CHAPTER
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Eating behavior of adult women during the pandemics

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ABSTRACT
The pandemic caused by the spread of the SARS-CoV-2 virus has caused several behavioral changes in the population, including eating behavior. This study aimed to evaluate the eating behavior of adult women in the Metropolitan Region of Recife during the lockdown period due to SARS-CoV-2 pandemic. Data collection was carried out through an electronic form with 431 women. The questionnaire contained questions about anthropometric data, social distance following, and the TFEQ-R21 questionnaire covering eating behavior and emotional feeding. The results obtained were that 80.5% of women were socially distant. About 37% of women were overweight, and 90.3% reported perceiving weight variation during the confinement period. An estimate of the risk of gaining or losing weight as a function of body condition was not found before and during social confinement. As for the TFEQ-R21 questionnaire, the domains addressed showed a positive correlation with weight variations in some of its items. It was concluded that an adverse emotional situation arising from a pandemic situation favors emotional eating. It is suggested that individualized nutritional care is necessary for the creation of efficient methods that aim to improve the relationship with food and to prevent the emergence of future eating disorders.

Keywords: Eating behavior, Pandemics, Eating habits, SARS-CoV-2.

1 INTRODUCTION

The disease resulting from COVID-19 infection, has high transmissibility and infectivity, and quickly spread to all countries, leading to a pandemic [1,2]. The most common symptoms are similar to those of the flu. The disease can bring sequelae to some individuals, but its main complication is severe acute respiratory syndrome [3,4]. Due to the pandemic, it was necessary to take some measures to contain the transmission of the virus and reduce its impact on the population. These measures included the adoption of stricter personal hygiene, sanitization of objects exposed to outdoor environments and the practice of social distancing [5].

Social distancing included the closure of spaces that gathered a large group of people, in order to reduce the transmission of the virus [6], which led to major changes in the daily life of the population. Schools and universities had to suspend activities and most workers were restricted to home office work [7]. At the beginning of the pandemic and social distancing, the lack of information about the disease linked to a longer period at home, led to emotional changes and increased negative feelings [8].

Under these conditions, the search for more palatable and, consequently, more caloric foods became common as a form of compensation for these feelings [9]. Emotional eating in turn is associated with momentary pleasure, since this search is for specific foods that stimulate the production of neurotransmitters responsible for generating the feeling of well-being in the short term [10].

The intake of caloric and highly palatable foods (usually ultra-processed) in a considerable frequency, can bring negative impacts to health, and generate consequent pictures of obesity. Obesity can bring several metabolic and hormonal changes, and increase the risk of developing chronic diseases, such as cancer, diabetes, systemic arterial hypertension (SAH) and cardiovascular diseases (CVDs) [11].

The choice and form of food intake is a personal characteristic that reflects the individual's relationship with food and their eating style or behavior. However, the changes in routine and behavior caused by confinement contributed to changes in the eating behavior of a large part of the population [12,13].

It is worth noting that a systematic review showed that females were the group that suffered the most from changes in this behavior [14]. This may be linked to the accumulation of functions commonly performed by women, such as domestic activities, paid activities, child care, among others [8].

Thus, the conditions linked to the COVID-19 pandemic contributed to negative repercussions on the mental health of the entire population, and may be a trigger for the emergence of "emotional eating" [15]. Thus, considering the greater likelihood of women seeking more palatable foods as a form of emotional compensation, this group may be more inclined to develop overweight and obesity through inadequate eating habits. The aim of this study was to identify the existence of an association between eating behavior and changes in body mass in adult women during a period of lockdown during the COVID-19 pandemic.

2 METHODOLOGY

The research was approved by the Research Ethics Committee (CEP) of the Federal University of Pernambuco (CAAE - 33048720.5.0000.5208). The study is cross-sectional and quantitative, with

a minimum sample of 10% (384 participants) of the female population of the Metropolitan Region of Recife.

The survey was conducted during the strictest period of social distancing due to the COVID-19 pandemic, between June 16 and 28, 2020. The inclusion criterion was people born with female biological sex, aged between 18 and 64 years, residents of the Metropolitan Region of Recife.

