Original Article

Risk Factor Analysis Of Diarrhea In Medical Students

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ABSTRACT

Background: Diarrhea is a condition of increased frequency of defecation more than 3 times along with liquid stool consistency followed by mucus or blood. In Indonesia alone in 2019, the reported incidence of diarrhea was 2,549 people with a case fatality rate of 1.14%. This study aims to analyze the risk factors for diarrhea in university students.

Methods: This study is an observational analytic descriptive study with a cross sectional study design. This study used a sample of 132 students who were determined by purposive sampling technique. Questionnaires were used as data collection instruments. Data analysis was carried out using bivariate and univariate tests with logistic regression techniques with a p <0.05 indicating data significant.

Results: Based on the research that has been done, 54 male subjects and 78 female subjects were obtained. Most of the research subjects experienced diarrhea with a frequency of 3 to 4 times a month (55.3%) which was associated with environmental and psychological factors with significant levels of $p < 0.043$ and $p < 0.049$, respectively.

Conclusion: Environmental and psychological factors have a significant relationship partially with the incidence of diarrhea in students of the Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya.

INTRODUCTION

Diarrhea can be described as a health condition characterized by an increase in bowel movements or a change in stool consistency.1–3 Patel and Joseph mention that diarrhea is not a disease, but a symptom that marks a dysfunction in the digestive system.1 However, the prevalence of diarrhea is still a serious health problem in the community. According to data from

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the Ministry of Health, in 2019, the incidence of diarrhea was recorded at 2,549 people with a case fatality rate of 1.14%. In 2021, according to the 2021 Indonesian Health Profile report by the Ministry of Health of the Republic of Indonesia, diarrhea is the most common cause of death in the post-neonatal period (29 days-11 months) and the under-five group.4

Diarrhea is a health condition characterized by increased frequency of bowel movements more than 3 times with liquid stool consistency followed by mucus or blood.3 Based on the duration of occurrence, diarrhea is classified into acute and chronic diarrhea.5 Furthermore, acute diarrhea has a duration of less than 2 weeks, while chronic diarrhea occurs for more than 2 weeks.6 The manifestations of the two types of diarrhea can be different. In acute diarrhea, patients will generally experience dehydration, while chronic diarrhea can sometimes be a clinical symptom of a more serious disease, such as malabsorption, inflammation, or congenital defects.7

Generally, diarrhea is transmitted through the fecal-oral route, either directly through the hands of the patient or indirectly through contaminated food or drink. Broadly speaking, the risk factors for diarrhea can be classified into two, namely behavioral factors and environmental factors.8,9. The incidence of diarrhea can also be caused by organisms, pathogens, and parasites, such as rotavirus, norovirus, E. coli, and so on.10,11

The infectious nature of diarrhea is the reason for researchers to analyze the risk factors of diarrhea in college students. The prevalence of diarrhea incidence that also often occurs in student groups is one of the reasons this study was conducted.

METHOD

Study Design

The study is an observational analytic descriptive study with a cross sectional research design. Researchers will observe the phenomenon of diarrhea incidence in a particular group accurately, then analyze the dynamics of the correlation between risk factors and effect factors.[12]

Research Population and Sample

The population in this study were all students of the Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya class of 2019-2022 with a total of 346 students. Of the 346 total students, 83 were class of 2019, 76 were class of 2020, 77 were class of 2021, and 110 were class of 2022. Sample determination was carried out using purposive sampling technique by setting inclusion criteria, namely (1) Active students in the Bachelor of Medical Education study program batch 2019-2022, (2) Students who have experienced acute diarrhea, (3) Students who are willing to become research respondents. In addition, we also apply exclusion criteria when determining the sample, namely students who have experienced diarrhea with severe dehydration that requires hospitalization. Through the calculation of the finite population, the minimum sample size required in this study is 121 research subjects.

Research Variable

This study uses 3 independent variables consisting of behavioral factors, environmental factors, and other factors, food and beverages, and psychology, while the dependent variable of this study is diarrhea. Each variable consists of several indicators which can be seen in **Table 1**.

Table 1. Research variables studied

Research Variables	Indicator
Behavioral Factors	1. Hand washing behavior
	2. Nail trimming behavior
Environmental Factors	1. Clean water
	2. Healthy latrine
Other factors	1. Knowledge
	2. Food and drink
	3. Psychology

Research Instruments

A questionnaire was used as a data collection instrument in this study. The questionnaire was divided into 2 parts. The first part is intended to obtain information on the characteristics of the respondents (age, gender, address, batch, study program). The next part of the questionnaire contains questions that represent each indicator of the research variable this time. The questionnaire contained 41 questions, divided into 11 questions representing behavioral factors, 18 questions representing other factors, and one question representing the incidence of diarrhea. Each question represents 3 answer options using a Likert scale, namely "0" indicates the answer no, "1" indicates the answer sometimes, "2" indicates the answer yes. While each answer had the highest score of 2 and the lowest score of 0, there were 6 items that had the best score.

