Hospitalaria

Original/*Obesidad*

Indicators of success in the dietary management of overweight and obesity: weight, body fat loss and quality

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Abstract

***Concepts:* %WL: Percentage of weight loss; %FL: Percentage of fat loss.**

***Objective:* evaluate which unit of measurement for weight loss could determine the success or failure of dietary treatment for overweight and obesity.**

***Method:* 4,625 consultations carried out on 616 patients in the southeast of Spain from 2006 to 2012. All of the patients were over 25 years of age and suffered from overweight or obesity. The consultations were carried out every fortnight, using the Mediterranean or low-calorie diet. The patients were divided into four groups according to their %WL and %FL.**

***Results:* most of the sample consisted of: women; participants between 25-45 years of age; attended consultations for over a month and a half; obese. 80% of the patients obtained a %FL ≥ 5% (15.5 ± 12.8). The groups with a higher %FL obtained significant differences in weight loss (22.6 *vs* 11.2%, p = 0.000). The multinomial analysis shows significant differences between the groups with the highest %FL and the lowest %WL and %FL: sex (p = 0.006 *vs* p = 0.005), BMI (p = 0.010 *vs* p = 0.003) and attendance (p = 0.000 *vs* p = 0.000).**

***Conclusion:* the patients who lost < 5% of fat had higher initial parameters (percentage of weight and fat); most of the sample lost ≥ 5% of fat. This means that the method of personalised dietary treatment results in a high fat loss; fat is an indicator of the quality loss obtained. Recommendations: use the measurement of fat as a complementary unit of measurement to weight loss; establish a limit of 5% to evaluate such loss; and increase this type of research in any method of weight loss.**

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INDICADORES DE ÉXITO EN EL TRATAMIENTO DIETÉTICO DEL SOBREPESO Y LA OBESIDAD: PÉRDIDA DE PESO, GRASA CORPORAL Y CALIDAD DE PÉRDIDA

Resumen

***Conceptos:* %WL: Porcentaje de pérdida de peso; %FL: Percentage of fat loss.**

***Objetivo:* evaluar qué unidad de medida en la pérdida podría determinar el éxito o fracaso del tratamiento dietético en el sobrepeso y obesidad.**

***Método:* 4.625 consultas se llevaron a cabo con 616 pacientes mayores de 25 años con sobrepeso y obesidad, en el sur-este de España, durante los años 2006-12. Las consultas se realizaban quincenalmente, se utilizó la dieta mediterránea e hipo-calórica. Se formaron cuatro grupos en función del menor o mayor %WL y %FL.**

***Resultados:* la mayoría de la muestra está formada por: mujeres; participantes entre 25-45 años; asistentes a más de mes y medio; obesos. El 80% de los pacientes obtienen un %FL ≥ 5% (15,5±12,8). Los grupos con mayor %FL obtiene diferencias significativas en la pérdida (22,6 vs 11,2%, p=0,000). El análisis multinomial, destaca diferencias significativas cuando se compara los grupos de mayor %FL con el menor %WL y %FL: en el sexo (p=0.006 vs p=0.005), IMC (p=0.010 vs p=0.003) y asistencia (p=0.000 vs p=0.000).**

***Conclusión:* los pacientes que pierden < 5% de grasa, muestran parámetros iniciales mayores (Porcentaje de peso y grasa); la mayoría de la muestra pierde ≥ 5% de grasa, por lo que el tratamiento dietético individualizado es un método que obtiene una elevada pérdida de grasa; la grasa es un indicador de la calidad de la pérdida obtenida. Se recomienda: la medición de la grasa como unidad de medida complementaria al peso; establecer el límite del 5% para evaluar dicha pérdida; y aumentar la investigación en esta línea en cualquier método de pérdida.**

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Palabras clave: *Obesidad. Dieta. Éxito. Fracaso y calidad de pérdida*

Introduction

Overweight, obesity and diet

Obesity is an epidemic which has coincided with changes in the habits of the population, the level of physical activity, food patterns and demographic and cultural changes which have affected the behaviour of human beings in several ways. It is a chronic, complex and multifactorial illness[1]. Dietary treament for obesity is included in all of the clinical guides and agreements relating to obesity. The most representative document for the international community is, without a doubt, the one published by the WHO. Its 2007 manifesto states that there is sufficient evidence to demonstrate the efficiency of low-calorie diets and low-fat diets with or without calorie reduction in weight loss[2].

