

# Investigating the Weight Loss Success of Clients Participated in Different Telenutrition Intervention Groups: A Cross-Sectional Design

## Farklı Telebesleme Müdahaleleri Uygulanan Danışanlarda Ağırlık Kaybı Başarısının İncelenmesi: Kesitsel Bir Tasarım

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**ABSTRACT Objective:** Technology-based remote communication offers unique opportunities regarding healthcare, and telenutrition provides ambulatory nutrition care equal to or even superior to in-person care. This study aimed to explore the effectiveness of different methods used in the telenutrition system in weight loss targeted processes. **Material and Methods:** Three different intervention methods were examined: interaction group (n=34), monitoring group (n=34), and mail group (n=34). Hundred and two women clients with a body mass index between 18.5 and 25 kg/m<sup>2</sup> were monitored for 8 weeks. Each participant conveyed the weekly weight measurements result before eating in the morning. The data were evaluated by SPSS 25.0 software, and the results were considered statistically significant for p<0.05. **Results:** The highest mean weight loss was observed among participants in the interaction group, and they experienced significantly higher weight loss than those in the mail group. The body mass index changes were more significant among clients in the interaction group with a mean of 2.2±0.4 kg/m<sup>2</sup>, followed by the monitoring group; 1.9±0.4 kg/m<sup>2</sup>, and the lowest change was observed in the mail group; 0.9±0.7 kg/m<sup>2</sup>. Additionally, participants in the interaction group experienced the highest body mass index decrease compared to the monitoring and mail groups (p<0.001). **Conclusion:** In conclusion, it should be indicated that increased interaction between client and dietitian and within clients may increase the weight loss success. More comprehensive studies evaluating telenutrition counseling with follow-ups and group interventions are required to investigate the exact effects of virtual counseling on weight loss management with a large population.

**Keywords:** Telemedicine; weight loss; obesity; internet-based intervention

**ÖZET Amaç:** Teknolojiye dayalı uzaktan iletişim, sağlık hizmetleri açısından benzersiz fırsatlar sunar ve telebeslenme yüz yüze bakıma eşit, hatta ondan daha üstün bir şekilde uzaktan beslenme bakımı sunmaktadır. Bu çalışma, telebeslenme sisteminde kullanılan farklı yöntemlerin ağırlık kaybına yönelik beslenme bakım süreçlerindeki etkinliğini araştırmayı amaçlamıştır. **Gereç ve Yöntemler:** Çalışmada etkileşim grubu (n=34), izlem grubu (n=34) ve mail grubu (n=34) olmak üzere 3 farklı müdahale yöntemi incelenmiştir. Çalışmada, beden kitle indeksi 18,5 ile 25 kg/m<sup>2</sup> arasında olan toplamda 102 kadın danışan 8 hafta boyunca izlenmiştir. Tüm katılımcılar, sabah yemekten önce haftalık vücut ağırlığı ölçüm sonucunu iletmiştir. Veriler SPSS 25.0 istatistik programı ile değerlendirilmiş ve sonuçlar p<0,05 için istatistiksel olarak anlamlı kabul edilmiştir. **Bulgular:** En yüksek ortalama ağırlık kaybı etkileşim grubundaki bireylerde gözlenmiş olup, mail grubuna kıyasla önemli ölçüde daha fazla ağırlık kaybı yaşamışlardır. Beden kitle indeksi değişiklikleri, ortalama 2,2±0,4 kg/m<sup>2</sup> ile en fazla etkileşim grubunda olup daha sonra 1,9±0,4 kg/m<sup>2</sup> ile izlem grubunda ve en düşük değişikliklik 0,9±0,7 kg/m<sup>2</sup> ile mail grubunda gözlenmiştir. Ayrıca izlem ve mail gruplarına göre en yüksek beden kitle indeksi düşüşünün etkileşim grubunda olduğu gözlenmiştir (p<0,001). **Sonuç:** Sonuç olarak danışan ile diyetisyen arasındaki ve danışanlar arası etkileşimin artması ağırlık kaybı sürecinin başarısını artırabilir. Çevrim içi danışmanlığın geniş bir popülasyonda ağırlık kaybı yönetimi üzerindeki kesin etkilerini araştırmak için izlem ve grup müdahaleleri yapılacak daha kapsamlı çalışmalara ihtiyaç vardır.

