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# Psychological and/or psychiatric factors present in patients who abandoned the preparation protocol for bariatric surgery

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**Original article**

## ABSTRACT

### Introduction
Severe obesity is the chronic disease with the highest prevalence around the world. It affects the life quality of patients in terms of physical and mental health. Although there are a variety of treatments for severe obesity, drop-out rates are between 40% to 80%.

### Objective
To identify the psychological and/or psychiatric factors presented in the initial evaluation of patients with severe obesity who dropped out from the preparation protocol for bariatric surgery and establish differences between them and those who did not defect.

### Method
An analytical observational, open study of cases (drop-out patients) and controls (non-drop-out patients), was carried out, of retrospective, cross-sectional character, with a sample of 286 files of patients candidates for bariatric surgery from General Hospital "Dr. Manuel Gea Gonzalez" in Mexico city selected by simple random sampling fulfilling desertion variable, with a BMI of 44.77 kg/m$^2$ ± 7.47 and 37.45 ± 9.94 years old and were selected by non-probabilistic convenience sample.

### Results
Significant differences were found: gender (men drop out more), drop-out patients showed a higher prevalence in post-traumatic stress disorder, attention deficit hyperactivity disorder, binge eating, isolation, impaired cognitive function and greater family and social dysfunction than non-drop-outs. A multivariate analysis of these factors showed that being male, having little social support, presenting binge eating disorder having a greater number of absences to appointments during treatment, are factors which contribute to attrition.

### Discussion and conclusion
There are psychological/psychiatric variables that could be established as risk factors for dropping out, increasing the possibility of affecting the patient's physical and emotional well-being.

**Keywords:** Obesity, bariatric surgery, drop-out, risk factors.

## RESUMEN

### Introducción
La obesidad severa es la enfermedad crónica con mayor prevalencia en el mundo, afectando la calidad de vida de los pacientes. Aunque existe una variedad de tratamientos para ella, las tasas de abandono de los mismos se encuentran entre el 40-80%.

### Objetivo
Identificar los factores psicológicos y/o psiquiátricos que presentaron en la evaluación inicial los pacientes con obesidad severa que desertaron del protocolo de preparación para la cirugía bariátrica y establecer diferencias con los pacientes que no desertaron.

### Método
Se llevó a cabo un estudio analítico observacional de casos (desertores) y controles (no desertores), retrospectivo, transversal, con una muestra de 286 expedientes de pacientes candidatos a cirugía bariátrica del Hospital General Dr. Manuel Gea González en la Ciudad de México, con IMC de 44.77 ± 7.47 kg/m$^2$ y una edad de 37.45 ± 9.94 años y que fueron seleccionados por muestreo no probabilístico por conveniencia.

### Resultados
Se encontraron diferencias significativas: género (los hombres desertan más), los pacientes desertores mostraron una mayor prevalencia en el trastorno por estrés postraumático, trastorno por déficit de atención e hiperactividad, trastorno por atracón, aislamiento, deterioro de las funciones cognitivas y mayor disfunción familiar y social que los no desertores. Un análisis multivariado sobre los mismos factores demostró que el ser hombre, tener poco apoyo social, presentar trastorno por atracón y tener un mayor número de faltas a sus citas durante el tratamiento, son factores contribuyentes para la deserción.

### Discusión y conclusión
Existen variables psicológicas/psiquiátricas que podrían establecerse como factores de riesgo en la deserción y como consecuencia incrementar la posibilidad de afectar el bienestar físico y emocional del paciente.

**Palabras clave:** Obesidad, deserción, cirugía bariátrica, factores de riesgo.

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## INTRODUCTION

Obesity is one of the most prevalent chronic diseases. Mexico is in the first position worldwide in relation to this ailment, according to the 2013 reports of Food and Agriculture Organization of the United Nations.[1] Morbid or severe obesity is defined as a degree of obesity characterized by a BMI≥40 kg/m$^2$ or a BMI≥35 kg/m$^2$ which is accompanied by some other disease (hypertension, diabetes, coronary problems, etc.).[2]

Etiology of severe obesity can be linked to the lifestyle a person leads: non-healthy eating habits, inadequate exercise or sedentariness, genetic, psychological, social, economic and educational factors.[3] Severe obesity is a risk factor for the development of other diseases such as diabetes *mellitus* II, dyslipidemia, arterial hypertension, cardiovascular, digestive, and respiratory diseases, bone and joint alterations, hyperuricemia, neoplasia (malignant tumors), and metabolic syndrome.[3]

Severe obesity also has an effect on all areas of a person's functioning: on a social, family and personal level;[4] it has been found that between 25% and 30% of patients with severe obesity who seek weight loss treatment suffer from some mood problem, such as depression, anxiety, development of eating disorders, sleep problems, greater levels of stress, low self-esteem, and distortion of the bodily image; this involves a deterioration of the quality of life for these persons.[5-7]