Units of measurement for expressing weight loss: success or failure

Weight and fat loss, expressed in kilos and percentages, are the most adequate ways of expressing this for patients of different weights, ages and sexes[3]. Nowadays, successful weight loss is defined as the loss of a specific percentage of body weight which, depending on the cases, is set between 5-10%[4,5].

Theoretical Framework

Obesity continues to increase worldwide. Recent studies have shown an average increase of body mass index (BMI) of 0.4 kg/m^2 per decade since 1980[6], and Spain is no exception[7]. But, despite this, there is still no homogenisation in the expression of the most adequate units of measurement for determining weight loss in any of the methods used for combating overweight and obesity[3].

Purpose of the study

Evaluate which unit of measurement for weight loss could determine the success or failure of dietary treatment for combating overweight and obesity. This information will prompt other treatments to evaluate which unit of measurement is the most adequate for determining the effectiveness of each of the methods used.

Method

Description of the participants, geographical and temporal location

In 4,625 consultations, we analysed the %WL (percentage of weight loss) and %FL (percentage of fat loss) of 616 patients who attended a nutrition consultation in the southeast of Spain (province of Alicante) from 2006 to 2012. The selection criteria for patients was as follows: patients over 18 years of age[8] with a body mass index of 25 kg/m^2 or above, who were then divided into two groups: overweight (BMI: 25 to 30 kg/m^2) and obese (BMI ≥ 30 kg/m^2)[9], with no food allergies or intolerences, psychomotor disorders or comprehension difficulties[10].

In the descriptive values of the initial sample, it is important to highlight the values of initial percentage of fat upon arrival at the consultation and the %FL compared to the BMI_I (initial BMI) %WL and BMI_{i-f} (difference between the initial and final BMI) (Table I). The initial sample was mostly made up of: women, over 45 years of age, obese and patients who attended nutrition consultations for over a month and a half. The sample was divided into four groups: PL ≥ 5%WF (patients who lost ≥ 5% of weight and fat); PL ≥ 5%&W < 5%F (patients who lost ≥ 5% of weight and < 5% of fat); PL<5%W&≥5%F (patients who lost < 5% of weight and ≥ 5% of fat; PL < 5%WF (patients who lost less than 5% of weight and fat) (Table II). The majority of the sample lost ≥ 5% of body fat (Table III).

Personalised measurement of weight and body fat

Participants were weighed using the Tanita BC-418MA body composition analyser (TANITA Corporation of America, Arlington Heights, IL, EE.UU.)[11]. Participants attended the consultation every fortnight and were measured in the following parameters: %$Weight_i$ (percentage of initial weight), %Fat_i (percentage of initial fat), %WL, %FL and quality loss; for a maximum period of six months[10,12].

Table I
Descriptive values of the initial parameters and the end of the whole sample used in the clinical trial ($n = 616$; n_{men}: 31%, n_{woman}: 69%)

Parameters	*Mean (SD)*
Age (years old)	45,1 (12,8)
$Weight_i$ (kg)	85,1 (16,2)
$Size_i$ (m)	1,64 (0,10)
BMI_i (kg/m^2)	31,8 (5,2)
%Fat_i	36,6 (8,1)
Number of consultations (weeks)	6,8 (4,3)
% Weight loss	6,5 (4,3)
% Fat loss	15,5 (12,8)
BMI_{i-f} (kg/m^2)	2,0 (12,8)
Quality loss	2,0 (7,6)

Dietary treatment: energy deficit and expected objectives

For the obesity treatment, we established a diet with an energy deficiency of 500 kcal based on the total calorie deficit[13]. Undergoing the treatment through a diet must aim to achieve a series of global objectives both in the short and long term. Weight loss is one of the objectives. But such a loss must also be accompanied by a series of other requirements: reduction of body fat, preserving lean mass as much as possible; follow the diet for a prolonged period of time; and correction of errors and inadequate food habits through nutritional education[14].