**Anahtar Kelimeler:** Teletıp; ağırlık kaybı; obezite; internet tabanlı müdahale

The World Health Organization stated that there had been an obesity pandemic existence in recent years and an increasing trend in terms of obesity

prevalence across the world.<sup>1</sup> Obesity treatment consists of different methods such as nutritional changes, increasing physical activity, behavioral changes, and

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medical and surgical treatment; nevertheless, some barriers prevent people from applying face-to-face counseling sessions.<sup>2</sup> Thus, thanks to the remarkable technological developments, virtual health care services have entered our lives as an applicable option for clients and professionals. They could offer potential solutions to some of the most pressing challenges facing healthcare providers and politicians, including universal, egalitarian, sustainable healthcare coverage for a growing, aging population. These developments have also resulted in emerging new counseling techniques for dietitians to provide telenutrition care.<sup>3</sup> According to a recent report of the Academy of Nutrition and Dietetics, the broader term telehealth is defined as “the use of electronic information and telecommunications technologies to support clinical health care, patient and professional health-related education, public health and health administration”.<sup>4</sup> Those activities use interactive, specialized equipment to promote health, prevent and diagnose diseases, and/or plan/intervent nutrition care, and non-interactive communication techniques over the internet, video-conferencing, e-mail, and other communication methods, to deliver the nutrition information.<sup>4</sup> Accordingly, telenutrition is the interactive use of telecommunication technologies by a dietitian at a remote location to gather electronic information and implement the nutrition care process.<sup>4</sup> Thus, patients could have a chance to access ambulatory care to receive any healthcare practice that might not be available in their region.<sup>5</sup>

As in other areas of health, technology-based remote communication offers unique opportunities to the counselor to gain insight into their patient’s health and nutrition status as well as increase access to health care, particularly for those in rural regions.<sup>3,6,7</sup> Thus, telenutrition, which may improve patient care and satisfaction, provides ambulatory nutrition care equal to or even superior to in-person care.<sup>5</sup> Recent evidence suggested that virtual lifestyle modification consulting via telemedicine/telehealth improves the accessibility to healthcare, compliance with the plan, weight loss success, and chronic disease-related health outcomes of the patients, as well as reduces healthcare costs.<sup>7-10</sup>

Despite all the advantages, there are some aspects of care that are not possible during a virtual session, including physical examination or personal interaction, and increased risk factor of dropout.<sup>11</sup> Using different techniques such as mobile telephone applications (Apps.) or tracking programs may increase the success of the intervention, but to the author’s knowledge, no study investigated the different techniques used in telenutrition practices in Türkiye. It was hypothesized that dietitians’ and clients’ increasing interaction affects weight loss positively. Thus, this study aimed to explore the effectiveness of different methods used in the telenutrition system in weight loss targeted nutritional care processes.

## MATERIAL AND METHODS

### PARTICIPANTS

In addition to the different effectiveness of diets between the sexes in terms of weight loss, following the ethical approval which was obtained from the Ethics Committee for Non-Invasive Clinical Studies of Marmara University with the approval number October 28, 2020/61, the sample was enrolled from volunteers who applied to a private outpatient clinic providing online service to lose weight in İstanbul and signed the informed consent prepared according to the Helsinki Declaration. Only 102 women individuals who are sedentary, over 18 years and with a body mass index (BMI) between 18.5 and 25 kg/m<sup>2</sup> were included in this study since men have higher muscle mass than women and have higher resting and total energy expenditures.<sup>12</sup> The exclusion criteria were determined as menopause, pregnancy, and lactation. According to the follow-up system preferred by the individuals, three intervention groups, each consisting of 34 participants, were formed.

### PROCEDURE

Three different intervention methods were examined in the study: interaction group, monitoring group, and mail group. All participants enrolled in each group were monitored for 8 weeks.

