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Research Article

Effect of early or late nutritional intervention with psychological support on symptoms associated with Anorexia Nervosa: a comparative study

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ABSTRACT

Introduction: Anorexia nervosa (AN) is a disease with increasing incidence and prevalence, favored by biological, psychological, familial, and social factors. Management must be interdisciplinary, involving the intervention of nutritionists and psychologists. Additionally, it is important to evaluate the effect of an early or a late onset of the intervention. **Objective:** To determine if early nutrition-based intervention along with psychological support leads to a decrease in the symptoms associated with Anorexia Nervosa, when compared with late intervention. **Methods:** To evaluate the above parameters, an exploratory study was proposed with a design of non-randomized clinical trial and a non-probability purposive sampling of n = 17 women with AN between 12 and 25 years of age ($\bar{x}$ = 16.8 ± 3.6). According to the moment of the nutritional intervention with psychological support, the 17 women were divided into two groups: Group 1 (n = 10) start the intervention in the first six months after the onset of the disease while Group 2 (n = 7) started 3 years after the disease. The nutritional and psychological carried out consisted of three phases: individualized nutritional assessment, design of the meal plan according to the metabolic needs of each patient and nutritional indications, and an individualized psychological intervention. Both interventions were carried out once a week for six months, for a total of 24 psychological and nutritional sessions. The physical variables of body mass index (BMI) and arm muscle area (AMA) were measured. To assess emotional changes, the body image dissatisfaction subscale of the Eating Disorder Inventory (EDI) was used. **Results:** Six months after follow-up, the results showed statistically significant changes in the BMI ($p <,0.01$), AMA ($p <,0.01$) and body image dissatisfaction ($p <,0.01$) after the intervention. It was found that the early-intervention group presented lower values in BMI and AMA as compared to the late-intervention patients while both groups showed a marked reduction in body image dissatisfaction values. The late-intervention group presented the sharpest reduction. There was no significant difference in the variables BMI and AMA in the intragroup comparisons. **Conclusion:** The early-onset nutritional intervention with psychological support decreased the physical and emotional symptoms associated with AN.

Key words: anorexia nervosa; nutrition disorder; psychology; early intervention; late intervention.

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RESUMEN

Introducción: La anorexia nerviosa (AN) es un padecimiento cuya incidencia y prevalencia va en aumento, favorecido por factores biológicos, psicológicos, familiares y sociales. Por lo anterior, el manejo debe ser interdisciplinario e involucrar la intervención no solo de nutriólogos sino también de psicólogos que apoyen el estado emocional del paciente. Además se debe analizar cuál es el efecto de estas intervenciones cuando se inician de forma temprana o tardía. **Objetivo:** Determinar si una intervención nutricional con apoyo psicológico de inicio temprano produce una disminución de la sintomatología asociada a la Anorexia Nerviosa en comparación con una intervención tardía. **Métodos:** Con la finalidad de evaluar los parámetros anteriores, se planteó un estudio exploratorio con diseño de ensayo clínico no aleatorizado y una muestra no probabilística intencional de n = 17 mujeres con AN entre las edades de 12 y 25 años ($\bar{x}$ = 16.8 ± 3.6). De acuerdo con el momento de la intervención nutricional con apoyo psicológico, se dividió las 17 mujeres en dos grupos: el Grupo 1 (n = 10) inició la intervención en los primeros seis meses posteriores al inicio del padecimiento y el Grupo 2 (n = 7) inició 3 años después del padecimiento. Se realizó una intervención nutricional de tres fases: valoración nutricional individualizada, diseño del plan de alimentación según las necesidades metabólicas de cada paciente e indicaciones nutricionales y una intervención psicológica individualizada. Ambas intervenciones se llevaron a cabo una vez por semana durante seis meses (un total de 24 sesiones de psicología y nutrición). Para conocer el efecto de la intervención se midieron las variables físicas de índice de masa corporal (IMC), y área muscular de brazo (AMB). Para medir los cambios emocionales se utilizó la subescala de insatisfacción corporal del Inventario de desórdenes de alimentación (EDI). **Resultados:** A los seis meses de seguimiento, los resultados mostraron que el grupo de inicio temprano presentó valores significativamente menores en IMC ($p < 0.01$) y AMB ($p < 0.01$) en comparación con el grupo de intervención con inicio tardío. Ambos grupos presentaron una disminución significativa en la variable de insatisfacción corporal con respecto a sus valores basales ($p < 0.01$), pero el grupo de inicio tardío presentó una mayor disminución. No hubo diferencia significativa en las variables IMC y AMB en las comparaciones intragrupales. **Conclusión:** La intervención temprana nutricional con apoyo psicológico disminuyó la sintomatología física y emocional asociada a la AN.

