Sibutramine Treatment in Obesity: Predictors of Weight Loss Including Rorschach Personality Data

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Abstract

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Objective: To study personality and clinical factors in weight loss by sibutramine (Meridia and Reductil), an anti-obesity drug enhancing satiety.

Research Methods and Procedures: The subjects were 30 obese patients [43 ± 12 years (mean ± SD), BMI 40 ± 4 kg/m^2]. The treatment comprised 15 mg of sibutramine administered daily and monthly dietary advice. Weight loss after 6 months of treatment was evaluated. For psychological assessment, the Rorschach method (Comprehensive System) and the Beck Depression Inventory were used.

Results: A multiple linear regression model including the Rorschach predictors' physical demand states (animal movement, designated as FM) being intrusive or difficult to hold and a dependency orientation (food contents) could explain 47% of 6 months of weight loss. A model including initial weight loss in addition to the Rorschach predictors explained 58% of the 6-month weight loss.

Discussion: The personality factors predicted greater weight loss. In particular, patients with difficulties concerning physical demand states, which would include hunger, could have reduced their eating behavior with enhanced satiety, resulting in greater weight loss. Enhanced satiety could also have helped patients with a dependent need for food to limit food intake. Being enrolled in a treatment program could also have provided essential support for patients with dependency needs. Furthermore, initial weight loss was a predictor of greater weight loss in sibutramine treatment, in accordance with prior research.

Key words: psychology, drug treatment, pharmacological treatment, eating behavior, appetite

Introduction

There is great need for weight loss predictors that would enable a better match of client to treatment in obesity. This study is aimed at identifying those persons who will lose the most weight in treatment with sibutramine. Sibutramine, with its satiety-enhancing effect, is a recently developed drug for weight management. Sibutramine acts through the central nervous system by blocking re-uptake of serotonin and noradrenalin released by hypothalamic neurons [serotonin and noradrenaline reuptake inhibitor (SNRI)[1] drug], and these mechanisms enhance satiety (1). Sibutramine has been proven to be an efficient drug for weight loss and weight loss maintenance (2,3). The Sibutramine Trial on Obesity Reduction and Maintenance (STORM) study reported that about one-half of the patients achieved a 10% weight loss effect in 6 months (2).

There is little information so far on who benefits most from sibutramine. Two studies have reported predictors of sibutramine treatment: Hansen et al. reported that only pretreatment body weight predicted greater weight loss (kilograms) in 6 months in the STORM study (4). Weight change over 2 years in the STORM study was predicted by higher pretreatment body weight, lower age, and sibutra-

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[1] Nonstandard abbreviations: SNRI, serotonin and noradrenaline reuptake inhibitor; STORM, Sibutramine Trial on Obesity Reduction and Maintenance; BDI, Beck Depression Inventory; An+Xy, anatomy and X-ray contents; FD, form dimension; DEPI, Depression Index; κ, Cohen's Kappa; ICC, intraclass correlation coefficient; CS, Comprehensive System; FM, animal movement.

mine (as compared with placebo). These three factors explained 8% of the weight loss at year 2. Other correlates that were associated with more weight loss by sibutramine were resting metabolic rate, height, fat free mass, and fat mass; however, these correlates were not predictors. Furthermore, initial weight loss by sibutramine has been found to predict later weight loss positively (5,6). Other suggested but nonsignificant factors that have been studied are age, gender, smoking, number of previous slimming attempts, and age at onset of obesity (4). Two studies have assessed depression, measured by the Beck Depression Inventory (BDI), but the predictive values of these data were not reported (7,8). We could find very little prior research on psychological predictors in treatment with any antiobesity drugs. Two studies found report anxiety as a negative predictor and reported the absence of a predictive value of the BDI (9,10).

