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RESEARCH ARTICLE

Smoking Habit and Coffee Consumption with Gastritis Incidence Rate at Productive Ages

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Abstract

Gastritis is a disease caused by an inflammation of the mucous and submucosal lining of the stomach. Several studies show that there is an influence of smoking habit and coffee consumption on gastritis incidence rate. The study was to determine the correlation between smoking habit and coffee consumption toward gastritis at productive ages. The research is an analytical observational study with a cross-sectional design conducted in Makale Health Center, South Sulawesi, in February 2020. Required data was gathered by conducting guided interviews using a questionnaire that includes age range, sex, and education level. Brinkman Index was used to measure smoking habits, coffee consumption, and gastritis questionnaire. Data was analyzed using a chi-square test with a significance level of p=0.05. From a total of 115 respondents, there are 69.6% included in the age range of 26–35 years old, 58.3% have mild smoking habits, 56.5% have severe coffee consumption, and 85.2% are suffering from gastritis. There is a relation between smoking habit (p=0.029) and coffee consumption (p=0.003) with gastritis (p<0.05). The conclusion is that there is a relationship between smoking habits, coffee consumption, and gastritis incidence.

Keywords: Coffee, gastritis, productive age, smoking

Introduction

Gastritis is a common disease that often occurs in everyone and is a health problem with a high prevalence. Lifestyle is an essential factor in the occurrence of gastritis.[1,2] Gastritis is an inflammation of the mucous and submucosal lining of the stomach, which can be caused by several factors, such as smoking, coffee drinking, and drug consumption, such as aspirin or NSAID.[3]

The incidence of world gastritis is around 1.8–2.1 million of the population every year. Based on research conducted by the World Health Organization, gastritis incidents occurred highly in the USA (47%), India (43%), Canada (35%), and China (31%). Based on data from the Ministry of Health of the Republic of Indonesia (2019), 40.8% of gastritis incidents occur in Indonesia.[1,4] Gastritis patient prevalence is often found in the age range of 20 to 44 years old. Research conducted by the University of Medicine and Pharmacy Tîrgu-Mureş mentioned that gastritis prevalence in people with coffee consumption and smoking habits often occurred in those who are 30 to 49 years old.[5]

Smoking is one of many modern lifestyles that are not only found in adults but also in children and young adults. According to the 5th Indonesian Family Life Survey (IFLS-5) data, the percentage of smoking in Indonesia was 58%, with 95% dominated by males with an average age of 19 years old. Most (48%) choose kretek filtered as the preferred cigarette.[6]

Smoking habits can cause gastric disturbance because nicotine in cigarettes will pucker and disrupt blood vessels in the stomach, which will further cause irritation that triggers excessive increase of gastric acid production.[7]

Another factor that influences gastritis occurrence is consuming coffee/caffeine. Long-term and high-frequency caffeine consumption (>3 glasses a day) will accelerate gastric acid production that would irritate the mucosa. When mucosa in the stomach is irritated, hydrochloride acid (HCl) diffusion towards the mucosa will disrupt mucosa and eliminate its ability to protect the stomach from HCl and pepsin auto digestion.[3,5,8,9] Research conducted by Ilham

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et al.[10] stated that the caffeine compound in coffee can accelerate gastric acid production stimulation and cause gastritis. However, a different result was published by Novitasary et al.,[11] which said that there is no relationship between coffee consumption and gastritis, which is highly dependent on the type of coffee, where in this research, the subjects consume more instant coffee with a lower caffeine compound than ground coffee beans. Research by Cheng et al.[12] said that there is a relationship between smoking habit and gastritis, but contrary research by Novitasary et al.,[11] Hairuddin et al.,[13] and Khandelwal et al.,[14] which said that there is no relationship between smoking habit and gastritis occurrence because there are factors with stronger influence on gastritis such as consumption habit and stress.

Based on the description above, the authors are interested in researching the relationship between smoking habits and coffee consumption and gastritis incidence rates at productive ages, which can further identify the contributing factors to preventive and curative sources of gastritis.

Methods

This research is a type of observational analytical study using a cross-sectional design. This study searched for a relationship between smoking habits and coffee consumption with gastritis incidence rate in Makale Health Center, South Sulawesi, conducted in February 2020. Subjects were men and women aged 26–45 years at the study site. Subjects in this study were taken through simple random sampling on subjects by the inclusion criteria, namely men or women aged 26–45 years, have smoking habits and coffee consumption, are not taking NSAIDs and aspirin, and are willing to sign informed consent. Determination of sample size is done by using an infinite-finite population formula with a significance level of 95% from 1.96, and with gastritis prevalence in Indonesia of 40.8%[1] where the measurement accuracy is 0.05 and 115 subjects are willing to participate in this study.