Palabras clave: anorexia nerviosa; desorden nutricional; psicología; intervención temprana; intervención tardía.

INTRODUCTION

Anorexia nervosa (AN) is the most common psychiatric disease among young women. The studies report a prevalence of 1.7% in women against 0.1% in men.[1] As the eating disorder most often seen in adolescent females, AN is characterized by a refusal to maintain a minimally normal body weight. This behavior is due to self-imposed severe dietary restrictions or other weight-loss actions, such as purging or excessive physical activity, motivated by an intense fear of weight gain and distorted body image.[2,3] This disease shows a large variability in its presentation and severity, which conditions different therapeutic approaches and the need to individualize the treatment. Therefore, a multidisciplinary approach is necessary.[4] AN is considered the third most common chronic disease in girls between the ages of 15 and 19 and affects 0.5% of adolescent girls in western countries.[5] Mortality is increased in AN patients, usually due to starvation-related medical problems, particularly heart-related complications and severe infections.[2] Although AN occurs mainly in adolescence, a trend has now been observed to occur in both preadolescents and later ages (after 20 years); individuals aged 10–29 years reported to account for almost 100% of cases.[6] Biological, psychological, familial, social, and cultural factors determine the origin of AN and act as predisposing, triggering, or maintaining aspects of the disease, considered a multifactorial disorder.

It is necessary to implement a therapeutic intervention against AN at an early stage of the disease due to its clinical characteristics, etiology, increasing incidence, costly treatment, and morbidity and mortality rates of adolescent girls in western countries.[2] The treatment of AN requires a multidisciplinary approach that includes pediatricians, nutritionists, and psychologists. The therapeutic approaches vary depending on the patient's condition but have the common purpose of refeeding the patient and improving their psychological functions.[7] Psychological therapy plays a central role in identifying the basis for concerns about weight gain and alterations in food intake.[8] This is the reason why the initial focus is behavioral change supported by changes in family dynamics that allow risk behaviors to be identified.[9] Early therapy in individuals with AN may have significant benefits and lead to sustained weight gain.[10] Consequently, the gain above 1.8 Kg in the first 4 weeks of treatment increases the recovery rate at 12 months.[11]

It is important to highlight the role that the environment plays in individuals suffering from AN and the need for a family support network, particularly in young populations.[10–12]

This study aimed to find out whether nutritional intervention (calorie supply according to metabolic needs) with

psychological support effectively reduces the symptoms associated with AN. Additionally, the investigation intended to determine if there are differences between the early or late start of this intervention.

MATERIALS AND METHODS

Informed consent was obtained from the patients prior to their participation in the study. The parents of patients under the age of 18 signed the consent and the minors had to agree to participate in the study. The study was conducted in accordance with the ethical principles specified in the Declaration of Helsinki and Good Clinical Practice guidelines. It was approved by the institutional review board and the research committee (number of registration: 201315) before its start.

Study design: As this is an exploratory study, no sample size was calculated. In this first stage, a non-probability purposive sample of 17 patients. Ten patients had an early nutritional intervention with psychological support during the first six months after the onset of the disease. The other seven received a late nutritional intervention with psychological support three years after the onset of the condition. This sample size allowed the detection of an effect size of 0.1 or larger.

Study population: Patients were eligible for participation if they were between ages 12 and 25 and required no hospitalization. The inclusion criteria included: diagnosis of restrictive or purgative AN, female gender, BMI in 3–25 percentiles according to the NIH growth charts[13], and minimum schooling of 5th grade to read the instructions and understand the reagents of the tests and questionnaires applied. The exclusion criteria were patients who presented risky eating behaviors, received nutritional treatment in the last six months prior to the start of the study, were outside the proposed age range, had a borderline or psychopathic personality disorder, suffered euthyroid sick syndrome, and received previous pharmacological treatment.

