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Kahve Tüketiminin Meme Kanserine Karşı Koruyucu Etkisi

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ÖZ

Meme kanseri gelişiminde önemli risk faktörü tanımlanmaktadır. Öte yandan koruyucu faktörler de güncel araştırmaların konusu olmaktadır. Bu nedenle, bu çalışmada kadınlardaki kahve tüketiminin meme kanserine karşı koruyucu etkisinin araştırılması amaçlanmıştır. Ocak 2022-Mayıs 2022 tarihleri arasında Onkoloji kliniğinde meme kanseri tanısıyla takip edilen (1. grup, n=72) ve meme ile ilgili herhangi bir hastalığı veya şikâyeti olmayan (2. grup, n=212) kontrol grubundaki kadın hastalar gözlemsel olarak incelenmiştir. Hastaların demografik verileri (yaş, cinsiyet), yandaş hastalık varlığı, menopoz durumu, beden kütle indeksi (BKİ), toplam vücut ve gövde yağ oranları (%) ile kahve tüketim miktarları kaydedilmiştir. Hastaların yaşları ortalama 49,68±11,43 yıl olarak bulunmuştur. Kontrol grubundaki hastaların kahve tüketimleri, 1. gruptakilere kıyasla daha fazla tespit edilmiştir (p=0,01). Günlük kahve tüketimi ile meme kanseri gelişme oranı arasında negatif ve anlamlı bir ilişki olduğu gözlenmiştir (p<0,05). Sonuç olarak; kadınlarda görülen meme kanseri ile kahve tüketimi arasında ilişki olduğu tespit edilmiştir. Kahve tüketiminin meme kanserine karşı koruyucu etkisinin olabileceğine dair bulguların epidemiyolojik çalışmalar ile desteklenmesine ihtiyaç vardır.

Protective Effect of Coffee Consumption on Breast Cancer

Research Article

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ABSTRACT

Important risk factors for the development of breast cancer are identified. On the other hand, protective factors are also the subject of current research. Therefore, this study aimed to investigate the protective effect of coffee consumption in women against breast cancer. Female patients in the control group who were followed up with a diagnosis of breast cancer in the Oncology clinic between January 2022 and May 2022 (group 1, n=72) and did not have any breast-related disease or complaints (group 2, n=212) were examined observationally. Demographic data of the patients (age, gender), presence of comorbidities, menopausal status, Body Mass Index (BMI), total body and trunk fat percentages (%), and coffee consumption amounts were recorded. The average age of the patients was found to be 49.68±11.43 years. The coffee consumption of the patients in the control group was determined to be higher compared to those in the 1st group (p = 0.01). It was observed that there was a negative and significant relationship between daily coffee consumption and breast cancer development rate (p<0.05). In conclusion; It has been determined that there is a relationship between breast cancer in women and coffee consumption. Findings that coffee consumption may have a protective effect against breast cancer need to be supported by epidemiological studies.

1. Introduction

Coffee, one of the most consumed beverages worldwide, contains various phytochemicals. It has been reported that the majority phytochemicals in coffee consist of antioxidants and provide 60% of the daily antioxidant intake (Svilaas et al., 2004; Halvorsen et al., 2006).

Caffeine, an essential component in coffee, has been suggested to exert anti-carcinogenic effects by altering antioxidant-sensitive element-mediated signaling. It is also known that diterpenes have anti-carcinogenic potential (Godos et al., 2017). Caffeic acid can inhibit deoxyribonucleic acid (DNA) methylation in cancerous cells. In addition, caffeic acid is associated with cell cycle regulation, inflammatory response, and apoptosis (Yu et al., 2011).

The World Cancer Research Fund (WCRF) published in 2007, reported a negative relationship between coffee consumption and cancer. However, an inverse relationship has also been reported without regional differences in the meta-analyses conducted since the publication of the WCRF report (Jiang et al., 2017; Li et al., 2013).

Epidemiological studies have evaluated the association between coffee consumption and cancer incidence or mortality. Most cancer research studies have focused on the gastrointestinal tract, bladder, endometrium, ovaries, lungs, and prostate. However, the limited number of studies have examined breast cancer. Therefore, this study was aimed to investigate the protective effect of coffee consumption on breast cancer.