On the other side, bariatric surgery has proven to be the most efficient treatment for weight loss (between 40% to 75% loss of the excess weight) in severe obesity.[8] Patients must be subject to an assessment and preparation previous to the surgical practice, since there are psychological, biological and social components related to weight loss and changes in lifestyle.[9]

Though there is a wide variety of treatments to attain the goal of losing weight in a significant and long-lasting manner in those patients with severe obesity, their drop-out rates are between 40% and 80%.[10,11] Drop-out or attrition in the treatment contributes to maintaining or increasing the risk of chronic-degenerative diseases related to obesity12 and of psychological and psychiatric pathologies. There is evidence in medical literature that obesity patients who drop out of treatment could have some characteristic psychological or psychiatric factors.[13-16]

Therefore, the main objective of the present study was to identify the psychological and/or psychiatric factors presented in the initial evaluation of patients with severe obesity who dropped out from the preparation protocol for bariatric surgery compared to those who did not desert. The following secondary goals were set: Knowing whether some psychological and/or psychiatric variables may be identified as risk factors for attrition; identifying interactions between variables which prove significant; and, lastly, determining how many patients dropped out from the bariatric surgery preparation protocol and at which stage did they do so.

## METHOD

### Study design

An open, observational-analytic study was carried out, which was retrospective and cross-sectional with cases and controls.

### Sample description

A study was carried out with 286 files (160 cases and 126 controls) of obesity patients candidate for bariatric surgery who attended Obesity Clinic at General Hospital Dr. Manuel Gea González (Mexico City) between 2010 and 2013.

The sample size was estimated taking into account the size of the yearly average population attending the clinic ($N$ = 500) with 99% reliability (thence $Z$ = 2.58), standard deviation of the population 0.5 and the acceptable limit of sample error ranging between 1% and 9%. The following formula was used:

$$n = \frac{N\,\sigma^2\,Z^2}{(N\text{-}1)\,e^2 + \sigma^2\,Z^2}$$

$$n = \frac{500*0.5^2 * 2.58^2}{(500\text{-}1)(\pm 0.05)^2 + 0.5^2 * 2.58^2} = \frac{832.05}{2.9116} = 285.77 = 286$$

Files of patients were selected by means of a non-probabilistic convenience sample. Cases were drop-out patients which were identified by means of compliance with the desertion variable (see characteristics below) and patients who did not comply with such variable were considered as controls.

### Measurements

They were divided into four categories, sociodemographic, psychological, psychiatric, and drop-out. Sociodemographic variables taken into consideration were: year of admission to treatment, age, gender, BMI, schooling, marital status, place of residence, and medical conditions. Psychological and psychiatric variables mentioned in the bibliography as common in patients with severe obesity,[5,6] and which are assessed as part of the bariatric surgery preparation protocol in the obesity clinic, were taken into consideration. Inventories validated or prepared for Mexican population which hold adequate psychometric properties for their use within this population were used to such purpose. This information can be found in detail in table 1.

**Table 1.** Psychological, psychiatric variables, and assessment instruments

| Variables | Instruments |
|---|---|
| *Psychologicals* | |
| Depression symptoms | Beck Depression Inventory (BDI)17 version tailored for Mexican population by Jurado et al.18 Reliability coefficient .87 for Mexican population and discriminative capacity at contrasting 25% low scores versus 25% high scores. Concurring validity between BDI and self-administered depression Zung scale was r = .70. |
| Anxiety sensitivity | Anxiety Sensitivity Index (ASI) version tailored for Mexican population by Jurado19 (2002) based on the original version by Donnel and McNally (1989) and the Spanish version of Sandin, Chorot and McNally (1996). Inner reliability index of the scale is .87 for Mexico City inhabitants and has a discriminative capacity at contrasting 25% high scores versus 25% low scores and reliability test retest of .70 (up to 3 years) in Mexican population. |
| Quality of life | Quality of Life Inventory (INCAVISA).20 Its reliability coefficient goes from .9337 for the everyday life area to .6831 for attitude to treatment and has shown a concurring validity with OMS-QoL Bref (WHO quality of life instrument) in the version adapted for Mexico by Sánchez-Sosa, González-Celis.[20] |
| Risk factors associated to eating disorders | Risk Factors Associated to Eating Disorders Scale (EFRATA).[21] Reliability coefficient for male version is .86 and .88 for female version. For the validity of the instrument, a factor analysis was carried out of the main components with VARIMAX rotation to a total of 1494 male and a total of 1915 female patients. |
| Motivation and expectations | Semi-structured interview which allows for classification of the patient's motivation regarding their goal for undergoing surgery (health, image, job...) and to identify whether or not their expectations are realistic. |
| *Psychiatrics* | |
| Main psychiatric disorders of axis I | Mini International Neuropsychiatric Interview (MINI) version translated to Spanish by Ferrando, Bobes, Gibert, Soto22 in 1999. A structured interview which explores symptoms compatible with DSM IV-TR for psychopathology. |
| Attention Deficit Hyperactivity Disorder in the adult | Validated for the Mexican population by Reyes et al.[23] in 2009. This instrument is related with the frequency in adult life of ADHD symptoms according to criterion A of DSM-IV-TR. This DSM-IV-TR criterion is made up of 18 items conforming 3 factors: inattention, impulsivity and hyperactivity. Scale proved having high internal consistency ($\alpha$ = .88). |
| Binge Eating Disorder | Interview structured with criteria for binge eating disorder according to DSM-IV TR. |

