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A Case Series Of Weight-Reduction Nutrition Consultation In A Central Hospital During The COVID-19 Pandemic

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Introduction

Obesity stands as a major focal point in public health, holding the fifth position among the leading causes of death worldwide. It is one of the primary lifestyle diseases and has a significant role in thedevelopment of various chronic conditions such as cardiovascular disease (CVD), diabetes (DM), arterial hypertension (HTA), urinary incontinence, sleep apnea/obstructive pulmonary disease, systemic inflammation, and metabolic syndrome. **[1]** Moreover, strongevidence links obesity to autoimmune diseases through immunological mechanisms involving T lymphocytesoverstimulation by nutrient- and energy-sensing pathways. **[2]** Adipose tissue produces adipocytokines, impacting systemic immune responses; consequently, metabolic overload from obesity can increase vulnerability to autoimmune diseases. **[2]** Due to their association with obesity (BMI>30Kg/m2), all these diseases are common in the nutritional approach of internal medicine weight- reduction nutrition consultation.

In addition to physical ailments, there are strong links between obesity and emotional states. Stress influences individuals' eating behavior, affecting appetite and determining the choice of generally more caloric foods. **[3]** These foods lead to endogenous opioids (endorphins) release, what appears to be a defense mechanism against the harmful effects of stress. **[4]** Consequently, eating in response to negative emotions may be an explanatory factor of the weight regain of many dieters. **[5]**

Confinement conditions imposed by COVID-19 may have aggravated this situation due to the increased stress generated by negative emotions associated with space restrictions and lack of socialization. In fact, in a study with 800 participants conducted in the USA in June 2020, has shown that most respondents (73.6%) experienced moderate to high perceived stress, significantly correlated with emotional eating. **[6]** Concomitantly, the respondent's lifestyle habits changed – they reduced physical activity and had a less healthy diet. These negative effects on eating habits and physical activity reduction, with a consequent increase in weight, were observed in Italy and other European countries **[7]**. People tend to enhance consumption of snacks, unhealthy foods, cereals, and sweets and lower exercise, which was correlated with a significantly higher weight gain **[8]**. Contrarily, Di Renzo et al. **[9]** observed most of the population declared not to have changed its habits (46.1%), although having a perceived weigh gain.

Due to face-to-face encounters restrictions, our weight-reduction nutrition consultation had to adapt to a non-presential approach (teleconsultation). Until the COVID-19 pandemic, a non-face-to-face approach based on the patient's report had never been performed in our hospital, but emerging evidence suggests that a regular intervention through telemedicine can improve factors related to CVD. **[10,11]** Telemedicine can be a reality today, due to the widespread adoption of mobile phones which are accessible to people across various socioeconomic levels, including older populations. **[12]** Based on this premise, the telephone has emerged as the primary and highly advantageous tool in telemedicine, proving its effectiveness in facilitating remote healthcare. **[13-15]** In contrast to face-to-face visits, phone calls consume less time and costs from patients. Teleconsultations encompass enhanced accessibility to medical expertise, are cost-effective interventions, provide augmented convenience for patients, and have the potential for

expedited healthcare delivery. **[16,17]** Yet, they have some disadvantages, suchas lacking physical contact between the physician and the patient, and a higher risk of misdiagnosis **[17]**.

The aim of the present work was to examine weight changes in patients from a clinical weight management consultation during the confinement period, and to evaluate the effectiveness of a remote consultation as a mean of monitoring these patients.

Methods

Patients

Patients from the first author Clinical Nutrition consultation of the Hospital Internal Medicine Department were enrolled in this study. All these patients were following a personalized and detailed dietary plan prescribed by the first author (precision nutrition) which was adjusted, if needed, in each appointment. The inclusion criteria were: (1) two in-person consultations before the COVID confinement, (2) a teleconsultation, and (3) two in-person consultations after the COVID confinement. The exclusion criterion was a COVID-19 diagnosis, either previously or during the study, and an age under 18 years.

Clinical and sociodemographic records of the eligible patients were retrieved from the Sclinico, including weight and waist circumference (WC) registered in two previous and two after COVID-19 confinement in-person consultations. So, in total, we retrieved five weight and five WC measures for each patient.

Prior to the teleconsultation, and during the lockdown, a phone call was made to all patients who would have a teleconsultation, requesting their authorization for its execution, and explaining how it would be conducted. During this phone call, patients were instructed on how to perform self-measurements of weight and waist circumference, and they were asked to take photographs of the scale and of their waist measurement. Additionally, neuro-linguistic programming (NLP) was conducted to reassure the patients about their weight management during the confinement, which was used only during teleconsultation. This phone call was performed by the first author.

