

Obstacles in dietary treatment of obesity

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ABSTRACT. *Those who work in obesity treatment know that long term success is hard to achieve. The reasons for non compliance in diet therapies are not well understood. In this study, we tried to recognize difficulties and barriers linked to unsuccessful weight reduction. This study was conducted in an outpatient clinic of a central university hospital. 442 overweight patients (371 women and 71 men), with BMI ≥ 25 kg/m², were enquired about diet compliance: a) existence of difficulties; b) difficulty degree (five point scale); c) barriers of diet therapy (close-ended options). Mean age was 41 years, with SD 13 years. More than half patients mentioned difficulties in the diet maintenance. When asked about the difficulty degree, almost all patients mentioned at least some difficulty, with degree 3 “quite difficult” being the most common answer. The top five barriers were similar for both genders, but they were differently ranked. Women seem to give more importance to psychological issues. Most overweight patients feel barriers in the compliance of their diet therapy. Although a similar proportion of males and females referred difficulties and similar difficulty degrees regarding their diet therapy, the main difficulty came from different origins. This enhances the importance of establishing an individual food plan respecting sensorial properties and social environment, together with the patient’s habits, psychological condition and motivation, as a way to encourage diet compliance and to achieve success in obesity treatment.*

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INTRODUCTION

Several researchers relate the unsuccess in obesity treatment with a lot of different factors that provoke resistance to weight reduction. The available scientific data relates obesity with three important factors: inadequate feeding (in quality or in quantity), lack of physical activity and stress (1-4). Those factors could be clustered in the Life Style concept. However, we did not find any study related with the barriers in the diet therapy compliance in obese patients.

Schachter (1968) proposed an obesity theory based on internal versus external factors (5). In normal weight people, eating pattern is dominated by physiology (internal) whereas in overweight people the eating pattern is dominated by (external) stimulus related with sensory food characteristics (5).

A model by Nisbett (1972) proposed that any individual has an ideal weight depending on physiological homeostasis, but social pressures tend to conduct the obese to re-

duce their weight using a diet plan, thus leading to hunger and promoting sensibility to food environment (6).

Herman and Mack (1975) had suggested that food restriction results from the balance between physiological appetite and cognitive efforts to resist (7). Unsatisfied with weight and image, people feel the need to control themselves, even if they are hungered, meaning that they must permanently worry about what they eat and resist to what they desire (7).

Five years later, Herman and Polivy (8) showed that any individual could control hunger and desire using self crave, but sometimes dieting and restriction alternate with non restrictive cycles, which leads to uncontrolled eating. The same authors named a series of factors that allow the non restrictive effects: anxiety and depression, cognitive factors like not worrying about eating because they are off limits, and chemical factors with sedative and overconfidence properties like alcoholic drinks (8).

Some studies (9, 10) relate the restrictive index with body weight concluding that obese people have high restrictive values which could be one of the causes of obesity. This theory could explain high sensibility to external stimulus and difficulties in complying with the diet therapy.

Galuska et al. (1999) investigated the implementation of the recommendations that the National Institutes of Health (1998) gave to the health professionals treating 12,835 adult patients with BMI >30 kg/m² in a weight loss program (11). Those who mentioned that health professional advised them to lose weight (42%) tried more frequently to do it and the study concluded that it is urgent to identify barriers to the advice by health professionals (11).

In a pan-EU survey related with food, nutrition and health, a Portuguese sample with more than 15 years, nine barriers were mentioned in healthy diet compliance (12). It is reasonable to assume that some of these barriers are also felt by patients, in particular by overweight patients.

Barnes and Terry (1991) showed that the majority of hospitalized men had negative attitudes to the taste of the hospital diet (13). They also mentioned difficulties of food choices in supermarkets and in eating out (13).

In a lipid clinic, patients studied by Wright (1994), that were apparently able to comply with their diet therapy, mentioned that they still desired forbidden foods and that the food plan was boring (14). One of the most frequent barriers in patients who are advised to reduce fat in foods is the lack of flavour, the high costs and the lack of familiar support (15).

One of the first papers published regarding barriers to diet therapy compliance was submitted by Kokkalainen et al. (1996) in which it was tried to identify the reasons why the food plan was not followed during the rehabilitation period in a group of heart disease patients (16). The main barriers to the plan compliance seemed to be emotional answers during meal time and the lack of control in social situations (16).