The recruitment of the research participants was carried out through the internet, randomly and by free adherence, through e-mail and social networks, such as *WhatsApp*® and *Instagram*®. Data collection was performed through an electronic questionnaire developed on the *Google Forms*® platform. All people with the address of the questionnaire were able to respond anonymously and voluntarily.

Self-reported weight and height data were used before and during social distancing to assess nutritional status by calculating the Body Mass Index (BMI). It was also asked if the participants were following social distancing according to the definition of Wilder-Smith and Freeman6, considering social distancing as being working from *home* and only leaving the house for essential activities such as going to the pharmacy or the supermarket.

The TFEQ-R21 questionnaire, proposed by Tholin et al, was used. [22], which assesses eating behavior, and assesses the food prohibition and its influence on weight or body shape; the emotional eating scale; and the tendency to lose food control in the presence of hunger or external stimuli. This questionnaire was used to assess whether emotional eating was present in the behavior of these women during the study period.

Statistical analysis was performed using the *Statistical Package for the Social Sciences* - SPSS (version 20.0, SPSS Inc., Chicago). Continuous variables were tested for normality of distribution by the Kolmogorov Smirnov test. The Gaussian distribution variables were expressed as mean and standard deviation. The variables with non-Gaussian distribution were presented in medians and their respective interquartile ranges. Categorical variable comparisons were analyzed using Pearson's chi-square test. Spearman's correlation was used to evaluate the correlation between the TFEQ-R21 questionnaire and the nutritional status of women. A significance level of $p<0.05$ was considered for all cases.

3 RESULTS AND DISCUSSION

A total sample of 431 women was obtained, with an age range between 18 and 64 years. There was a high concentration of women in the 18 to 24 years and 25 to 34 years age groups, understood as young adults, accounting for almost 70% of the sample.

Regarding compliance with social distancing, a high percentage of women who were following this measure (80.5%) was obtained, while 19.5% said they did not follow social distancing.

Table 1. Nutritional status of adult women before and during social distancing due to the COVID-19 pandemic, Metropolitan Region of Recife, PE, 2020

	Before social distancing		During social distancing	
Nutritional status	N	% valid	N	% valid
Low Weight	16	5,4	15	5,1
Eutrofia	166	55,9	169	57,7
Overweight	84	28,3	72	24,6
Obesity grade 1	25	8,4	27	9,2
Obesity Grade 2	4	1,3	6	2,0
Obesity Grade 3	2	0,7	4	1,4
Total Valid	297	100	293	100
I didn't know	134	-	138	-
Total	431	-	431	-

Results expressed as percentages. n: Number of participants. Low weight: BMI <18.5 kg/m2. Eutrophy: BMI ≥ 18.5 and < 25 Kg/m2. Overweight: BMI ≥ 25 and < 30 Kg/m2. Obesity grade 1: BMI ≥ 30 and < 35 Kg/m2. Obesity grade 2: BMI ≥ 35 < 40Kg/m2. Obesity grade 3: BMI ≥ 40 Kg/m2. Spearman's correlation test p=0.7677

Table 1 contains data on the nutritional status of participants before and during social distancing. Only the data of the women who were able to report their weight and height were considered to calculate the valid percentage, since about 32% of the women did not know how to answer in both moments. It was noted that before the pandemic the majority were within the eutrophy

category (55.9%), followed by overweight women (overweight and obesity) (38.7%) and finally, underweight (5.4%). The same distribution was observed in the data obtained during social distancing. There was no statistical difference (p = 0.7677) between the two moments.

The group presented a prevalence of overweight lower than percentages found by the Ministry of Health in 2021, through VIGITEL, where the frequency of overweight in Brazilian women is 55% [16].

Excess weight, in addition to being associated with metabolic changes and increased morbidity and mortality, is an additional risk factor to the prognosis of COVID-19 and can also bring impairments in quality of life in other aspects, such as psychological and social health [17, 18]

Table 2. Weight variation of adult women during social distancing due to the COVID-19 pandemic, Metropolitan Region of Recife, PE, 2020

Variation	N	% valid
Lost weight	122	42,2
Kept the weight	28	9,7
Gained weight	139	48,1
Total Valid	289	100
I didn't know	142	-
Total	431	-

Results expressed as percentages. N: number of participants. Valid percent: participants who answered BMI.

