



THE EFFECT OF COFFEE CONSUMPTION PATTERN ON THE INCIDENCE OF DYSPEPSIA IN MEDICAL FACULTY STUDENTS

Habib Al Huda¹, Erlina Marfianti², Nuni Ihsana⁴, Nurcholid Umam Kurniawan^{3*}

¹Undergraduate Program, Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

²Department of Internal Medicine, Faculty of Medicine, Universitas Islam Indonesia, Yogyakarta, Indonesia

³Department of Child's Health, Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

⁴Departement of Physiology, Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

ABSTRACT

Background: Dyspepsia syndrome can be defined as a collection of complaints described as pain or discomfort in the pit of the stomach, bloating, nausea, vomiting, belching, feeling full quickly, stomach feeling full or full. Based on the 2007 Indonesian Health Profile Information, dyspepsia was ranked 10th in the category of disease inpatients hospitalized in 2006 with 34,029 sufferers or approximately 1.59%. One of the various aspects of the risk of developing dyspepsia is consuming caffeine. **Objective:** This study aims to determine the influence of coffee consumption patterns on the incidence of dyspepsia in medical students of the Faculty of Medicine. **Methods:** This study uses an observational analytic method. The research was conducted in October 2021 – November 2021 at Medical Faculty, Ahmad Dahlan University. Research population was 110 active students of the 2018-2020 according to the inclusion and exclusion criteria. Analysis bivariate using chi-square. **Results:** It was found that the pattern of coffee consumption in students with the majority being in the moderate category was 87 people (79.1%) and the majority experienced the incidence of dyspepsia as many as 73 people (66.4%) while students with moderate consumption patterns had the greatest risk opportunity 1.753 times for experienced dyspepsia events with a relative risk ranging from 0.810 to 3.791. This shows the influence of coffee consumption patterns on the incidence of dyspepsia in students with a value of $p = 0.002$ ($p < 0.005$). **Conclusion:** Coffee consumption patterns influence the incidence of dyspepsia in medical students, Medical Faculty Students, Ahmad Dahlan University.

Keywords:

*Dyspepsia,
Coffee,
Coffee consumption patterns,
Medical students*

Received: 9 August 2024

Revised: -

Accepted: 27 August 2024

Available online: 31 August 2024

Corresponding Author:

E-mail: nurcholid.umam@med.uad.ac.id

INTRODUCTION

Dyspepsia syndrome can be described as pain or discomfort in the pit of the stomach, bloating, nausea, vomiting, belching, feeling full quickly, stomach feeling full or full. An irregular diet and an unhealthy lifestyle have a strong influence on the occurrence of dyspepsia in the society. In Indonesia, according to epidemiological data based on Health Profile Information 2007, dyspepsia has ranked 10th in the category of disease most hospitalized in 2006 with the number of cases 34,029 or reach about 1,59%.¹ Research carried out in the City of Yogyakarta based on the Health Profiles of the Yogyakarta Special District, dyspsia syndrome was ranked 6th of the top

10 patterns of street care disease in Yogyakarta Hospital in 2012. RSUP Dr.Sardjito records reports of roadside care of patients with dyspepsia up to 40% every year.¹

The dyspepsia syndrome is caused by various factors that trigger the increased production of excess gastric acid such as irregular dietary intake, Helicobacter pylory infection, peptic fever, as well as the consumption of spicy, acidic, and high-salted foods and drinks such as coffee and alcohol that can stimulate the emergence of indications of dyspsia syndrome.² One of the risks of dyspepsia is caffeine. Caffeine in coffee increases the secretion of gastrin, thus triggering an increase in gastric acidity. High



Habib Al Huda, Erlina Marfianti, Nuni Ihsana, Nurcholid Umam Kurniawan

acidity causes inflammation and erosion of the stomach mucous membrane, which can lead to symptoms of dyspepsia. Stomach mucosa that is constantly exposed to irritants, such as coffee, causes inflammation so that the stomach mucous layer can disappear and cause atrophy.³

Children of late adolescent age, i.e. students generally have moderate levels of physical activity. But the problem lies in activities that have a routine with time that tends to repeat and have a social life that affects consumption patterns so that it can impede healthy life behavior in a student. Many students are active until late at night or outside the campus so that from thinking about making coffee a solution in accompanying their activities.⁴

