International Journal Of Health, Engineering And Technology (IJHET) E-ISSN 2829 - 8683
Volume 5, Number 1, May 2026, *Page. 491 - 497*
Email : editorijhess@gmail.com

The Relationship Between Smoking Habits And Exposure To Passive Cigarette Smoke With Symptoms Of ARI In Public Health Students

Enzelina Rosiana Tampubolon[1)],Dwi Noerjoedianto[2)],Budi Aswin[3)],M. Ridwan[4)],Ashar Nuzulul Putra[5)]
[1)] Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi
[2,3,4,5)] Faculty of Medicine and Health Sciences, Universitas Jambi

*Corresponding Author
Email : enzelinapage@gmail.com

Abstract

Acute Respiratory Tract Infection (ARI) remains a common health problem among young adults and can disrupt academic productivity. Smoking and exposure to secondhand smoke are thought to increase respiratory tract vulnerability through mucosal irritation and decreased respiratory defense function. This study aims to analyze the relationship between smoking and secondhand smoke exposure with ARI symptoms in students of the Public Health Science Study Program, class of 2024, Jambi University. The study used a quantitative cross-sectional design with 100 students selected using a simple random sampling method. Data were collected using a structured questionnaire covering respondent characteristics, smoking status, secondhand smoke exposure, and ARI symptoms in the past month. Univariate and bivariate analyses were performed using the Chi-square test, Odds Ratio (OR), and 95% confidence intervals. The results showed that 42.0% of respondents experienced ARI symptoms, 12.0% were active smokers, and 54.0% were frequently exposed to secondhand smoke. Smoking habits were significantly associated with ARI symptoms (p=0.031; OR=5.00; 95%CI=1.26-19.80). Exposure to secondhand smoke was also significantly associated with ARI symptoms (p=0.042; OR=2.94; 95%CI=1.28-6.79). Gender was not significantly associated with ARI symptoms (p=0.788). Strengthening smoke-free areas and promoting smoking cessation education should be prioritized on campus and in student housing environments.

Keywords: ISPA; Students; Smoking; Exposure To Passive Cigarette Smoke; Public Health.

INTRODUCTION

Acute Respiratory Tract Infections (ARI) are a public health problem that remains common across various age groups. ARI encompasses both upper and lower respiratory tract infections with a rapid onset and symptoms that can include cough, runny nose, sore throat, fever, and shortness of breath. In the context of primary care, ARI symptoms are often considered mild, but their high frequency results in significant morbidity, treatment requirements, school absences, and decreased productivity. National guidelines prioritize early detection of respiratory symptoms and control of environmental risk factors as crucial components of ARI prevention.[1]

One of the environmental and behavioral risk factors relevant to respiratory disorders is cigarette smoke. Tobacco products produce a mixture of irritating chemicals, fine particles, nicotine, tar, and carbon monoxide, which can cause inflammation, mucosal irritation, and decreased airway defense function. The effects of smoking are not only felt by active smokers but also by individuals who inhale secondhand smoke. Secondhand smoke can linger in the air, cling to surfaces, and be inhaled repeatedly in enclosed spaces and crowded social settings.[2]

Indonesia still faces significant challenges in controlling tobacco consumption. The Global Adult Tobacco Survey Indonesia report shows that smoking among productive-age groups remains a public health issue, including among late adolescence and young adulthood. National surveys also show an increase in the number of adult smokers over the past decade, necessitating strengthening tobacco prevention efforts in educational settings.[3.4]In students, smoking behavior can arise due to peer influence, academic pressure, social habits, and low compliance with smoke-free area rules.
Jambi Province presents an important environmental context to study, as respiratory disorders can be influenced by air quality, residential density, and student social activities around campus. The regional

health profile indicates that respiratory issues remain a major concern for health services, particularly in areas with seasonal air pollution dynamics.[5]Students who live in boarding houses or shared housing are potentially exposed to double exposure, namely exposure to active/passive cigarette smoke and exposure to environmental pollutants.

Public Health students are an interesting group to study. As future public health workers, they are expected to have a better understanding of the dangers of smoking and infectious disease prevention. However, this knowledge is not always followed by behavioral changes. Findings about smoking behavior and secondhand smoke exposure among health students can be important indicators of the effectiveness of health education, enforcement of smoke-free areas, and the need for campus health promotion programs.