Nutrition programs were sent to all individuals in three groups via e-mail every week on the initial update day. The initial self-reported anthropometric

measurements, including weight, waist, hip, and chest circumference measurements of all participants, were recorded. The anthropometric measurement protocol was shown during the initial video-call session. Each participant conveyed the weekly weight result before eating in the morning on the day of the update. All participants were warned that they should measure after getting up in the morning, without taking any liquid or solid food, and with their clothes removed subsequent to urination or defecation. The data collection form questioning the demographic information, disease status, and individual’s habits and recording their anthropometric follow-up has been delivered to all participants at the beginning of the intervention and was retrieved at the end of the study.

Three groups were formed according to the interventions planned in the study (Figure 1).

1. Interaction group: Received the counseling service as a video call via the internet for 45 minutes, repeated once a week. Their diets were updated once a week, and they had a separate diet plan for each day. They could communicate with their dietitians during working hours without any restrictions. All participants were asked to photograph their consumption of main and snack meals to follow the current meal at various times of the day. In addition, a reminder of water consumption was made during the day. This group was also joined an interaction group where they could communicate with their dietitians and interact through the WhatsApp (Meta, Inc. WhatsApp Inc. USA) application.

2. Monitoring group: All the consulting methods used in the interaction group were continued in the same way for the participants enrolled in the moni-

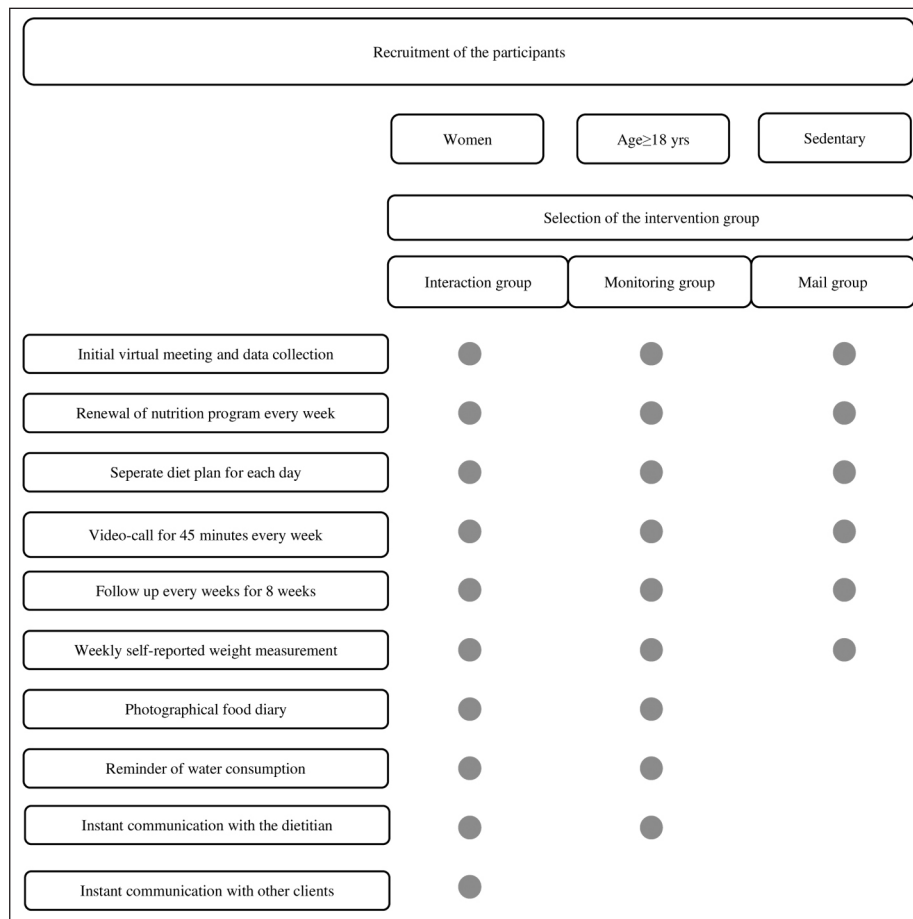


FIGURE 1: Flow chart of the recruitment and interventions conducted.

toring group. Although they were in instant communication with their dietitians, this group differentiated from the interaction group because they did not belong to a group they could interact with.