The main psychiatric disorders of Axis I which were assessed were as follows: major depressive episode, dysthymic disorder, risk of suicide, manic episode, distress disorder, agoraphobia, social phobia, obsessive-compulsive disorder, posttraumatic stress disorder, alcohol dependence, alcohol abuse, substance dependence, substance abuse, psychotic disorders, anorexia nervosa, bulimia nervosa, generalized anxiety disorder and antisocial personality disorder.

Finally, the drop-out variable[12,16,24,25] for considering that a patient dropped out treatment was: when they had at least three consecutive absences and did not make an appointment with any of the specialists in the clinic in the following months; did not attend any date with the clinic specialists in a period three months of longer; that the patients themselves mentioned they did not want to pursue this treatment. When these characteristics were fulfilled, the patient was identified as drop-out. A patient was considered non-drop-out from the bariatric surgery preparation protocol if they had already undergone surgery or else, if they had not missed over three appointments in any service and had appointments scheduled in all services in the next two months.

Within the drop-out variable, the number of absences was taken into account, as well as the time when the patient dropped out or abandoned treatment; this was made attempting to identify intervention opportunities adequate to the moment most prone to the occurrence of attrition. For the present study, three different drop-out moments were identified: 1) Diagnosis phase (patient dropped out after initial psychological assessment and before starting the bariatric surgery preparation protocol); 2) Pre-surgery preparation phase (once the bariatric surgery preparation protocol has started –appointments with various specialists– and before being approved by the committee for undergoing surgery), and 3) Bariatric surgery phase (patient who concluded the preparation protocol but who did not undergo surgery).

## Procedure

Data collection as carried out by the head researcher by means of a checklist which includes the study variables. 362 files were checked to identify compliance with the inclusion criteria hereby described: any gender, patients with severe obesity (BMI40≥kg/$m^2$ or BMI≥35 kg/$m^2$), aged between 18 and 65 years, having completed the initial interview and battery of tests. Those files which did not comply with such criteria and patients referred to another treating institution for not being considered suitable candidates to bariatric surgery, due to absolute contraindications (such as dependence to alcohol or other drugs, tobacco addiction, schizophrenia or suicide risk) were excluded from the study (76 patients in all), with a total of 286 for the final analysis. Once enough files had been collected and verified for compliance of the criteria specified, identification of variables in cases and controls followed (figure 1).