2. Material and Method

The study was conducted between January and May 2022. Female patients were divided into two groups. In the first group, female patients who followed up with the diagnosis of breast cancer in the oncology clinic of our hospital (who underwent surgery with a breast cancer diagnosis, followed up on oncology) and agreed to participate in the study were included. In the second group, female patients without breast disease were included in the control group of the study. In the first group, female patients with inoperable or metastatic breast cancer, patients diagnosed with breast cancer and scheduled for surgery after preoperative systemic treatment were excluded from the study. In both groups patients, did not complete data and did not agree to participate in the study, were also excluded.

2.1. *Data collecting*

Female patients' demographic data (age, gender), presence of comorbid disease and menopausal status were recorded.

Body weight was recorded by the researchers after each patient was measured individually using a weighing scale.

The height of each patient was recorded using a height meter. Anthropometric measurements of height measurements (cm), body weights (kg), body fat percentage (%), abdominal fat percentage (%) were also recorded. Body Mass Index (BMI; kg/m^2) was calculated by dividing body weight (kg) by height (m2) square. In addition, the body and abdominal fat rate estimated by bioelectrical impedance analysis (BIA) was calculated and recorded. Bioelectrical impedance analysis (BIA) is performed to calculate estimated body fat. In bioelectrical impedance analysis, a very small electrical current is passed through the person's body and the total body water in the person's body is measured through monitors (Ling et al., 2011).

Coffee consumption was asked to the patient and data was obtained using the food recording method. Patients' coffee consumption, coffee consumption status, daily coffee consumption status, and daily coffee consumption amount (cup) were recorded. A standard coffee cup is calculated as 200 ml. When questioning the food consumption method of the patients, they were questioned according to this value.

The study design and content were explained to all participants. Participants were asked to sign a voluntary consent form. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the [Osmaniye State Hospital, Ministry of Health of the Republic of Turkey; 2022/623]. Written informed consent was obtained from all subjects/patients.

2.2. *Statistical analysis*

Mean, standard deviation, minimum and maximum values of the features were used in the statistics of continuous data in the scales. Frequency and percentage values were used to define categorical variables. Mean was used for daily coffee consumption amount. The Student's t-test was used to compare the means of two independent groups. The Chi-square test was used to evaluate the relationship between categorical variables. In order to evaluate coffee consumption and breast cancer incidence, logistic regression analysis was performed with the variables that were statistically significant using backward and enter methods. The statistical significance level of the data was taken as $p<0,05$. Statistical analyzes were performed using the MedCalc program and www.e-picos.com.

3. Results

During the study, 89 patients were followed up due to breast cancer in the oncology clinic of our hospital. Five patients who received preoperative systemic therapy, seven patients with metastases in their postoperative follow-up, four patients who were considered inoperable at the first admission due to their metastases, and one who refused to participate in the study, were excluded from the study.

The study was conducted with 284 patients, 72 of whom met the inclusion criteria with a diagnosis of breast cancer (group 1) and 212 in the control group (group 2). The demographic and clinical characteristics of the patients in both groups are summarized in Table 1.

The mean age of the patients was 49.68±11.43 years. All of the patients were women. 119 (41.9%) of the patients were in the premenopausal period, and 165 (57,1%) were in the postmenopausal period. In addition, 159 (55.9%) of the patients had a comorbid disease history. There was no statistically significant difference between the groups regarding age, menopausal period, and comorbid disease (p>0,05) (Table 1).

In the first and control group; the mean BMI values were respectively 26.83±5.23 and 24,.47±4.83 kg/m^2; the mean body fat ratio values were 42.63±10.52 and 38.05±8.89%, the mean abdominal fat ratio values were 32.17±6.57 and 29.43+4.56%. In the first group, the mean BMI and abdominal fat ratio values were statistically significantly higher than in the control group (p<0.001 for all) (Table 1).