The diets were created using the food and health programme software Prof. Mataix (Version 0698.046). The type of treatment used was a balanced low-calorie diet. There is no unanimous agreement about what is considered a "balanced low-calorie diet". It is usually understood as a diet that creates a calorie deficit of between 500 and 1,000 kcal/day, with a total calorie count of over 800 kcal per day. The term "balanced" means that the distribution of the macronutrients is not significantly different from what is recommended to the general population. The objective with regards to the loss of weight and fat agreed in the consultation was 0.5-1 kg per week. This loss was expected to influence the adipose tissue in the same proportion. With a daily energy deficit of 500-1,000 kcal/day required to obtain this loss, we recommended diets of 1,000-1,500 kcal/day for women and 1,500-2,000 kcal/day for men. The distribution of macronutrients used was as follows: 45-55% carbohydrates, 15-25% protides and 25-35% total fat. A number of recommendations were estabilised for facilitating the therapeutic achievement of the conventional low-calorie diet. The most important recommendations were: control portion sizes and reduce the consumption of high energy density foods; distribute food throughout the day, reducing consumption in the late afternoon or evening[10,12,14].

Diet adjustment: food habits and portion sizes

As observation of the diet continued, we tried to transmit the most relevant issues for achieving the loss and

Table II
Percentage of participants by percentage of weight loss and fat obtained

Groups	*Participants n (%)*	*PL≥5%WF n (%)*	*PL≥5% &W<5%F n (%)*	*PL<5%W &≥5%F n (%)*	*PL<5%WF n (%)*	*Chi-squared test*
n_T	616	334 (54,2)	11 (1,8)	158 (25.6)	113 (18,3)	
Men	188 (30,5)	107 (56,9)	1 (0,5)	55 (29,3)	25 (13,3)	**0.049**
Women	428 (69,5)	227 (53)	10 (2,3)	103 (24,1)	88 (20,6)	
25-45 years old	156 (25.3)	82 (52,6)	4 (2,6)	39 (25)	31 (19,8)	ns
>45 years old	460 (74.7)	252 (54,8)	7 (1,5)	119 (25,9)	82 (17,8)	
Overweight	275 (44.6)	151 (54,9)	3 (1,1)	80 (29,1)	41 (14,9)	ns
Obese	341 (55.4)	183 (53,7)	8 (2,4)	78 (22,9)	72 (21)	
≤ 3 consultations (≤ Month and a half)	133 (21.6)	18 (13,6)	1 (0,8)	46 (34,5)	68 (51,1)	**p<0.000**
> 3 consultations (> Month and a half)	483 (78.4)	316 (65,4)	10 (2,1)	112 (23,2)	45 (9,3)	

Table III
Patientes overweight and obesity, which obtained an advisable loss when performing an individualized dietary treatment

Patients initiating treatment (n = 616)			
Recommended loss (RL) (n=492; 80 %) Patients who always lose ≥ 5% fat		*Lost not recommended (LNR) (n=124; 20 %) Patients lose < 5% fat*	
PL≥5%WF (n= 334)	PL<5%W&≥5%F (n= 158)	PL≥5%W&<5%F (n= 11)	PL<5%WF (n= 113)

why, in order to increase interest. We tried to facilitate real objectives for each case, e.g. simple diet guidelines, such as drinking one litre of water per day, or an amount of weight and fat loss that was achievable every fifteen days. We stated "how" it would be most recommendable to achieve these real goals, facilitating specific techniques for each case. Criticism of non-recommended habits and unattained objectives were avoided, showing patience and confidence instead. The advantages of achieved improvements were always stressed, both in terms of variations of weight and fat as well as health improvements (reduction of blood pressure; improvements to analytical parameters which may have been out of the recommended range, such as cholesterol and triglycerides; improvements in mobility, etc). We tried to minimise abandonement of the treatment by facilitating communication and access to a nutritionist by telephone, email and social networking sites[15]. In order to improve understanding of the treatment, we implemented a continuous learning process that was divided into two parts: initiation and perfection. The recommended loss level varied according to the weight and body fat at the beginning of the diet. This was the way we recommended "how" to consider the loss in the consultation[10,12].