In a diabetic patient sample research, Williamson et al. (2000) concluded that the main contributors for a patient not complying with his diet therapy were: lack of time, lack of symptoms, lower education level, high period without the professional visit, lower self-esteem and lack of information of their relatives (17). The authors advise individual food plans and to educate the patient together with their family (17).

The above studies indicate several barriers when a food plan needs compliance. Research in the area of overweight treatment is scarce and we have the motivation to understand why so many overweight patients who received an individual food plan, based on their habits and preferences, do not comply with it. The purpose of this study was to find individual, social, familiar (and other) reasons that lead the overweight not to comply with the prescribed dietetic therapy necessary to achieve a metabolic equilibrium.

The great concern of the scientific community regarding obesity is to understand the difficulties associated with weight reduction (18-21). However, barriers related to diet therapy compliance are not fully understood. Furthermore, if health professionals understood these barriers, they could improve the patients' treatment.

STATISTICAL ANALYSIS

Mean (M) and standard deviation (SD), minima (min) and maxima (max) were computed for the scale variables and frequencies were used to describe ordinal and cardinal variables. All the scale variables had a distribution close to the normal.

In order to compare independent samples, we used Student's t-test to evaluate differences in the means of scale variables with normal distribution, or Mann-Whitney's test to compare the average order of ordinal variables. To evaluate the independence between pairs of nominal variables we used the Chi-Square test. The degree of association between pairs of variables was quantified by Spearman's correlation coefficient (ρ) and the strength of the association is commented as in Finney (22). We computed a logistic regression to evaluate the relation between a dichotomous variable and other variables. We rejected the null hypothesis when its critical significance level was below 0.05.

METHODOLOGY

We evaluated all consenting adult overweight patients that attended the Endocrinology and Nutrition outpatient clinic of the S. João Hospital in Porto, Portugal. The exclusion criteria were: no confirmation of fat mass excess; diabetes; hyperlipidemia with LDL cholesterol above 160 mg/dl or triglycerides above 150 mg/dl; renal insufficiency; liver insufficiency; arterial hypertension; other endocrinal diseases or iatrogenic obesity. The fat mass was evaluated by bioelectric impedance analysis (BIA) and its excess is defined by values over 20% of the body weight, for males, and values over 30% of the body weight, for females. All patients gave their informed consent and our sample consists of 442 patients with BMI ≥ 25 kg/m², 371 female and 71 male, aged between 18 and 76 years. Our consultation protocol includes: education level, previous attempts of weight loss, height, current, desired and maximum weight, and age when maximum weight was reached. From this data, we computed the reference weight (the average of the Buttheau and Metropolitan Life Insurance formulas (23), the body mass index (BMI) of the current weight (23), the BMI of the reference weight and the BMI of the desired weight).

To assess the patients' actions to diet therapy, an indirect questionnaire with three different parts was administered: 1) they were queried with one closed question "Have you been feeling difficulties in following your diet therapy?"; 2) it was assessed the degree of difficulty in fol-

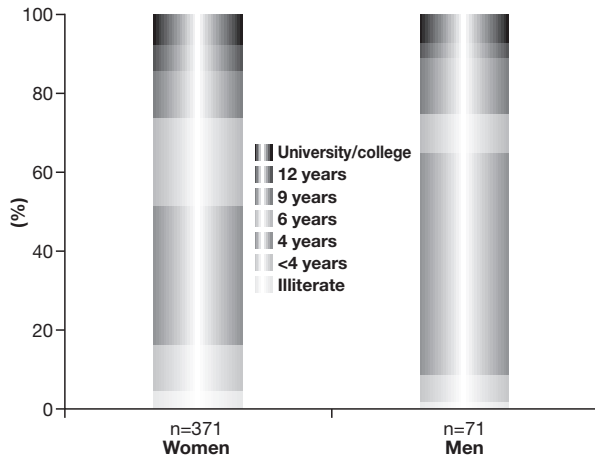


Fig. 1 - Education level by gender.