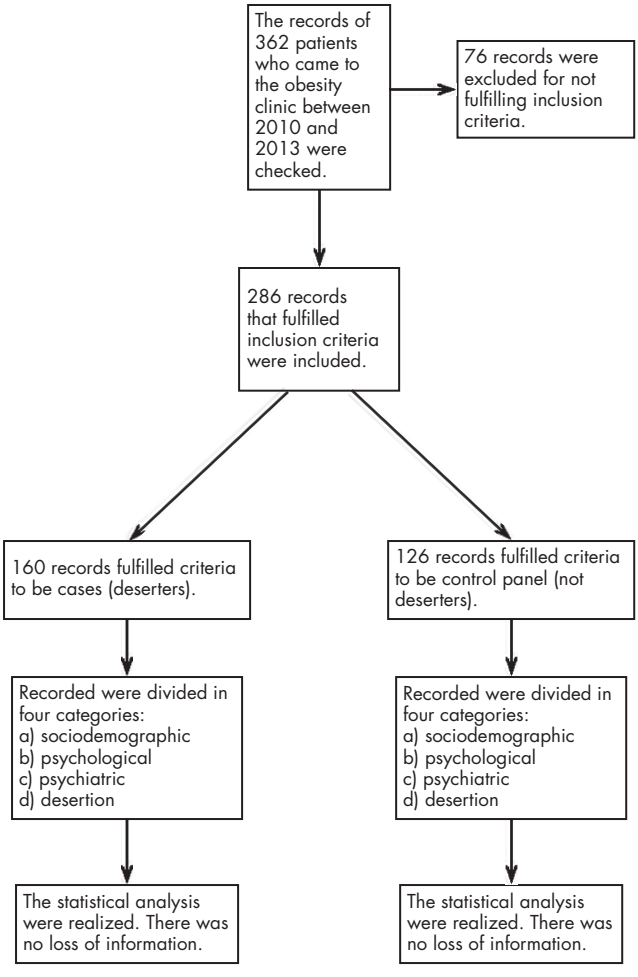


**Figure 1.** Flowchart of procedures.

## Statistical analysis

For data validation, descriptive statistics (frequency and percentage tables) were used for relevant variables. For independent sample comparison groups (cases and controls), Chi Square, Mann Whitney U and Student t tests were carried out. To identify interactions, an R classification was performed, and in the end, multivariate analysis by logistic regression, using variables which had been previously significant in bivariate logistic analyses. SPSS version 17.0 and STATA version 13.0 statistics packages were used. A result was considered to be statistically significant when p<.05, subject to its limitations;[26] robust estimates were also obtained for standard deviation of the parameters (*Bootstrap*) and the results remain unchanged.

## Ethical considerations

This protocol was approved by the Ethics and Research Commissions at General Hospital Dr. Manuel Gea González and all procedures were in agreement with the stipulations of the Regulations of the General Health Act regarding Health Research. Title II, Chapter I, Article 17, Section II, non-risk research, which thence not demanded an informed consent since the research materials were gathered from descriptive and retrospective information from the database at the obesity clinic.

# RESULTS

286 patient files were included in the study (20.6% male and 79.4% female) with a BMI 44.77 ± 7.47 kg/$m^2$ and an average age 37.45 ± 9.94 years. Patients came from different states in the Mexican Republic (73.1% from Mexico City and 26.9% from outside the capital city). 49.7% were single and 33.9% married; 41.3% had a job. Regarding medical conditions with comorbidity with severe obesity, 25.2% had high arterial hypertension, followed by 16.1% with diabetes, 13.6% dyslipidemia and 11.9% hypothyroidism.

Gender was taken as a confusing variable, carrying out thence the adjustment without considering it as well as separate adjustments; similar results were obtained in all three cases (with no significant differences in the value of estimators). However, it is important to point out that, being a smaller sample of men, at adjusting the model only for men, some of the parameters might lose significance.

Considering this, some significant differences were found in some of the variables studied between cases (drop-out patients) and controls (non-drop-out patients). To be precise, sociodemographic variables which were significant between drop-outs and non-drop-outs were Admission year $\chi^2$ (3, N = 286) = 10.16, $p$ = .017 and gender $\chi^2$ (1, $N$ = 286) = 8.65, $p$ = .003. As to psychological factors,

**Table 2.** Variables which were significant when comparing cases (drop-out patients) and controls (non-drop-out patients)

| Variables | Cases *f* (%) | Controls *f* (%) | *p* |
|---|---|---|---|
| Year of admission | | | |
| 2010 | 41 (26.0) | 32 (25.0) | .017 |
| 2011 | 35 (22.0) | 16 (13.0) | |
| 2012 | 52 (33.0) | 33 (26.0) | |
| 2013 | 32 (20.0) | 45 (36.0) | |
| Gender | | | |
| Women | 117 (73.1) | 110 (87.3) | .003 |
| Men | 43 (26.9) | 16 (12.7) | |
| Posttraumatic Stress Disorder | 11 (6.9) | 2 (1.6) | .033 |
| Adult Attention Deficit Hyperactivity Disorder | 41 (25.6) | 20 (15.9) | .046 |
| Binge Eating Disorder | 46 (28.8) | 22 (17.5) | .026 |
| Isolatien (InCaViSa) | 111 (69.4) | 105 (83.3) | .010 |
| Cognitive functions (InCaViSa) | 75 (46.9) | 79 (62.7) | .033 |
| Family (InCaViSa) | 124 (77.5) | 110 (87.3) | .026 |
| Social networks (InCaViSa) | 97 (60.6) | 100 (79.4) | .000 |
| Number of absences | | | |
| 0 | 52 (32.5) | 74 (58.7) | .000 |
| 1 | 63 (39.4) | 38 (30.2) | |
| 2 | 21 (13.1) | 8 (6.3) | |
| 7 | 1 (0.6) | 1 (0.8) | |

$p < .05$.

isolation $U = 8729$, $z = -2.59$, $p = .010$; cognitive functions $U = 8746$, $z = -2.12$, $p = .033$; family $U = 9039$, $z = -2.23$, $p = .026$; and social networks $U = 8038$, $z = -3.60$, $p = .000$.

