

# The Effects Between Black Coffee and Mixed Coffee Consumption Towards Gastroesophageal Reflux Disease (GERD) Symptoms

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## ABSTRACT

**Introduction :** *Gastroesophageal Reflux Disease (GERD) is a disease characterized by regurgitation of stomach contents into the esophagus. Signs and symptoms of GERD are regurgitation and heartburn. One of the triggers for GERD is coffee consumption. This study aims to determine differences in the effect of coffee consumption on black coffee drinkers and mixed coffee drinkers on symptoms of GERD.*

**Methods:** *Cross sectional research was conducted throughout Bekasi City and DKI Jakarta aged 18 - 55 years using demographic questionnaires and consumption of black and mixed coffee as well as the Gastroesophageal Reflux Disease Questionnaire (GERDQ) in Indonesian. Data analysis used the Mann-Whitney test to test the percentage difference between the dependent variable and the independent variable.*

**Results:** *This study obtained 195 participants who were analyzed. As much as 50.8% (99 people) consumed mixed coffee and 52.8% (19 people) had GERD and 50.3% (80 people) did not experience GERD. As many as 49.2% (96 people) consumed black coffee and 47.2% (17 people) had GERD and 49.7% (79 people) did not have GERD. The Mann-Whitney test did not show a significant change (P-Value 0.790).*

**Conclusion:** *There is no significant comparison between the effects of coffee consumption on black coffee drinkers and mixed coffee drinkers on GERD symptoms.*

**Keywords:** *Black Coffee, Gastroesophageal Reflux Disease, GERD, Mixed Coffee*

## ABSTRAK

**Latar belakang:** *Gastroesophageal Reflux Disease (GERD) merupakan penyakit yang ditandai dengan regurgitasi isi lambung ke kerongkongan. Tanda dan gejala GERD yaitu regurgitasi dan heartburn. Pemicu GERD salah satunya disebabkan oleh konsumsi kopi. Studi ini bertujuan untuk mengetahui perbedaan efek konsumsi kopi pada peminum kopi hitam dan peminum kopi campuran terhadap gejala GERD.*

**Metode:** *Penelitian cross sectional dilakukan di seluruh Kota Bekasi dan DKI Jakarta yang berusia 18 - 55 tahun dengan menggunakan kuesioner demografi dan konsumsi kopi hitam dan campuran serta Gastroesophageal Reflux Disease Questionnaire (GERDQ) dalam bahasa Indonesia. Analisis data menggunakan uji Mann-Whitney untuk menguji perbedaan persentase antara variabel terikat dan variabel bebas.*

**Hasil:** *Penelitian ini mendapatkan 195 responden yang dianalisis. Sebanyak 50,8% (99 orang) mengonsumsi kopi campuran dan 52,8% (19 orang) mengalami GERD dan 50,3% (80 orang) tidak mengalami GERD. Sebanyak 49,2% (96 orang) mengonsumsi kopi hitam dan 47,2% (17 orang) mengalami GERD dan 49,7% (79 orang) tidak mengalami GERD. Uji Mann-Whitney tidak menunjukkan perubahan signifikan (P-Value 0,790).*

**Kesimpulan:** *Tidak terdapat perbandingan yang signifikan antara efek konsumsi kopi pada peminum kopi hitam dan peminum kopi campuran terhadap gejala GERD.*