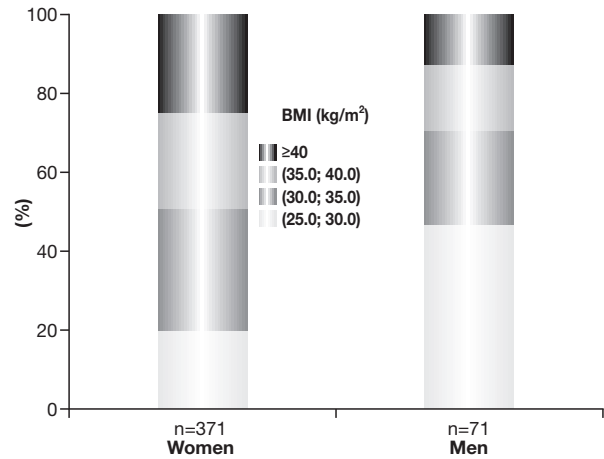


Fig. 2 - Classification according to BMI classes by gender.

lowing their diet therapy in a Likert scale (1 “low difficulty” to 5 “very high difficulty”) and; 3) a list with 34 statements (and an open question), related with obstacles of adherence to diet therapy, was used. We tried to assess the attitudes related with the individual food plan. Patients could choose as many statements as they wanted, and if they wanted they could add other reasons to the list.

The 34 statements of the third part were taken from the most referred phrases obtained from a previous pilot research with open end questions. The questionnaire was applied during one consultation and each part of the questionnaire was mixed with our consultation protocol.

RESULTS

The majority of 442 overweight patients were (83.9%, n=371) females, aged between 18 and 76 years, with a mean

age of 41 years and a standard deviation (SD) of 13 years. Men were significantly older than women (p<0.001).

The majority of patients were of low education level, with four or less years of school, with no significant differences between men and women (Fig. 1).

The distribution of BMI by gender according to Garrow’s classification (24) is presented in Figure 2.

We compared the values of weight (current, maximum, desired and reference) by gender and the age at which the maximum weight was reached (Table 1). Statistically significant differences between gender were found for height, desired weight and BMI for current and reference weights; all these values were higher in males (p<0.001).

Regarding the first part of the applied questionnaire, more than half patients (54.4% women and 62.0% men) mentioned difficulties in the diet compliance. There was

Table 1 - Patient’s characteristics.

Women	n	mean	SD	min	max
Height (cm)	371	155.7	6.3	137.0	173.0
Current weight (kg)	371	86.7	16.4	51.5	140.0
Body Mass Index (kg/m ²)	371	35.8	6.7	25.0	60.9
Reference weight (kg)	371	56.8	4.6	40.1	70.1
BMI for reference weight (kg/m ²)	371	23.4	0.7	21.4	24.1
Desired weight (kg)	351	66.3	9.1	47.0	111.0
BMI for the desired weight (kg/m ²)	351	27.4	4.0	18.4	51.4
Men	n	mean	SD	min	max
Height (cm)	71	166.7	6.6	154.0	186.0
Current weight (kg)	71	90.0	17.4	64.0	134.0
Body Mass Index (kg/m ²)	71	32.4	6.0	25.0	46.8
Reference weight (kg)	71	66.4	4.9	57.1	81.9
BMI for reference weight (kg/m ²)	71	23.9	0.5	22.2	24.1
Desired weight (kg)	64	76.2	9.1	55.0	100.0
BMI for desired weight (kg/m ²)	64	27.4	2.7	19.3	35.9

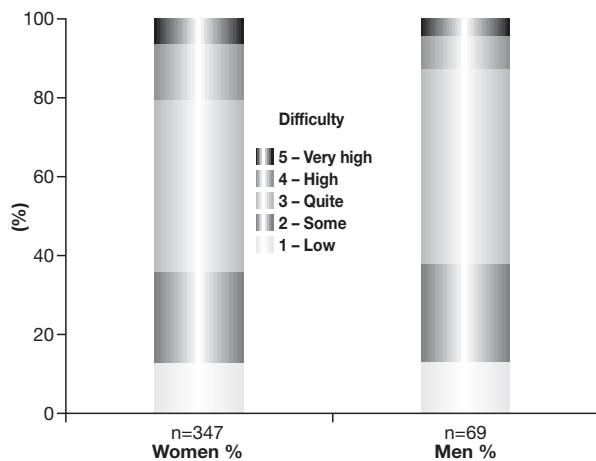


Fig. 3 - Degree of difficulty in diet therapy compliance by gender.

no significant dependence between gender and mentioning difficulties.