Portion size has an influence on the self-regulation of consumption; the larger the size the more difficult it is[16]. The diet did not require patients to weigh their food. Instead, they were asked to measure the amount of food on the plate using ladles and measuring sticks, which are frequently used items found in all kitchens. This technique achieved two objectives: making only one meal at home and not having to weigh the food products, which is a time-consuming task. Ladles were used for measuring meals with a lot of liquid (lentil stew, beans, chickpeas, soups, etc) and the measuring sticks were used for non-liquid meals (rice, pasta, etc). For cold meats, such as ham, patients were told the number of slices and sizes they could have. For cheese, they were given the weight or portions. For grilled meat and fish, they were shown the aproximate size (images) and weight. Fruit was consumed by number according to the type and no limit was set for vegetables. It was suggested that food such as deserts (ice-cream, sweets, chocolate biscuits, etc), pizzas and hamburgers were homemade and eaten in moderation at the weekend. The use of food grown in the patient's region was recommended in order to make it easier for them to get hold of and use in their diet[10,12].

The Mediterranean diet as a food pattern

DietMed is characterised for having an abundance of food of vegetable origin, minimally processed and seasonal, preferably fresh; fresh fruit as the typical daily desert; occasional consumption of sweets; olive oil as the main source of fat; a low or moderate consumption of dairy products (mainly cheese and yoghurt) as well as fish and poultry; consumption of eggs; red meat in small quantities; and low or moderate consumption of wine, usually during meals (it was suggested to limit consumption to weekends)[17].

Success and failure in nutrition consultations

In order to express the loss obtained through the dietary treatment in this test, we used the percentage of weight, body fat and quality loss (Table IV and Fig. 1). These units of measurement enable the comparison of any patient, regardless of their age and sex. Taking fat into account as a measurement of such a loss enables us to observe where the decrease in weight comes from: body fat, muscle mass and/or body fluids. In order to assess whether the loss was considered a success or not, we had to take into account the decrease of a specific percentage. This percentage was taken from other pieces of research, which refer to a weight reduction of 5-10%[4,5]. We concluded that a reduction of 5% enabled the assessment of overweight patients, who were subject to a lower loss (Table II, IV, V). The loss of fat had to be evaluated alongside the loss of weight. This method provided more information than simply evaluating weight loss (Fig. 1). Within this new assessment method, we decided to group the patients according to their loss of weight and fat, taking into account all of the possible variations. Four groups were created: PL ≥ 5%WF; PL ≥ 5%&W<5%F; PL<5%W& ≥ 5%F; PL < 5%WF (Table II). The groups who obtained a greater loss of fat would be considered the patients who obtained the best results in the dietary treatment (Table III).

We felt that it was not adequate to use the terms "success" or "failure" in the consultations, given that they led to the following reactions when linked to weight loss: successful patients became more confident and relaxed in the application of the techniques learnt during the maintenance period, which could lead them to putting the weight back on; and those considered failures felt a sense of defeat and a lower interest in applying the recommended techniques and, on occasions, they did not achieve their expected results. In order to avoid this situation, we insisted that their obtained loss and maintenance was the result of their efforts[10,12].

Concepts

n: participants; n_T: Total Participants; I: initial; F: end; %: Percentage; I-F: Difference between the start and end of treatment; Percentage weight loss (%WL) = 100 x (Weight lost between visits to the clinic/initial weight); Lost fat percentage (%FL) = 100 x (Lost fat between visits to the clinic/initial fat); quality loss (QL): %FL/%WL (Reig, et al., 2015); PL ≥ 5%WF *(Group 1)*: Patients who lost ≥ 5% of weight and fat; PL ≥ 5%&W < 5%F *(Group 2)*: Patients who lost ≥ 5% of weight and < 5% of fat; PL < 5%W& ≥ 5%F *(Group 3)*: Patients who lost < 5% of weight and ≥ 5% of fat; PL < 5%WF *(Group 4)*: Patients who lost less than 5% of weight and fat. Sucess-

Table IV
Inicial parameters and changes in %WL, %FL (mean and SD) by sex, age, BMI, number of consultations in participants (n=616)

