

Overview of Sleep Quality in Active Smoking Adolescents in Denpasar City

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ABSTRACT

Poor sleep quality is a common health problem among adolescents, and smoking is known to worsen sleep quality. Nicotine, as a stimulant, can disrupt sleep patterns, prolong sleep latency, and reduce sleep efficiency. Denpasar City has a relatively high prevalence of adolescent smokers; however, data regarding the sleep quality of active adolescent smokers remain limited. This study aimed to describe the sleep quality of active adolescent smokers in Denpasar City. This study employed a descriptive observational design with a cross-sectional approach. The results showed that most respondents were male (80.3%), all were late adolescents aged 18–24 years (100%), and the most commonly used type of cigarette was electronic cigarettes (47%). More than half of the respondents had poor sleep quality (56.1%). In conclusion, the majority of active adolescent smokers in Denpasar City are male late adolescents, with electronic cigarettes being the most commonly consumed tobacco product. Most respondents demonstrated poor sleep quality. These findings highlight the impact of smoking on adolescent sleep quality and may support promotive and preventive efforts to improve adolescent sleep health in Denpasar City.

INTRODUCTION

Sleep is an unconscious condition that is relative and plays a role in maintaining the body's homeostasis (WHO, 2019). Sleep activity is controlled by the sleep centers in the brainstem, namely the Reticular Activating System (RAS) and the Bulbar Synchronizing Region (BSR). The function of RAS is to maintain alertness by releasing catecholamines, but when RAS experiences fatigue, it will trigger the activation of BSR to stimulate the release of serotonin, which will trigger drowsiness. Sleep is divided into two main phases, namely Rapid Eye Movement (REM) and Non-Rapid Eye Movement (NREM). The NREM phase, known as slow-wave sleep, is characterized by a decrease in physiological activities such as blood pressure and breathing frequency. This phase accounts for about 75% to 80% of the total sleep time, while the REM phase only covers 20% to 25% (Asiah et al., 2022). Sleep quality reflects an individual's ability to maintain a normal sleep cycle without interruption, so that it does not cause excessive sleepiness, headaches, frequent yawning, swollen eyes, or disturbing feelings of anxiety (Ardiani and Subrata, 2023). Sleep can be said to be good when it meets the quality and quantity according to its provisions. The Centers for Disease Control and Prevention (CDC) states that sleep deprivation is a very important health problem, especially among adolescents. About 68.8% of adolescents in America experience sleep disorders (Baso et al., 2020). The prevalence of sleep disorders in Indonesia is even higher, at 73.4%. These findings indicate that sleep disorders are still a health problem that needs special attention among Indonesian adolescents (Haryono et al., 2021). The high rate of sleep disorders in adolescents can be associated with unhealthy lifestyle changes, one of which is the habit of smoking. Smoking is known to have various adverse effects on health. Each puff of cigarette smoke contains about 4,000 chemicals, 200 of which are toxic. One of the main compounds that plays a role in causing these negative effects is nicotine, which is the main active component in cigarettes and contributes significantly to various health disorders (Pabottingi et al., 2023).

Nicotine in cigarettes is a stimulant substance that affects the central nervous system. Research shows that smokers take longer to fall asleep compared to people who don't smoke. Within 30 minutes, nicotine begins to be excreted from the brain, but receptors in the addict's brain want more nicotine, which then disrupts the smoker's sleep patterns. Individuals who experience a heavy dependence on tobacco may wake up about two hours after going to bed due to the urge to smoke. In addition to having difficulty sleeping, the stimulant effects of nicotine also make it difficult to fall asleep again after smoking. This cycle continues to repeat throughout bedtime, encouraging the urge to smoke further. In addition, the addictive nature of smoking causes smokers' sleep quality to deteriorate over time. Brain wave recordings taken in sleep labs showed that smokers had lighter sleep and experienced less deep sleep, especially in the first few hours of sleep (Haliza, 2024). Other studies have also found that teenage smokers have a higher risk of developing insomnia. As many as 17% of adolescent smokers reported sleeping less than

six hours per night, while about 28% experienced poor sleep quality (Bimantara, 2022).