Caffeine consumption is common among medical students and is increasing significantly. The high level of academic pressure on students in the medical education system constantly exposes them to biopsychosocial factors that may be associated with gastrointestinal diseases. Conditions High levels of education affect stress levels and their high daily caffeine consumption patterns are associated with the incidence of dyspepsia that has been identified in students studying health sciences and higher in the first years of study.⁵

An irregular diet coupled with coffee intake will stimulate an increase in stomach acid. The caffeine content contained in coffee will increase gastrin secretion which will stimulate the production of stomach acid, causing inflammation and erosion of the stomach. This leads to episodes of dyspepsia that can have a great deal of impact on health-related quality of life as it can interfere with day-to-day activities.⁶

This study emphasizes more on the discussion of the effects of caffeine consumption contained in coffee through frequency and portion in medical students that can cause incident of dyspeptic.

METHODS

The population of this study was medical students, Faculty of Medicine who consumed coffee and the exclusion criteria of this study were consuming alcohol, smoking, and NSAID drugs in the last 3 months.

Data analysis used in the study was univariate analysis and bivariate analysis. Univariate analysis to describe the characteristics of each variable presented in the form of distribution and percentage. Bivariate analysis is performed to assess the influence and risk estimates of coffee consumption patterns with occurrences of dyspepsia. The chi-square test was used for bivariate analysis with the provisions of the value $\alpha = 0.05\%$ and ρ value.

This type of research was conducted quantitatively observational with a cross sectional design and studied analytically. The sampling technique in this study was non-probability sampling. Data collection consisted of primary data from the research questionnaire.

RESULTS

Population on research is medical students of the Medical Faculty of Ahmad Dahlan University for 2018-2020. The total sample in this study is 110 students. The sample criteria in the study are active students of the Faculty of Medicine who have consumed coffee and have not consumed alcohol, smoking and NSAID drugs in the last 3 months.

Characteristics of Research Subjects

Table 1. Characteristics of Respondents

Characteristics	n = 110	
	F	%
Age		
18	3	2,7
19	30	27,3
20	38	34,5
21	33	30
22	6	5,5
Gender		
Male	26	23,6
Female	84	76,4
Generation		
2018	30	27,3
2019	37	33,6
2020	43	39,1
Total	110	100

Table 1 shows that the respondent characteristics of the majority of 20-year-old students were 38 respondents, with (34.5%). The female sex was 84 respondents (76.4%), in terms of the 2020 majority students were 43 (39.1%).



Habib Al Huda, Erlina Marfianti, Nuni Ihsana, Nurcholid Umam Kurniawan

Frequency Distribution of Coffee Consumption Pattern variables

Table 2. Frequency Distribution of Coffee consumption pattern variables

Variabel	n= 110	
	f	%
Coffee consumption pattern		
High	13	11,8
Moderate	87	79,1
Low	10	9,1
Total	110	100

Table 2, shows that the variable coffee consumption pattern of medical students, Faculty of Medicine, Ahmad Dahlan University is said to be moderate as many as 87 people (79.1%). Respondents with high coffee consumption patterns were 13 people (11.8%) while respondents with low categories were 10 people (9.1%). Frequency Distribution of Dyspepsia Event Variables.

Table 3. Frequency distribution of dyspepsia incidence

Variabel	Inklusi n = 110	
	f	%
Incidence of Dyspepsia		
Incidence	73	66,4
Not Incidence	37	33,6
Total	110	100

Based on the table shows that the incidence of dyspepsia in the category of medical students occurred as many as 73 (66.4%) and responses that did not experience dyspeptic events were 37 people (28.7%).

Bivariate Analysis

Table 4. Effect of Coffee consumption patterns with dyspepsia incidence

Coffee consumption pattern	Incidence of Dyspepsia				Total	
	Incidence		Not Incidence		F	%
	F	%	F	%		
High	8	61,5	5	38,5	13	100
Moderate	61	70,1	26	29,9	87	100
Low	4	40,0	6	60,0	10	100
Total	73	66,4	37	33,6	110	100

Based on table 4, it shows that the coffee consumption pattern that experienced dyspeptic events in the moderate category experienced

dyspeptic events as many as 61 respondents (70.1%) and those who did not experience dyspepsia were 26 respondents (29.9). Low consumption patterns that experience dyspepsia are 4 respondents (40.0%) while those who do not experience 6 (60%) respondents. High coffee consumption pattern experienced dyspepsia as many as 8 respondents (61.5%) and those who did not experience dyspepsia were 5 (38.5%).