Data collection was collected through questionnaire filling that gathers information regarding identity (name, age, sex, and education level), Brinkman index questions to measure the number of cigarettes consumed in a day multiplied by length of smoking habit in a year with valuation category of light between 0–199, medium between 200–599, and heavy >600.[15] The questionnaire also measures the length and frequency of coffee consumption practiced by the subjects with categories of light with a frequency of ≤3 glasses/day and heavy with a frequency of >3 glasses/day.[16] A gastritis questionnaire was also included to measure the perceived gastritis symptom complaints with a valuation of ≥12 and <12 for non-gastritis complaints.[2]

The Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti, Jakarta, has already approved this research, with approval number 11/KER-FK/1/2019.

Results

Univariate analysis was used to determine the frequency distribution of respondents' characteristics in terms of age, sex, education level, smoking habits, coffee consumption, and gastritis events of the research subjects.

Table 1 suggests that most subjects in the Makale Health Center were aged between 26 and 35 years (69.6%), with a slightly higher proportion of males (56.5%) than females. Eighty subjects (69.6%) had a high level of education, 67 subjects (58.3%) could be considered to have a mild smoking habit, and 65 subjects (56.5%) are known to consume coffee to a significant extent.

Table 1 Characteristic Data

Variables	n=115 (%)
Age (years)	
26–35	80 (69.6)
36–45	35 (30.4)
Gender	
Male	65 (56.5)
Female	50 (43.5)
Level of education (years)	
Low (<9)	35 (30.4)
High (≥9)	80 (69.6)
Smoking habit	
Mild (<200)	67 (58.3)
Moderate (200–599)	45 (39.1)
Severe (>600)	3 (2.6)
Coffee consumption	
Mild (≤3)	50 (43.5)
Severe (>3)	65 (56.5)
Gastritis occurrences	
Gastritis	98 (85.2)
Non-gastritis	17 (14.8)

In the assessment of the incidence of gastritis, it was found that 98 subjects (85.2%) had gastritis.

Bivariate analysis with a chi-square test was used to determine the relation between socio-demographic factors (age, sex, and level of education), smoking habits, and coffee consumption on the incidence of gastritis at the age of 26–45.

Table 2 shows that gastritis occurrence is found more in people in the age group of 26–35 years old with 68 subjects (59.1%), and from chi-square statistical test result, it is revealed that there is no significant relation between age group and gastritis incidence rate in subjects of 26–45 years of age (p=0.921). As many as 55 subjects (47.8%) are male with gastritis, which is slightly higher than female subjects. This shows that there is no significant difference between the two sexes. Based on the chi-square statistical test result, a value of p=0.836 was obtained. Based on that, we can conclude no significant relation exists between sex and gastritis incidence rate in subjects at productive ages. In groups with higher education levels, there are 66 subjects (57.4%) that suffer from gastritis, which is more than the one with lower education. In this group, the chi-square statistical test result shows a value of p=0.214, which means no relation exists between education level and gastritis incidence rate in subjects at productive age.

On a bivariate result of the smoker group, authors combine moderate and severe smokers because there are only three subjects who are heavy smokers. The result obtained shows that the light smokers group suffers more gastritis incidence with 53 subjects (46.1%). On the chi-square test result, a value of p=0.029 was obtained, which means a relationship exists between smoking habits and the incidence rate of gastritis in subjects at a productive age. As for the coffee consumption variable, gastritis incidence was found more in heavy coffee consumers, with 61 subjects (53%). The chi-square test result shows a value of p=0.003, which means that there is a relationship between coffee consumption and gastritis incidence. The results indicated that the subjects consuming more coffee can increase the incidence of gastritis at a productive age.

Discussion

In this research, demographic characteristics (age, sex, and education level) are unrelated to the gastritis incidence rate in subjects aged 26–45. Gastritis tends to happen at a younger age due to uncontrolled eating patterns caused by daily activity.[1,17] The results by Feyiza and Woldeamanuel[3] showed younger aged 18–28

Table 2 Bivariate Relation between Demographic Characteristics, Smoking Habits, and Coffee Consumption with Gastritis Incidence Rate at Productive Ages

Variables	Gastritis Occurrence				p[c]
	Gastritis		Non-gastritis		
	n=98	%	n=17	%	
Age (years)					
26–35	68	59.1	12	10.4	0.921
36–45	30	26.1	5	4.3	
Gender					
Male	55	47.8	10	8.7	0.836
Female	43	37.4	7	6.1	
Level of education (years)					
Low (<9)	32	27.8	3	2.6	0.214
High (≥9)	66	57.4	14	12.2	
Smoking habit					
Mild	53	46.1	14	12.2	0.029*
Moderate–severe	45	39.1	3	2.6	
Coffee consumption					
Mild	37	32.2	13	11.3	0.003*
Severe	61	53	4	3.5	