Also, posttraumatic stress disorder $\chi^2$ (1, $N = 286$) = 4.54, $p = .033$, adult attention deficit hyperactivity disorder $\chi^2$ (1, $N = 286$) = 3.99, $p = .046$ and binge eating disorder $\chi^2$ (1, $N = 286$) = 4.95, $p = .026$ (psychiatric factors) were significant between drop-outs and non-drop-outs. Finally, number of appointments missed is an important variable which makes a difference between cases and controls with $t$ (284) = 4.34, $p = .000$. Table 2 shows the results.

With the intention of explaining and predicting the probability of a patient dropping out or not based on sociodemographic, psychological and psychiatric factors, a logistic regression analysis was carried out. To determine which variables to include in the multivariate model, bivariate analyses were carried out with all explicative variables and later the variable selection method was used with those which were significant. Thus, ADHD and family, which were significant in the bivariate model, were not significant in the multivariate model. Table 3 shows the data obtained.

Results show that having little support in the social network area assessed by the InCaViSa (Inventory of Quality of Life and Health) (*CM* = 4.16) and a greater number of absences (*CM* = 1.66) are the best predictors for attrition. For example, regarding absences, for each appointment that the patient misses, the drop-out risk increases in 66%. Being female and not being a binge eater are protection factors for drop-out. The rest of the sociodemographic variables and psychological and psychiatric factors were not significant predictors for attrition.

Interactions were also assessed, particularly those between gender and different variables, though none was significant. However, in the R classification tree (figure 2), interactions of gender with other variables were considered, such as the fact that female patients with more than one absence who showed high perception in the isolation, worrying and cognitive functions variables (InCaViSa), as well as distorted expectations regarding the surgery and arterial hypertension tended to drop out.

Finally, the largest percentage of desertion appeared in the preparation phase with 60%, followed by the diagnostic phase (29%) and 11% of the patients dropped out once the treatment had concluded and they were ready to undergo surgery, though they did not do it. As to non-drop-out patients, those who did undergo surgery, 70% had already undergone gastric bypass, 7% underwent a gastric sleeve resection and 23% of patients was still in the program at the time of data dump.

**Table 3.** Results of logistic regressions carried out with relevant variables

| | Odds Ratio | | Confidence Interval | |
|---|---|---|---|---|
| | Bivariate model | Multivariate model | Univariate | Multivariate |
| Gender | 2.5267 | 2.9237 | 1.3454, 4.7452 | 1.5068, 5.6729 |
| Networks | 4.0601 | 4.1644 | 1.6207, 10.1715 | 1.6029, 10.8189 |
| Binge | 0.5242 | 0.4762 | 0.2955, 0.9301 | 0.2584, 0.8773 |
| Absences | 1.7119 | 1.6648 | 1.3174, 2.2244 | 1.2748, 2.1741 |
| ADHD | 0.7225 | | 0.3778, 1.3818 | |
| Family | 1.6275 | | 1.0467, 2.5304 | |

Odds ratios (OR) and 95% confidence intervals (CI) were obtained from a logistic regression model with attrition as dichotomous outcome variable and gender, social networks, binge eating disorder, number of absences as predictors in the multivariate model and each of the variables in the bivariate model.

