
**Drinking Two Cups of Coffee a Day May Help Prevent Metabolic Syndrome
-observations From a Coffee Intake Frequency Survey Conducted in a
Resident Health Check-up-**

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Abstract

In recent years, various companies have been marketing coffee as a functional food, claiming it is good for dieting. Coffee contains chlorogenic acid and caffeine, and animal experiments have shown its blood sugar-lowering and fat-burning effects, suggesting its potential for preventing metabolic syndrome. This study compared coffee intake with metabolic syndrome test results during a resident health checkup to whether coffee has an inhibitory effect on investigate metabolic syndrome. The results of a dietary questionnaire survey (coffee intake and frequency) for 437 people (180 male and 257 female) who participated in the 2024 Yakumo Town resident health checkup were analyzed, along with data on waist circumference, blood glucose level, HALC level, cholesterol level, and blood pressure, which were categorized by a doctor into normal, pre-metabolic syndrome, and metabolic syndrome groups. The results were 300 people with normal values, 53 people at risk, and 84 people with metabolic syndrome. Within each group, there was a very significant difference between the normal value group and the risk group in terms of frequency of coffee intake (more than two cups per day and less than one cup per day). The normal value group had a specifically significantly higher coffee intake than the risk group. This suggests that consuming more than two cups of coffee per day may be useful in preventing metabolic syndrome.

Keywords: coffee intake frequency, metabolic syndrome prevention, health checkup, dietary questionnaire

1. Introduction

Numerous, companies are currently marketing coffee drinks for dieting purposes. In Japan, based on various evidence, coffee drinks are sold primarily online and at pharmacies at high prices (100 to 205 yen per cup) as "functional foods: lipolysis¹⁻⁴⁾, metabolic increased rate⁵⁾, suppressed blood pressure⁶⁾, diabetes prevention⁷⁾, increased cardiac parasympathetic nervous

activity^{8,9)}, and reduced risk of all-cause mortality¹⁰⁾. Furthermore, most of the evidence regarding the beneficial components of coffee, such as caffeine and chlorogenic acid, is based on animal experiments, and human results are sometimes controversial. Therefore, the mechanisms underlying these effects have not been fully verified scientifically. However, a 2015 study of 90,914 Japanese men and women aged 40 to 69 years found an inverse correlation between coffee intake and all-cause mortality, with those who consumed 3 to 4 cups of coffee per day reporting a 24% reduced risk of all-cause mortality compared to non-drinkers.¹⁰ Therefore, this study reports on the results of an investigation into whether there is a correlation between coffee intake, which is included in a self-administered dietary questionnaire completed in advance as part of the annual health checkup for residents of Yakumo Town, Hokkaido, and the presence or absence of metabolic syndrome, which increases the risk of various diseases

2. Method

A preliminary questionnaire survey was conducted in September 2024 for residents of Yakumo Town, Hokkaido, Japan, asking about the frequency of coffee consumption. During the health check-up, doctors also assessed whether or not participants had metabolic syndrome.

2.1 Participants

The 2024 Yakumo Town Resident Health Check-up had 437 participants (180 male and 257 female). Participants brought the results of their pre-survey questionnaire with them, underwent various health checkups, and received a doctor's diagnosis (including the presence or absence of metabolic syndrome)

2.2 Questionnaire survey and medical examination in resident health checkup

In a health checkup for residents of Yakumo Town, Hokkaido, conducted in fiscal year 2024, responses to the question "frequency of coffee intake" in a pre-checkup questionnaire were compared between three groups determined by a doctor based on the results of the checkup: "normal value group, metabolic syndrome pre-patients, and metabolic syndrome group." The pre-checkup questionnaire included a self-administered question about coffee intake, with participants asked to circle one of the following: "hardly ever drink," "1-3 times a month," "1-2 times a week," "3-4 times a week," "5-6 times a week," "once a day," "2 times a day," or "3 or more times a day."

2.3 Statistical treatment of the results obtained

Based on the results obtained, the frequency of coffee intake and the presence or absence of metabolic syndrome were statistically analyzed using the Chi-square test.

3. Results

The results obtained from the health check-up are shown below.

3.1 Participants

A total of 437 people (male and female) participated in the health checkup. Of these, 300 were in the normal group, 53 in the pre-metabolic syndrome group, and 84 in the metabolic syndrome group. The frequency of coffee intake in the questionnaire survey completed before the health checkup is shown in Table 1.

Table 1. Results of coffee drinking frequency and obesity level

	Don't drink	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	once daily	twice daily	3 or more times daily
Normal values (n=300)	33	17	17	18	24	86	67	38
Pre-metabolic syndrome (n=53)	4	5	6	2	9	17	7	3
Metabolic syndrome (n=84)	11	3	10	2	9	21	14	14

3.2. Presence or absence of metabolic syndrome and frequency of coffee intake

Based on these results, the 300 normal subjects, 53 pre-metabolic syndrome subjects, and 84 metabolic syndrome subjects were divided into two groups: those who consumed coffee twice or more per day and those who consumed coffee once or less per day, as shown in Table 2. They were further divided into those who consumed coffee once or more per day and those who consumed coffee 5-6 times or less per week, as shown in Table 3.

