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Original article

The effect of caffeine consumption habits of contact tracing teams on anxiety, insomnia, and cardiac symptoms during the COVID-19 pandemic period

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Abstract. *Purpose:* The aim of this study was to examine the caffeine consumption habits and insomnia and anxiety levels of the personnel working in the contact tracing teams in the COVID-19 pandemic and to reveal their relationship with each other and with cardiac symptoms. *Design and Methods:* The population of this cross-sectional study consisted of the personnel working in contact tracing teams affiliated with a provincial health directorate. Data were collected with online questionnaire forms. There are questions intended for the descriptive characteristics, caffeine consumption habits, and cardiac symptoms of the participants, Beck Anxiety Inventory and Insomnia Severity Index in the questionnaire form consisting of three parts. *Results:* Mild anxiety was detected in 12.0% of the participants, and medium and severe anxiety in 23.6%. The insomnia rate in the participants was found to be 35.6%. A positive correlation was detected between the anxiety scores of the participants and insomnia scores and the number of cardiac symptoms; as their daily caffeine consumption increased, the anxiety, insomnia, and the number of cardiac symptoms increased as well. *Practice Implications:* Psychological support for healthcare professionals like the contact tracing team working with infected patients in the pandemic period must be ready to be given when necessary.

Key words: Caffeine Consumption Habits, Anxiety, Insomnia, Cardiac Symptoms, Covid-19 Pandemic Period

1. Introduction

The COVID-19 pandemic that emerged in late 2019 and rapidly took hold of the whole world has put the health sector under an intense pressure. This situation negatively affects the physical and mental health of the health personnel (1,2).

In fighting against contagious diseases where effective treatment is not possible, filiation plays a significant role in the isolation of the sick individuals, identifying the source, and ensuring contact tracing (3). Since March 11, when the first COVID-19 case was encountered in Turkey, filiation works have been continuing rapidly. In filiation teams that were established in this process, physicians, nurses, other health personnel, and auxiliary staff are included. The responsibilities of the health workers in the team are contact tracing, doing screen tests, ensuring isolation, and referring to the hospital when necessary. According to the latest data, there are 7 thousand filiation teams in Turkey. The contact tracing teams operating in 81 provinces can sometimes make 80 contact visits for a single case (4).

The contact tracing teams are under serious psychological stress since they work in the field, are in touch with people with a high risk of COVID-19, and the workload in the process. The increased psychological burden has the potential to cause anxiety and sleep disorders. Eating and drinking habits are likely to change with the increasing stress. Due to stress and working conditions, a change in the habits of consuming caffeinated beverages can also be expected. Different studies show that caffeine consumption affects anxiety, the cardiovascular system, and sleep.(1, 5-8)Studies show that 24-36% of the people with chronic sleep disorder also experience anxiety disorders (9). Somatization is physical complaints that develop on a psychological basis, the organic cause of which cannot be explained (10). Cardiac symptoms, particularly palpitation, are the most common somatic symptoms that are encountered in anxiety disorders. While these symptoms can be symptoms of severe heart disease, the main goal of doctors in patients with these complaints is to determine whether there are medical pathologies that can explain the symptoms. Lipowski defines somatization, which he regards as an important public health issue, as "the unsolved problem of medicine" (11).

Along with sleep disorders, a great part of cardiac symptoms accompany anxiety clinic, and these symptoms generally are not symptoms of a severe cardiac problem. They are a part of anxiety symptoms. These symptoms can be counted as chest pain, shortness of breath, dizziness, lightheadedness, and palpitations (10, 12, 13).

Anxiety can also cause tachycardia and hypertension. For these reasons, it is quite important to evaluate sleep and cardiac symptoms in anxiety.

One of the most important subjects that countries should be prepared for the possible epidemics in the future like COVID-19 is to protect the mental health of the health teams working in the forefronts along with their physical health and to take measures in this regard. The aim of this study was to examine the caffeine consumption habits and sleeplessness and anxiety levels of the contact tracing teams working in the COVID-19 pandemic and to reveal their relationship with each other and cardiac symptoms.