More than half of our patients (87.3% female and 87.0% male) mentioned at least some difficulty, with “quite difficult” as the most common answer (Fig. 3). There were no significant differences between genders in the mean rank of the degree of difficulty.

The degree of difficulty is not significantly related with either age or education level, but patients with higher BMI indicated higher difficult degree (female: $\rho=0.234$, $p<0.001$; male $\rho=0.306$, $p=0.011$).

In Table 2 we present the 34 statements indicating barriers to compliance with the diet therapy and the correspondent frequency of choices by the order of the questionnaire. There was statistical significant dependence between gender and the frequency of response of statements: 14 “Diet is not enough, I feel hunger” ($p=0.007$), 19 “Anxiety and nerves make me eat more” ($p=0.001$), and 33 “Diet gives me no pleasure” ($p=0.044$).

We found that patients who indicated a higher number of barriers, indicated also a higher difficulty degree (female: $\rho=0.310$, $p<0.001$; male: $\rho=0.408$, $p=0.001$). We also found that females who indicated a higher number of barriers were older ($\rho=0.182$, $p<0.001$), have lower education level ($\rho=-0.170$, $p=0.001$) and had a higher BMI ($\rho=0.123$, $p<0.018$). Similar weak correlations were found for males, but without any significance probably due to the smaller male sample size.

We sorted out the 5 most indicated barriers of each gender with the respective frequency of choice. For females, the top 5 statements were (in decreasing frequency of choice) 19, 11, 26, 8 and 22 (▲ in Table 2). For males, the top 5 statements were 11, 26, 14, 8 and 19. The 5th most chosen statement of females, 22 “I like to eat sweet things” is not present in the male top 5, and the 3rd most

chosen statement of males 14 “Diet is not enough food, I feel hunger” does not belong to the female top 5.

Using Koikkalainen methodology (25), statements with less than 10% of the frequency of choice were not considered as barriers. The 5 least chosen barriers by both genders are statements 3, 15 and 17 (▼ in Table 2). The barriers less chosen by females that are not present in the male’s bottom 5 are statements 10 and 23, and the barriers less chosen by males that are not in the female’s bottom 5 are statements 6 and 31.

We also studied the effect of previous attempts of losing weight in the barriers chosen by our patients. Most female (73%) tried previously to lose weight and less than half (42%) of the male had tried it. We observed that the women who had previously attempted to lose weight had a higher BMI ($p<0.001$) and identified a lower number of barriers ($p=0.010$). The men who previously tried to lose weight also had higher BMI ($p=0.002$).

For both genders, we did not find differences in the mean rank of education level between previous attempts to lose weight. However, women who previously tried to lose weight indicated higher mean rank of the degrees of difficulty ($p=0.040$).

For females, we found statistically significant dependency between previous attempts to lose weight and the indication of barriers for 5 of the 34 statements as shown in Table 3. For males there was no significant dependency between previous attempts to lose weight and any statement.

We sorted out the 5 most indicated barriers by females who previously tried to lose weight and the 5 most indicated barriers by females who never tried to lose weight. Sentences 19, 11, 26 and 8 were more frequently chosen barriers by these two groups but in a different order. Sentence 32 is present in the top 5 barriers of the females who never tried to lose weight and sentence 22 is present in the top 5 barriers of the females who previously tried to lose weight.

For males, the most indicated barriers for those who previously tried to lose weight and for those who never tried to lose weight are sentences 11, 26, 19 (with different ordering). The statements 7, 8, 14 and 30 are present in the top 5 barriers of the males who never tried to lose weight (sentences 7, 19 and 30 are tied in 5th place) and statements 9 and 12 are present in the top 5 barriers of the males who previously tried to lose weight.

We computed a logistic regression to evaluate the relation between the frequency of choice of the top 5 barriers to compliance with the diet therapy chosen by females with age, BMI and previously attempts to lose weight. We found that: 19 “Anxiety and nerves force me to eat more” was more chosen by younger women ($p=0.013$) and by the ones with previous attempts at weight loss ($p=0.004$); 11 “Diet forces me to give up what I like to eat” was more chosen by older women ($p=0.039$); 23 “I like to eat” was

Table 2 - Barriers to the diet therapy compliance by gender.