Table 2. The relationship between frequency of coffee intake (2 or more times daily) and metabokic syndrome

	2 or more times daily	Less than once a day
Normal values (n=300)	105	195
Pre-metabolic syndrome (n=53)	10	43
Metabolic syndrome (n=84)	28	56

Table 3. The relationship between frequency of coffee intake (one or more times daily) and metabokic syndrome

	One or more times daily	No more than 5-6 times a week
Normal values (n=300)	191	109
Pre-metabolic syndrome (n=53)	27	26
Metabolic syndrome (n=84)	49	35

3.3. Statistical treatment using chi-square test

A squared test was performed based on Tables 2 and 3 to test for significance differences between groups.

As a result, there was no significant difference between the "normal group and metabolic syndrome group" in the group that consumed coffee twice or more times a day and the group that consumed coffee once or less, with a P value of 0.777 (see Table 4).

There was no significant difference between the "pre-metabolic syndrome group and metabolic syndrome group (P=0.065) (See Table 5).

There was significant difference between the "normal group and pre-metabolic syndrome group (P=0.002*) (see Table 6).

Table 4. Relationship between coffee intake frequency (2 or more times daily) and metabolic syndrome (χ -test results for normal and metabolic syndrome groups)

	2 or more times daily	Less than once a day	χ -square test
Normal values (n=300)	105	195	P=0.777
Metabolic syndrome (n=84)	28	56	

Table 5. Relationship between coffee intake frequency (2 or more times daily) and metabolic syndrome (χ -test results for metabolic syndrome and pre-metabolic

	2 or more times daily	Less than once a day	χ -square test
Pre-metabolic syndrome (n=53)	10	43	P=0.065
Metabolic syndrome (n=84)	28	56	

Table 6. Relationship between coffee intake frequency (2 or more times daily) and metabolic syndrome (χ -test results for normal and Per-metabolic syndrome groups)

	2 or more times daily	Less than once a day	χ -square test
Normal values (n=300)	105	195	P=0.021*
Pre-metabolic syndrome (n=53)	10	43	

However, there was no statistically significant difference between the group that consumed coffee once or more times a day and the group that consumed coffee 5-6 times or less a week (see Tables 7, 8, and 9).

Table 7. Relationship between coffee intake frequency (one or more times daily) and metabolic syndrome (χ -test results for normal and metabolic syndrome groups)

	One or more times daily	No more than 5-6 times a week	χ -square test
Normal values (n=300)	191	109	0.372
Metabolic syndrome (n=84)	49	35	

Table 8. Relationship between coffee intake frequency (one or more times daily) and metabolic syndrome (χ -test results for metabolic syndrome and pre-metabolic syndrome groups)

	One or more times daily	No more than 5-6 times a week	χ -square test
Pre-metabolic syndrome (n=53)	27	26	P=0.397
Metabolic syndrome (n=84)	49	35	

Table 9. Relationship between coffee intake frequency (one or more times daily) and metabolic syndrome (χ -test results for normal and Per-metabolic syndrome groups)

	One or more times daily	No more than 5-6 times a week	χ -square test
Normal values (n=300)	191	109	P=0.079
Pre-metabolic syndrome (n=53)	27	26	

4. Discussion

Various papers have reported on the usefulness of coffee intake, including obesity, high blood pressure, cancer, and mortality. Since it has been reported that consuming 3-4 cups of coffee daily may reduce mortality, we compared the "frequency of coffee intake" in the results of a questionnaire survey conducted before the annual health checkup for residents of Yakumo Town, Hokkaido, with the metabolic syndrome diagnosis determined by doctors based on the health checkup results. The results showed that people who consume more than two cups of coffee per day are less likely to develop metabolic syndrome. Drinking coffee at least twice a day may be useful in preventing metabolic syndrome.

However, the results of this study showed no statistically significant difference in coffee intake frequency between the metabolic syndrome group and the normal group. This may be related to

the fact that "coffee diets" are currently being heavily commercialized in Japan, and that coffee is being promoted to consumers at pharmacies and on the Internet as a "functional food" that claims various benefits (such as preventing obesity, high blood pressure, dyslipidemia, and postprandial hyperglycemia).

Those with metabolic syndrome group may already be purchasing and drinking coffee diet products for health management. But the pre-metabolic syndrome group may not yet be proactive about coffee intake because they do not feel a sense of crisis.

In the future, we will increase the number of subjects and investigate the relationship between coffee intake frequency and metabolic syndrome prevention, again. I would like to clarify the possibilities related to this.

Many researchers have reported a link between caffeine, which is found in coffee and other foods, and NAFLD ^{11, 12}), so in the future we would like to further confirm the link between caffeine and NAFLD using medical examination results and questionnaire survey results.

There are also reports that caffeine can have a mental effect depending on the amount consumed ¹³), so we believe that careful investigation is needed in the future.

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