Statistical Analysis

The data that has been collected will then be carried out univariate and bivariate tests. The statistical test used is logistic regression to compare several groups of samples with the same variable and coincide the variables that are labeled on an ordinal scale. Data were analyzed using SPSS Ver. 24 developed by IBM with a $p<0.05$ indicating significant data.

RESULT AND DISCUSSION

Through observation, we managed to identify the characteristics of this research sample. The general description of the respondents presented in table 2 shows that the most respondents came from the 2019 batch with a total of 58 students.

Table 2. General description of research respondents

	Characteristic	Frequency	Precentage (%)
Class	2022	28	21.2
	2021	26	19.7
	2020	20	15.1
	2019	58	43.9
Gender	Male	54	40.9
	Female	78	59.1
Diarrhea Incidence	Rare (1-2x/month)	57	43.2
	Often (3-4x/month)	73	55.3
	Always (≥5x in a month	2	1.5

Furthermore, respondents in this study were dominated by female students with a frequency of 78 female students, while male respondents were 54 students. The results of observations on the incidence of diarrhea showed that 74 students in all generations often experienced diarrhea.

Table 4 shows the results of descriptive analysis of each question from each risk factor for diarrhea that has been answered by 132 respondents. Through this analysis, we can describe the answers to each question shown by the average value.

Table 3. Results of descriptive analysis of risk factor variables for diarrhea

No.	Question	Mean	Category
QP	**Behavioral Factors**		
1	Do you always wash your hands with soap/hand sanitizer?	1.485	Good
2	Do you always wash your hands with running water?	1.795	Good
3	Do you always wash your hands before eating?	1.659	Good
4	Do you always wash your hands after eating?	1.773	Good
5	Do you always wash your hands after toileting?	1.962	Good
6	Do you think tegal stalls (warteg) always wash their hands before serving food?	1.008	Enough
7	Do you think tegal stalls (warteg) always wash their hands before processing the food they are going to cook?	1.083	Enough
8	Do you think diarrhea can be caused by not washing hands?	1.826	Good
9	Do you cut your fingernails every week?	1.674	Good
10*	Do you eat with long and dirty nails?	1.636	Not Good
11	Do you think diarrhea can be caused by not keeping your nails clean?	1.795	Good
12	Do you think diarrhea can be caused by not using clean water?	1.886	Good
13	Do you think diarrhea can be caused by not using healthy latrines?	1.773	Good
QL	**Environmental Factors**		
1	Do you use PDAM water as your daily source of clean water?	1.629	Good
2*	Do you use well water as your daily source of clean water?	1.417	Not Good
3	Does the water used meet the requirements (odorless, tasteless, colorless)?	1.742	Good
4	Do you think tegal stalls (warteg) use clean water when processing their food ingredients?	1.265	Good
5	Do you often use gooseneck latrines?	1.197	Good
6*	Do you often use a flush toilet?	1.326	Enough
7	Does the toilet you use have a septic tank?	1.871	Good
8	Does the latrine you use have ventilation?	1.742	Good
9	How often (3x a week) do you clean the latrine?	1.386	Good
QPe	**Knowledge Factor**		
1	What is diarrhea?	1.977	High
2	What causes diarrhea?	1.917	High
3	What are the symptoms of diarrhea?	1.902	High
4	How to prevent diarrhea?	1.924	High
5	Can diarrhea cause dehydration?	0.811	High
6	Do diarrheal diseases lead to hospitalization?	0.076	Low
QMM	**Eating and Drinking Factors**		
1	Do you think diarrhea can occur due to food factors (stale food, food poisoning, and spicy food)	1.879	Good
2	Do you often eat snacks from the medical faculty stall?	1.258	Enough

3	Do you often eat food from outside the medicalfaculty (warteg)?	1.652	Good
4	Do you think diarrhea can occur because you ate the wrong food due to eating snacks from outside or warteg?	1.598	Good
5*	Is your daily source of drinking water PDAM water?	1.636	Not Good
6	Is your daily source of drinking water gallon water?	1.977	Good
7*	Is your daily source of drinking water well water?	1.848	Not Good
8	Is the water brought to a boil before drinking?	0.985	Enough
9	Do you think diarrhea can be caused by eating and drinking mistakes?	1.864	Good
QPs	**Psychological Factors**		
1	Do you think diarrhea can occur due to psychological factors (anxiety/stress)?	1.273	Good
2	Do you experience diarrhea when you are under a lot of stress (such as when you have exams)?	0.758	Enough
3	Do you think diarrhea can be caused by psychological factors (anxiety/stress)?	1.485	Good

Furthermore, Table 4 shows the recapitulation of the perceptions of medical faculty students at Universitas Nahdlatul Ulama Surabaya. Based on the table, it is known that the risk factors for diarrhea in Surabaya Nahdlatul Ulama medical students class of 2019-2022 are classified as good in behavioral, environmental, and eating and drinking factors. However, the psychological factor is quite good.