LITERATURE REVIEW

According to a report from the World Health Organization on global tobacco consumption, the number of active smokers reached 62.8 million, with 40% of them coming from bottom-up economies. Based on data from the Ministry of Health in 2018, in Indonesia, the prevalence of smoking among the population aged 10 years and above has increased, from 28.8% in 2013 to 29.3% in 2018. This phenomenon shows that smoking habits are no longer limited to adult groups, but are also increasingly widespread among children and adolescents, who are an age group vulnerable to the negative impacts of cigarettes (Ministry of Health, 2024). The island of Bali had a smoking prevalence of 18.0% in 2013 and increased to 18.86% in 2018, with the highest number of adolescent smokers, one of which is in Denpasar City at 22.02%, according to Basic Health Research (RISKESDAS) data (Riskesdas, 2018). However, research related to the picture of sleep quality in adolescent active smokers in the city of Denpasar has still not been carried out. Based on this background, the researcher is interested in conducting a study that focuses on the picture of sleep quality among adolescent active smokers in Denpasar City. This study aims to understand the extent to which smoking habits can affect adolescent sleep patterns and quality, so that it can provide further insight into the impact of smoking on adolescent sleep health.

METHODOLOGY

This study was conducted observationally with a cross-sectional descriptive design, and the target population was adolescent active smokers who were students of Warmadewa University, with inclusion criteria including adolescents who had been active smokers for at least 6 months, aged 18-24 years, and willing to become respondents by signing an approval sheet. Adolescents with a history of neurological or psychiatric disorders, chronic diseases, and taking medications that affect sleep quality were excluded from this study. The sample size was set at 66 people, which was calculated using a large formula of cross-sectional descriptive samples with the proportion of adolescent active smokers in the city of Denpasar of 22% (Riskesdas, 2018). Samples were selected using the consecutive sampling method.

Sleep quality data were obtained through structured interviews using the Indonesian version of the PSQI questionnaire. The Pittsburgh Sleep Quality Index (PSQI) is a self-assessment questionnaire to measure sleep quality in the last 1 month. It consisted of 19 questions in the form of: sleep quality, time to fall asleep, sleep duration, sleep efficiency, sleep disorders, use of sleep medications, and impaired daytime functioning. Each component is scored 0-3, with a total overall score of 0-21. A score of >5 indicates poor sleep quality (Permatananda et al., 2025). The data analysis carried out was a descriptive analysis of variables such as gender, age, and type of cigarettes consumed, which were presented in the form of frequency (f) and percentage (%) tables,

while sleep quality data was made in the form of ordinal scales and displayed in the form of bar charts.

RESULTS AND DISCUSSION

The subjects of this study are active smoking adolescents with an affordable population who are adolescents who are active students of Warmadewa University, with a total of 66 respondents. During the data collection process, no respondents were excluded.

Table 1. Respondent Characteristics

No.	Variabel	Frequency (n)	Percentage (%)
1.	Gender		
	Male	53	80,3
	Women	13	19,7
2.	Age		
	18-24 years old	66	100
3.	Types of Cigarettes		
	Conventional	8	12,1
	Electricity	31	47
	Mix	27	40,9

As shown in Table 1, the gender distribution of adolescent active smokers was dominated by males with 53 respondents (80.3%) compared to females with a total of 13 respondents (19.7%). All respondents in this study were late adolescents with an age range of 18-24 years, as many as 66 respondents (100%). The type of cigarette that is most consumed by adolescent active smokers in Denpasar City is e-cigarettes, with 31 respondents (47%), followed by mixed cigarettes, with 27 respondents (40.9%), and the type of cigarettes that are least consumed is conventional cigarettes, with 8 respondents (12.1%). The quality of respondents' sleep was measured using the Indonesian version of the PSQI questionnaire. There are seven questions on the questionnaire, and each question has a score range of 0 to 3. The measurement results can be seen in Figure 1, categorized into good sleep quality if the score is ≤ 5 and poor sleep quality if the score is >5 . This study found that 37 respondents (56.1%) had poor sleep quality amounting to 29 respondents (43.9%). These results show that the frequency and percentage of poor sleep quality in respondents is higher than that of good sleep quality.