**Kata kunci:** *Gastroesophageal Reflux Disease, GERD, Kopi Campuran, Kopi Hitam*

## INTRODUCTION

Gastroesophageal Reflux Disease (GERD) is a common gastrointestinal disease that can be found all over the world. Prevalence of GERD is estimated to be 18.1-27.8% in North America, 8.8-25.9% in Europe, 2.5-7.8% in East Asia, 8.7-33.1% in the Middle East, 11.6% in Australia, and 23% in South America.<sup>1</sup> According to Syam AF et al., prevalence of GERD in East Asia is relatively low. One hospital-based study in Indonesia claimed that prevalence of GERD in dyspepsia patients undergoing endoscopy were 32.4%.<sup>2</sup> GERD symptoms potentially interfere with daily activities, which then impact a person's quality of life.<sup>1</sup> GERD is defined as a chronic gastrointestinal disease characterized by the regurgitation of stomach contents into the esophagus.<sup>3</sup> Typical GERD symptoms include regurgitation - a reflux condition that occurs before and after consuming food which leads to a sour and bitter sensation in the tongue - and heartburn - an epigastric burning sensation accompanied by pain radiating to the chest.<sup>4</sup>

GERD can be triggered by various factors, such as consuming certain medications, chocolate, foods high in fats, coffee, alcohol and smoking cigarettes. Moreover, changes in hormone levels during pregnancy and menopause, as well as hiatus hernia and high body mass index (BMI) are also considered as risk factors.<sup>4</sup> From the aforementioned factors, consuming coffee is highly associated with GERD due to it being one of the most consumed beverage across the world and is

considered to be a part of our lifestyle. Functionality, taste, sense of pleasure and habit were some of the main reasons why it's highly desired by the society.<sup>5</sup> In 2020/2021, around 166.63 million coffee bags with each weighing as much as 60 kg were consumed worldwide.<sup>6</sup> Coffee has also become a form of tradition among young adults and elderly in Indonesia. In young adults, coffee is mainly consumed to promote alertness and stay awake throughout the night

According to Rahardjo, coffee was classified into several types: Arabica, Robusta, Liberian, and Excelsa coffee.<sup>7</sup> Arabica and Robusta coffee were the more well-cultivated types in Indonesia.<sup>8</sup> International Coffee Organization (ICO) reported that Indonesia consumed up to 5 million coffee bags in total during the period between the years of 2020 and 2021, thus becoming the fifth largest consumer of coffee in the world.<sup>9</sup> Apart from black coffee, we could also find a variety of coffee mixtures; those blended with milk, cacao powder, cinnamon or even flavoured syrups. Mixed coffee was generally found to be more preferred than black coffee. Nevertheless, both types of coffee could be served in either hot or cold brewed. Bringing into view the benefit of consuming coffee in productivity aspect as well as a form of culture among the society in Indonesia, the author aimed to determine whether there is a correlation between the type of coffee consumed towards GERD symptoms.<sup>10</sup>

**METHODS**

A cross-sectional study was conducted on 195 participants with an age range of 18-65 years in DKI Jakarta and Bekasi City. Through research ethics approval (NO: 15/02/KEP-FKIKUAJ/2023). Inclusion criteria were those who regularly consumed coffee in the last 3 months, aged 18-65 years, and were willing to become participants. The exclusion criteria for this study were those who smoked, consumed alcohol, were diagnosed with an anxiety disorder, consumed medication, and/or did not complete the participant questionnaire. The instruments used to measure the results were as follows: demographic characteristics and coffee type questionnaires, as well as the Indonesian version of the GERDQ. Researchers took samples by distributing the questionnaire link via social media to residents in Bekasi City and DKI Jakarta. Consecutive sampling was conducted for this study via Google form to the participants. The collected results are processed using computer software. The Mann-Whitney bivariate test was used to analyze black and mixed coffee data on GERD symptoms.

**RESULT**

195 participants met the inclusion criteria. Majority of the participants were late teenagers aged 18 to 25 years old accounting for 93.3% (182 individuals), followed by young adults aged 26 to 35 years old making up of 4.6% of the participants (9 individuals), and the remaining 2.1% were pre-elderly aged 46 to 55 years old (4 individuals). Majority of the participants were also found to be female, which accounted for 71.3% (139 individuals), whilst males made up 28.7% of the total respondents (56 individuals). 31.8% of the participants resided in Bekasi City (62 individuals), followed by 20.5% in South Jakarta (40 individuals), 20% in North Jakarta (39 individuals), 12.3% in East Jakarta (24 individuals), 11.8% in West Jakarta (23 individuals), and 3.6% in Central Jakarta (7 individuals). Meanwhile, 74.4% of the participants comprised of students (145 individuals), 10.3% were employees (20 individuals), 6.2% were doctors (12 individuals), 3.1% were unemployed (6 individuals), 2.1% teachers/lecturers and another 2.1% were entrepreneurs (4 individuals), 1.5% were freelancers (3 individuals), and at 0.5% was a lawyer (1 individual).