Previous studies have largely assessed the relationship between smoking and acute respiratory infections (ARI) in children or the general population, while evidence in health students needs to be strengthened, particularly among new students adapting to the campus and residential environment. The novelty of this study lies in its focus on Public Health students from the 2024 intake of Jambi University, assessing both active and passive exposure simultaneously. This study aims to analyze the relationship between smoking habits and secondhand smoke exposure and the emergence of acute respiratory infection (ARI) symptoms in Public Health students from the 2024 intake of Jambi University.

RESEARCH METHODS

This study is a quantitative study with a cross-sectional design. This design was chosen because the exposure variables—smoking habits and secondhand smoke exposure—and the outcome variable, ARI symptoms, were measured over the same period. A cross-sectional approach is appropriate for efficiently describing the prevalence of health problems and assessing the relationships between variables in a specific population.

The research was conducted at the University of Jambi, specifically among students of the Public Health Science Study Program, class of 2024. The study population was all active students of the class of 2024. The research sample consisted of 100 respondents. This number refers to the minimum calculation using the Lemeshow formula with a 95% confidence level, a maximum proportion of 0.5, and a 5% margin of error. The sampling technique used was simple random sampling to ensure that each member of the population had an equal chance of being selected.

Inclusion criteria included active students, willingness to participate, residing in the Jambi region at the time of data collection, and completing the questionnaire completely, including characteristics, smoking history, secondhand smoke exposure, and acute respiratory infection symptoms. Exclusion criteria included incomplete data on key variables. All respondents received an explanation of the study's purpose, data confidentiality, and the right to refuse or discontinue participation. Respondent identities were not included in the results report.

The research instrument was a structured questionnaire containing sections on respondent characteristics, active smoking habits, passive cigarette smoke exposure, and ARI symptoms. Smoking status was categorized into active smokers and nonsmokers. Active smokers included respondents who smoked daily or occasionally, including conventional cigarettes and e-cigarettes. Passive cigarette smoke exposure was categorized as frequent if respondents reported frequent or occasional exposure to secondhand smoke in the past month; the category of infrequent/no exposure was used if exposure was rare or never. Questions related to smoking behavior were based on the adult tobacco survey measurement concept.

The dependent variable was the incidence of ARI symptoms in the past month. Respondents were categorized as having ARI symptoms if they reported at least one respiratory complaint such as

cough, runny or stuffy nose, sore throat, fever, or shortness of breath. This approach was used to capture early clinical symptoms in the student population, not to establish a definitive medical diagnosis. Data were analyzed univariately to describe frequency distribution and percentages, then bivariately using the Chi-square test with an alpha of 0.05. The magnitude of risk was expressed as the Odds Ratio (OR) and 95% confidence interval.

RESULTS AND DISCUSSION

A total of 100 students met the analysis criteria. The general characteristics of the respondents showed a predominance of women, with 84 respondents (84.0%), and 16 respondents (16.0%). Most respondents were nonsmokers, but their exposure to secondhand smoke was quite high. Overall, 42 respondents (42.0%) reported symptoms of acute respiratory infections (ARI) in the past month. This finding indicates that respiratory symptoms are a fairly common complaint among the student population studied.

Table 1. Distribution of respondent characteristics and research variables (n=100)

Variables	Category	n	%
Gender	Man	16	16.0
	Woman	84	84.0
Smoking status	Active smoker	12	12.0
	Non-smoker	88	88.0
Exposure to secondhand smoke	Frequent exposure	54	54.0
	Rarely/not exposed	46	46.0
Symptoms of ARI	There are symptoms	42	42.0
	No symptoms	58	58.0

Analysis of the relationship between smoking status and ARI symptoms showed that the proportion of symptoms was higher in active smokers than in non-smokers. Of the 12 active smokers, 9 respondents (75.0%) experienced ARI symptoms, while in the non-smoker group, 33 of the 88 respondents (37.5%) experienced symptoms. The Chi-square test showed a significant relationship between smoking habits and ARI symptoms (p=0.031). The OR value of 5.00 indicates that active smoker students have a five times greater chance of experiencing ARI symptoms than non-smoker students.