Procedure: A complete assessment (individual interview) was carried out to select the subjects. Once the diagnosis was obtained, patients who met the inclusion criteria were invited to participate in the study. All the patients provided their informed consent and, if they were underaged, their parents' approval was requested. The nutritional treatment began was provided for six months, once a week in 30-minute sessions with each patient as follows:

1. The Nutrition intervention included an meal plan that met the energy requirements of each patient to recover body composition by weight. Likewise, the nutritional goals for the patient and the family at home were established.
2. The anthropometric evaluation of BMI[14] and AMA[15] followed the Manual of Procedures of the Ministry of Health, Mexico (2002).

The study subjects were weighed and measured; then, the BMI was calculated as follows:

$$\frac{Weight\ (Kg)}{Height\ (mts)^2} = Body\ Mass\ Index\ (BMI) \qquad (14)$$

For the measurement of the AMA, the triceps fold was taken by the thumb and index finger on the posterior midline of the upper arm at the mid-acromiale-radiale site; it was taken vertically and parallel to the longitudinal axis of the arm. The arm circumference was taken at the midpoint between the acromion and the olecranon; the tape was placed perpendicular to the longitudinal axis of the humerus, the elbow was extended, and the muscles relaxed. Subsequently, the AMA was calculated with the following formula:

$$MAC-(\pi \times TSF)]\ 2/4\pi = Arm\ Muscle\ Area\ (cm^2) \qquad (15)$$

MAC = Arm circumference.

TSF = Tricipital skinfold.

3. Attendance to a therapeutic dining room reestablished the eating pattern and aimed to reintroduce different foods and preparations as well as eliminate inappropriate behaviors at mealtimes, such as breaking food into very small pieces, hiding food, cleaning fat from food, and spreading food.
4. During the psychological support (45-minute sessions), the patient worked with the internal conflicts manifested through the eating behavior and concern for their body, managing to communicate what happened to them through words.
5 At the end of the six-month treatment, a psychological and nutritional evaluation was carried out to observe possible changes.

Evaluation Measure: For the evaluation of emotional symptoms, the Eating Disorders Inventory (EDI) test was used. The EDI-1 consists of 64 items with six response options (never, almost never, sometimes, quite a bit, almost always, and always). The first three options are scored 0 and the last three, on a continuum from 1 to 3, respectively. The items are grouped into eight subscales; however, for the purposes of this research, only body image dissatisfaction was analyzed. For the evaluation of the physical symptoms, BMI and AMA were used.[16]

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Statistical analysis

For the statistical analysis, Prisma GraphPad was used. A Mann–Whitney U test evaluated the difference between the groups, assessing weight and BMI, AMA, and body image dissatisfaction. Additionally, a Wilcoxon test was used to perform intragrupal analysis. To calculate the size of the effect, we used Rosenthal's r effect size for data with non-normal distribution. This test can be used alongside Mann–Whitney U-test results.

RESULTS

Patient Demographics: seventeen female patients were included in this study, all of them diagnosed with AN, single, and aged between 12 and 25 years (12 minors and 5 adults) (16.8235 ± 3.66120; $\bar{x}$ ± SD) (Table 1). Nearly half of the participants (47%) reported secondary schooling; 29.4%, high school; and 23.5%, undergraduate degree. Most of them were students (88.2%) and 11.8% were professionals. Regarding the initial nutritional status, the participants presented a minimum weight of 25.9 kg and a maximum weight of 52.7 kg (41.62 ± 7.115; $\bar{x}$ ± SD) (Table 1).

Improvement assessments: To observe if there was a significant difference between the early- and late-intervention groups (intergroup comparison), a Mann–Whitney U test was performed. Figure 1 shows that, at the baseline, both groups presented similar BMI values ($p > 0.05$). Six months later, early-intervention patients showed a lower BMI as compared to the late-intervention group ($p < 0.01$). In order to strengthen these results, we calculated Rosenthal's r effect size (clinical efficacy of the intervention). The results showed a large size effect in the early-intervention group ($r = 0.68$). There was no significant difference when comparing baseline versus six-month values in each studied group ($p > 0.05$).