Table 4. Recapitulation of respondents' perceptions on risk factors

No	Risk Factor	Mean	Category
1	Behavioral Factors	1.643	Good
2	Environmental Factors	1.508	Good
3	Knowledge Factor	1.434	High
4	Eating and Drinking Factors	1.633	Good
5	Psychological Factors	1.172	Enough

Table 5. *Goodness-of-fit*

	Chi-Square	*df*	*Sig.*
Pearson	222.503	255	0.930
Deviance	184.968	255	1.000
Link Function: Logit.			

The goodness of fit analysis results show a Pearson significance value of 0.930 ($p > 0.005$), thus it can be concluded that the logistic regression model fits the observed data. The table shows the results of the logistic regression test using the Nagelkerke test (Pseudo R-Square) is worth 0.105 and these results indicate that the independent variables consist of behavioral factors, environment, knowledge, eating and drinking, and psychology are able to influence the independent variable (diarrhea) by 10.5%.

The environmental factors and psychological factors have a significance value of 0.043 and 0.049 respectively ($p < 0.005$), it can be interpreted that partially environmental and psychological factors

affect the incidence of diarrhea in students of Universitas Nahdlatul Ulama Surabaya.

Meanwhile, other factors did not show a significant relationship.

Table 5. Logistic regression test results

		Estimate	Nagelkerke	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Threshold	[Diare=0]	-2.226		0.413	-7.551	3.099
	[Diare=1]	2.463		0.375	-2.978	7.904
Location	Qp	-0.102		0.208	-0.261	0.057
	QL	-0.153	0.105	0.043	-0.315	0.008
	QPe	0.110		0.508	-0.216	0.437
	QMM	0.049		0.608	-0.139	0.237
	QPs	0.191		0.049	-0.015	0.397

Keterangan:
QP   : Behavioral Factors
QL   : Environmental Factors
QPe   : Knowledge Factor
QMM   : Eating and Drinking Factors
QPs   : Psychological Factors

DISCUSSION

The general description of the respondents explained that the incidence of diarrhea tends to occur in female students and this is in line with the research of Meleine et al. (2014) which states that the sex ratio in diarrhea is very skewed towards the female sex. This suggests that sex hormones have an important role in the physiopathology of diarrhea during the menstrual cycle, especially exacerbation of abdominal pain during menstruation, or a condition where ovarian hormone levels are low. However, the mechanisms underlying these sex-related differences still require further research.[13]

Data on the prevalence of diarrhea incidence that has been collected shows the highest condition, namely students often experience diarrhea in a period of 1 month. This can be attributed to several factors, ranging from behavioral, environmental, knowledge, and psychological factors. Trikora and Siwiendrayanti (2015) explained in their study, performing unclean activities such as using unwashed hands to cook after defecating or cleaning feces, as well as the state of sanitation facilities is one of the factors most often associated with the development of diarrhea.[9]

Through the analysis, we found several factors that trigger diarrhea in students. The first factor is behavioral factors, one of which is seen from nail hygiene. Observations on respondents showed that the hygiene of students' nails was in the poor category, increasing the possibility of diarrhea. This result is in line with the research of Ibrahim et al. (2021) which shows a significant relationship between poor nail hygiene and the incidence of diarrhea.[14] This is a major concern because diarrhea transmission generally occurs through the fecal-oral route and poor hand hygiene further increases the risk of infection. Another factor is the source of water used. Observations show that most respondents still use water sources that are not clean. Unhygienic water source conditions have the potential to become a source of spread of various diseases or known as water-borne diseases, as well as

water-washed diseases through cooking or eating utensils that are washed with the water.[15]

In addition, we found that psychological factors partially had a significant relationship with the incidence of diarrhea in university students. Kim et al (2021) explained that a person's poor psychological state can trigger chronic diarrhea and constipation. These events are associated with the influence of individual behavior and hygiene practices. For example, individuals who experience high levels of stress or anxiety may lack good sanitation practices. A person's psychological state can also affect their immune system. Stress and anxiety can weaken the human immune system.[16] These results are also supported by research conducted by Ballou et al. (2019) which states that chronic diarrhea is

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significantly more common in depressed individuals than non-depressed individuals.[17]

CONCLUSION

We found that medical students in the 2019-2022 class Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya often experience diarrhea. Environmental and psychological factors partially have a significant relationship with the incidence of diarrhea in students. Personal hygiene, food, and beverages as well as the psychological condition of students need special attention to overcome this problem.