Table 2. Relationship between smoking status and ARI symptoms

Smoking status	Symptoms of ISPA (+)	Symptoms of ISPA (-)	Total	p-value	OR (95%CI)
Active smoker	9 (75.0%)	3 (25.0%)	12 (100%)	0.031	5.00 (1.26-19.80)
Non-smoker	33 (37.5%)	55 (62.5%)	88 (100%)		1.00

Secondhand smoke exposure also showed a consistent pattern. Among respondents frequently exposed to secondhand smoke, 29 out of 54 (53.7%) experienced ARI symptoms. Conversely, among respondents rarely or never exposed, only 13 out of 46 (28.3%) experienced symptoms. Chi-square test results showed a significant association between secondhand smoke exposure and ARI symptoms (p=0.042). The OR value of 2.94 indicates

that respondents frequently exposed to secondhand smoke were almost three times more likely to experience ARI symptoms than respondents rarely or never exposed.

Table 3. Relationship between exposure to passive cigarette smoke and symptoms of ARI

Exposure to secondhand smoke	Symptoms of ISPA (+)	Symptoms of ISPA (-)	Total	p-value	OR (95%CI)
Frequent exposure	29 (53.7%)	25 (46.3%)	54 (100%)	0.042	2.94 (1.28-6.79)
Rarely/not exposed	13 (28.3%)	33 (71.7%)	46 (100%)		1.00

Additional analysis by gender showed that the proportion of ARI symptoms in men and women was relatively similar. Among male respondents, 7 of 16 respondents (43.8%) experienced ARI symptoms, while among female respondents, 35 of 84 respondents (41.7%) experienced symptoms. Statistical testing showed no significant association between gender and ARI symptoms (p=0.788).

Table 4. Relationship between gender and ARI symptoms

Gender	Symptoms of ISPA (+)	Symptoms of ISPA (-)	Total	p-value	OR (95%CI)
Man	7 (43.8%)	9 (56.2%)	16 (100%)	0.788	1.09 (0.37-3.20)
Woman	35 (41.7%)	49 (58.3%)	84 (100%)		1.00

Discussion

The study results showed that 42.0% of respondents experienced symptoms of acute respiratory infections (ARI) in the past month. This figure indicates that acute respiratory complaints are quite common among students in the class of 2024. In the student population, symptoms of cough, runny nose, fever, and sore throat can be influenced by many factors, including classroom interaction density, air quality in the residential environment, hand hygiene, fatigue, and exposure to pollutants. Although this study design cannot confirm a causal relationship, the high proportion of symptoms suggests that ARI prevention efforts need to be placed on the campus health agenda.

Active smoking is significantly associated with ARI symptoms. The proportion of symptoms in active smokers reached 75.0%, significantly higher than in nonsmokers. The OR of 5.00 indicates a strong association, although the confidence interval is relatively wide because the sample size was only 12 active smokers. This finding aligns with Ahyanti and Duarsa's research on students at the Tanjungkarang Health Polytechnic, which demonstrated a link between smoking and ARI incidence.[9]These results also support the finding that smoking behavior in young adulthood remains an important determinant of respiratory disorders.

Biologically, cigarette smoke may explain the increased symptoms of acute respiratory infections (ARI) in active smokers. Particles and irritants in cigarette smoke stimulate inflammation of the airway mucosa, increase mucus production, and reduce the effectiveness of mucociliary clearance. Under normal conditions, mucociliary clearance helps remove particles and microorganisms from the respiratory tract. When this function is impaired, viruses and bacteria more easily survive, adhere, and cause infection or irritation. This mechanism strengthens the interpretation that exposure to cigarette smoke can exacerbate susceptibility to acute respiratory complaints.

The findings regarding secondhand smoke exposure are also significant. More than half of the respondents were frequently exposed to secondhand smoke, and this group was nearly three times more likely to experience acute respiratory infections (ARI) symptoms. This pattern suggests that health risks are not limited to students who smoke, but also to those in social and residential environments that are not smoke-free. Studies of secondhand smoke in adults have also reported an association between secondhand smoke exposure and acute respiratory infections (ARI), making these findings consistent with previous evidence.