**Table 1. Demographic Characteristics of People Living in DKI Jakarta and Bekasi City**

Characteristics	Frequency (Person)	Percentage
<b>Age</b>		
Late Teenagers	182	93,3
Young Adults	8	4,6
Pre-elderly	4	2,1
<b>Gender</b>		
Male	56	28,7
Female	139	71,3
<b>Domicilr</b>		
North Jakarta	39	20
East Jakarta	24	12.3
South Jakarta	40	20.5
West Jakarta	23	11.8
Central Jakarta	7	3.6
Bekasi City	62	31.8
<b>Occupation</b>		
Student	145	74,4
Enterpreneur	4	2,1
Employee	20	10,3
Doctor	12	6,2
Lawyer	1	0,5
Freelancer	3	1,5
Teacher/Lecturer	4	2,1
Unemployed	6	3,1

Table 2 depicts the frequency distribution of coffee consumption and participants' knowledge about coffee. A total of 100% (195 individuals) consumed coffee in the last 3 months. It was found that 93.8% of participants (183 individuals) were aware of black coffee and mixed coffee types. On the other hand, 6.2% (12 individuals) were not familiar with black and mixed coffee types. Our research also discovered that over than half of the total participants consumed mixed coffee (50.8%), and the remaining half

consumed black coffee (49.2%). Frequency of coffee consumption widely varies; 30.3% were daily drinkers (59 individuals), 39% weekly drinkers (76 individuals), 9.7% were monthly drinkers (19 individuals), and 21% were occasional drinkers of coffee (41 individuals)

According to our research, 66.2% (129 individuals) of participants had been reported to be enjoying their coffee in cafes or coffee shops, followed by 26.2% (51 individuals) who drank coffee at home, 3.6% (7 individuals) in traditional coffee shops or stalls, and

**Table 2. Frequency Distribution of Coffee Consumption and Knowledge about Coffee**

Characteristics	Frequency	Percentage
Consumed coffee within the last 3 months	195	100
Yes		
Familiar with the types of black and mixed coffee		
Yes	183	93,8
No	12	6,2
Type of coffee consumed		
Mixed coffee	99	50,8
Black coffee	96	49,2
Frequency of drinking coffee		
Daily	59	30,3
Weekly	76	39
Monthly	19	9,7
Occasionally	41	21
Location of drinking coffee		
Home	51	26,2
Café / Coffee Shop	129	66,2
Kedai kopi / Warung	7	3,6
Others	8	4,1
Time of drinking coffee		
Morning	52	26,7
Afternoon	71	36,4
Evening	49	25,1
Night	23	11,8
How long have the drinking habit been going?		
1 – 2 years	60	30,8
3 – 4 years	61	31,3
>5 years	74	37,9
How often is coffee consumed per week?		
1 – 3 times/week	143	73,3
4 – 6 times/week	35	17,9
>6 times/week	17	8,7
Reasons of drinking coffee		
Out of habit	63	32,3
To relieve stress	37	19
Refreshing	52	26,7
Social gathering	18	9,2
Others	25	12,8
Feeling of stomach discomfort after drinking coffee		
Yes	83	42,6
No	112	57,4

**GERD-Q Score Distribution of People Living in DKI Jakarta and Bekasi City**

GERD score	Frequency (Person)	Percentage %
Score < 7 (Non-GERD)		
0	1	0,5
2	1	0,5
3	5	2,6
4	17	8,7
5	26	13,3
6	77	39,5
7	32	16,4
Score 8 – 18 (GERD)		
8	19	9,7
9	11	5,6
10	1	0,5
11	1	0,5
12	3	1,5
13	1	0,5

4.1% (8 individuals) in other locations. The time of day for coffee consumption varied according to the participants' preferences, 26.7% were found to prefer having their coffee in the morning (52 individuals), 36.4% during the day (71 individuals), 25.1% in the afternoon (49 individuals), and 11.8% in the evening (23 individuals).