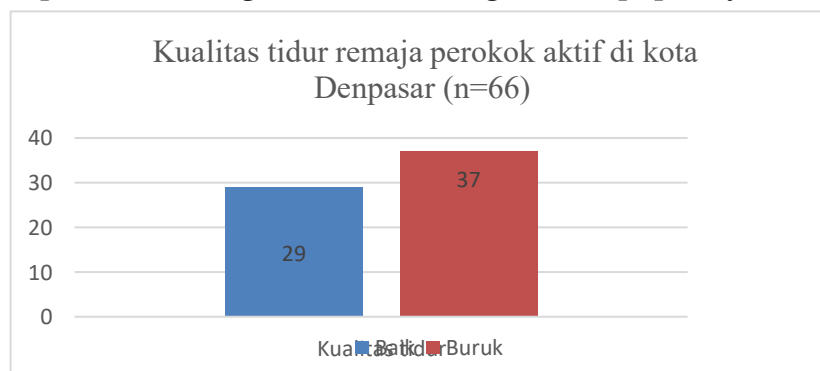


Figure 1. Sleep Quality of Active Smokers in Denpasar City

Overview of Active Smoking Teenagers in Denpasar City Based on Gender

In this study, it was found that the majority of respondents, namely adolescent active smokers in Denpasar City, were mostly male (80.3%). This is in line with research conducted by Putri et al (2024), based on data from the Indonesian Demographic and Health Survey, which reported that 70.4% of smokers in the adolescent group studied were men (Putri et al., 2024). In addition, another study by Liziawati et al (2025) in Depok City found that the majority of adolescent male respondents (74%) are smokers compared to women (Liziawati et al., 2025). Adolescent boys are more likely to have a smoking habit compared to adolescent girls. The difference in the prevalence of smoking behavior by gender is influenced by various social and cultural factors that develop in society. In men, the construction of masculinity norms still plays a strong role in shaping behavior, and smoking is often perceived as a representation of maturity, courage, and a means to gain social recognition and acceptance. In addition, men are generally more often exposed to a permissive social environment to cigarettes and experience peer pressure at a higher intensity, thus increasing the risk of initiating smoking and maintaining the habit in the long term. Several studies have also shown that men tend to have a higher risk tolerance to long-term health impacts than women, which ultimately contributes to the high prevalence of active smokers in the adolescent male group (Jane Ling et al., 2023).

Overview of Active Smoking Teenagers in Denpasar City by Age

This study found that the majority of active smoking adolescents in Denpasar City are groups of late-age adolescents with an age range of 18-24 years (100%). This is in line with research conducted by Sulistiyoningrum et al (2024) in Limbangan Wetan Village, Brebes Regency, which shows that adolescents aged 18-24 years are the group with the highest number of cigarette consumption (50%) (Sulistiyoningrum et al., 2024). Another study in Kuningan Regency also showed the same results, namely active smokers were dominated by adolescents aged 18-24 years (12.69%) (Marlindasari et al., 2025).

The findings reinforce that at this age range, adolescents are in a phase of searching for and forming self-identity, which includes an understanding of identity, social roles, and life direction and goals. This period falls into the late adolescence stage, where individuals tend to have a greater need to gain social recognition and are perceived as more mature individuals. This condition can encourage the emergence of exploratory or trial behavior, including the habit of smoking, which is often considered to be able to improve self-image and strengthen social relations with the surrounding environment. In addition, the late adolescence phase is also a period of relative vulnerability to the influence of the friendship environment as well as social media exposure, which can contribute to the formation and reinforcement of smoking behavior (Ismawati et al., 2025).