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REFERENCES

1. *Patel M, Sellin JH. Diarrhea. In: Encyclopedia of Gastroenterology. Elsevier; 2004. p. 568–75.*
2. *Kiesau M. Diarrhea. In: Comprehensive Pediatric Hospital Medicine. Elsevier; 2007. p. 149–52.*
3. *Alemayehu M, Alemu T, Astatkie A. Prevalence and Determinants of Diarrhea among Under-Five Children in Benna Tsemay District, South Omo Zone, Southern Ethiopia: A Community-Based Cross-Sectional Study in Pastoralist and Agropastoralist Context. Adv Public Health. 2020;2020.*
4. *Kementrian Kesehatan RI. Profil Kesehatan Indonesia 2021. Jakarta; 2022.*
5. *Rokhmah NN, Manuel YGP, Putri Kusuma EN, Nurdin NM. The Rationality of Antibiotics Use on Acute Diarrhea to Pediatric Inpatients in the Fatmawati Hospital for 2018-2019 Period. Jurnal Farmasi Galenika (Galenika Journal of Pharmacy) (e-Journal). 2022 Mar 1;8(1):10–21.*
6. *Ningsih AN, Wahyuningsih HP, Margono. Pemberian ASI Eksklusif dan Kejadian Diare pada Bayi di Puskesmas Umbulharjo 1 Yogyakarta Tahun 2016. Jurnal Kesehatan Ibu dan Anak [Internet]. 2017 Jul 31 [cited 2023 Oct 13];11(1):16–22. Available from: https://e-journal.poltekkesjogja.ac.id/index.php/kia/article/view/54*
7. *Gurram B. Diarrhea. In: Nelson Pediatric Symptom-Based Diagnosis. Elsevier; 2018. p. 182-203.e1.*
8. *Utami N, Luthfiana N. Faktor-Faktor yang Memengaruhi Kejadian Diare pada Anak. Jurnal Majority [Internet]. 2016 Oct 1 [cited 2023 Oct 13];5(4):101–6. Available from: https://juke.kedokteran.unila.ac.id/index.php/majority/article/view/893*
9. *Trikora E, Siwiendrayanti A. Hubungan Praktik Cuci Tangan, Kriteria Pemilihan Warung Makan Langganan dan Sanitasi Warung dengan Kejadian Diare pada Mahasiswa Universitas Negeri Semarang. Unnes Journal of Public Health [Internet]. 2015 Jan 17 [cited 2023 Oct 13];4(1). Available from: https://journal.unnes.ac.id/sju/index.php/ujph/article/view/4708*

10. *Banwait K. Diarrhea. In: xPharm: The Comprehensive Pharmacology Reference. Elsevier; 2007. p. 1–5.*

11. *Peters PJ, Marston BJ, Weidle PJ, Brooks JT. Human Immunodeficiency Virus Infection. In: Hunter's Tropical Medicine and Emerging Infectious Disease. Elsevier; 2013. p. 217–47.*

12. *Notoatmojo S. Metodologi Penelitian Kesehatan. Jakarta: Rineka Cipta; 2014.*

13. *Meleine M. Gender-related differences in irritable bowel syndrome: Potential mechanisms of sex hormones. World J Gastroenterol. 2014;20(22):6725.*

14. *Ibrahim I, Sartika RAD. Faktor-Faktor yang Berhubungan dengan Kejadian Diare pada Siswa Sekolah Dasar di Kabupaten Lebak, Provinsi Banten, Indonesia. Indonesian Journal of Public Health Nutrition. 2021 Oct 30;2(1).*

15. *Harsa IMS. The Relationship Between Clean Water Sources And The Incidence Of Diarrhea In Kampung Baru Resident At Ngagelrejo Wonokromo Surabaya. Journal of Agromedicine and Medical Sciences. 2019;5(3):124.*

16. *Bae YS, Shin EC, Bae YS, Van Eden W. Editorial: Stress and Immunity. Front Immunol. 2019 Feb 14;10.*

17. *Ballou S, Katon J, Singh P, Rangan V, Lee HN, McMahon C, et al. Chronic Diarrhea and Constipation Are More Common in Depressed Individuals. Clinical Gastroenterology and Hepatology. 2019 Dec;17(13):2696–703..*