Statements	Women %	Men %
1 I am unable to diet because my work's timetables do not allow me.	15.9	16.9
2 Diet food is not what I feel like eating.	11.6	14.1
3 I'm unable to cook/prepare diet.	▼ 9.4	▼ 4.2
4 I feel difficulties on complying because my life style is too busy.	17.3	18.3
5 I feel different from those around me when I'm dieting.	15.6	15.5
6 Where I usually eat there are no diets.	12.1	▼ 8.5
7 I feel weak when I'm dieting, without strength.	25.9	28.2
8 My relatives and friends like a different type of food.	▲ 32.4	▲ 38.0
9 Dieting is a big change in my eating habits.	29.1	29.6
10 I feel difficulties in finding food for my diet.	▼ 9.7	11.3
11 Diet forces me to give up what I like to eat.	▲ 56.9	▲ 59.2
12 Diet food is different from my eating habits.	28.8	35.2
13 Eating diet food is more expensive.	17.5	14.1
14 Diet is not enough food, I feel hunger.	23.2	▲ 39.4
15 I need to spend a lot of time in diet preparation.	▼ 5.7	▼ 7.1
16 I have no strength or will to diet.	20.5	14.1
17 I don't want to change my eating habits.	▼ 3.2	▼ 2.8
18 Gaining weight is a family characteristic.	28.6	22.5
19 Anxiety and nerves force me to eat more.	▲ 57.1	▲ 35.2
20 I can not resist when I have food in front of me.	18.3	21.1
21 Food diet is not tasty.	10.5	14.1
22 I like to eat sweet things.	▲ 31.8	21.1
23 Diet disturbs my family living.	▼ 8.9	11.3
24 Knowing that I need dieting forever.	17.8	14.1
25 Eating put me less nervous.	19.1	18.3
26 I like to eat.	▲ 36.9	▲ 47.9
27 I can't stop eating after I start it.	12.7	15.5
28 I always think that tomorrow is the day I will start dieting.	19.9	11.3
29 I feel unsatisfied due to dieting.	12.7	15.5
30 I can't do a diet in a serious way.	25.9	29.6
31 I feel unhappy when I'm dieting.	13.7	▼ 8.5
32 Diet forces me to cook different food for me.	28.6	19.7
33 Diet gives me no pleasure.	10.5	19.7
34 I feel that something is missing when I'm dieting.	28.6	23.9
35 Other	▼ 1.6	▼ 7.0

The sum of frequencies is above 100% because patients could choose as many statements as they wanted.
The top 5 barriers for each gender are indicated by ▲ and the bottom 5 barriers are indicated by ▼.

more chosen by older women ($p < 0.001$); 8 "My relatives and friends like a different type of food" was chosen by older women ($p < 0.001$) and; 22 "I like to eat sweet things" presented no relation either with age or with BMI or with previous attempts to lose weight.

The same analysis was performed for males and we found that: 11 "Diet forces me to give up what I like to eat", 26 "I like to eat" and 14 "Diet is not enough food, I feel hunger" presented no significant relation either with age or with BMI or with previous attempts to lose weight; 8

"My relatives and friends like another type of food" was more chosen by older men ($p < 0.021$) and; 19 "Anxiety and nerves force me to eat more" was chosen by men with higher BMI ($p < 0.012$).

DISCUSSION

More than a half of our sample mentioned at least some difficulty in diet compliance and patients with higher BMI indicated higher degrees of difficulty. Probably, patients with higher BMI had more often tried to lose

Table 3 - Barriers to the diet therapy compliance for women by previous attempts to lose weight.

Statements	Never tried % (n=102)	Tried % (n=269)	p
4 I feel difficulties on complying because my life style is too busy.	10.8	19.7	0.046
5 I feel different from those around me when I'm dieting.	8.8	18.2	0.026
19 Anxiety and nerves force me to eat more.	46.1	61.3	0.010
24 Knowing that I need dieting forever.	8.8	21.2	0.006
31 I feel unhappy when I'm dieting.	6.9	16.4	0.018

Only the sentences with significant dependence are shown.

weight but these consecutive unsuccessful experiences made them more alert to the difficulties.

The barriers most mentioned by both genders (statements 8, 11, 14, 19, 22 and 26) are related to sensorial properties (statements 11, 14, 22 e 26); social relation (statement 8) and psychological factors (statement 19).