Overview of Active Smoking Teenagers in Denpasar City Based on Types of Cigarettes

The results of this study show that the type of cigarette that is most consumed by adolescent active smokers in Denpasar City is e-cigarettes (47%).

This study is in line with research conducted by Wibowo et al (2025) in 17 different provinces in Indonesia, which found that as many as 62.2% of adolescents reported having consumed e-cigarettes (Wibowo et al., 2025). Research conducted by Bigwanto et al (2022) in Jakarta also showed that e-cigarettes are the most common type of cigarettes consumed by adolescents (51.1%) (Bigwanto et al., 2022). E-cigarettes are often seen as a safer option than conventional cigarettes because they do not involve the process of burning tobacco, so they are considered to have lower health risks. In addition, the existence of various flavor choices, a more modern product appearance, and an image as part of today's lifestyle make e-cigarettes more acceptable among teenagers. Social environmental factors also play a role, especially through peer influence and exposure to promotions on social media, which makes e-cigarettes easier to popularize and normalize than conventional cigarettes. However, various studies have shown that e-cigarettes still contain nicotine, which is addictive and has the potential to cause adverse health impacts, including disruption to sleep quality. Therefore, the use of e-cigarettes in adolescents still needs serious attention and supervision (Sulthana et al., 2025).

Overview of the Sleep Quality of Active Smokers in Denpasar City

The results of this study stated that the majority of adolescent active smokers in Denpasar City had poor sleep quality, namely 37 respondents (56.1%). This is in line with research conducted by Abdi et al (2025) in Bonjol and Lubuk Sikaping Districts, which stated that the majority of adolescent active smokers have poor sleep quality (57.3%) (Abdi et al., 2025). Another study conducted by Haliza & Suwanti (2024) also found that adolescents with poor sleep quality were active smokers (88.9%) (Haliza & Suwanti, 2024).

Smokers with high levels of nicotine dependence have a greater risk of impaired cognitive function, compulsive behavior, and difficulty initiating and maintaining sleep. Nicotine dependence encourages repetitive smoking behaviors that have an impact on the appearance of insomnia. Nicotine is a stimulant that affects the central nervous system and is known to prolong the time it takes to fall asleep in smokers compared to non-smokers. Although nicotine levels in the brain can decrease in about 30 minutes, the reactivation of nicotinic receptors in individuals with addiction can interfere with the sleep process. In addition, the stimulant effects of nicotine trigger the release of dopamine that causes a sensation of freshness and decreases drowsiness, thus contributing to a decrease in sleep quality (Diva Ingriani et al., 2025).

Research conducted by Nuraini et al (2024) states that lifestyles such as smoking habits can affect fatigue levels and have a direct impact on sleep quality. Moderate fatigue can help individuals sleep better, while severe fatigue can actually disrupt sleep patterns, including shortening the Rapid Eye Movement (REM) phase. In addition, the individual's health status also plays a role, so good health conditions tend to support optimal sleep quality, while physical disorders or sick conditions can cause sleep to be uncomfortable. Based on the results of this study by Nuraini et al (2024), most respondents who have poor sleep quality are active smokers, while respondents who do not smoke generally have better sleep quality, so smoking is the main factor that affects

sleep quality. The habit of smoking before bed contributes to poor sleep quality due to the addictive nicotine content and stimulates the central nervous system. In addition, quitting smoking before bed in individuals who have experienced nicotine dependence can cause symptoms such as restlessness, physical discomfort, acidic mouth, feelings of incompleteness, and mood swings, which also interfere with the sleep process (Nuraini et al., 2024).

CONCLUSION AND RECOMMENDATION

The majority of adolescent active smokers in Denpasar City have poor sleep quality. Further research with correlational methods is needed to be able to explain the causes of poor sleep quality in adolescent active smokers in the city of Denpasar. The results of this study also encourage the importance of increasing promotional and preventive efforts to promote the dangers of smoking on health, especially sleep quality in adolescents.

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