Table 5. Risks of the effect of coffee consumption patterns on the incidence of dyspepsia

Incidence of Dyspepsia	High/Moderate (95% CI)	High/Low (95% CI)	Moderate/Low (95% CI)	Pvalue
	0,878 (0,559 – 1,378)	1,538 (0,643 – 3,681)	1,753 (0,810 – 3,791)	0,002

Based on table 5 on the calculation of Risk Estimate, the Relative Risk is high compared to moderate 0.878 (95% Confidence Interval: 0.559 - 1.378), high compared to low 1.538 (0.643 - 3.681), while compared to low 1.753 (0.810 - 3.791). Based on the calculation of chi-square tests using the Pearson Chi-Square formula, the results of the p-value significance value of 0.002 (p < 0.05).

DISCUSSION

Pattern Consumption of Coffee

According to research from Germany, a university student can consume about one cup (or 70 mg) of caffeine per day. Medical school is an educational field that tends to be very demanding and consumes a lot of time and energy. In general, medical students face a heavy and lengthy study load and so they prefer caffeinated drinks or energy drinks as a first choice.⁷ Another study from The Aga Khan University, Pakistan reported that 52% of medical students consume caffeine to cope with the academic load and keep them awake and active throughout the day to help them get through their daily tasks and activities.⁸ Meanwhile, the results of our study showed that the frequency of drinking coffee in Ahmad Dahlan University Faculty of Medicine students was mostly in the moderate category, as many as 87 people (79.1%). Coffee consumption patterns in the moderate category are medical faculty students who often consume coffee, consume coffee twice a day with a dose of 3-7 cups/glass, consume coffee 5-7 times a week, and have consumed coffee



Habib Al Huda, Erlina Marfianti, Nuni Ihsana, Nurcholid Umam Kurniawan

for 3-5 years. Based on research conducted by Wahyuni⁹ in her journal which shows that students with coffee consumption mostly consume mild or moderate coffee, namely 1-2 cups in a day, namely 79 respondents (79%) compared to those who consume heavy coffee > 3 cups in a day as many as 21 respondents (21%)¹⁰.

Coffee consumption patterns in the high category of medical faculty students were 13 people (11.8%). Medical students always consume coffee every day, a day consuming coffee more than 3 times with a frequency of more than 7 cups / glass. During one week consume coffee more than 7 times and have consumed coffee for more than 5 years. In line with research conducted by Yusuf¹¹ in her journal which shows that the proportion of respondents who have high category coffee consumption is 91.9%. Coffee consumption in the medical student environment is very diverse and has a tendency for high consumption patterns in men. Caffeine in coffee is the main ingredient of consumption by students. Coffee consumption is considered to bring energy, fitness, emotional stability, positive thoughts, good lifestyle, trendy, and other positive influences¹⁰. Existing research shows that about 49% of the adult population in America consume coffee almost every day¹².

Coffee consumption patterns in the low category were 10 people (9.1%). Medical faculty student respondents who do not routinely (only once) consume coffee in a day and in one week only consume coffee 3-4 times. Research conducted by Ekawati in her articles showed that respondents with consumption of 1-3x cups / week were 27 people (49.1%). Most respondents have a normal body mass index and are shown in a rare coffee consumption pattern of about 1-3 times a week.