Table 2 refers to women's weight variation during social distancing. Among the sample, 32.9% did not know how to answer; In this case, only the responses of 289 women were taken into account for the valid percentage. It is noted that 40.5% reported weight loss, 9.7% said they had maintained weight and 49.8% reported weight gain during social distancing. This last data is very similar to that found by Santos et al, in which weight gain was reported by 45.7% of the total sample [19].

A very close percentage was observed between those who reported loss and those who reported gain in body mass, thus configuring a high variation in weight in the isolation period. In total, 90.3% reported having noticed some modification, either weight loss or weight gain.

These results are in agreement with other similar studies that have demonstrated both weight gain and reduction during this atypical period due to COVID-19 [20, 21]. Despite this, this study found values relatively close to reduction and increase in weight, although, in the literature, the numbers of weight gain are higher and more frequent than those of weight loss. This may be due to the fact that some people, in moments of anxiety, pathological or not, have the opposite behavior to that discussed until then, in which they reduce food intake and consequently do not supply the body energy demand, which culminates in weight loss [22].

The variation in weight can be justified by the change in routine that leads to changes in lifestyle and, consequently, emotional disturbances. A study of Canadian families showed changes in eating routine since the pandemic in more than half of the sample (70% of mothers, 60% of fathers and 51% of children), and some of the most common behaviors cited were eating more and snacking more [23].

In addition to the alteration of the eating routine, physical activity configures another very modified behavior. Similar work brings data showing both a decrease in and an increase in exercise during the pandemic. However, the amount of studies that have obtained a reduction in the practice of physical activity is much greater than the studies that bring an increase in this variable [24, 25, 26]. It is very likely, then, that such a change in the habit of practicing exercises favors weight variation, but it is not possible to affirm this hypothesis with the sample of the present research, since this variable has not been studied.

Table 3. Association between overweight women before and during social distancing and weight variation during social lockdown due to the COVID-19 pandemic, Metropolitan Region of Recife, PE, 2020

		Weight variation					
		Lost weight		**Gained weight**		**Total**	
		N	%	N	%	N	%
Excess weight before distancing	No excess weight	72	45,9	85	54,1	157	100
	Overweight	50	48,1	54	51,9	104	100
TOTAL		122	46,7	139	53,3	261	100
Excess weight during distancing	No excess weight	79	49,4	81	50,6	160	100
	Overweight	43	42,6	58	57,4	101	100
TOTAL		122	46,7	139	53,3	261	100

Results expressed as percentages. Overweight: BMI ≥ 25 Kg/m2. Spearman's correlation test. p = 0.822 (overweight before distancing). p = 0.283 (overweight during distancing)

Table 3 shows the comparison between overweight before social distancing and weight variation during social distancing. For this comparison, we selected women who reported some weight variation during confinement, whether it was weight loss or weight gain. Then, the groups were divided into those who were overweight before distancing and those who were not. The data show no association (p = 0.822) with an estimated risk of gaining or losing weight as a function of body condition prior to social confinement.

In the same way that inappropriate eating behaviors have been found during the pandemic, some studies have shown the emergence of improvements in eating [27]. As an example, healthy eating habits stand out in people who have adhered to the Mediterranean diet in European countries, in the purchase and consumption of vegetables; preference for organic products and higher consumption of homemade preparations [26, 28].

Regardless of nutritional status, people have different ways of relieving stress and negative emotions. The triggers from the pandemic can impair an individual's quality of life, but there are also chances that they won't cause such critical changes. A study conducted with a group of university students showed that there was no significant difference in the consumption of ultra-processed foods in the period before and during the COVID-19 pandemic, as well as, the consumption of *in natura* and minimally processed foods were maintained with the same frequency. [29]

In the following table (Table 4), it was evaluated whether there was an association between weight variation, weight loss or weight gain alone, and some components of the TFEQ-R questionnaire21. The items were enumerated according to the order of questions of the complete questionnaire used in the research.