Of the patients 29 (40.3%) in group 1 and 121 (57.1%) in group 2 stated that they preferred to drink coffee. Seventeen (58.6%) patients in group 1 and 94 (77.7%) patients in group 2 consumed coffee regularly every day. Six (35.3%) of the patients in group 1 and 64 (68.1%) in group 2 were consuming ≥2 cups of coffee per day (Table 1).

Table 1. Demographic and clinical data of the patients

	All patients (n=284)	**Group 1 (n=72)**	**Group 2 (n=212)**	**p value**
	x±SD	**x±SD**	**x±SD**	
Age (year)	49.68±11.43	50.26±12.31	48.51±10.22	0.17*
BMI (kg/m^2)	25.11±6.08	26.83±5.23	24.47±4.83	**<0.001***
Body fat (%)	40.57±14.52	42.63±10,.52	38.05±8.89	**<0.001***
Abdominal fat (%)	30.78±6.98	32.17±6.57	29.43±4.56	**<0.001***
Coffee consumption amount (cup=200 ml)	1 (1-6) 0.79±0.71	1 (1-4) 0.68±0.52	1 (1-6) 0.83±0.61	**<0.001***
	n (%)	**n (%)**	**n (%)**	
Menopause				
Premenopausal	119 (41.9)	25 (34.7)	94 (44.3)	0.15**
Postmenopausal	165 (57.1)	47 (65.3)	118 (55.7)	
Comorbid disease				
Yes	159 (55.9)	44 (61.1)	115 (54.2)	0.31**
No	125 (44.1)	28 (38.9)	97 (45.8)	
Do you drink coffee ?				
Yes	150 (52.8)	29 (40.3)	121 (57.1)	**0.01****
No	134 (47,2)	43 (59,7)	91 (42,9)	
Do you drink coffee everyday?				
Yes	111 (74)	17 (58.6)	94 (77.7)	**0.04****
No	39 (26)	12 (41.4)	27 (22.3)	
How many cups do you drink daily?				
1 (200 ml)	41 (36.9)	11 (64.7)	30 (31.9)	**0.01****
≥2 (>200 ml)	70 (63.1)	6 (35.3)	64 (68.1)	

* Student's t-test, ** Chi-square (p<0.05).

The median coffee consumption value of the patients was one cup. The mean value of coffee consumption was statistically higher in group 2 than in group 1 (p<0.001). In addition, group 2 patients preferred to drink more coffee than group 1 (p=0.01). Coffee drinkers in group 2 consumed

more daily coffee and drank more cups of coffee compared to group 1 (p=0.04, p=0.01, respectively) (Table 1).

The risk of developing breast cancer in those who prefer to drink coffee is 51% of the risk of those who do not prefer coffee (OR: 0.51 95% CI 0.29 – 0.87). The risk of developing breast cancer in coffee drinkers and daily coffee drinkers is 41% compared to those who do not consume coffee daily (OR: 0.41 95% 0.17 – 0.96). Those who consume ≥2 cups of coffee per day have a 26% risk of developing breast cancer than those who consume one cup per day (OR: 0.26 95% 0.09 – 0.76). Consuming more than 2 cups of coffee every day statistically reduces breast cancer ($p<0.05$) (Table 2).

Table 2. Relationship between multivariate analysis and coffee consumption and breast cancer

	Odds ratio	**95% Confidence Interval (Lower – Upper)**	**p value**
Coffee consumption (yes/no)	0.51	0.29 – 0.87	**<0.05***
Daily consumption (yes/no)	0.41	0.17 – 0.96	**<0.05***
Amount of coffee consumed (200/≥200)	0.26	0.09 - 0.76	**<0.05***

* Multivariate Analysis of Variance, ($p<0.05$)

4.Discussion

Breast cancer is the most common cancer in women. Various mechanisms are effective in the formation of breast cancer in women. The current research topic is substances and agents that prevent breast cancer.

Coffee is the subject of current research into cancer prevention. The anti-carcinogenic effects of many substances in coffee have been described. The amount and type of antioxidant compounds consisting of polyphenols (caffeic acids, ferulic, chlorogenic and coumaric), diterpenes (kahweol and cafestol) and melanoidins formed during the roasting process depend on the type of coffee blend, brewing method, roasting degree and portion size (Alicandro et al., 2017).