We were interested in identifying predictors of 6 months of weight loss in treatment including sibutramine by studying psychological aspects that could affect appetite and behavior, in addition to the kind of general pretreatment data considered earlier. An SNRI drug enhancing satiety probably has a higher relevance for some types of obesity behaviors. The satiety enhancing effect of sibutramine could have a greater impact for patients having difficulties in resisting overeating due to physiological and also psychological influences. Appetite is obviously a complex behavior, particularly in obesity. We have suggested that additional aspects in the complexities of obese eating behavior could be understood by taking underlying personality variations into consideration (11) and have included as a tool, therefore, a performance based psychological technique that does not rely on self-reported ratings. We have chosen the most widely used performance based personality assessment technique, the Rorschach Comprehensive System (CS) method (12,13). Some of our considerations in this decision are that psychological reasons for behavior are not easily identified by asking (14) and that eating disordered patients, in particular, have been shown to answer self-report questionnaires in socially acceptable ways (15). The Rorschach CS is commonly used in psychiatric settings when a more thorough understanding of personality functioning is needed. The use of the Rorschach as a research tool has been debated, however, and it is still a controversial issue. Because the Rorschach could provide a unique type of information that is not available by other methods and because an enhanced understanding of obesity behaviors is urgently needed, we want to consider the information derived by Rorschach in our research.

The personality aspects considered in this study are mainly those presumed to be related to eating. According to our earlier research using the Rorschach, a variable measuring higher affective responsiveness and reactivity to external stimuli (affective ratio) is related to appetite as measured by a higher initial eating rate (16) and to an acute reduction in food intake after sibutramine compared with placebo (17) External stimuli would also include sensory stimuli such as sight, smell, and taste of food and, thus, could be related to appetite in obesity.

Another variable is associated with physical demand states (animal movement: FM) (13). Physical demand states refer to primary drives that are inborn and natural and represent the more instinctive aspect of human nature. Higher levels of the variable have been found to decrease in the elderly in the years preceding death (18); this finding is understood as a decline in vital energy and perhaps in vital interest for a physical involvement in life. Hunger is included in such demand states, and an increase in this variable has been found after onset of a "fluid only" phase of a weight reduction program (13). The variable has also been associated with drug dependence (19).

When in excess, the FM variable implies that physical demand states and urges can be intrusive and disturb and disrupt planned and deliberate thinking and functioning. When lacking, the variable is presumed to signify difficulties in holding demand need states, meaning that there can be a low ability for self-regulation and a push toward instant gratification. In obesity, this could mean being disturbed by hunger urges that interfere with concentration and even cause impairments in functioning; it could also mean being unable to wait for food when hungry because the demanding hunger urges cannot be tolerated and handled. Thus, with deviating levels of the variable, either elevated or lowered, there could be difficulties with demand states that may have implications for eating behaviors. The instinctual life drives indicated by the variable could, perhaps, be difficult for a person to alter solely by intention. We were interested if enhanced satiety could affect food intake in patients influenced by these factors.

Furthermore, a dependency orientation, also described as oral dependency and implying oral characteristics, is a classic concept in eating and related matters (20) that can be captured by a Rorschach variable (food contents). A dependency orientation can imply preoccupation with oral activities such as eating and dependency on food. Oral Rorschach characteristics have earlier been linked to eating disorders (21) and addiction to alcohol (22) and to tobacco (23). Furthermore, we have found the Rorschach variable food contents in patients having a biologically unexpected accelerating rate of consumption during the meal (16). An accelerating rate can reflect disturbed eating regulation and an inability to feel satiation. We have postulated that if eating is motivated by a dependency orientation rather than by biology, this might result in a nonphysiological eating curve lacking the signs of satiation toward the end of the meal. We were interested in taking such oral characteristics into account. The direction of a hypothesis is, however, not

unequivocal. Enhanced satiety could be helpful in these patients' eating characteristics, or, on the other hand, with suggested psychological need for food, there could rather be a resistance to a biological intervention.

Also of interest are psychological factors related to behavioral changes in weight reduction. We have found Rorschach indications of more bodily concern [anatomy and X-ray contents (An+Xy)] in patients with relatively lower degrees of obese body weight (24), and others have found this Rorschach indication of bodily concern in patients with medical conditions implying good reason to worry about health (25,26). Such bodily concern might be considered as a weight-controlling factor that could be tested in weight loss treatment. Form dimension (FD) is another Rorschach variable suggested to measure self-inspective ability that is considered beneficial for personality change in psychological treatments (27). Self-inspective ability means an ability to monitor and reflect on one's behavior and thinking and is considered essential when patients are assigned to psychotherapy. Being able to monitor one's self and reflect on thoughts and behaviors enhances making changes in habits, behaviors, and attitudes that constitute obstacles to the goals the person wants to achieve. The ability to self-monitor and self-reflect could also be regarded in relation to behavioral changes such as weight reduction.