As much as 37.9% of the participants had been consuming coffee for more than 5 years (74 individuals), 61% for 3-4 years (61 individuals), 30.8% for 1-2 years (60 individuals). Meanwhile, the frequency of drinking ranges from 1-3 times per week (73.3%), 4-6 times per week (17.9%), and up to more than 6 times per week (8.7%). Reasons for consuming coffee include drinking out of habit (32.3%), as a way of refreshing (26.7%), to relieve stress (19%), and for social gatherings (9.2%).

After data analysis, 42.6% of the participants claimed to not experience stomach discomfort after coffee consumption (83 individuals), while 57.4% experienced stomach discomfort after coffee consumption (112 individuals).

Table 3 shows the distribution of GERD scores collected from the Gastroesophageal Reflux Disease Questionnaire (GERDQ). The GERDQ scores were classified into 2 groups according to the total number of days participants experienced their symptoms. Score of <7 is defined as not having GERD while score of 8-18 is defined as having GERD.

It was identified that 81.5% had GERD (159 individuals), with 6 as the highest score recorded in 77 individuals, 32 other individuals scored 7, 26 individuals scored 5, 17 individuals scored 4, 5

individuals scored 3, and one individual scored 0 and 2 each.

as much as 18.3% of the participants scored between 8-18, hence they were defined as having GERD. This includes 19 participants who scored a value of 9 in the GERDQ, 3 participants who scored 12, and one participant in each category of score 10, 11 and 12.

Out of 195 participants, 99 participants consumed mixed coffee (50.8%), 96 participants consumed black coffee. From those consuming mixed coffee, 19 of the participants experienced GERD (52.8%) and 80 others did not experience GERD (50.3%). Participants consuming black coffee had 17 of them experiencing GERD (47.2%) and 79 did not (49.7%).

Our study kept the significant threshold at the value of 0.05. In reference to Table 6, the test result is shown to be not statistically significant ( $p= 0.790$ ).

Three hundred and thirty-six participants filled out the questionnaire. After screening, a total of 195 participants met the inclusion criteria (drank coffee regularly for 3 months, did not smoke, did not consume alcohol, and completes the questionnaire). Participants who took part in this study were residents of DKI Jakarta and Bekasi City aged 18-65 years old. Majority of the participants were women (71.3%). Prevalence of GERD in this study was 18.3%. Out of the 195 participants, 69.45% of women and 30.6% of men experienced GERD.

**DISCUSSION**

This result is in line with the study conducted by Karimian M et al., where prevalence of GERD in

**Tabel 4. GERD-Q Score Distribution in Male and Female Participants Aged 18-65 Years Old with and without GERD in DKI Jakarta and Bekasi City**

Gender	GERD	Non-GERD	Total
Male	11	45	56
Female	25	114	139
Total	36	159	195

**Table 5. Distribution of Coffee Types with GERD**

Types of coffee consumed	GERD	Non-GERD	Total
Mixed coffee	19 (52,8%)	80 (50,3%)	99 (50,8%)
Black coffee	17 (47,2%)	79 (49,7%)	96 (49,2%)
Total	36 (100%)	159 (100%)	195 (100%)

**Table 6. Non-Parametric Test Results on the Comparison of Black Coffee and Mixed Coffee**

THE TYPE OF COFFEE	N	MEAN RANK	SUM OF RANK	Mann-Whitney Test
GERD	Mixed Coffee	99	98,71	P-Value 0,790
SYMPTOMS	Black Coffee	96	97,27	
SCORE	TOTAL	195		

Iran was 5.64%, with the female participants (7.88%) having a higher prevalence when compared with the male participants (5.72%).<sup>11</sup> GERD was more likely to be experienced by older females, due to hormonal changes and/or hiatal hernia. This statement is also further supported by this study, whereas GERD prevalence was found higher in female than male participants.