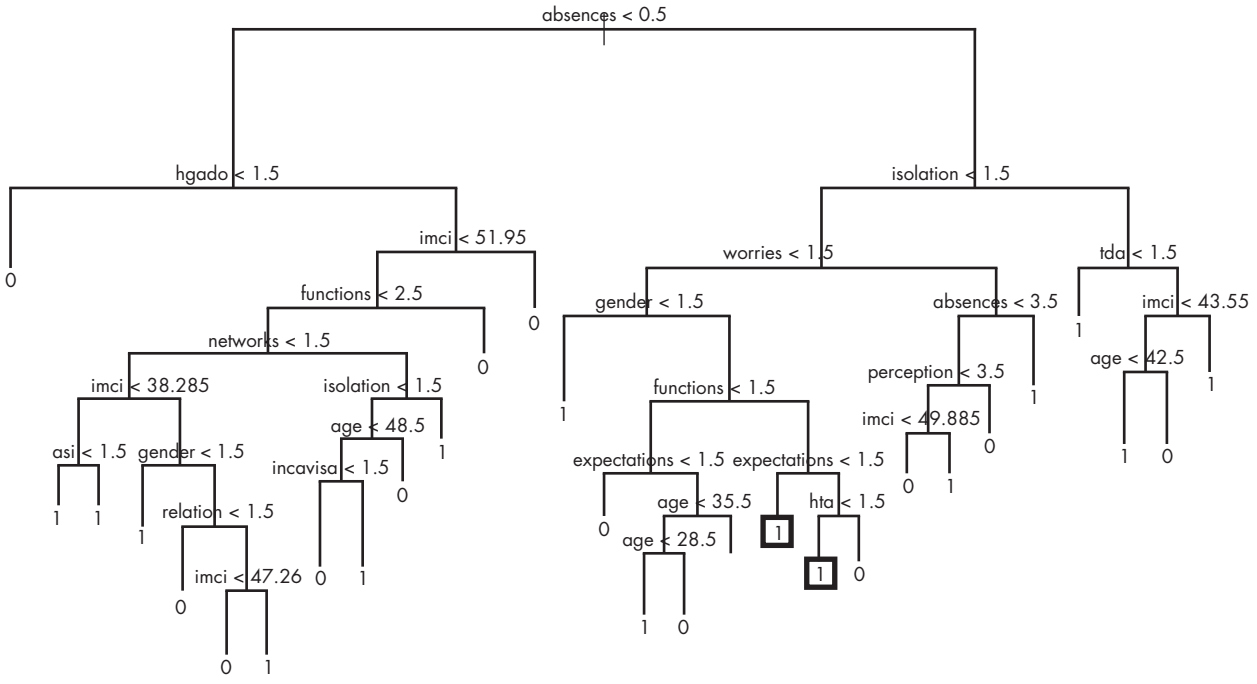


**Figure 2.** Classification tree for identification of probabilities of desertion and not desertion.

## DISCUSSION AND CONCLUSION

The objective of the present work was to identify the psychological and/or psychiatric factors presented in the initial evaluation of patients with severe obesity who dropped out from the preparation protocol for bariatric surgery compared to those who did not defect. In this regard, results showed that the year of admission, gender, number of absences, posttraumatic stress disorder, ADHD in adults, binge eating disorder and some InCaViSa variables such as isolation, cognitive functions, family and social networking were significant variables in the comparison made between cases (drop-out patients) and controls (non-drop out patients).

Regarding the year of admission, 2012 showed a greater percentage of patients who dropped out compared with the year 2013, when the lowest attrition rate appears; these results can probably be explained on account of the improvements at the obesity clinic attention service. On the other hand, regarding gender, it was shown that men, despite being a minority within the treatment, had a greater, significant probability of defecting than women.

Psychological variables which were significant between cases and controls were those assessed by InCaViSa, which showed that patients who dropped out tend to be more isolated, to show worse results in cognitive functions and to have greater dysfunction in their relationship with family and social networks that those who did not drop out. These results show the importance of family and social networks for the support of the obesity patient during treatment, since they promote their adherence to it. Therefore, social support is a relevant factor in the achievement of goals set during treatment and, thence, it deserves closer attention in future research. In this regard, one of the predictors of greater import in adhering to treatment and on attrition is the degree of social support as perceived by the patient from friends and family; thus, people who see themselves as isolated from others tend to not comply with instructions, as opposed to those who perceive social support, who seem to have a greater readiness to continue treatment.[27]

The rest of psychological variables were not significant for this study. Notwithstanding, in general, symptoms of depression, sensitivity to anxiety, low quality of life, risk factors associated to eating disorders (specially worrying about weight and food), were more frequent in patients who dropped out than in those who did not.

As to psychiatric comorbidity, posttraumatic stress disorder was significant among cases and controls, which is in accordance with the data presented by Sockalingam et al.,[16] where drop-out patients showed significantly greater rates for this disorder than patients who did not drop-out. As to this variable, posttraumatic stress disorder could be related with the history of sexual abuse that some patients referred to have experienced in childhood. A study[28] showed that 18% of the female participants confessed to have survived sexual abuse before the age of 16, showing twice as much

risk of presenting symptoms of eating disorders, with an obviously negative perception of their bodies. The author of this study insists on declaring that fear to be in an affective-sexual relationship causes some people to eat too much with the purpose of gaining weight and thence being less attractive to the opposite gender.

Other psychiatric variables which were significant among the groups was attention deficit hyperactivity disorder in the adult and binge eating disorder, showing greater prevalence in the patients who dropped out than in those who did not drop out. However, it is important to point out that the results related to these two disorders are different from those found in other research works, such as Sockalingam et al.[16] who did not find significant differences in those variables in drop-out patients *vs* those who did not drop out; it is thence important to explore in depth both variables in future works by means of more precise research tools for diagnosis and classification.

The rest of the psychiatric factors assessed in this study did not show significant differences between groups; nonetheless, there is greater prevalence in drop-out patients when compared to non-drop-outs. Finally, number of missing appointments with specialists in the obesity clinic was also significant among drop-outs and non-drop-outs, since drop-out patients have more absences that those who did not withdraw from the program.

Another interesting result of this study was the identification of variables which could explain and predict the probability for a patient to drop out or not. In this case, it is acknowledged that being male, having a greater number of absences, binge eating disorder, and a deficient perception regarding social networks are risk factors associated to attrition. The importance of these findings lies in their contribution at selecting assessment instruments which allow for better identification of risk factors for attrition in patients who are candidate for surgery, while making it possible to generate strategies from the beginning of the treatment which reduce the possibility of the patient's attrition.