Besides having an ability to regulate satiety, serotonin neurotransmission is known to influence depression (28), although sibutramine is not formally indicated for such treatment. Because depressive features can be associated with elevated appetite (29), baseline level of moods and subsequent weight loss with an SNRI drug could be evaluated by Rorschach [Depression Index (DEPI)] and subjective ratings (BDI). Successful weight loss for patients with depressive features could support a serotonin hypothesis on mood and eating.

Besides factors suggested earlier such as initial weight, initial weight loss, age, gender, age at onset of obesity, and previous slimming attempts that could be related to weight fluctuations, some additional information to be considered in obesity regards parents' weights, adult weight, and eating disorders. A family history of obesity and having been obese during adulthood could make it more difficult to lose weight. Successful weight loss by sibutramine for patients with eating disorders would suggest that enhanced satiety can positively affect more definitely disturbed eating behavior.

We decided to evaluate the weight loss results after 6 months of prolonged administration of sibutramine because this treatment duration is known to be a clinically relevant period (3). Thus, the aim of this study is to evaluate if personality aspects potentially related to eating, behavioral changes, and, also, some general pretreatment factors can predict 6 months of weight loss by treatment with sibutramine and monthly dietary advice.

Research Methods and Procedures

Participants

The participants were 30 patients included in a study with sibutramine at the Obesity Unit, Huddinge University Hospital. There were 22 women and 8 men, with a mean age of 43 $\pm$ 12 years (mean $\pm$ SD) and a range of 20 to 64 years. The mean BMI was 40 $\pm$ 4 kg/m^2 and ranged from 33 to 45 kg/m^2. Medical exclusion criteria for participation were the earlier established contraindications for sibutramine treatment (3). A total of 36 patients entered the study, but 6 of these dropped out before the evaluated 6-month period was completed. Reasons for these dropouts were medical (development of hypertension, $n = 1$) and subjective reasons given by the patient, such as adverse side effects, lack of time, and less drug effect on weight than expected ($n = 5$). The local Ethics Committee at the Karolinska Institutet approved the study. The patients gave their informed consent to participate, and there were no dropouts from Rorschach testing.

Instruments

The Rorschach CS (12,13) was used. The Rorschach is commonly known as the "ink blot" method (30) and consists of a perceptual stimulus material. In the response process of the person taking the test, perceptual, cognitive, and emotional aspects of personality are activated and, hence, reflected in the answers. The results provide quantifiable data, sums, and percentages. The variables chosen for presentation are commonly used in Rorschach interpretation. Variables used were those suggested to be related to eating: affective responsiveness to external stimuli (affective ratio), difficulties concerning physical demand states measured by deviating levels of the variable (animal movement: FM), either higher or lower than the average range, and a dependency orientation (food contents). Additional variables were bodily concern, which at higher levels indicated preoccupation and anxiety regarding the body and its functions (An+Xy), self-inspective ability (FD), and depressive features measured by the number of conditions fulfilled in the DEPI. The dimensional Rorschach CS variables were used for the study because information is discarded and power reduced when variables are dichotomized (31).

BDI (32) was used as an additional tool for assessing clinical depression. The BDI was adequately completed and returned by 28 of the 30 patients in the sample.

General Pretreatment Information

Items selected from a more extensive interview on pretreatment data, collected according to preestablished categories and performed for all subjects being Rorschach tested at the Obesity Unit, were those related to obesity history and eating disorder: 1) "Family history: obesity in parent" refers to whether either one of the patient's biological parents was obese as defined by the patient; 2) "Age at onset of obesity"

was divided into "Childhood," defined as before age 13, "Adolescence," defined as ages 13 to 19, and "Adulthood," defined as from age 20; 3) "Weight during adulthood" refers to whether the patient ever did have a normal weight (in own standards if weights were not remembered) as an adult or was always obese as an adult; 4) "Weight fluctuations" refers to alterations in body weight recognized by the patient as "considerable" because many patients do not regularly weigh themselves. Our definition implied alterations of at least 5 to 10 kg, resembling definitions used earlier, although no standardized definition exists for weight cycling (33). Our categories include "stable weight," meaning largely the same weight year by year, and "sporadic fluctuations" and "frequent fluctuations," where the latter refers to considerable alteration in body weight several times during the last years; 5) "Eating disorder" refers to having recurrent food binges. The diagnostic criteria for binge eating disorder according to the DSM-IV was used (29), implying large amounts of food being consumed in an addictive way and without a sense of control over this behavior and being in distress about this. Binging with a frequency of at least once a week was used as a criterion for eating disorder; hence, the definition does not have to match the criteria for a full binge eating disorder, implying binges at least twice a week, but rather matches the DSM-IV criteria for binge eating.

