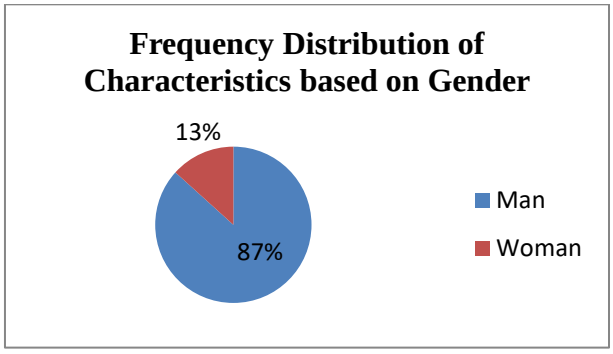

Figure 1. Based on Table 1, it is observed that out of the 30 samples, the majority of participants were male, with 26 male participants (86.7%) compared to 4 female participants (13.3%).

Table 1. Frequency Distribution of Characteristics Based on Gender

Gender	Frequency (n)	Percentage (%)
Man	26	86,7
Woman	4	13,3
Total	30	100

3.2. Frequency Distribution of Characteristics Based on Age (20–25 Years)

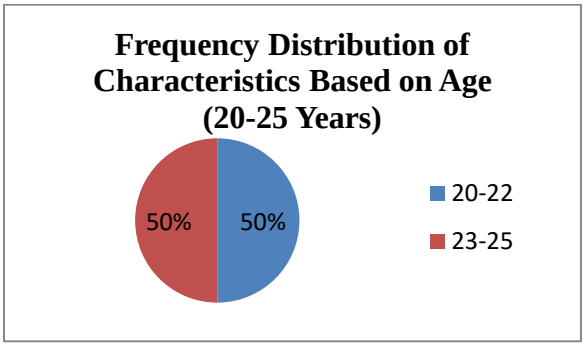

Figure 2. According to Table 2, the characteristics of the 30 total samples show an equal distribution within the age range of 20-25 years.

Table 3. Distribution of age among frequency and percentage

Age (Years)	**Frequency (n)**	**Percentage (%)**
20–22	15	50
23-25	15	50
Total	30	100

3.3. Frequency Distribution of Clotting Time

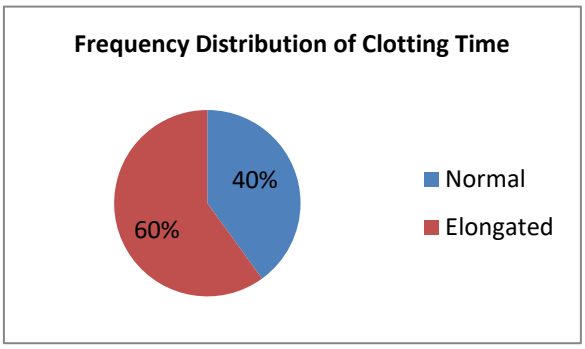

Figure 3. According to Table 3, among the 30 samples examined, the group with prolonged clotting time accounted for the majority, with 18 samples (60%). In contrast, the normal clotting time group included only 12 samples (40%).

Table 3. Distribution of clotting time among participants

Clotting Time	Frequency (n)	Percentage (%)
Normal	12	40
Elongated	18	60
Total	30	100

Conclusions

In conclusion, the study using the Lee-White method to measure blood clotting time found that smoking students at Politeknik Piksi Ganesha tend to have shorter clotting times, with 60% of the samples showing shortened clotting time and 40% exhibiting normal clotting times. This highlights the impact of smoking on the body's hemostatic system, suggesting that smoking can be a significant factor influencing blood clotting time.

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Conflicts of Interest

The authors declare no conflict of interest.

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