3. Mail group: All the consulting methods used in the other groups remained the same for the mail group. But they did not contact the dietician and did not receive any reports from the dietician during the day.

The dietary energy and nutrient content of the diet plans of all participants were determined by the research dietitian in accordance with the principles of Dietary Approaches to Stop Hypertension which has been proven to improve diet quality and lower cardiometabolic risk factors independent of weight loss or physical activity changes, for the standardization of nutrition programs.<sup>13</sup>

## STATISTICAL ANALYSIS

A database was created in the SPSS 25.0 (IBM SPSS Statistics for Windows, Version 25.0. IBM Corp., Armonk, NY.) statistics program to evaluate the data obtained at the end of the 8-week interventions. Numerical variables were reported as mean, standard deviation, range, and categorical variables as numbers and percentage. Quantitative variables were observed to be distributed non-normally according to the Shapiro-Wilks test. Accordingly, the differences between repeated measurements were tested via the Wilcoxon test. In addition, differences between the three intervention groups were examined with the Kruskal-Wallis test, while post-hoc two groups investigations were conducted with the Mann-Whitney U test. The confidence interval was determined as

95% in all analyses, and the results were considered statistically significant for  $p < 0.05$ .

## RESULTS

A total of 102 patients participated in our study, and all of them reported that they did not have any disease. Table 1 represents the initial anthropometric characteristics of the clients. The mean age of the participants was  $29 \pm 2.83$  years with a range of 25 to 34 years, mean initial weight was  $64.6 \pm 5.5$  kg, BMI was  $23.1 \pm 0.9$  kg/m<sup>2</sup>, waist circumference was  $73.5 \pm 4.1$  cm, hip circumference was  $102.5 \pm 5.4$  cm, and chest circumference was  $93.2 \pm 5.2$  cm.

As shown in Table 2, the initial mean weight of the participants in the interaction group was slightly higher (66.9 kg) than in the other two intervention groups. These findings indicated that those with higher weight preferred to be placed in a group where they might have a chance to interact with the dietitian and other clients. The highest mean weight loss in kilograms was observed in the interaction group with  $-6.4 \pm 1.4$  kg during 8 weeks, while it was  $-5.1 \pm 1.1$  kg in the monitoring group and  $-2.9 \pm 1.6$  kg in the mail group. Moreover, the mean weight loss change in percentages (% change from the first measurement to the 8<sup>th</sup> week) of those in the interaction group was  $-9.5\% \pm 1.7$ , the highest among all intervention groups, with a range of -5% and -13%. Accordingly, a significant difference was observed between the three intervention groups regarding changes in weight loss both in kilograms and in percentages ( $p < 0.001$ ), and post-hoc analysis revealed that those in the interaction group experienced sig-

TABLE 1: Age and initial anthropometric characteristics of participants.

Age and anthropometric characteristics	Interaction group (n=34)	Monitoring group (n=34)	Mail group (n=34)	Total (n=102)
	Mean±SD (Range)	Mean±SD (Range)	Mean±SD (Range)	Mean±SD (Range)
Age (years)	28.7±2.4 (26-33)	29.9±2.9 (26-34)	28.6±2.7 (25-33)	29.1±2.8 (25-34)
Initial weight (kg)	66.9±6.9 (55.6-77.8)	63.2±3.9 (56.6-70.2)	63.9±4.4 (52.6-72.5)	64.6±5.5 (52.6-77.8)
BMI kg/m <sup>2</sup>	23.3±1.1 (20.7-24.5)	22.8±0.7 (21.2-4.3)	23.1±0.9 (21-24.4)	23.1±0.9 (20.7-24.5)
Waist circumference (cm)	74.6±3.9 (64-85)	72.9±4.1 (62-83)	73.1±3.7 (62-84)	73.5±4.1 (62-85)
Hip circumference (cm)	103.1±6.1 (95-112)	102.0±4.9 (93-110)	102.5±5.1 (94-111)	102.5±5.4 (93-112)
Chest circumference (cm)	94.1±4.9 (82-106)	92.4±4.5 (81-102)	93.1±5.1 (80-105)	93.2±5.2 (80-106)

BMI: Body mass index; SD: Standard deviation.

nificantly higher weight loss than those in the other intervention groups ( $p<0.001$ ). The weekly dietitian-led web-based meeting participation of clients and interaction with each other was observed as significant predictors of weight loss in an 8-week intervention.