Incidence of Dyspepsia

The factor associated with the incidence of dyspepsia in our study was coffee consumption. This is in line with a Colombian study where 57% of patients with dyspepsia had high coffee intake. This could be attributed to the effect of caffeine in coffee which can affect upper gastrointestinal symptoms. While many medical students choose caffeinated beverages or energy drinks as their primary choice. The frequency of dyspepsia in a population of students studying health sciences was found to be 44.4% of the population experiencing dyspeptic events. However, the percentage was much higher in

the Peruvian population where in a study conducted in 8 medical schools in Peru, one out of every 4 medical students experienced dyspepsia.⁵ Meanwhile, the results showed that the incidence of dyspepsia in medical students of the Faculty of Medicine, Ahmad Dahlan University, the majority of dyspepsia occurred as many as 73 people (66.4%). Respondents who experienced dyspepsia were respondents who in the last 3 months felt pain and discomfort in the solar plexus or abdomen, felt an uncomfortable burning heat in the chest, felt bloated after eating normal portions of food, felt full quickly or were unable to finish food with normal or usual portions, felt nauseous, experienced complaints of vomiting, experienced excessive burping.¹³

Functional dyspepsia is based on the Rome III Criteria. The Asia-Pacific Consensus, (2012) produced a basic concept of the Rome III diagnostic criteria in the form of an additional complaint, namely a feeling of bloating in the upper abdomen which is commonly found in the incidence of functional dyspepsia.¹⁴ Functional dyspepsia fulfills one or more of the symptoms of a nagging feeling of fullness after meaning, rapid satiety, epigastric pain, epigastric burning and no evidence of structural grade with the criteria being met for at least 3 months with symptom onset at least 6 months prior to diagnosis.¹⁵

Therefore, according to the research conducted by Irman¹⁶ which showed that there were 138 respondents consisting of students of the Faculty of Medicine, Riau University, 2014 where they had a picture that fit the criteria of dyspepsia syndrome compared to those who did not have dyspeptic symptoms. Respondents who were described as meeting the dyspepsia criteria were 77 people (55.88%) and those who did not have a picture of dyspepsia criteria were 61 people (44.2%).¹⁷ The complaints obtained varied and were sorted by the most common occurrence, namely epigastrium (29.7%) and the least common complaint, namely the feeling of heat or burning in the chest area (7.2%). Similar variations in complaints were also obtained by describing the most common complaint as epigastric pain (50.1%).¹⁸ This is also supported by existing research where most adolescents have been diagnosed by a health professional and resulted in 96% being diagnosed with dyspeptic syndrome.¹⁹ The percentage value shows a high assessment where almost most adolescents have experienced dyspeptic events. Another study also showed similar results



where 27% of adolescents were found to have dyspepsia.²⁰

Medical faculty, medical student respondents who did not meet the criteria for dyspeptic events were 37 people (33.6%). These respondents did not experience dyspeptic events were respondents who did not experience discomfort in the solar plexus or abdomen, did not feel an uncomfortable burning heat in the chest, did not feel bloated after eating a normal portion of food, did not feel full or able to finish food with a normal or usual portion, did not feel nauseous, did not experience complaints of vomiting, and did not experience excessive burping. The research that has been carried out found that more than half of the respondents (57%) did not experience dyspepsia, because it was supported by some students who did not consume foods/drinks that did not irritate the stomach and had the awareness to live a healthy life based on adequate eating and drinking patterns.²¹

The risk of coffee consumption patterns on the incidence of dyspepsia

In the high category of coffee consumption patterns have a greater risk of 0.878 times to experience dyspeptic events compared to students who have moderate consumption patterns. Comparison of the lowest possible relative risk is 0.559 times and the highest possible relative risk is 1.378 times. Meanwhile, the high category of coffee consumption pattern has a greater risk of 1.538 times to experience dyspeptic events compared to students who have low consumption patterns. The lowest relative risk ratio is 0.643 times and the highest relative risk ratio is 3.681 times. Meanwhile, coffee consumption patterns in the medium category have a greater risk of 1.753 times to experience dyspepsia compared to students who have low consumption patterns. The lowest relative risk ratio is 0.810 times and the highest relative risk ratio is 3.791 times.²²

Research from Nehlig³ proved that the analysis of the statistical value between the effect of coffee on the incidence of dyspepsia and GERD found a relative risk of 1.06 with a 95% confidence interval (Confidence Interval: 0.94-1.19) with a correlation value of low intake (<4 cups / day) reached 0.91 (95% CI = 0.82-1.01), while in the high intake group (>5 cups / day) was 1.14 (95% CI = 0.69-1.88). The relative risk was not statistically significant between groups with or without coffee exposure.²³

Effect of coffee consumption patterns on the incidence of dyspepsia

The results of our study showed that there was an effect of coffee consumption patterns on the incidence of dyspepsia in medical students obtained based on data from 110 respondents. The results of this study indicate that there is an effect of coffee consumption patterns on the incidence of dyspepsia in medical students, Faculty of Medicine, Ahmad Dahlan University with a p value of 0.002 ($p < 0.05$).