In the report published in 2007 of a study conducted by the World Cancer Research Fund (WCRF), it was stated that there was a non-significant inverse relationship between drinking one cup of coffee a day and the risk of breast cancer (Van't et al., 2007; Jiang et al., 2013). In case-control studies where the relationship between colorectal cancer risk and coffee consumption was evaluated, no linear relationship was found regarding the decrease in the risk of colorectal cancer in those who consumed more than 4 cups of coffee per day, and in cohort studies, in those who consumed 5 cups of coffee per day (Tian et al., 2013). In our study, those who consume ≥2 cups of coffee a day have a 26% risk of developing breast cancer compared to those who consume one cup of coffee a day (OR: 0.26, 95% 0.09 – 0.76). Consuming more than 2 cups of coffee every day statistically reduces the risk of breast cancer ($p<0.05$) (Table 2).

Kahweal and cafetel are two specific diterpenes that are involved in inducing enzymes involved in carcinogenic detoxification. It is also known that these diterpenes provide inhibition of the enzyme responsible for carcinogenic activation (World Cancer Research Fund, 2007; Alicandro et al., 2017).

Coffee has been associated with inhibition of aromatase, the enzyme that converts androgens to estrogens. These mechanisms cause circulating free estrogen levels to be a risk factor for breast cancer. Coffee has been found to regulate estrogen levels (Liu et al., 2017). Additionally, coffee affects DNA damage repair, activation of proto-oncogenes, and inactivation of onco-suppressor (Ellingjord-Dale, 2021). Caffeine and coffee intake are inversely related, directly or indirectly, to free estradiol levels in women. Sex hormone binding globulin (SHBG) is effective in this mechanism. SHBG, the primary transporter of sex steroids, reduces circulating free estrogen levels. A positive relationship has been found between coffee consumption and SHBG in postmenopausal women (Grosso, 2017; Liu et al., 2017). In our study, there was no statistically significant difference between the groups in terms of menopausal period ($p>0.05$) (Table 1).

A meta-analysis of 21 prospective cohort studies reported a weak inverse association between coffee consumption and breast cancer (Lafranconi, 2018). Zheng et al. (2021) found no association between caffeine consumption and overall breast cancer risk. The data obtained from our study determined that breast cancer patients did not consume coffee or consumed less coffee. Based on these data, we think that coffee consumption has a preventive effect on breast cancer.

As seen in other types of cancer, breast cancer is accompanied by comorbidities. Insulin resistance and metabolic syndrome observed in cancer patients play an important role in the function of many endocrine and immune factors related to cell proliferation (Svilaas et al., 2004; Zheng, 2021). Coffee consumption is also thought to affect comorbidities. For example, studies aiming to reverse metabolic syndrome in breast cancer patients have emphasized that coffee consumption reduces the risk of diabetes, metabolic syndrome and hepatosteatosis (Marventano et al. 2016). In our study, the relationship between comorbidities in breast cancer patients was also examined, but no statistically significant difference was found. This situation was interpreted as a result of the similar distribution of the groups. Mehta et al. (2018) examined comorbidities in breast cancer patients and the mechanisms affecting their incidence. In our study, there was no statistically significant difference between the groups in terms of age, menopausal period and comorbidities ($p>0.05$) (Table 1).

Obesity is associated with a higher mortality rate from both premenopausal and postmenopausal breast cancer. Palmioli et al. (2017) found that the risk of postmenopausal breast cancer was positively associated with every 5 kg/m2 increase in BMI. Obesity causes preadipocyte formation. In our study, the average BMI and abdominal fat ratio values in group 1 (patient group) were statistically significantly higher than the control group ($p<0.001$ for all) (Table 1).

5.Conclusion

Breast cancer is the most common type of cancer seen in women. Coffee may be a protective factor for breast cancer risk. More evidence considering population subsets and specific strata is needed to confirm the relationships obtained.

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Authorship: : DT developed the study hypothesis, performed the data analysis, and wrote the first draft. FBKB and AT performed the data analysis and critically revised the manuscript. All authors approved the final manuscript.

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