Groups/statistical test	*PL≥5%WF*	*PL≥5%&W<5%F*	*PL<5%W&≥5%F*	*PL<5%WF*	*Kruskal-Wallis test*
Age (years old)	45.4 (12.3)	*54.5 (18.3)*	43.3 (12.7)	*45.7 (13.7)*	0.092
$Weight_i$ (kg)	84.4 (15.5)	*87.4 (20.7)*	85.2 (17.7)	*86.8 (15.7)*	0.642
$Size_i$ (m)	1.64 (0.09)	1.58 (0.13)	1.64 (0.11)	1.66 (0.16)	0.335
BMI_i (kg/m^2)	31.4 (4.8)	35.2 (7.2)	31.4 (5.2)	32.9 (5.9)	0.045
$\%Fat_i$	36.3 (7.8)	*41.4 (8.0)*	35.6 (8.3)	*38.5 (8.6)*	**0.002**
Number of consultations (weeks)	8.6 (4.3)	8.0 (1.5)	*5.0 (2.5)*	*4.2 (4.2)*	**0.000**
% Weight loss	9.7 (4.1)	6.0 (0.9)	*3.1 (1.6)*	*1.5 (1.7)*	**0.000**
% Fat loss	22.6 (11.8)	*3.7 (1.5)*	11.2 (7.4)	*1.1 (4.1)*	**0.000**
BMI_{i-f} (kg/m^2)	3.0 (1.7)	1.9 (0.4)	1.1 (1.1)	0.5 (0.5)	**0.000**
Quality loss	2.4 (1.0)	*0.6 (0.3)*	3.0 (8.3)	*-0.4 (14.8)*	**0.000**

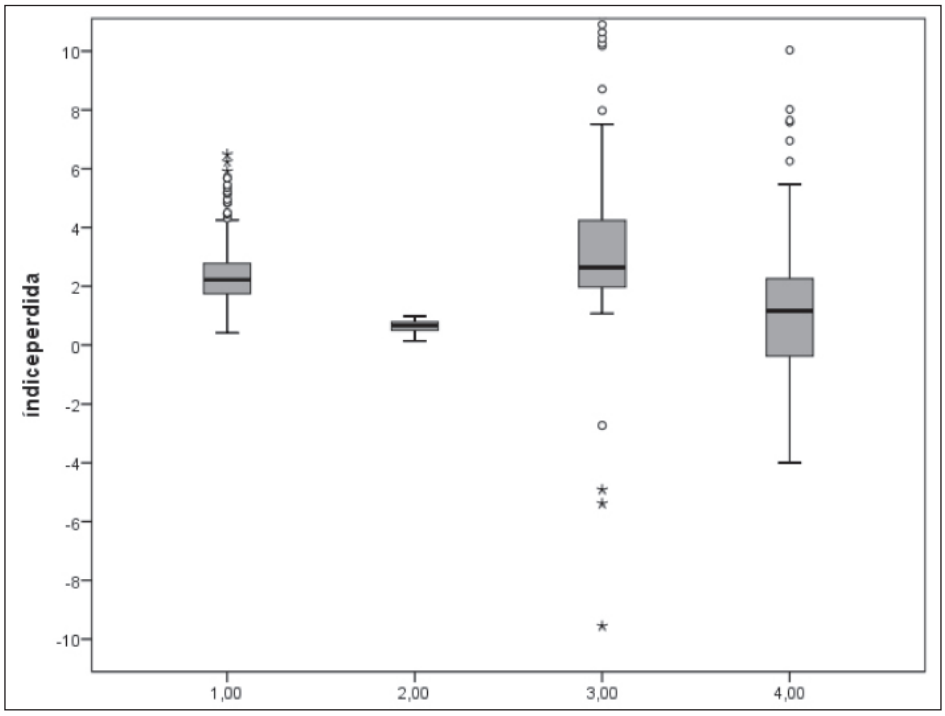

Fig. 1.—Relationship quality Indica loss with four groups of loss (Kruskal-Wallis test).

ful loss: loss of ≥ 5% of fat (Group 1 and 3); unsucessful loss: loss of < 5% of fat (Group 2 and 4).