2. Materials and methods

2.1. Design

The study was carried out as a cross-sectional by time and descriptive correlation study with the participation of the personnel working in contact tracing teams affiliated to the Malatya Provincial Directorate of Health in the COVID-19 pandemic process.

2.2. Population and sampling

The population of the research consisted of all of the personnel working in the contact tracing teams affiliated to the Malatya Provincial Directorate of Health between 21 and 30 December 2020 (n=500). The research aimed to reach the entire population. After applying the questionnaire on 445 people who accepted to participate in the study, those with psychiatric diseases before the pandemic and/or tasking, those using psychotic medications, those who had sleep disorder before the pandemic, those who had coronary heart disease, heart failure, severe congenital heart disease, valvular heart disease, those who had gone through cardiac surgery and critical major surgery, and those in an active COVID-19 infection period were excluded from the study. The study was conducted on 259 individuals.

2.3. Data collection tools

The data of the study were collected with the online data collection form prepared by the researchers. In the first part of the form, descriptive characteristics of the participants such as age, gender, and occupation were questioned. Cardiac symptoms were questioned in the second part. The part regarding cardiac symptoms was prepared by a cardiology specialist. Caffeine consumption habits were questioned in the third part. There was the Insomnia Severity Index in the fourth part of the questionnaire and the Beck Anxiety Inventory in the fifth part.

2.3.1. Insomnia severity index:

The Likert-type scale was developed by Bastien et al. (14) The Turkish validity and reliability studies of the scale were done by Boysan et al., and they reported the Cronbach's alpha internal consistency score as 0.79 for all items in the scale in the same study. In this study, the Cronbach's alpha internal consistency score of the scale was found to be 0.88. Each item of the 7-question scale is scored between 0 and 4. The scale total score is interpreted as normal between 0 and 7, as the lower threshold between 8 and 14, as medium between 15 and 21, and as severe insomnia between 22 and 28 (15).

2.3.2. Beck anxiety inventory:

The scale used for revealing the severity of the anxiety symptoms was developed by Beck et al., and its Turkish validity and reliability studies were done by Ulusoy et al.(16). Ulusoy et al. reported the Cronbach's alpha internal consistency score for all items of the scale as 0.93 (17). In our study, on the other hand, the Cronbach's alpha internal consistency score of the scale for all items was 0.94. Each item of the scale is scored between 0 and 4 and consists of 21 questions.0-7 score interval is interpreted as normal, 8-15 as mild, 16-25 as medium, and 26-63 as severe anxiety (17).

2.4. The Variables of the study

The independent variables of the study are descriptive characteristics of the participants (age, gender, educational background, marital status, occupation, having COVID-19), and daily caffeine consumption. The dependent variables, on the other hand, are cardiac symptoms and the results of the Beck Anxiety Inventory and the Insomnia Severity Index.

2.5. Analysis of the data

SPSS 21.0 (Statistical Package for Social Sciences) statistical software was used to analyze the data obtained as part of the research. Research data showed normal distribution according to the Kolmogorov-Smirnov test and homogeneous distribution according to Levene's test ($p>0.05$). Pearson correlation analysis, ANOVA, t-test were used in the analysis of the data. $p < 0.05$ was considered statistically significant.

2.6. Ethical considerations

Permission for the study was obtained from the COVID-19 Scientific Research Evaluation Commission formed within the Republic of Turkey Ministry of Health General Directorate of Health Services. The ethics committee approval was given by Inönü University Non-interventional Research Ethics Committee (IRB no. 2020-1329).

3. Results

Some descriptive data of the contact tracing team are presented in Table 1. The majority of the contact team members in the scope of the research were female (60.6%), their average age was 35.36±8,67, and 35.1% percent were under the age of 30. 69,5% of the participants were married, and 52,1% had undergraduate degrees. When categorized by their occupations, 39.8% of the contact tracing team members were nurses, 19.7% were physicians, 15.5% were health technicians. The average total service time of the participants was 11.13±8.,64 years. 31.3% of them had a service time of 5 years and below, 25.9% had 6-10 years, 13.1% had 11-15 years, and 29.7% had 15 years and more of a service time. Generalized anxiety disorder was observed in 12.0% of the participants at mild levels, and at medium and severe levels in 23.6%. The insomnia rate of the participants was 35.6%, and 12.0% of these had mild insomnia while 12% experienced medium level insomnia, and 11.6%, had severe insomnia. The average of daily caffeine consumption of the participants was 322.80± 192.83 mg, and 27.8% of the participants consumed above 400 mg of caffeine daily. 1 or 2 cardiac symptoms were observed in 34.7% of the participants, 3 and more in 26.3%, and at least 1 in 61.0%.