Procedure and Study Design

The first author, trained at the specialist level in personality assessment with the Rorschach method, administered these tests. The same clinical psychologist also collected the pretreatment data. The long-term sibutramine treatment was preceded by a 6-week clinical trial evaluating the effect of sibutramine on food consumption in laboratory test meals. This trial involved 2 weeks each of sibutramine, placebo, and a washout period, in a crossover design (34). The Rorschach was administered before the onset of the trial. After the experimental phase, the patients received 15 mg of sibutramine daily for a prolonged treatment period for which they were not blinded. The first weights assessed when the patients had entered this active treatment phase were used as the baseline measure in this study.

In this treatment phase, dietary advice was given monthly in group sessions conducted by a dietitian. These group sessions also included discussions on behavior alterations. Once a month, the patient also met a nurse who assessed body weight, blood pressure, and pulse rate and recorded adverse events.

Rorschach Interrater Reliability

The Rorschach sibutramine protocols belong to a larger data pool of 120 protocols. From these, 25% were randomly selected and rescored independently by one of two other psychologists who were blind to the scoring of the first author. Interrater agreement was calculated using the Rorschach Research Utility (35,36), providing Cohen's Kappa (κ) for response level scores and the intraclass correlation coefficient (ICC) for protocol level reliability of summary scores (37–39). For main segments at the response level, there was an excellent agreement (defined as $\kappa = 0.75$ to 1.00) for Location and Space ($\kappa = 0.96$), Developmental Quality ($\kappa = 0.84$), Determinants ($\kappa = 0.87$), Pairs ($\kappa = 0.88$), Contents ($\kappa = 0.82$), Populars ($\kappa = 0.93$), and Z-Score ($\kappa = 0.88$). Good agreement (defined as $\kappa = 0.61$ to 0.74) was reached for Special Scores ($\kappa = 0.69$). For the particular variables investigated in this study, the protocol level agreement of summary of scores was excellent for affective ratio (ICC = 1.00), FM (ICC = 0.94), food contents (ICC = 0.88), FD (ICC = 0.83), and DEPI (ICC = 0.80). Good agreement was reached for An+Xy (ICC = 0.74).

Statistics

The outcome variable was percentage weight loss during 6 months of prolonged daily sibutramine administration. The general effects of sibutramine on weight loss for the whole sample were tested with two-tailed paired Student's *t* test. As a first step in our statistical analyses of the potential correlates of weight reduction, two-tailed correlations (Pearson *R*) were used for comparing 6-month weight loss with initial weights, initial (1 month) weight loss, and Rorschach and BDI scores**.** To measure deviating levels of the Rorschach variable physical demand states (FM), either elevated or lowered, as a dimensional variable, the FM scores were transformed to standardized *z* scores, implying a mean of 0. In the next step, the negative *z* scores (meaning values below the mean) were changed to positive, making all values positive. In this way, higher levels of the variable show more deviating scores (originally either heightened or lowered). Values close to zero show values close to the mean. The mean value of the original FM variable in the present sample was 3.7 ($\pm$2.6). Parametric statistics were used for psychological variables because the distributions of the data were within recommended values for performing these tests (40). For comparing discrete pretreatment data with weight loss, two-tailed unpaired Student's *t* tests or ANOVA were performed. The selected level of statistical significance was $p < 0.05$.

In the next step, the variables found to be statistically significant in the first set of analyses were tested in multiple linear regression analysis. A stepwise procedure set on $p = 0.05$ in and $p = 0.10$ out were used. The residuals of the multiple linear regression models were analyzed to ensure that they were within recommended values.