Students' exposure to secondhand smoke can occur in many settings, such as boarding houses, cafeterias, community areas, vehicles, or crowded open spaces. In the context of student housing, secondhand smoke can linger in poorly ventilated rooms and travel through hallways or common areas. This creates repeated exposure for non-smoking students. The finding that secondhand smoke is associated with respiratory tract infections (ARI) provides a basis for strengthening smoke-free policies not only in academic spaces but also in supporting environments such as cafeterias, parking areas, community areas, and boarding houses around campus.

The results of this study are in line with the study by Wahyudi and colleagues who reported that respiratory risk factors in students can be related to behavior and environmental exposure.[11]In this study, smoking status and passive exposure were the two variables statistically associated with ARI symptoms, while gender was not significantly associated. This pattern suggests that exposure factors outweigh basic demographic factors. This means that both men and women are at risk of developing respiratory symptoms when exposed to cigarette smoke.

The lack of association between gender and ARI symptoms should be interpreted with caution. Descriptively, the proportion of symptoms in males and females was nearly equal. This suggests that ARI causative agents and air pollutants do not discriminate by gender in the young adult age group. Differences in social behavior may still exist, but in this sample, the effect was not strong enough to produce a statistical association. These findings support the need for universal interventions for all college students, not just specific gender groups.

The local context of Jambi also needs to be considered in the discussion. Studies in Jambi City demonstrate that risk factors for acute respiratory infections (ARI) are often related to environmental conditions, exposure to pollutants, and housing characteristics.[12]While this study did not directly measure ambient air quality or particle levels, the high levels of secondhand smoke exposure suggest that the micro-air quality surrounding the students requires attention. Measurements of indoor air quality, PM2.5 levels, ventilation area, and residential density could strengthen further research.

From a public health perspective, smoking is a behavioral problem influenced by knowledge, attitudes, peer norms, cigarette availability, and environmental supervision. Educational approaches alone are often insufficient without environmental management. The concept of behavior change emphasizes that healthy behavior is influenced by predisposing, enabling, and reinforcing factors.[15]Therefore, campuses need to provide smoking cessation support, make smoking-free area signs clear, activate surveillance, and build social norms that smoking around others is a form of harmful exposure.

The implementation of smoke-free zones on health campuses has strategic value because public health students are expected to be role models in health promotion. When health students are still exposed to secondhand smoke in their learning and living environments, health promotion messages about respiratory disease prevention become less effective. Strengthening these efforts can be achieved through regular campaigns, smoking cessation counseling, education about the dangers of secondhand smoke, and collaboration with boarding house managers to establish smoke-free zones. Residential managers can be provided with practical recommendations, such as prohibiting smoking in enclosed rooms and providing designated smoking areas away from room ventilation.

Research findings on toddlers and the general public also show that environmental factors such as cigarette smoke, housing density, and ventilation are associated with ARI.[13,17,18]Although the age groups in this study differ, the principles of environmental exposure remain relevant. College students with high social activity are at risk for repeated and cumulative exposure. This population difference demonstrates that ARI control is not only an issue for families with young children, but also for campuses and young adult communities.

This research has several practical implications. First, simple screening for respiratory symptoms and smoking behavior can be incorporated into health promotion programs for new students. Second, education about the dangers of smoking should not only emphasize cancer or long-term chronic diseases, but also short-term impacts such as coughs, colds, sore throats, and disruption to academic activities. Third, non-smoking students need to be empowered to assertively request a smoke-free environment without triggering social conflict.

There are several limitations to this study. The cross-sectional design can only demonstrate associations, not causal relationships. The measurement of ARI symptoms used a self-administered questionnaire, potentially subject to recall bias or misclassification. The diagnosis of ARI was not confirmed through clinical examination, laboratory tests, or health care provider assessment. The number of active smokers was also relatively small, resulting in wide confidence intervals for the estimated OR. Future research should use a longitudinal or case-control design, include air quality measurements, and examine other factors such as ventilation, housing density, mask use, allergy history, nutritional status, and sleep quality.

CONCLUSION

Active smoking habits and exposure to secondhand smoke were significantly associated with ARI symptoms in students of the Public Health Science Study Program, class of 2024, at the University of Jambi. Active smokers were five times more likely to experience ARI symptoms than nonsmokers, while students frequently exposed to secondhand smoke were almost three times more likely to experience ARI symptoms than those rarely or never exposed. Gender was not significantly associated with ARI symptoms.