As seen in Table 2, the caffeine consumption habits of the participants did not differ according to their genders ($p = 0.212$). However, insomnia and anxiety levels of females were higher and there were more cardiac symptoms observed ($p < 0.001$). The daily caffeine consumption amounts, insomnia, anxiety score distributions, and number of cardiac symptoms observed did not differ according to age, marital status, and children numbers of the participants ($p > 0.05$).

When we categorize team members by their educational backgrounds, although their caffeine consumption amounts and anxiety levels did not differ, insomnia scale score distributions differed ($p = 0.269$, $p = 0.071$, $p = 0.006$, respectively). While the daily

Table 1. Descriptive characteristics of the participants (n=259).

	f	%
Gender		
Female	157	60.6
Male	102	39.4
Age		
Under the age of 30	91	35.1
Between 31-40 years	95	36.7
Over the age of 40	73	28.2
Marital status		
Married	180	69.5
Single	79	30.5
Educational background		
Post Graduate	37	14.3
Undergraduate	135	52.1
Associate Degree	48	18.5
High School	39	15.1
Occupation		
Physician	51	19.7
Nurse	103	39.8
Health Technician	40	15.4
Support staff	65	25.1
Total service time (years)		
5 years and below	81	31.3
6-10 years	67	25.9
11-15 years	34	13.1
Over 15 years	77	29.7
Generalized Anxiety Disorder-7 Test		
Normal	167	64.5
Mild	31	12.0
Medium	31	12.0
Severe	30	11.6
Insomnia Severity Index		
Normal	110	42.5
Mild	100	38.6
Medium	41	15.8
Severe	8	3.1
Caffeine consumption (mg/day)		
Under 200 mg	70	27.0
200-400 mg	117	45.2
401 mg and above	72	27.8
Cardiac symptoms		
No	101	39.0
1-2	90	34.7
3 and more	68	26.3

caffeine consumption amounts of the participants did not differ according to their occupations ($p = 0.228$), anxiety and insomnia score distributions differed ($p < 0.001$). While the anxiety score averages of nurses were the highest, insomnia mean score of the support personnel was the lowest. The group in which cardiac symptoms were observed the least was the physicians ($p = 0.001$). There was no significant difference between the daily caffeine consumption amounts, observed cardiac symptoms, anxiety and insomnia score distributions of the participants according to their service times ($p = 0.994$, $p = 0.692$, $p = 0.327$, $p = 0.666$, respectively). 25.5% of the participants were diagnosed with COVID-19. Cardiac symptoms observance frequency and insomnia score distributions of the ones diagnosed with COVID-19 were higher than the ones that were not diagnosed ($p = 0.0001$, $p = 0.016$). 49.4% of the contact tracing team members had at least one relative that was diagnosed with COVID-19. While there was no statistically significant difference between caffeine consumption, cardiac symptom rates, and anxiety score distributions of the ones with or without a relative that was diagnosed with COVID-19 ($p = 0.964$, $p = 0.306$, $p = 0.226$, respectively), the insomnia score distributions of the ones with a relative diagnosed with COVID-19 were higher ($p = 0.044$). There was a statistically significant difference between the caffeine consumption, cardiac symptom rates, and anxiety score distributions of the participants according to their status of making changes in their caffeine consumption habits in the pandemic period ($p < 0.001$, $p = 0.003$, $p = 0.001$, $p < 0.001$, respectively).