The mean initial BMI of the participants regarding different intervention groups was quite similar, and it was observed that the final BMI measurements were significantly lower than the initial measurements in all three groups ( $p<0.001$  for each group). As shown in Table 3, the changes in BMI were more significant among clients in the interaction group with a mean of  $-2.2\pm 0.4$  kg/m<sup>2</sup>, followed by the monitoring group at  $-1.9\pm 0.4$  kg/m<sup>2</sup>, and the lowest change was observed in the mail group;  $-0.9\pm 0.7$  kg/m<sup>2</sup>. Besides, the difference was statistically significant between intervention groups regarding not only mean units but also mean percentages. Participants in the interaction group were observed to be experienced the highest BMI decrease compared to the

monitoring and mail groups ( $p<0.001$ ). These findings also may support the hypothesis that increased interaction between client and dietitian and within clients may increase the success of the weight loss process.

## DISCUSSION

This study investigated the difference in weight loss with different telenutrition system practices during an 8-weeks of follow-up.

In addition to the different effectiveness of diets between the sexes in terms of weight loss, only women patients were included in this study since men have higher muscle mass than women and have higher resting and total energy expenditures.<sup>13</sup> Other contributors to weight loss variability between men and women include work-life differences and lifestyle interventions. A review by Williams et al. indicated that men lost significantly more weight than women.<sup>14</sup>

**TABLE 2:** Age and initial anthropometric characteristics of participants.

	Initial weight		The changes in weight			
	n	Mean±SD (Range)	Mean±SD (kg) (Range)	p <sup>a</sup>	Mean±SD (%) (Range)	p <sup>a</sup>
Interaction group <sup>b,c</sup>	34	66.9±6.9 (55.6-77.8)	6.4±1.4 (2.8-8.8)		9.5±1.7 (5.0-13.0)	
Monitoring group <sup>b,d</sup>	34	63.2±3.9 (54.6-70.2)	5.1±1.1 (2.6-7.8)	<0.001*	8.0±1.8 (3.6-11.9)	<0.001*
Mail group <sup>c,d</sup>	34	63.9±4.4 (52.6-72.5)	2.9±1.6 (0.3-8.1)		4.6±2.4 (0.4-11.7)	

<sup>a</sup>p value calculated via Kruskal-Wallis test; <sup>b,c,d</sup>p value calculated via post-hoc Mann-Whitney U test was <0.05 for the difference of those two groups; \* p<0.01; SD: Standard deviation.

**TABLE 3:** The changes in BMI of the three intervention groups.

	Initial BMI		8 <sup>th</sup> week BMI		The changes in BMI			
	n	Mean±SD (Range)	Mean±SD (Range)	p <sup>a</sup>	Mean±SD (kg/m <sup>2</sup> ) (Range)	p <sup>a</sup>	Mean±SD (%) (Range)	p <sup>a</sup>
Interaction group <sup>b,c</sup>	34	23.3±1.1 (20.7-24.5)	21.1±1 (18.7-22.7)		2.2±0.4 (1.2-3.2)		9.5±1.7 (5.5-13.2)	
Monitoring group <sup>b,d</sup>	34	22.8±0.7 (21.2-24.3)	21.2±1 (19.5-23.2)	0.003	1.9±0.4 (0.9-2.9)	<0.001	8.1±1.8 (3.7-11.9)	<0.001
Mail group <sup>c,d</sup>	34	23.1±0.9 (21-24.4)	21.9±1 (20-23.7)		0.9±0.7 (0.1-2.9)		3.9±3.1 (0-12.1)	

<sup>a</sup>p value calculated via Kruskal-Wallis test; <sup>b,c,d</sup>p value calculated via post-hoc Mann-Whitney U test was <0.05 for the difference of those two groups; BMI: Body mass index; SD: Standard deviation.