Statistical Analysis

The data was analysed using IBM SPSS Statistics 20.0. Given the abnormal distribution, the differences between the subgrups were evaluated through non-parametric tests. A multinomial logistic regression model was used to estimate the adjusted odds ratio (OR) with the aim of analysing the relation between the loss and the variables of sex, age group, BMI and consultation attendance. A significance level of 5% was established for all of the analyses carried out and the associated confidence interval (CI of 95%) was calculated for all relevant parameters.

Results

Initial parameters and changes in loss

The division of the sample into four groups according to their loss led to very significant differences in terms of the percentage of initial fat, assistance to the

consultation, the %WL, %FL, BMI_{i-f} and quality loss (Table IV). The common characteristics of the groups who experienced a greater loss of fat (PL ≥ 5%WF; PL < 5%W& ≥ 5%F) compared to the total sample were: older age; lower weight and percentage of fat at the beginning of the treatment; greater loss of the percentage of weight, fat and quality loss. With regards to quality loss in the sample groups, the largest loss of fat was observed in Groups 1 and 3 (PL ≥ 5%WF; PL < 5%W& ≥ 5%F) (Fig. 1). The common characteristics of the groups who lost less than 5% of fat (least successful loss) were (PL ≥ 5%&W < 5%F; PL < 5%WF): age; initial weight and percentage of initial fat; higher parameters than the successful groups (Group 1 and 3); lower values in the case of %FL and quality loss (Table IV). The unsuccessful patients represented 20% of the sample (Table III), the majority of which attended the consultations for less than a month and a half (Table II).

Multinomial regression analysis of the loss

The aim was to observe whether there were any significant differences between the different groups of weight and fat loss. A common significant difference was observed (Group 1*vs*4, 2*vs*4, 3*vs*4) with regards to attendance of consultations (Table V). Additional significant differences were identified in the comparison of the successful groups (Groups 1 and 3) and the group of the lowest loss of the unsuccessful groups (4).

Interpretation of results

Participants

In the initial sample, we found differences between the percentage of initial fat, the %FL and quality loss compared to initial BMI, %WL and BMI_{i-f} (Table I). The high quality loss of the sample and the differences mentioned above indicate that the measurement of body fat provides an added value in the assessment of the loss for the nutrition consultation (Millstein, 2014), despite the fact that European intervention studies only show the result of weight loss (Larsen, et al., 2010). Amongst the characteristics of the participants we can observe significant differences in terms of sex (70% were women) and attendance of consultations (80% attended for over a month and a half) (Table II). 80% of the sample is made up of patients who obtained a successful loss (Group 1 and 3) (Table III). This means that, on the one hand, personalised dietary treatment leads to greater attendance of consultations and, on the other hand, that it helps with the loss of body fat. Although there is some discrepancy between authors on whether attendance of consultations results in weight loss and vice versa (Stubbs, et al., 2011). In this test, greater attendance does not always lead to a

Table V
Multinomial regression analysis of the risk of loss by sex, consultation, age and BMI (1 vs 4; 2 vs 4; 3 vs 4)

1 vs 4	*OR (95% CI)*	*p*
Men vs women	2.29 (1.27-4.15)	**0.006**
25-45 years old vs > 45 years old	0.87 (0.48-1.57)	0.639
Overweight vs obese	2.04 (1.19-3.52)	**0.010**
≤ 3 consultations vs > 3 consultations (≤ Month and a half vs > Month and a half)	0.03 (0.02-0.06)	**0.000**
2 vs 4	*OR (95% CI)*	*p*
Men vs women	0.44 (0.05-3.75)	0.456
25-45 years old vs > 45 years old	0.72 (0.18-2.89)	0.640
Overweight vs obese	0.86 (0.20-3.79)	0.846
≤ 3 consultations vs > 3 consultations (≤ Month and a half vs > Month and a half)	0.07 (0.01-0.57)	**0.013**
3 vs 4	*OR (95% CI)*	*p*
Men vs women	2.37 (1.37-4.30)	**0.005**
25-45 years old vs > 45 years old	0.80 (0.43-1.49)	0.485
Overweight vs obese	2.32 (1.34-4.02)	**0.003**
≤ 3 consultations vs > 3 consultations (≤ Month and a half vs > Month and a half)	0.23 (0.14-0.39)	**0.000**