Last, there was an attempt to identify how many patients had dropped out from the bariatric surgery preparation protocol and at what stage. In this regard, the findings of this research determined that 55.9% of patients candidate for bariatric surgery withdrew from treatment; 60% of those patients withdrew in the preparation phase, i.e., they were patients who were already part of the program and who had appointments scheduled with more than one specialist and who even attended those appointments in more than one occasion. Thanks to these results, it can be seen that strategies for reducing the probability of attrition must lead to modifying and/or improving at this phase, involving all specialists who take part in the multidisciplinary team at the obesity clinic.

Results of the present study must be interpreted bearing in mind certain limitations.

The present study does not analyze all variables reported as risk factors for attrition; thence it would be important to consider other factors which may have an influence, such as sexual abuse, perceived stress or personality traits.

It is also important to mention that, after the initial assessment, the participants of this study were subject to a tailor-made cognitive-behavioral psychological intervention and to multidisciplinary (not only psychological) treatment as part of the bariatric surgery preparation hospital protocol. It is possible that some of these treatments generated bias that were not considered while carrying out this study.

Another limitation regards the design of the study (retrospective) and the data collection method (subjective self-reports), considering that the answers given might be influenced by social desirability, attempts of manipulation by the patient to be chosen as candidate for surgery and other biases.

Cross-sectional nature of the study does not allow for causality inferences or for observing change in the variables assessed for some period of time. It is suggested that longitudinal studies be carried out in order to obtain information regarding the behavior of the variables analyzed.

Finally, the findings of this research cannot be generalized since the information was obtained from a single sample of patients attending a secondary care hospital.

Based on the results found and the discussion presented here, the following suggestions are made to lower the probability of attrition and to improve the selection of patients with severe obesity who are candidates for bariatric surgery:[29]

- Improve and maintain the quality of the medical and administrative attention of severe obesity patients, offering clear and appropriate information in relation to treatment, including the average time that the preparation protocol involves and the objectives sought.
- Identify the reasons why the patients withdrew from the pre-surgery protocol at the three stages (diagnosis, preparation and surgery phases) by means of surveys or questionnaires (qualitative study).
- Perform a survival analysis which allows for determining the rhythm of attrition of patients.
- Design a "phone rescue" procedure for drop-out patients.
- Design specific assessment instruments to measure and identify psychological and psychiatric variables relevant to this particular population or, by default, validate the inventories available for populations other than the Mexican.
- Implement treatments which have proven the best level of evidence for the most frequent psychopathologies in drop-out patients, such as neurotherapy[30] for ADHD patients and mindfulness or dialectical behavior therapy[31] for binge eating disorder.

– Promote that the patient's family be involved in treatment to foster commitment and education in their social networks.

In spite of its limitations, the results of the present study suggest that psychological/psychiatric factors, such as poor perception of social support and binge eating disorder could be established as risk factors for attrition. It is important to identify such problems and offer efficient treatment for their remission in order to increase the probability for a patient to modify their lifestyles and to get health benefits.

Thus, one can underscore the importance of adapting in an individual manner those strategies for handling obesity for each patient and their particular situation. In this sense, the need is perceived to identify in depth those psychological and psychiatric factors which may be associated to attrition and thus be able to try new treatment strategies which may help the patients to improve their therapeutic adherence and thus improve their overall health condition.

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None.

## Conflict of interest

Authors hereby declare to have no conflict of interest whatsoever.