In Table 3, the participants were categorized according to their insomnia, anxiety levels, and caffeine consumption habits. In the group with no insomnia problems, in the group with normal anxiety levels, and in the group consuming below 200 mg of caffeine daily, the rate of cardiac symptom observance was lower than other groups ($p<0.001$, $p=0.003$, $p=0.013$, respectively).

As seen in Table 4, as the daily caffeine consumption of the participants increases, their insomnia levels ($r=0,.37$, $p<0.001$), anxiety severity ($r = 0.228$, $p < 0.001$), and the number of cardiac symptoms ($r = 0.191$, $p = 0.002$) increases.

Table 2. Daily Caffeine Consumption, cardiac symptoms number (CSN), Beck Anxiety Inventory (BAI), Insomnia Severity Index (ISI) score distributions according to some descriptive characteristics of the participants.

	f	Caffeine (mg/day)	CSN	BAI	ISI
Gender					
Female	157	334.88±181.67	1.83±1.65	12.17±12.04	10.60±5.91
Male	102	304.23±208.41	0.95±1.38	5.28±8.15	7.06±5.05
df	1	t= 1.25 P= .212	t= 4.63 p<0.001	t= 5.49 p<0.001	t= 5.15 p<0.001
Age					
Under the age of 30	91	334.90±216.83	1.20±1.52	9.00±10.17	9.76±6.26
Between 31-40 years	95	327.36±174.70	1.65± 1.60	9.41±10.56	9.13±5.21
Over the age of 40	73	301.81±184.31	1.60±1.67	10.09±13.12	8.62±6.09
df	2	F=.,636 p= .530	F= 2.085 p= .126	F= .195 p= .823	F= .786 p= .457
Marital status					
Married	180	323.97±195.20	1.57±1.64	9.73±11.62	9.18±5.72
Single	79	320.15± 188.54	1.29± 1.50	8.83±10.14	9.26±6.13
df	1	T=0.147 p = 0.149	t=1.275 p=0.203	t=0.594 p=0.553	t=-0.11 p=0.911
Education levels					
Post Graduate	48	338.00±295.82	1.90±1.38[a]	8.38±7.57	9.24±6.08[a]
Undergraduate	135	357.77±255.39	1.56±1.64[a,b]	10.51±11.04	9.98±5.53[a,b]
Associate Degree	37	317.19±156.45	1.08±1.73[b]	10.56±12.49	9.35±4.56[a]
High School and below	39	274.05±217.93	1.08±1.36[a]	5.46±12.19	6.28±5.73[a,c]
df	3	F= 1.319 p=0.269	t=2.844 p=0.038	F= 2.374 p=0.071	F= 4.219 p= 0.006
Occupation					
Physician	51	378.57±389.08	0.96±1.50	8.47±9.43[b,c]	8.98±4.79[a]
Nurse	103	327.88±173.58	1.80±1.61	12.73±12.92[a,c]	10.63±6.15[a]
Health Technician	40	365.08±220.82	1.93±1.62	10.25±10.70[a,c]	10.78±5.72[a]
Support staff	65	292.86±188.67	1.12±1.49	4.57±7.47[b]	6.15±5.01[b]
df	3	F= 1.454 P= 0.228	F= 5.495 P = 0.001	F= 7.860 p<0.001	F= 9.863 p<0.001
Total service time (years)					
5 years and below	81	333.99±216.03	1.63±1.70	10.98±11.62	9.69±6.46
6-10 years	67	338.55±281.85	1.33±1.58	7.64±9.72	9.39±5.33
11-15 years	34	324.88± 182.82	1.56±1.60	8.73±9.98	8.32±5.75
Over 15 years	77	336.83±256.28	1.43±1.53	9.77±12.90	8.92±5.68
df	3	F= 0.026 p=0.994	F= 0.486 P=0.692	F= 1.156 P= 0.327	F= 0.524 P= 0.666
Status of being diagnosed with COVID-19					
Yes	66	342.77±163.04	2.06±1.77	11.32±12.94	10.70±6.12
No	193	332.10±263.61	1.29± 1.50	8.82±10.47	8.70±5.67
df	257	t=0.309 p=0.757	t=3.47 p=0.001	t=1.569 p= 0.118	t= 0.118 p=0 .016