Results

General Weight Loss Results

Sibutramine showed a significant general effect on weight loss at 6 months for the whole sample. Mean weight

Table 1. Rorschach and BDI correlates of weight loss (%) by sibutramine for 30 obese patients

Correlates of weight loss	*r*	*p*
Rorschach correlates		
Affective responsiveness (affective ratio)	0.149	0.431
Difficulties with demand states (deviating levels of FM)	0.533	0.002
A dependency orientation (food contents)	0.478	0.008
Anxiety related to the body (anatomy + X-ray)	0.303	0.104
Self-inspective ability (form dimension)	0.379	0.039
Depressive features (DEPI)	0.244	0.193
BDI sum of scores*	0.139	0.480

* $N = 28$.

at start was 111.1 kg (±18.5) and after 6 months of sibutramine treatment was 105.3 kg (±20.3) ($p < 0.001$). Weight loss ranged from 17.9 kg lost to 4.7 kg gained. The weight loss results for 6 months (in kilograms) showed no association with initial weight in kilograms ($r = -0.220$, $p = 0.242$). Weight loss during the first month was 0.9 kg (±1.6), and this initial weight loss was positively associated with percentage weight loss results for 6 months ($r = 0.424$, $p = 0.022$).

Rorschach Personality Variables in Relation to Weight Loss

Weight-loss results related to the Rorschach personality factors are displayed in Table 1. Three of the correlations between weight loss and Rorschach variables reached the level of statistical significance. First, patients with more deviating levels of FM (demand states), elevated or lowered from the mean, lost more weight. The variable measures difficulties concerning physical demand states and implies that demand states can exert influence on behavior. Second, weight loss was positively correlated to food contents, implying a dependency orientation and describing so-called oral traits. Finally, the variable FD suggested to measure self-inspective ability was positively associated with weight loss.

The variable An+Xy, used to measure anxiety and concern regarding the body, and number of positive signs in the Rorschach DEPI, indicating depressive features, were not significantly related to weight loss.

BDI Scores and Weight Loss

Baseline BDI scores were not significantly associated with weight loss, as shown in the correlation in Table 1.

Obesity History and Other Pretreatment Descriptors in Relation to Weight Loss

Gender and age were not related to weight loss results (men: 4.5 ± 6.4% vs. women: 6.2 ± 4.8%, Student's *t* test value = −0.807, $p = 0.472$; age: $r = -0.021$, $p = 0.912$). A family history of obesity, with obesity in at least one of the parents, and having been obese during all of adulthood were significantly associated with less weight loss, as seen in Table 2. Of the 30 patients, 23 had had an obese parent, and 10 patients were always obese as adults. The remaining pretreatment descriptors showed no significant association with weight loss.

Multiple Linear Regression Analysis

The multiple linear regression analysis is displayed in Table 3. Using a step-wise procedure, the Rorschach variables and the remaining general correlates that were significant according to the univariate analyses were tested. This resulted in three models according to the three steps in the regression analysis, displayed in Table 3. In the first step, deviating levels of FM suggesting difficulties concerning physical demand states were statistically selected as a sole predictor, explaining 27% of weight loss results. In the next step, food contents, indicating a dependency orientation, was selected together with deviating levels of FM, raising the explaining value to 47%. In the third and final regression model, initial weight loss was selected in addition to the Rorschach predictors above, and with these three predictors, the explaining value reached 58%. All three models and the separate variables in each model are statistically significant at at least $p < 0.01$.

Discussion

Sibutramine treatment resulted in weight loss, in agreement with an extensive amount of earlier findings (2,3,5,41–44). This study contributes to the research on sibutramine by identifying predictors of 6 months of weight loss based on personality variations. A model consisting of the Rorschach personality predictors' difficulties with demand states and a dependent orientation explained 47% of weight loss. Including initial weight loss in addition to the Rorschach predictors explained 58% of weight loss.