Table 4. Correlation between the weight of women during the period of social distancing with questions from the TFEQ-R questionnaire21

Grouping variables		**Weight variation**	**Gained weight**	**Lost weight**
Sum of cognitive restriction questions (08, 12, 18, 24, 25 and 28)	Correlation coefficient	0,157(**)	1,000	1,000
	P	0,007	.	.
08) I deliberately eat small portions to control my weight	Correlation coefficient	-0,145(*)	-0,109	-0,161
	P	0,014	0,166	0,076
09) I start eating when I feel anxious	Correlation coefficient	0,239(**)	0,229(**)	0,241(**)
	P	0,000	0,003	0,008
11) When I feel sad, I often eat too much	Correlation coefficient	0,216(**)	0,226(**)	0,215(*)
	P	0,000	0,004	0,017

13) Being with someone who is eating, often makes me want to eat too	Correlation coefficient	0,163(**)	0,527(**)	0,621(**)
	P	0,005	0,000	0,000

** The correlation is significant at the 1% level
* The correlation is significant at the level of 5%
Results expressed as percentages. Overweight: BMI ≥ 25 Kg/m2. Spearman's correlation test.

The sum of the questions that cover cognitive restriction (questions 8, 12, 18, 24, 25 and 28), two questions from the emotional eating domain (questions 09 and 11) and one question from the eating control domain (question 13) had a significant and positive correlation with weight change, that is, the score in this variable was directly linked to the perception of variation in weight, be it weight loss or gain. Question 08 (*I deliberately eat small portions to control my weight*) also had a significant correlation with weight change, but in a negative way – as the weight variation increases, the score on this variable decreases.

Regarding weight gain or loss during distancing, in isolation, only questions 09 (I *start eating when I feel anxious) and* 11 (*When I feel sad, often like too much*) had a significant and positive correlation. The other questions of the questionnaire did not show significance with changes in weight in general, nor weight loss, nor weight gain.

Previously, in the literature, it was revealed that among the three domains of behavior addressed in the TFEQ-R21 questionnaire, the one most responsible for the lack of food control and exaggerated consumption resulting in weight gain is emotional eating [30]. Two questions in this domain (9 and 11) showed a significant correlation with the weight change of the studied group. However, the session that presented the most significance in this study was the cognitive restriction session. It was also observed that the questions correlated more with weight variation (weight loss and weight gain together), and less with weight loss or gain in isolation. It is understood, then, that an individual will not necessarily experience weight loss or gain, but eating because of emotions leads to inappropriate eating habits that, in the long run, can induce changes in weight.

"Emotional eating" stood out at the beginning of the pandemic period [15]. People who generally had healthier habits, who consumed natural foods and who worried about weight gain, ended up focusing on other concerns and thus, consumed foods that, at another time, would not be part of the routine [31]. However, the fact that it was confined also meant that people could have the opportunity to improve their eating habits [26].

These changes in eating behavior, associated or not with changes in body composition, emphasize the importance of individualized multidisciplinary care. The nutritional accompaniment should be based on respect for the reality of the individual and based on the preferences, socioeconomic

conditions and cultural experiences of each one, as well as aiming at the good relationship with food and walking together with psychological monitoring.

As limitations of the research, we highlight that there was no assessment of the nutritional status in person by a trained individual. Thus, weight and height were self-reported by the research participants, which may bring an error bias to the data, since they may not know for sure their weight, height and other information outlined in the questionnaire applied. However, due to the pandemic state and social isolation that occurred during the research period, the format of electronic questionnaires was used in several studies with validation. In addition, this method has already been used even before the pandemic, such as VIGITEL. Thus, the data collected in this study can be used from a scientific point of view.

4 FINAL CONSIDERATIONS

The information found in this study suggests that social distancing has had certain impacts on women's diet. There was no exclusive relationship between the presence of excess weight and social confinement, but changes in eating behavior and changes in weight were observed during this period. Through the EFTF-R21, common behaviors such as eating more because of anxiety or sadness were found.

It was concluded that emotional changes caused by adverse situations linked to the pandemic favored "emotional eating". By associating these behaviors with the conditions experienced during the COVID-19 pandemic, it is understood that emotional eating was present in the eating habits of most women, and it was not linked to a specific body condition.

Further research on this topic is necessary, both with women and with other groups, aiming to define the groups with the highest risk of suffering changes in eating behavior during troubled and emotionally charged phases.

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