Table 2 (*Continued*)

	f	Caffeine (mg/day)	CSN	BAI	ISI
Status of having a relative diagnosed with COVID-19					
Yes	128	335.52±260.66	1.59±1.70	10.31±12.42	9.95±6.26
No	131	334.14±222.70	1.39±1.50	8.63±9.79	8.48±5.33
df	1	t= 0.046 p=0.964	t= 1.50 p=0.306	t= 1.215 p= 0.226	t= 2.029 p= 0.044
Changes in caffeine consumption in the pandemic process					
No change	182	280.03±171.17^{a}	1.28±1.47^{a}	7.80±10.38^{a}	8.08 ± 5.77^{a}
Increased	65	453.23±203.81^{b}	1.86± 1.71^{b}	13.20±10.55^{b}	12.12±4.70^{b}
Decreased	12	265.17±118.11^{a}	2.50±2.19^{b}	14.42±18.85^{b}	10.50±7.13^{b}
df	2	F= 23.322 p<0.001	F= 5.90 p= 0.003	F= 7.156 p= 0.001	F= 12.879 p<0.001

t: independent sample t-test, F: one-way ANOVA test

Table 3. Correlation table of Daily Caffeine Consumption, cardiac symptoms number (CSN), Beck Anxiety Inventory (BAI), and Insomnia Severity Index (ISI) score averages.

		Caffeine (mg/day)	ISI	BAI	CSN
Caffeine (mg/day)	r	1.000	.237**	.228**	.191**
	P	.	.000	.000	.002
	n	259	259	259	259
ISI	r	.237**	1.000	.679**	.415**
	P	.000	.	.000	.000
	f	259	259	259	259
BAI	r	.228**	.679**	1.000	.573**
	p	.000	.000	.	.000
	f	259	259	259	259
CSN	r	.191**	.415**	.573**	1.000
	p	.002	.000	.000	.
	f	259	259	259	259

r: correlation analysis

4. Discussion

The COVID-19 pandemic has turned into a worldwide health crisis. Along with the difficulty of adapting to the daily routine that has changed with the COVID-19 pandemic, health workers encountered the heavy burden that being at the forefront in this process has brought. In this study, 12.0% of the participants had a mild generalized anxiety disorder, and 23.6% had medium and severe generalized anxiety disorders. Although a similar study conducted on contact tracing teams specifically was not seen in the literature, it is stated in the studies conducted on health workers in the COVID-19 pandemic process that the anxiety rate changes range between 31.8% and 52.3% (1,18,19). In our study, the insomnia rate in the contact tracing team members was found to be 35.6%. While the insomnia rate in the health workers in the COVID-19 process is stated as 53.1% in the study conducted in Turkey, the insomnia rate in health workers was 34.0% in the study conducted in China (19,20).

In the case of the daily caffeine consumption under 200 mg in adult individuals, it is possible to speak of its positive stimulant effects such as collecting

Table 4. The distribution of the participants' status of cardiac symptom observance according to cardiac symptoms number (CSN), Beck Anxiety Inventory (BAI), Insomnia Severity Index (ISI).

	f	No symptoms	There are symptoms	x^2	df	p
BAI						
Normal	167	86 (51.5%)	81 (48.5%)	31.117	3	<0.001
Mild	31	6 (19.4%)	25 (80.6%)			
Medium	31	5 (16.1%)	26 (83.9%)			
Severe	30	4 (39.0%)	26 (86.7%)			
ISI						
Normal	110	56 (50.9%)	54 (49.1%)	11.820	2	0.003
At the lower threshold	100	32 (32.0%)	68 (68.0%)			
Medium-severe	49	13(26.5%)	36 (73.5%)			
Caffeine consumption (mg/day)						
Under 200 mg	70	36 (51.4%)	34 (48.6%)	6.233	1	0.013
200 mg and above	189	65 (34.4%)	124 (65.6%)			

attention, retarding fatigue, and affecting cognitive functions (7). The average daily caffeine consumption up to 400 mg is regarded as safe in the literature (21). The anxiety increasing along with the changing working conditions may increase the caffeine consumption habits. In the study, 25% of the participants increased the caffeine consumption in the pandemic process. Besides, the daily caffeine consumption was 322.80± 192.83 mg.