Late teenagers aged 18-25 years old was the dominant age group in this study (91.7%). This is consistent with one previous study conducted by Saputra et al., where majority of the participants were aged 20-25 years old (77.33%), thus dominating over other age groups. One factor that could explain this phenomenon derived from coffee consumption. Coffee consumption tend to be lower in age groups over 20-25 years old. This might be due to the awareness on the health risks associated with coffee consumption at older age, such as the risk of developing hypertension and atherosclerosis. As a result, this led to elderly limiting their coffee consumption as a preventive measure.<sup>12</sup>

In the aspect of occupation, students were the most represented in this study, with as much as 74.4% (145 individuals). However, this finding is not in line with the study done by Alsuwat et al., where correlation between occupation and GERD was not statistically significant. Variety in sample size and working hours might be the reason of this difference.<sup>41</sup> Factors such as

diet, lifestyle, academic stress and study habits which potentially affect digestion were thought to contribute to the higher number of students experiencing GERD. However, further research is needed to confirm and understand these contributing factors

Data obtained from this study showed that the most consumed type of coffee is mixed coffee, for as much as 50.8%, meanwhile 49.2% others consumed black coffee. This is in line with Tarigan et al.'s study, where the 32 respondents who took part in their research had half of them consuming instant coffee and 40.6% consuming black coffee.<sup>13</sup> Mixed coffee is more preferable than black coffee in this study's participants, possibly because the wider range of mixed coffee's combinations with sugar, chocolate, cinnamon and many more, making it more enjoyable. Meanwhile, black coffee has a stronger and robust flavor as there is no mixture other than coffee grounds and water. This study also found that the highest coffee consumers were those of age 18-25 years old who preferred mixed coffee over black coffee.

This study aimed to find the differences between black coffee and mixed coffee impact on GERD symptoms in people aged 18 to 65 years old living in DKI Jakarta and Bekasi City. A total of 195 participants met the inclusion criteria. According to this study's analysis, 52.8% (19 individuals) were found to suffer from GERD and 50.3% (80 individuals) did not

in those who consumed mixed coffee. Meanwhile, those who consumed black coffee had 47.2% (17 individuals) reported to suffer from GERD symptoms and 49.2% (79 individuals) did not. Low frequency coffee drinkers (1-3 times/week) were found to be 73.3% (143 individuals), mid frequency coffee drinkers (4-6 times/week) were 17.9% (35 individuals), high frequency coffee drinkers (>6 times/week) were 8.7% (17 individuals). This aligned with the study done by Hartoyo et al., where 26 out of 105 of the study participants reported having GERD symptoms. From the study, 65 participants were mid to high frequency coffee drinkers. The study also found a significant relationship between the frequency of coffee consumption and the incidence of GERD.<sup>14</sup> In our study, we found that the results were not statistically significant ( $p=0.790$ ). This however, does not rule out the possibility that one suffered from GERD due to coffee, since factors such as drinking coffee before eating, drinking too much coffee, smokes, drinking too much alcohol, diagnosed with anxiety and consumed certain medications could potentially affect GERD.

## CONCLUSION

In this study, we found 47.2% of the participants who were black coffee drinkers experienced GERD symptoms and 49.7% did not experience GERD symptoms. On the contrary, mixed coffee drinkers had 52.8% experiencing GERD symptoms and 50.3% others did not. No significance was found between black coffee drinkers and mixed coffee drinkers towards GERD symptoms in people aged 18-65 years old living within DKI Jakarta and Bekasi City

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