1: PL≥5%WF; 2: PL≥5%&W<5%F; 3: PL<5%W&≥5%F; 4: PL<5%WF.

greater loss. Group 3 (PL < 5%W& ≥ 5%F) lost a higher amount of body fat (Table IV, V and Fig. 1) and attended fewer consultations than Group 2 (PL ≥ 5%&W < 5%F), who achieved a lower fat loss (Table IV, Fig. 1). Perhaps this could be due to the fact that these clinical tests did not take into account fat loss[3].

Initial parameters and changes in loss

Significant differences are observed in the percentage of initial fat, attendance to consultations, %WL, %FL, $BMI_{i\text{-}f}$ and quality loss (Table IV). This is because the groups have different weight and fat loss characteristics, meaning that they show different initial and end values.

We suggest using the percentage of fat loss as a complementary unit of measurement to the percentage of weight loss. This parameter enables us to observe where such a decrease in weight, body mass, muscle mass and/or body fluids comes from[3]. The recommended loss is the decrease which comes from body fat[18]. We recommend a reduction of 5% of weight and fat because it enables the assessment of all overweight patients, regardless of their age and sex[3]. The use of impedance machines for measuring body fat is a recommended technique in the case of obesity and metabolic syndrome[19]. We recommend introducing impedance machines for measuring body fat in the nutrition consultations which do not have them.

Multinomial regression analysis of the loss

The number of significant differences observed in the comparisons between Groups 1*vs*4 and 3*vs*4 indicate that the measurement of body fat and the groups created in this test provide a richer perspective on weight loss than other current research studies[3]. Thus, Group 3 experienced a weight loss of < 5% and a fat loss of ≥ 5% (Table II, IV and V). If we had used weight loss as the only unit of measurement, this group would have been considered unsuccessful. This could happen in patients who incorporate physical exercise into their daily routines[20]. Personalised dietary treatment based on the use of the Mediterranean diet[21] is recommended as a tool to help obtain a loss of body mass of over 5% (15,5±12,8, Table I). This is based on the fact that 80% of the sample obtained such a decrease, which will be visible in the quality loss (Table IV and Fig. 1). There is a great lack of research in this area[3]. The satisfactory results obtained in this clinical test recommend increasing research in the assessment of the loss in other dietary treatments and methods used for combating overweight and obesity (pharmacological treatments, corrective surgeries, etc.)[18].

Conclusions

The characteristics of the majority of the patients who attended a nutrition consultation and the most successful were: women, over 45 years of age, obese and followed the dietary treatment for over a month and a half. The least successful patients had larger initial parameters of weight and fat percentages and obtained a lower fat loss.

Most of the sample lost 5% or more of body fat (15,5±12,8). Thus, personalised dietary treatment based on the use of the Mediterranean diet can be recommended as a method that helps to obtain fat mass loss. Measuring this parameter will enable you to differentiate between a successful and unsuccessful loss in the cases which experience under 5% of weight loss, as is the case of those who incorporate physical exercise into their daily routine.

The percentage of fat is an indicator of quality loss. In future studies, we recommend measuring this parameter as a complementary unit of measurement to weight percentage. This will enable the comparison of the loss obtained in any treatment. In order to determine whether the loss is successful or unsuccessful, we recommend using the decrease of 5% of weight and fat as the figure for assessing the achieved loss in any patient, regardless of their BMI. Finally, we would like to make two recommendations: introduce impedance machines for measuring body fat in the nutrition consultations which do not have them and increase research in this area in other dietary treatments and methods (pharmacological treatments, corrective surgeries, etc.).

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Authorship/Contributions

Manuel Reig: author of the research, data collection in nutrition consultation, design for statistical analysis and writing the paper.

Ernesto Cortes: co-author, responsible for overseeing the research, performed all the statistical process monitoring and drafting.

Mercedes Rizo: co-author, with responsibility for research oversight and supervision of the drafting of the document.

Conflict of Interest

The authors report no conflict of interest.

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