On the teleconsultation, the patient's informed consent was recorded; the signature was obtained in the subsequent in-person consultation. Patients authorized the use of clinical data from previous consultations.

Patients were presented with the familiar questions they typically answer during an in-person appointment, including the recording of a reported anthropometric 24-hour dietary survey was carried out, allowing for adjustments to be made to the dietary plan if necessary. Regarding the clinical evaluation, the patient was specifically asked about any changes to the prescribed therapy since their last nutrition consultation.

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board (IRB) of the Hospital; full review was obtained in a written consent with the Ref. 155/2020. All the patients enrolled in the study have provided written informed consent.

Data analysis

The outcome of this study is the variation in weight, BMI (Kg/m2), WC (cm) and WC/Height ratio during the five evaluation periods.

Statistical analysis was performed using SPSS (IBM SPSS Statistics 23). Proportions were compared using the qui-square test or the Fisher's exact test when appropriate (Yates correction for multiple entries). For the continuous variables, evaluation of differences between means will be performed with the paired Student's t-test, comparing the results obtained for the same patient. A p-value <0.05 with a 95% confidence interval will be considered statistically significant.

Results

Patients were sequentially selected from the first author clinical nutrition consultation. We included all patients observed in the teleconsultation who met the above-mentioned inclusion and exclusion criteria (n=61). The patients attended the nutrition appointments between March 2018 and August 2022.

The consultations were named as: in-person appointment before the teleconsultation – Pre1; previous in-person appointment before the in-person appointment preceding the teleconsultation – Pre2; teleconsultation – TC; in-person appointment after the teleconsultation (Post1); and in-person appointment after the previous in-person appointment held after the teleconsultation (Post2). The patient's clinical characteristics are presented in **Table 1**.

Table 1: Patients clinical characteristics (n=61) during the five nutrition consultations

	Pre2	Pre1	TC	Post1	Post2
Age (years; mean ± SD)	60.1 ± 9.9	⟞	⟞	⟞	⟞
Females (%)	83.6	⟞	⟞	⟞	⟞
Height (m; mean ± SD)	1.62 ± 0.80	⟞	⟞	⟞	⟞
Weight (Kg, mean ± SD)	84.1 ± 15.3	84.7 ± 15.4	82.4 ± 15.2	82.2 ± 14.7	82.6 ± 16.0
BMI (mean ± SD)	32.0 ± 4.3	32.1 ± 4.2	31.3 ± 4.3	32.1 ± 4.2	32.1 ± 4.2
WC (cm, mean ± SD)	102.1 ± 12.8	102.9 ± 12.6	101.4 ± 13.3	101.2 ± 13.1	102.4 ± 13.3
WC/Height (mean ± SD)	0.63 ± 0.07	0.63 ± 0.07	0.62 ± 0.08	0.62 ± 0.07	0.63 ± 0.08

Of the 61 patients included in the study, 40 lost weight (65.6%), 14 gained weight (23.0%), and 7 had no weight change (11.4%) between Pre1 and TC (65.6%) consultations, the period that included the lockdown. Since consultation intervals were not constant, leading to different weight and WC assessment intervals, we divided the differences by the number of days between measurements. Thismeans that daily calculations of anthropometric measures (weight, BMI, WC, and WC/Height) were performed, and with these standardized values we analyzed the variations between appointments. The data obtained are presented in **Table 2**.

Table 2: Comparison of weight, BMI, WC and WC/Height standardized values between consultations (the differences were averaged per day)

	Pre2 / Pre1	p-value	Pre1 / TC	p-value	TC / Post1	p-value	Post1 / Post2	**p-value**
Weight (g, mean ± SD)	0.89 ± 37.8	0.427	-14.7 ± 34.4	**0.001**	5.0 ± 40.4	0.167	2.9 ± 19.2	**0.125**
BMI (mean ± SD)	0.18 ± 14.8	0.463	-5.4 ± 12.8	**0.001**	-1.6 ± 15.0	0.211	0.95 ± 7.2	**0.154**
WC (cm, mean ± SD)	0.11 ± 0.60	0.078	-0.11 ± 0.25	**0.001**	0.075 ± 0.50	0.129	0.007 ± 0.23	**0.410**
WC/Height (mean ± SD)	0.069 ± 0.38	0.081	-0.067 ± 0.16	**0.001**	-0.043 ± 0.30	0.137	0.0043 ± 0.14	**0.410**

Analysing the data obtained it has been observed that the variations between appointments were only significant when comparing the measurements obtained at the appointment prior to the teleconsultation (Pre1) with those obtained during theteleconsultation (TC). A decrease was observed in all the assessed parameters ($p<0.001$).