These findings confirm that preventing ARI in college students needs to focus on controlling smoking behavior and creating a smoke-free environment. Campuses and student housing areas should be the targets of interventions, as they are the primary spaces for students' daily activities.

REFERENCES

Ahyanti, M., & Duarsa, A. B. S. (2013). Hubungan merokok dengan kejadian ISPA pada mahasiswa Politeknik Kesehatan Kementerian Kesehatan Tanjungkarang. Jurnal Kesehatan Masyarakat, 7(2), 47–53.

Dahlan, S. (2014). Statistik untuk kedokteran dan kesehatan: Deskriptif, bivariat, dan multivariat. Salemba Medika.

Dinas Kesehatan Provinsi Jambi. (2023). Profil kesehatan Provinsi Jambi 2023. Dinas Kesehatan Provinsi Jambi.

Febiyanti, S. R. S., Setianingsih, A. F., Chairudinsyah, F. A., Danil, A. M., Putri, N. A., Juwita, R., et al. (2025). Dampak merokok pasif terhadap kejadian infeksi saluran pernafasan akut pada anak di lingkungan keluarga perokok aktif. Jurnal Ilmu Kesehatan, 21(2).

Guyton, A. C., & Hall, J. E. (2019). Guyton and Hall textbook of medical physiology (14th ed.). Elsevier.

Kementerian Kesehatan RI. (2021). Pedoman pencegahan dan pengendalian Infeksi Saluran Pernapasan Akut. Direktorat Jenderal Pencegahan dan Pengendalian Penyakit.

Kementerian Kesehatan RI. (2022). Temuan survei GATS: Perokok dewasa di Indonesia naik 10 tahun terakhir. Kementerian Kesehatan RI.

Nisa, W., Nasution, F. A., Syafei, A. N., Apriliani, Lauta, A. P., & Salsabila, Z. (2026). Determinan yang mempengaruhi kejadian ISPA pada masyarakat di wilayah kerja Puskesmas Suggal Kota Medan. Jurnal Dunia Kesmas, 6604(1), 66–75.

Notoatmodjo, S. (2014). Ilmu perilaku kesehatan. Rineka Cipta.

Notoatmodjo, S. (2018). Metodologi penelitian kesehatan. Rineka Cipta.

Prayata, R. H., Mahendra, A. I., Indraswara, I., Setyarto, Z. S., Nurulnisa, S., Kumila, B. Y., et al. (2023). Hubungan paparan asap rokok pada perokok pasif dengan angka kejadian ISPA pada usia 18-65 tahun di Dusun Krajan Desa Sidodadi, Kecamatan Lawang, Kabupaten Malang. MANUJU: Malahayati Nursing Journal, 5(1), 53–66.

Sitanggang, H. D., & Kalsum, U. (2024). Distribusi faktor risiko penderita ISPA pada balita yang berobat ke puskesmas di Kota Jambi. MAHESA: Malahayati Health Student Journal, 4(10), 4240–4253.

Sugiyono. (2020). Metode penelitian kuantitatif, kualitatif, dan R&D. Alfabeta.

Suharsimi, A. (2019). Prosedur penelitian: Suatu pendekatan praktik. Rineka Cipta.

Taufik, R., & Harun, L. (2024). Analisis faktor yang berhubungan dengan kejadian ISPA pada balita di wilayah kerja Puskesmas Sebamban 2. Jurnal Promotif Preventif, 7(5), 981–987.

Wahyudi, Shabrina, A. D., Kudadiri, N. B., Komaruddin, N. Z., & Nurlisa, T. (2025). Faktor risiko gejala penyakit pernapasan ISPA pada mahasiswa Fakultas Kesehatan Masyarakat UIN Sumatera Utara. Klinik: Jurnal Ilmiah Kedokteran dan Kesehatan, 4(2), 454–464.

World Health Organization. (2021). Global Adult Tobacco Survey (GATS) Indonesia report 2021. World Health Organization Indonesia.

World Health Organization. (2022). World No Tobacco Day: Tobacco's threat to our environment. World Health Organization.