In this study, it was observed that more frequent communication with the dietitian had a positive effect on weight loss success. Similar to our findings, a study indicated that patients who received 20 intervention sessions over 6 months lost a higher amount of weight than those who received ten calls. These results suggest that weight management programs that offer regular or weekly follow-up with a coaching system to support participants were seen as more successful during the weight loss process and even chronic disease management.<sup>15,16</sup> Studies indicated that both men and women benefit from a coaching system and regular follow-up to increase engagement and success in weight loss.<sup>16,17</sup>

The e-mail system was generally used for supporting personalized interventions. In our study, the lowest weight loss was observed among participants in the mail group. Moreover, in accordance with the findings of this study, it was reported that weekly e-mail and face-to-face coaching sessions from a trainer helped participants lose between 10% to 20% of their body weight.<sup>18</sup> Alternatively, weekly e-mail coaching and personalized self-monitoring coaching phone calls have also been shown to improve adherence to health-related strategies, reduce health risk factors and improve weight loss.<sup>19,20</sup>

According to the findings obtained from the present study, the highest weight loss success was observed in the interaction group indicating higher weight loss success was achieved with the increase in the interaction between dietitians and clients and also within clients. According to the literature, it should be highlighted that, while behavioral interventions provide clinically significant weight loss, group-based administrations of such interventions are more common and effective than individual-based delivery.<sup>21-23</sup> As implemented as a part of the design of our study, a study conducted a 6-month intervention reported that the number of feedback days was found to be an important determinant of weight loss.<sup>24</sup>

Participants in group-based behavioral weight loss programs often comment on the value of being a group member in improving their weight loss success.<sup>25</sup> Our study findings also support the idea that group cohesion was associated with better outcomes

as increased adherence in many practices, including exercise programs and psychotherapy groups.<sup>26,27</sup> Moreover, in agreement with our results, the weekly telenutrition group sessions were found to make a significant contribution to weight loss, and individuals in the groups achieved better results at a high level of cohesion within the group.<sup>24,25,28</sup> Contrary to these results, a study indicated that positive group characteristics such as group cohesion, participation, and social support were not found to be associated with weight loss.<sup>29</sup> However, these studies did not examine the relationships between group factors and outcomes.

## LIMITATIONS

In addition to the strengths of the study, including examining different techniques of telenutrition counseling and following up with individuals who want to receive counseling under realistic circumstances, there are also some limitations. Firstly, due to the nature of virtual settings, all data collected were self-reported, including anthropometric measures, limiting the accuracy of BMI calculation. In addition to this, due to the study design, clients were asked to choose the intervention group they wanted to participate in, and it was observed that those with high weight applied to participate in the interaction group. Furthermore, only sedentary individuals specifically were included in this study, but no possible changes were observed in their physical activity status during the follow-up. Besides, the diet compliance status of individuals was interpreted according to weight loss. Therefore, it is furtherly recommended to measure the level of physical activity and evaluate dietary compliance with other parameters. Notwithstanding these limitations, this study reveals significant findings and warrants further studies.

## CONCLUSION

In conclusion, it should be indicated that increased interaction between client and dietitian and within clients may increase the success of the weight loss process. The previous studies investigated the effectiveness differences between in-person and telenutrition counseling systems. However, although there are studies examining the effectiveness of face-to-face and virtual counseling, to the author's knowledge,

there is no study examining the differences between the methods used in the virtual system. The findings obtained in the study show a direction for future studies that will examine the factors that increase telenutrition efficiency. More comprehensive studies evaluating telenutrition counseling with follow-ups and group interventions are required to investigate the exact effects of virtual counseling on weight loss management with a large population.

### Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Design:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Control/Supervision:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Data Collection and/or Processing:** Ezgi Mısırlı; **Analysis and/or Interpretation:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Literature Review:** Ezgi Mısırlı; **Writing the Article:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Critical Review:** İrem Kaya Cebioğlu; **References and Fundings:** Ezgi Mısırlı, İrem Kaya Cebioğlu; **Materials:** Ezgi Mısırlı.

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