Rorschach Personality Predictor of Weight Loss: Physical Demand States

Initial signs of difficulties concerning physical demand states (FM), which mean that such demand states can have more influence on behavior, were strong positive predictors of weight loss, explaining 27% alone. To recapitulate, phys-

Table 2. Obesity history correlates of weight loss (%) by sibutramine for 30 obese patients

Obesity history correlates	*n*	Weight loss m (SD)	Student's *t* value	*p*
Family history: obesity in parent				
Yes	23	4.2 (4.2)	3.239	0.003
No	7	10.1 (4.3)		
Age at onset of obesity				
Childhood	16	5.3 (4.5)	0.169*	0.845
Adolescence	8	5.4 (5.6)		
Adulthood	6	6.7 (5.8)		
Weight during adulthood				
Always obese	10	3.0 (3.7)	2.194	0.037
Once normal weight	20	6.9 (4.9)		
Weight fluctuations				
Stable weight	9	4.3 (5.0)	1.210*	0.314
Sporadic fluctuations	14	5.2 (3.5)		
Frequent fluctuations	7	8.0 (6.8)		
Eating disorder				
Yes	10	5.9 (5.7)	−0.234	0.817
No	20	5.5 (4.6)		

* *F* value.

Table 3. Stepwise multiple linear regression analysis of weight loss (%) by sibutramine including Rorschach and clinical data for 30 obese patients

Predictors	B (SD)	R^2	*F*	*p* value of model
Step 1 (model)		27%	10.04	0.004
Difficulties with demand states (deviating levels of FM)	5.1 (1.6)†			
Intercept	1.3 (1.6)†			
Step 2 (model)		47%	11.53	<0.001
Difficulties with demand states (deviating levels of FM)	4.6 (1.4)†			
A dependency orientation (food contents)	3.0 (1.0)†			
Intercept	−0.2 (1.5)			
Step 3 (model)		58%	11.58	<0.001
Difficulties with demand states (deviating levels of FM)	4.3 (1.3)†			
A dependency orientation (food contents)	2.8 (0.9)†			
Initial weight loss (%)	1.2 (0.5)*			
Intercept	−0.6 (1.3)			

* $p < 0.05$.
† $p < 0.01$.
Excluded variables (model 3): FD, obesity in parent, adult weight.
Change statistics: from model 1 to model 2, $R^2 = 20\%$, $F = 9.8$, $p = 0.004$; and from model 2 to model 3, $R^2 = 11$, $F = 6.7$, $p = 0.016$.

ical demand states refer to primary drives that are inborn and natural and represent the more instinctive aspect of human nature, which would also include hunger. We suggested that in obesity, deviating levels of the variable could mean being disturbed by interfering hunger urges or being unable to handle and withstand the demanding hunger urges. Patients characterized by these kinds of difficulties in experiencing or handling a demand state such as hunger could have had initial difficulties controlling food intake, being ruled by their physical urges. The enhanced satiety with sibutramine could have helped these patients, in particular, to reduce their food intake and, thus, lose more weight.

Drugs moderating the intensity of hunger facilitate the conscious control over food intake (45) and, thus, also restore the patient's own confidence in a structured eating behavior (46). Patients overeating due to instinctual drives could perhaps have received help in handling their hunger urges and improved their conscious self-management by a drug like sibutramine. Alternatively, if eating behavior is directly ruled by instinctual drives, there could simply be a higher sensitivity to alterations in hunger and satiety, resulting in substantially decreased food intake.

Rorschach Personality Predictor of Weight Loss: A Dependency Orientation

A dependency orientation (food contents) was an additional suggested eating-related Rorschach predictor of weight loss. The common clinical implication of such oral traits is the possibility of the patient being overly dependent and relying on support from others. As a fixation at the oral stage of development is assumed, there can also be implications for eating. An oral activity such as eating could have an exaggerated importance, and there could be a kind of dependent relationship toward food. A problematic relationship with food for patients with oral Rorschach characteristics was supported by research findings linking orality to eating disorders (21) and to an accelerating rate of eating consumption commonly suggested to reflect disturbed eating regulation and an inability to feel satiation (16).

Thus, some more-or-less problematic implications for eating behavior could be suggested for patients with oral characteristics. Our results on a dependency orientation and weight loss by sibutramine imply that patients with these characteristics were helped by the treatment. One possibility is that with enhanced satiety due to sibutramine, a potentially problematic preoccupation and need for food, possibly even causing a deviating eating pattern, could have become easier to handle. A dependent need for food could have diminished in importance or could have become easier to withstand.