Note: [c]chi-square statistical test, *significance p<0.05

years (57.5%) tend to suffer gastritis because they don't know about good health behaviors, but according to Khandelwal V et al.,[14] those aged 14–25 years and 36–45 years has more tend to be gastritis. However, gastritis can also occur in older subjects because of several factors such as age increase, degenerative process, *Helicobacter pylori* infection, and NSAID drug usage.[18] The research by Putri et al.[17] concluded that gastritis is found more in females because females tend to lower their weight by managing food consumption frequency, size, and type, which would lead to gastritis. This statement was also made by Yunanda et al.[19] Women also tended to have gastritis due to lack of rest,[3] but some studies said the opposite.[14] The research by Liu et al.[20] revealed that gastritis risk factors depend on each country's economics, education, and health problems. Sipponen and Maaroos[21] also say that the prevalence of gastritis is increasing in line with the increasing age in developed countries. Still, other statements say that 50% of the prevalence of gastritis occurs in young age groups and even in childhood in developing countries. The research by Wulandari et al.[22] said that education level does not have any relationship with gastritis because both education levels can suffer from gastritis. A low education doesn't mean a low knowledge level because it can be obtained from non-formal education, such as information and personal experience, as their future references.[23] Still, Umasugi et al.'s[4] research said that a lack of education could cause a lack of behavior regarding gastritis prevention.

This research shows that there is a relation between smoking habits and gastritis incidence rate at productive ages. The mechanism of smoking influence on the mucosa is by stimulating HCl and pepsinogen, reducing pancreatic bicarbonate flow, removing the protective mucus layer, disturbing epithelial repair, microcirculation disruption, reducing gaster's motility and decreasing prostaglandin E2.[5,24] Smoking can lower prostaglandin synthesize in gastric mucosa and lower barrier function on stomach.[5] Smoking has various factors, such as reactive oxygen species, peroxynitrite, peroxynitrite, free radicals, and other reactive compounds that can cause oxidative stress, impacting endothelial function. This inflammation reaction will continue to occur and further lead to gastritis.[5,12] Smokers who have smoked for more than two years could increase gastric acid secretion and lower gastric pH.[24] This research had similar findings by Cheng et al.,[12] where a smoking lifestyle could lead to gastritis. Still, some had different conclusions, which said there's no relationship between smoking habit and gastritis because there are other stronger influencing factors that might lead to gastritis occurrence, which are eating patterns and stress.[11,14,25]

This research showed a relation between coffee consumption and gastritis incidence rate at productive ages. Coffees are available in several forms. The chemical composition of coffee depends on green beans and roasted and brewed coffee. The green coffee beans depend on roasting, which can cause a Maillard reaction. This reaction can produce coffee acrylamide and reduce free chlorogenic acids and antioxidant forms. Meanwhile, roasted coffee consists of many components, and some effects are antioxidant, anti-inflammatory, antifibrotic, and antiproliferative. Coffee brewing also influenced the coffee composition. It depends on coffee solubilization in hot or cold water, separation of the water extract from the coffee ground, and water absorption. A recent study showed that hot and cold brew coffees have essential differences in total antioxidant capacity. But, whatever your coffee's methods, its components will affect your body.[8] The caffeine compound in coffee stimulates the secretion of HCl and gastrin through G cells, which are present in the gaster and duodenum but don't expedite gastric emptying.[9,10] Increased gastric acid secretion can increase the possibility of dyspepsia, gastritis, ulcers, and gastroesophageal reflux disease.[9] Caffeine can stimulate the central neural system and increase stomach activity to produce gastrin hormones in the stomach and pepsin, which are acidic, leading to irritation and stomach mucosa erosion.[8,26] Caffeine can accelerate acid production in gaster and produce excess gas, which can cause bloating.[27] This result is similar to the one Mahmoud et al.[18] conducted, which shows a significant association between gastritis and drinking coffee. The opposite study by Novitasary et al.[11] showed that the respondents rarely or not excessively drink coffee. Our body can absorb caffeine wholly and rapidly (95% within 45 minutes), and plasma levels increase within 30–60 minutes.[28] The International Agency for Research on Cancer also said there is evidence that coffee consumption helps reduce incidents of certain cancers, like colon, prostate, endometrium, melanoma, and liver.[8] Based on

International Food Information Council data, the safe consumption of coffee within the moderate range is up to 400 mg of caffeine per day or 3–5 cups per day for healthy adults.[28] Regarding this research, which reveals that most of the subjects consumed >3 glasses of pure coffee per day (black coffee), although every individual experiences different effects, it would risk them to contract gastritis. This result is the same with Santoso,[27] who said drinking coffee for an extended period and continuously with more than three glasses per day can irritate mucosa gaster, leading to gastritis and recurrence of gastritis.

The limitation of this research is that endoscopy examination is not used for gastritis diagnosis due to resource limitations. Therefore, the authors are unable to exclude gastritis contributors due to *Helicobacter pylori* infection or other irritant exposure.

Conclusion

Smoking behavior and coffee consumption are related to the incidence rate of gastritis at productive ages in Makale Health Center, South Sulawesi.

Conflict of Interest

The authors declare that there is no conflict of interest.

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