Given that the period between the two appointments includes the confinement period (10 March to 30 May 2020), we aimed to assess the possible effect of the confinement on the decrease of these parameters. Due to the fact that time spent in confinement differed between patients, we calculated it as the percentage of days spent in confinement between Pre1 and TC measurements.

It has been observed that a weak but significant correlation between the number of days spent in confinement and the weight, BMI, WC and WC/Height decrease **(Table 3)**.

Table 3: Correlation between the days spent in confinement and weight, BMI, WC and WC/Height

	Pearson Correlation	p-value
Weight	-0.364	0.004
BMI	-0.341	0.007
WC	-0.365	0.005
WC/Heigh	-0.346	0.007

Discussion

In the present work we aimed to evaluate the weight-reduction utrition consultation during the COVID pandemic, considering that the lockdown may have prone individuals to weight gain. This was particularly critical for the obese/overweighted individuals enrolled in our cohort (BMI was > 32 Kg/m2 at the study beginning).

Several studies have shown a weight gain during the COVID pandemic confinement **[18,19]**, either in normal weight **[20,21]** or in obese/overweight individuals. **[18,21,22]** Variable proportions of patients with weight gain have been reported: 22% in the USA **[23]**, 30.6% in China **[20]**, 32.4% in Iraqi Kurdistan **[24]**, 21.0% **[25]**, 34% **[26]** and 38.2% **[27]** in Portugal, 38.5% in a pool of 12 Latin American countries

(n=10 552 individuals) **[28]**, 38.8% **[29]** and 44.5% in Spain **[22]**, 43.3% **[30]** and 48.6% in Italy. **[9]** In a meta-analysis of the global impact of COVID-19 on adult population weight, about 50% of the respondents reported weight gain. **[31]** Contrarily, in the Rodríguez-Pérez et al. study **[32]** study, only 13.2% of the individuals gained weight, probably due to the adoption of healthier dietary habits/behaviors.

Inadequate sleep **[9,23,33]**, snacking after dinner **[23]**, less healthy diets **[20,23,28,31,33-39]**, eating in response to stress **[23,27,34]**, and reduced physical activity **[9,20,23,31,33,35,38,40]** seem to be the risk factors associated with weight gain. Loneliness and anxiety lead to increased food intake **[20]**, with people eating for comfort and stress relief. **[3,4,23]**

No weight changes were reported in Italian older adults **[41]**, and in a Lebanese population. **[42]**

Weight loss was also reported, although contributing factors were not discussed: 12% **[26]**, 12.9% 25 and 15.7% **[27]** in Portugal, 16.9% in Latino American countries **[28]**, 19% in USA 23, around 25% in a meta-analysis comprising 61,764 respondents **[31]**, 31.1% **[29]** and 36.9% in Spanish cohorts. **[21]**

In the present study, a low percentage of obese/overweight patients gained weight (23.0%), with the majority experiencing weight loss (65.6%). A low percentage of patients gaining weight is in accordance with some of the above referred studies, mostly carried out in normal or overweight individuals. Contrarily, in a meta-analysis including 3999 obese individuals, 52% gained weight **[43]**, which is much

higher than the 23% it has been observed. Additionally, the high percentage observed of obese patients losing weight duringlockdown was not previously described.

A major difference between the present study and previous research is that our study involved a lengthy follow-up of patients from an obesity reduction consultation, whereas others were based on the general population. The patients we observed were mostly senior women with a high BMI and a cardiovascular risk WC. The long follow-up allowed a better evaluation of the confinement and teleconsultation roles in their weight management.

Another difference is that in previous studies the majority of the information was self-reported, retrieved through questionnaires. In our case, besides using other measures validating the weight changes (e.g., WC), clear instructions and proof of the measurements were required. Patients were aware that their weight loss was monitored, especially during confinement.