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## REFERENCES

1. **The State of Food and Agriculture. Food and Agriculture Organization of the united nations. Roma: 2013.**
2. **Sandoval M. Obesidad: definición, clasificación, sintomatología y diagnóstico. En: Morales J (ed). Obesidad. Un enfoque multidisciplinario. México: Ciencia al Día; 2010.**
3. **Silencio J. Enfermedades y fármacos que favorecen la obesidad. En: Morales J (ed). Obesidad. Un enfoque multidisciplinario. México: Ciencia al Día; 2010.**
4. **Castillo R, Azuara H, Ruiz J, Garza M et al. Tratamiento quirúrgico de la obesidad y control de peso. Rev Salud Tabasco 2004;10:233-242.**
5. **Abilés V, Rodríguez S, Abilés J, Mellado C et al. Psychological characteristics of morbidly obese candidates. Obes Surg 2010;20:161-167.**
6. **Sierra M, Vite A, Ramos V, López J et al. Psychosocial profile of bariatric surgery candidates and the correlation between obesity level and psychological variables. Int J Psychol Psychol Ther 2012;12:405-414.**
7. **Vázquez V. ¿Cuáles son los problemas psicológicos, sociales y familiares que deben ser considerados en el diagnóstico y tratamiento del paciente obeso? Rev Endocrinol Nutr 2004;2:136-142.**
8. **Rodríguez L, Vega M. Cirugía bariátrica: tratamiento de elección para la obesidad mórbida. Acta Méd Costarric 2006;48:162-171.**
9. **LeMont D, Moorehead M, Parish M, Reto C et al. Suggestions for the pre-surgical psychological assessment of bariatric surgery candidates. American Society for Bariatric Surgery; 2004; https://asmbs.org/wp/uploads/2014/05/PsychPreSurgicalAssessmet.pdf**
10. **Brosens C. Barreras en la adherencia al tratamiento de la obesidad. Evid Actual Práct Ambul 2009;12:116-117.**
11. **Huisman S, Maes S, De Gucht V, Chatrou M et al. Low goal ownership predicts drop-out from a weight intervention study in overweight patients with type 2 diabetes. Int J Behav Med 2010;17:176-181.**
12. **Sámano L. Abandono del tratamiento dietético en pacientes diagnosticados con en un consultorio privado de nutrición. Nutr Clín Diet Hosp 2011;31:15-19.**
13. **Inelmen E, Toffanello E, Enzi G, Gasparini G et al. Predictors of drop-out in overweight and obese outpatients. Int J Obesity 2005;29:122-128.**
14. **Ahnis A, Riedl A, Figura A, Steinhagen-Thiessen E et al. Psychological and sociodemographic predictors of premature discontinuation of a 1-year multimodal outpatient weight-reduction program: an attrition analysis. Patient Preference Adherence 2012;6:165-177.**
15. **Merrell J, Ashton K, Windover A, Heinberg L. Psychological risk may influence drop-out prior to bariatric surgery. Surg Obes Relat Dis 2012;8:463-469.**
16. **Sockalingam S, Cassin S, Crawford SA, Pitzul K et al. Psychiatric predictors of surgery non-completion following suitability assessment for bariatric surgery. Obes Surg 2013;23:205-211.**
17. **Beck AT, Steer RA, Garbin MC. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clin Psychol Rev 1988;8:77-100.**
18. **Jurado S, Villegas E, Méndez L, Rodríguez F et al. La estandarización del Inventario de Depresión de Beck para los residentes de la Ciudad de México. Salud Ment 1998;21:26-31.**
19. **Taylor S, Zvolensky M, Cox B, Deacon B et al. Robust dimensions of anxiety sensitivity development and initial validation of the anxiety sensitivity Index-3. Psychol Assesment 2007;19:176-188.**
20. **Riveros A, Sánchez-Sosa J, Del Águila M. Inventario de calidad de vida y salud (InCaViSa). México: Manual Moderno; 2009.**
21. **Gómez Pérez-Mitre G. Escala de factores de riesgo asociados a trastornos de la conducta alimentaria. Prevención primaria y factores de riesgo de trastornos alimentarios, IN-305599 (PAPIT) UNAM, 34507 H (CONACYT): México; 2009.**
22. **Sheehan D, Lecrubier Y. Mini International Neuropsychiatric Interview. Versión en español 5.0.0. México: Instituto Nacional de Psiquiatría; 2000.**
23. **Reyes E, Cárdenas E, García K, Aguilar N et al. Validación de constructo de la escala de autorreporte del trastorno por déficit de atención con hiperactividad (TDAH) en el adulto de la Organización Mundial de la Salud en población universitaria mexicana. Salud Ment 2009;32:343-350.**
24. **Vargas F, Tiellet M. Razões expressas para o abandono de tratamento psicoterápico. Aletheia 2003;17-18:155-158.**
25. **Vinkers C, Adriaanse M, De Ridder D. In it for the long haul: characteristics of early and late drop out in a self-management intervention for weight control. J Behav Med 2013;36:520-530.**
26. **Halsey L, Curran-Everett D, Vowler S, Drummond G. The fickle P value generates irreproducible results. Nature Methods 2015;12:179-185.**
27. **Orozco A. Factores que influyen en la adherencia a tratamientos farmacológicos y no farmacológicos en los pacientes inscritos en el Programa de control de la hipertensión arterial de la Unidad Básica de**

**Atención de COOMEVA. Barranquilla: Salud Uninorte 2010;26:201-211.**

28. **Morín R. Obesidad y sexualidad. Rev Trab Soc 2008;18:4-13.**
29. **Hotz S, Kaptein A, Pruitt S, Sánchez-Sosa J et al. Behavioural mechanisms explaining adherence. What every health professional should know. En: Sabate E (ed.). Adherence to long term therapies: Evidence for action. Geneva: World Health Organization; 2003; pp. 135-139.**
30. **Moore N. The neurotherapy of anxiety disorders. J Adult Dev 2005;12:147-154.**
31. **Safer D, Telch C, Chen E. Dialectical behavior therapy for binge eating and bulimia. Nueva York: The Guilford Press; 2009.**