In spite of the similarities for both genders in the top 5 barriers, the importance given in the behaviour group is different between them. We could assume that psychological factors are more frequently a barrier for women since indicating 19 "Anxiety and nerves force me to eat more" is more frequent by females. Men seem to give more importance to sensorial properties because their first 3 barriers were 11 "Diet forces me to give up what I like to eat", 26 "I like to eat" and 14 "Diet is not enough food, I feel hunger". Taking a look into the significance of the first barrier for men and the second for women, 11 "Diet forces me to give up the food I like", we feel that this barrier could be caused by low education levels of our sample and their food preferences. These could also be related with the barrier "Diet is not enough food, I feel hunger", and as Bellisle demonstrates (26), obese people are particularly sensitive to food sensorial properties.

Society usually associates the word "diet" with eating a lot of vegetables and forbidden cereal products, thus giving a negative connotation to this word. We think that this could be responsible for the frequent choices of the statement "I like to eat" in both genders. Obese people think of "diet" as something so different from their eating habits that they need to mention the sensorial pleasure as a justification for not complying with the diet. This sensorial barrier could also be related with the thought of restriction in quantities and types of food, even when the health professional respects their tastes and preferences. Obese think of "diet" as a sacrifice, which is partially true, since it is a need to restrict quantities and in most cases, lose some sensorial qualities. However, to create a non monotonous (with sensorial diversity) individual food plan is a task achieved everyday by health professionals by teaching to the patient how to diversify their meals while maintaining nutritional balance.

As regards relating age with number of statements, generally older females indicated a higher number of obstacles in diet compliance that could be due to their resistance to change of habits and behaviours. We noted that females with higher BMI indicated a higher number of barriers. Analysing this data, we consider that most obese people feel that any obstacle is impeditive to diet compliance.

Our motivation was to compare patients who never tried to reduce weight with those who tried. We found that those who previously tried to lose weight have higher BMI, which could have been caused by an earlier development of obesity and failure of past treatments in these patients. The number of sentences indicated by females is lower in those who never tried to lose weight. Since this is their first time carrying out a food plan, these females probably do not have as many barriers as the group with more experience in diet therapy.

We found that the women who previously tried to lose weight indicated more frequently than those who never tried the following barriers: 4 "I feel difficulties on complying because my life style is too busy", 5 "I feel different from those around me when I'm dieting", 19 "Anxiety and nerves force me to eat more", 24 "Knowing that I need dieting forever" and 31 "I feel unhappy when I'm dieting". All these sentences are related to a feeling of sacrifice when they have to comply with a food plan without the expected results at the end of their previous attempts.

We studied the association between the choice of the top 5 barriers for each gender with BMI, age and previous attempts at weight loss. We did not find any statistically significant effect for females between the top 5 barriers and the BMI. However, older women had a lower frequency of choice for the sentence 19 "Anxiety and nerves force me to eat more" and a higher frequency of choice for sentences 11 "Diet forces me to give up what I like to eat", 26 "I like to eat" and 8 "My relatives and friends like a different type of food". This might be related to the fact that younger females are at a more stressful period of their lives. We also found that mentioning 19 "Anxiety and

nerves force me to eat more” was more frequently chosen by the ones with previous attempts at weight loss, which might be related with the fact that past failures in losing weight might increase the stress felt by these patients.

Due to the fact that the male sample size is smaller, statistically significant effects are harder to find. This might explain the fact that sentences 11, 26 and 14 of the top 5 barriers chosen by males had no significant relation either with age or with BMI or with previous attempts to lose weight. Nevertheless, older men chose more frequently 8 “My relatives and friends like another type of food”, which might be related to a higher dependency on the family or friends to cook their meals. We also found that males with higher BMI chose more frequently 19 “Anxiety and nerves force me to eat more”, and if we assume that patients with higher amounts of stress have a higher tendency to choose this sentence, then their higher BMI would be a behavioural consequence of this situation. Analysis of the relation between these sentences and a psychometric evaluation can be found in Correia et al. (27).

We must enhance the importance of establishing an individual food plan with the inclusion of healthy and acceptable alternatives that respect the patient's sensorial preferences and social environment, together with their habits, psychological condition and motivation. This may be a way to reduce anxiety, to encourage diet compliance and to achieve success in obesity treatment.

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