Alternative explanations to be considered are the social implications of a dependency orientation. Orality in the Rorschach characterizes persons vulnerable to social isolation (47) and the absence of warm support (48). The support provided by being enrolled in a treatment program can have sustained patients for whom social support and care are crucial, temporarily facilitating a patient's ability to abstain from food.

Rorschach Personality Aspect in Weight Loss: Self-Inspective Ability

Self-inspective ability (FD) was related to weight loss according to the univariate analyses but did not enter as a predictor of weight loss in the regression analysis. Such an ability to monitor and reflect on one's behavior and thinking could, to some extent, have facilitated changes in eating behavior when a person was given dietary advice or experienced enhanced satiety. Thus, self-inspective ability may contribute to the overall effect in such a combined pharmacological and behavioral treatment (49).

General Pretreatment Data and Weight Loss Results

Initial weight loss was a positive predictor of later weight loss, which is in accordance with earlier reported results (5,6). Based on such findings, initial weight loss is now an officially approved indication for further sibutramine treatment (50).

In the univariate analyses, the absence of obesity in parents and having been normal weight at some point as an adult made it easier to lose weight, although these variables were not statistically selected as predictors in the regression model. The variable obesity in parent has a somewhat broad definition. It indicates a genetic heritage with predisposition for obesity and also includes a so-called shared environment where lifestyle and habits leading to obesity can have been transferred to the patient. Parental obesity has earlier been tentatively associated with failure in weight maintenance (51). It should be noted, however, that most of the patients in our study had a family history of an obese parent and still lost weight. The next variable, once having been normal weight as an adult, could indicate better genetic prerequisites or better behavioral and psychological strategies and prerequisites, and also a normal weight adult identity to be resumed. The lack of association between age of onset of obesity and weight loss by sibutramine is in agreement with earlier findings (4). This also applies to weight fluctuations, which would have similarity to numbers of slimming attempts evaluated earlier (4).

Having an eating disorder did not impact the treatment results. Others have reported positive results with sibutramine for patients with even a full binge eating disorder (7,52). Patients with initial signs of depressive features did not lose more weight. On the other hand, they did not fail more often than the patients without depression.

Additional Implications: Suggested Trait and State Aspects of Appetite

Although the hypothesized appetite-related Rorschach feature, affective responsiveness to external stimuli (Affective ratio), was related to an acute reduction in food intake after sibutramine (17) and also to appetite as measured by a higher initial eating rate (16), it was not related to the 6 months of weight loss results. The association between the Rorschach variable affective responsiveness and appetite has been discussed earlier in relation to the classic externality theory by Schachter, suggesting that obese subjects are more externally receptive to food cues (53). Perhaps affective responsiveness could have described an aspect of appetite that is rather immediate, being linked to the food cues present in the eating situation and, therefore, was apparent in measurements of single food intakes. In the long run, the Rorschach features implying that physical demand states influence behavior and, also, a dependency orientation could be more crucial. The difficulties in handling or holding demand states without giving way to excessive eating and dependent needs for food could have a greater everyday impact in the patients' lives than an external receptiveness to food cues. With enhanced satiety, patients with the former characteristics were more likely to reduce their food intake over a longer time period. Thus, our results also imply the identification of different aspects of personality that could exert influence in an immediate eating measurement or in prolonged everyday life, respectively. Tentatively, these findings could reflect state and trait aspects related to hunger to be further explored.

Applications

To summarize our results, a model including Rorschach data and clinical factors could predict over one-half of the weight loss in a treatment program with sibutramine plus monthly dietary advice. Patients with initial signs of difficulties with physical demand states, suggesting an inclination to give way to hunger urges, and also those with a dependent orientation lost most weight. With the help of increased satiety and perhaps also dietary advice, these patients could most optimally alter the behaviors that have earlier resulted in excess weight. Furthermore, initial weight loss, earlier known as a predictor of weight loss by sibutramine, also contributed as a predictor in the present study.

Because the sample size was small, these findings should be regarded with some caution, and a confirmation is needed in a new larger sample. The psychological findings, however, did provide possible explanations for weight loss in the context of enhanced satiety and could be of clinical utility in treatment selection. The results can also add to our understanding of the complex interplay between psychology and eating. Therefore, we suggest that the results could be regarded as a tentative model to be further considered in future research on drugs exerting their mechanisms on the appetite system.

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