The variations of weight, BMI, WC and WC/Height ratio calculated per day, allowed for a more accurate assessment of changes over time, considering the variable time intervals between measurements, and the variable duration of confinement for each patient. Statistically significant differences occurred only between Pre1 and TC. They occurred for all the variables, with a p-value of < 0.001. Previous studies only reported weight changes, and no additional anthropometric measures such as WC, and WC/Height ratio, as we did in the present study, which make our results more reliable.

The decrease in weight, BMI, WC and WC/Height ratio had a weak but significant correlation with a greater number of days spent in confinement. This may be due to the adoption of healthier dietary behaviors during the confinement when compared to previous habits, as previously reported by Rodríguez-Pérez et al. **[32]** in a Spanish cohort who had a higher adherence to the Mediterranean diet (MedDiet) during the lockdown. In our case, since the patients were already following their personalized dietary plan, we believe a higher compliance to this plan has occurred. This is even more foreseeable since, during the phone calls preceding TC, an NLP approach was carried out aiming at raising awareness for objective data collection in a non-in person appointment, and focusing on lockdown-related concerns (e.g., COVID stress, weight gain fears) and the additional need for compliance in the confinement circumstances.

NLP is a communication framework employing techniques to comprehend and facilitate changes in thought and behavior **[44]**. It has been used in several health conditions, namely anxiety disorders, weight maintenance, morning sickness, substance misuse, claustrophobia during MRI scanning, leading to inconsistent results. **[44]** In the nutrition context, no recent studies were found. In a study published in 2022, NLP addressed low perceived milk supply due to maternal stress, malnutrition, and cultural food beliefs. **[45]** An increase in endorphin and oxytocin release occurred, maintaining breast milk production and reducing early weaning. **[45]** Health coaching, including NLP and self-efficacy, has been shown to be a cost-effective method to improve weight loss. **[46]**

In our cohort, we suppose that the NLP intervention could have been the driver for the weight decrease observed during the lockdown. Additionally, during confinement, patients had more time for themselves and for self-awareness, and more time to exercise. In fact, it was shown that confined individuals reported having more time to cook and eat healthier foods, meeting given recommendations. **[39]** Cancello et al. **[47]**,

found that 34% of their study population improved the quality of their diet, and 27% of the sedentary individuals began to exercise.

After confinement, weight tended to increase to previous confinement values, probably due to individuals returning to their comfort zone and having less time for self-care when returning to work/regular activities. Differently, Álvarez-Goméz **[48]** observed a post-confinement maintenance of the improvements in dietary and lifestyle habits adopted during confinement. In our case, since NLP focused on lockdown-related concerns (e.g., COVID stress, weight gain fears), possibly explaining the shift from prior healthier behaviors.

We may hypothesize that since NLP was mainly focused on issues related to confinement (e.g., stress of COVID pandemic, fear to gain weight), and limited to that period, that may explain the reversal of the healthier behaviors previously adopted.

Another aspect we studied was the feasibility of using telemedicine in the context of clinical nutrition follow-up. Telemedicine is emerging as a valuable instrument benefitting both patients and healthcare providers, helping maintaining uninterrupted care, with promising outcomes in effectively managing individuals with obesity.

[49] In the present study, patients did not increase weight or WC after the TC, suggesting that TC is a valuable substitute for in-person visits. Patients were comfortable with the approach, saving them time and transportation expenses, and were able to reliably report weight and WC. TCs provide cost-effective, timely remote interventions, enhancing healthcare accessibility. **[16]**

There are some limitations in the present study that worth mentioning. Firstly, it is a case series from a weight reduction hospital consultation, making it difficult to extrapolate our results to other populations. Secondly, no evaluation of lifestyle alterations was performed, information that could better support our assumptions for the weight and WC reductions observed during the lockdown.

The study has also some strengths. It was based on actual data rather than measurements reported through questionnaires. Even the self-reported measurements performed during the confinement relied on clear instructions transmitted in a phone call and documented through photographs. The evaluations were performed always by the same nutritionist (first author). Additionally, a five-appointment long follow-up provided better insight into individual changes, enhancing result reliability.

Implications For Research And Practice

The present study, a case series of obese/overweighed individuals undergoing clinical nutrition consultations in a central hospital, revealed that the COVID-19 lockdown may not necessarily result in a period of worsening obesity despite the risks it posed to these patients. On the contrary, a lockdown may be a window of opportunity for implementing changes, creating healthier habits that could potentially persist beyond the confinement period.

If our observations can be supported by future randomized controlled trials, we may envision the usage of future tailored interventions for healthy behaviors during lockdowns, and the prevention of unhealthy habits.

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