Another study showed a significant relationship between the habit of consuming caffeinated beverages and the incidence of dyspepsia in the study can be stated that people who have a habit of consuming caffeine can experience dyspeptic events by 50.6% of the total respondents.²⁴ The results of our study are in line with Dilnessa's research, stating that there is a significant relationship between the habit of drinking coffee and the incidence of dyspepsia, with significant results $p < 0.05$.²⁵

CONCLUSION

Based on the study, it can be concluded that there is a relationship between coffee consumption patterns and the incidence of dyspepsia in medical students.

ETHICAL APPROVAL

An ethical clearance was obtained from the Health Research Ethics Commission (KEPK) Faculty of Medicine Universitas Ahmad Dahlan with No. 012111088

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

No specific funding was provided for this article.

AUTHOR CONTRIBUTIONS

Conceptualization, HAH and EM; methodology, EM; software, NUK; validation, HAH, EM, and NUK; investigation, NI; resources, HAH; data curation, NUK; writing—review and editing, HAH and NI; supervision, NI; project administration, EM and NUK.

ACKNOWLEDGMENTS

This research was supported by Department of Internal Medicine, Faculty of Medicine, Ahmad Dahlan Universitas



REFERENCES

1. Fikrinnisa R. Hubungan antara Ketidakteraturan Makan dan Pola Konsumsi Makanan Tinggi Lemak dengan Kejadian Sindroma Dispepsia Fungsional Pada Remaja Putri di SMA Kota Yogyakarta. *Scientia*. 2018;7(2):176-179.
2. Fithriyana R. Faktor-Faktor Yang Berhubungan Dengan Kejadian Dispepsia Pada Pasien Di Willayah Kerja Puskesmas Bangkinang Kota. *PREPOTIF J Kesehat Masy*. 2018;2(2):2018. <https://journal.universitaspahlawan.ac.id/index.php/prepotif/article/view/79>
3. Nehlig A. Effects of Coffee on the Gastro-Intestinal Tract: A Narrative Review and Literature Update. *Nutrients*. 2022;14(2):1-31. doi:10.3390/nu14020399
4. Nababan HR. Kebiasaan Makan, Aktivitas Fisik Dan Keluhan Gastritis Pada Mahasiswa Fakultas Matematika Dan Ilmu Pengetahuan Alam Universitas Sumatera Utara. Published online 2018:14-18. <http://repositori.usu.ac.id/>
5. Talledo-Ulfe L, Buitrago OD, Filorio Y, et al. Factors associated with uninvestigated dyspepsia in students at 4 Latin American schools of medicine: A multicenter study. *Rev Gastroenterol México (English Ed)*. 2018;83(3):215-222. doi:10.1016/j.rgmxe.2017.05.009
6. Maresa T. Hubungan Tingkat Stres dan Keteraturan Pola Makan Dengan Terjadinya Dispepsia Pada Usia Produktif di Puskesmas Depok III Sleman Yogyakarta. Published online 2019.
7. Gangwal U, Mir MT, Gupta RK, et al. Caffeine consumption among medical students: an exploratory study in a medical school in a sub-Himalayan state of India. *Int J Community Med Public Heal*. 2024;11(7):2799-2804. doi:10.18203/2394-6040.ijcmph20241841
8. Hassan U. Prevalence and awareness of caffeine consumption among the medical students. *Prof Med J*. 2020;27(12):2763-2768. doi:10.29309/tpmj/2020.27.12.4631
9. Wahyuni I, Yusuf S, Magga E, et al. Pengaruh Konsumsi Kopi Terhadap Tekanan Darah Dan Insomnia Pada Mahasiswa Universitas Muhammadiyah. *J Ilm Mns dan Kesehat*. 2020;3(3):395-402.
10. Ekawati FR. Hubungan Konsumsi Kopi dengan Status Gizi Pada Pekerja WFH Selama Covid-19 di Surabaya. *Media Gizi Kesmas*. 2021;10(1):97-105.
11. Yusuf A, Nurmawan Y, Suhaeni E. Hubungan Kebiasaan Konsumsi Kopi Terhadap Kejadian Dispepsia di Puskesmas Pamengkang Kabupaten Cirebon Tahun 2023. *J Ners*. 2024;8(1):102-108.
12. Loftfield E, Freedman ND, Dodd KW, et al. Coffee drinking is widespread in the United States, but usual intake varies by key demographic and lifestyle factors. *J Nutr*. 2016;146(9):1762-1768. doi:10.3945/jn.116.233940
13. Kurniawan A, Ridho MR. Perilaku Konsumtif Remaja Penikmat Warung Kopi Ardietya. *Jurnal Sociol DILEMA*. 2017;32(1):ISSN: 0215-9635.
14. Mariyani Rumlolas. Hubungan Pola Makan yang Tidak Teratur Terhadap Sindroma Dispepsia Pada Remaja Di SMP Negeri 13 Makassar. Published online 2018.
15. Purnamasari L. Faktor Risiko, Klasifikasi, dan Terapi Sindrom Dispepsia. *Contin Med Educ*. 2017;44(12):870-873.
16. Irman T, Annis NF, Arneliwati. Gambaran Tingkat Stres Dan Stresor Pada Mahasiswa Keperawatan Universitas Negeri. *J Keperawatan Indones*. 2021;13(1):149-164. <https://www.neliti.com/id/publications/104729/umur-orang-dengan-hiv-aids-odha-berhubungan-dengan-tindakan-pencegahan-penularan>
17. Samoggia A, Riedel B, Ruggeri A. Social media exploration for understanding food product attributes perception: the case of coffee and health with Twitter data. *Br Food J*. 2020;122(12):3815-3835. doi:10.1108/BFJ-03-2019-0172
18. Wijaya I, Nur NH, Sari H. Hubungan Gaya Hidup Dan Pola Makan Terhadap Kejadian Syndrom Dispepsia Di Rumah Sakit Bhayangkara Kota Makassar. *J Promot Prev*. 2020;3(1):58-68. doi:10.47650/jpp.v3i1.149
19. Arniaty V. Hubungan Kebiasaan Minum Kopi dengan Peningkatan Tekanan Darah pada Masyarakat di Desa Ponjian Pegagan Julu X Sumbul Kabupaten Dairi. Published online 2019:37.