It is stated in the literature that caffeine consumption affects anxiety, the cardiovascular system, and sleep (1,5,7,8,22). People experiencing anxiety disorders are likely to experience sleep problems. Studies conducted showed that 24-36% of the people with chronic sleep disorder experienced anxiety disorders at the same time (9). The majority of the cardiac symptoms observed along with sleep disorders accompany anxiety clinic. The majority of these symptoms observed are not symptoms of a severe cardiac problem and are a part of anxiety. These symptoms are chest pain, shortness of breath, dizziness, lightheadedness, and palpitation (10,12,13). In our research, 61.0% of the participants stated that they experienced at least one cardiac symptom in the pandemic process. While a positive correlation was detected between the anxiety scores of the participants and insomnia scores and the number of cardiac symptoms in our study in line with the literature, as the daily amount of caffeine consumption increased, the anxiety, insomnia, and the number of cardiac symptoms increased as well. Also, in the group of people with no sleep problems, with normal anxiety levels, and with a daily caffeine consumption of below 200 mg, the observance rate of cardiac symptoms was much lower than other groups. It is stated in the literature that there is a correlation between COVID-19 and cardiac symptoms. In this study as well, cardiac symptoms were observed more in people that have gone through COVID-19.(23) In the study, cardiac symptoms were observed more in people who decreased caffeine consumption. This situation can be explained by the changes they made in their caffeine consumption habits due to the cardiac symptoms they experienced.

In our study, the anxiety rate of females was found to be higher compared to males. It is stated in the literature that females are more prone to anxiety disorders (1,24,25). Also, while the group with the highest anxiety score among the occupational groups within the contact tracing team members were nurses, the lowest group was the support personnel. Taghizadeh et al. state that among the health workers, anxiety levels of doctors and nurses were higher compared to others in the pandemic period (26). In our study, 70.24% of the contact tracing team did not make changes in their caffeine consumption habits in the pandemic process, and the anxiety score averages of this group were the lowest.

This situation may be because they had decreased caffeine consumption to repress the anxiety symptoms or because of the need to increase caffeine consumption due to anxiety. However, the daily caffeine consumption amount was above 200 mg in all groups.

In our study, the rate of getting diagnosed with COVID-19 in contact tracing team members was 25.4%. This rate was quite high in comparison with other segments of society. While it is stated in the literature that health workers are diagnosed with COVID-19 more compared to other segments of society, this rate is stated as 19.2% in the study conducted on health workers in Turkey (2,19). In this study, participants that were diagnosed with COVID-19 and those with a relative diagnosed with COVID-19 experienced insomnia problems more. Insomnia score distributions were higher in females, nurses, and health technicians. Jahrami et al. state in the study they conducted on healthcare professionals that insomnia is observed more in females and nurses (25). In our study, the group with the lowest insomnia score distribution were the ones with high school education and below. This situation can be explained by the fact that this group consisted of support personnel like drivers and their responsibilities and contacts with patients were less compared to the others.

As a result, a correlation was detected between caffeine consumption and insomnia, anxiety, and cardiac symptoms in this study. Anxiety symptoms, insomnia, and risky caffeine consumption habits are seen in the contact tracing team working in the front line in the fight against the pandemic more frequently compared to the society. It is necessary not to skip the mental health problems of the personnel for ensuring sufficient human resources in carrying out health services and maintaining the well-being of the healthcare professionals. This way, both the health of health workers will be protected and the health service they provide for society will continue without any interruptions.

5. Conclusions

In Turkey, the majority of the nurses taking an important place in the contact tracing team are still women. Especially considering the predisposition of women towards anxiety, nurses particularly are at more risk. Psychological support for healthcare professionals like the contact tracing team working with infected patients in the pandemic period must be ready to be given when necessary.

5.1. Limitations of the study

The fact that the study was conducted on a contact tracing team in a single province is the limitation of the study; carrying out the study in a multi-centered setting may provide wider and more detailed results.

Conflicts of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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