Habib Al Huda, Erlina Marfianti, Nuni Ihsana, Nurcholid Umam Kurniawan

20. Sumarni. Hubungan Pola Makan Dengan Kejadian Dispepsia. *J Keperawatan Dan Fisioter.* 2019;2(1):61-66. doi:10.35451/jkf.v2i1.282
21. Hutapea MN. Perbedaan Kejadian Dispepsia Antara Pengguna Obat Antiinflamasi Non Steroid (OAINS) dan Bukan Pengguna Obat Antiinflamasi Non Steroid (OAINS) di RSUP. Haji Adam Malik Medan Tahun 2017. *Angew Chemie Int Ed* 6(11), 951–952. Published online 2017.
22. Bili OS, Prawito, Vidhiastutik Y. Coffee Consumption Patterns Relationship With Risk Of Gastritis In Communities In RT 10 RW 03 Village Mancar, Peterongan District Jombang District. *Prima Wiyata Heal.* 2023;4(2):42-46.
23. Chao Y-S, Wu C-J, Po JY, et al. The Upper Limits of Risk Ratios and Recommendations for Reporting Risk Ratios, Odds Ratios, and Rate Ratios. *Cureus.* 2023;15(4):1-22. doi:10.7759/cureus.37799
24. Seid A, Tamir Z, Demsiss W. Uninvestigated dyspepsia and associated factors of patients with gastrointestinal disorders in Dessie Referral Hospital, Northeast Ethiopia. *BMC Gastroenterol.* 2018;18(1):1-10. doi:10.1186/s12876-017-0723-5
25. Dilnessa T, Amentie M. Prevalence of Helicobacter pylori and risk factors among dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia: A comparative study. *Ethiop J Heal Dev.* 2017;31(1):4-12.