In the case of AMA, the groups also started with similar basal values ($p > 0.05$; Figure 2); however, six months later, the early-intervention group presented the lowest values ($p < 0.01$). In this case, we also calculated Rosenthal's r effect size and found a large effect in the early-intervention group ($r = 0.62$). The comparison between baseline and six-month values did not

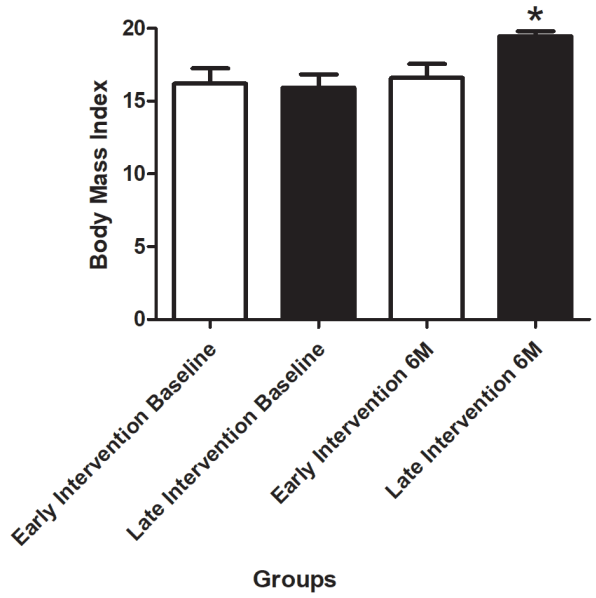

Figure 1. Body mass index (BMI) of the evaluated groups. BMI improved in early-intervention group vs late-intervention patients; *p < 0.01. The p value was calculated by Mann–Whitney U test. Each bar represents the mean ± SD of 10 (early onset group) and 7 (late onset group) individuals.

Table 1. Characteristics of the participants at baseline.

Variables	Description	Percentage %	Mean ± SD	Median-range
Age (years)	12-25		16.82	
Marital Status				
Single	17	100		
Occupation				
Student	15	88.2		
Employee	2	11.8		
Schooling				
Secondary	8	47.1		
High school	5	29.4		
Degree	4	23.5		
Weight (Kg)	25.9–52.7		41.629 ± 7.115	
BMI*	14.90–17.29			16.0–2.39

*Body mass index (BMI) is the weight in kilograms divided by the square of the height in meters.

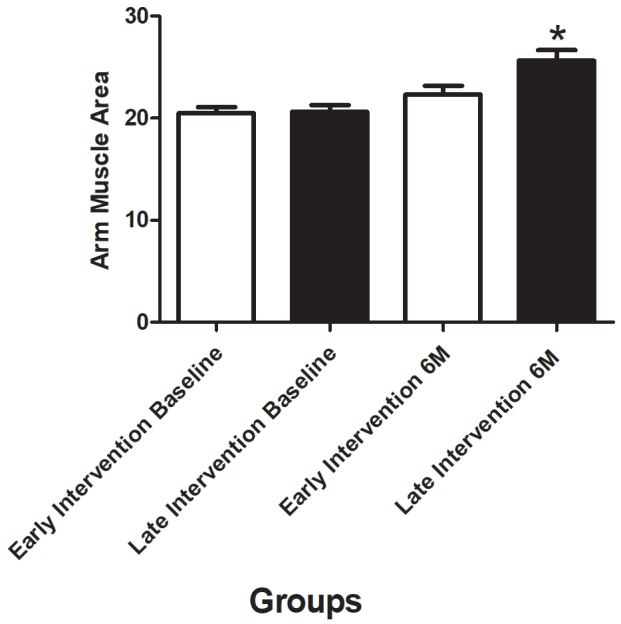

FIGURE 2. Arm muscle area (AMA) in evaluated groups. AMA was lower in early-intervention patients vs late-intervention group. *p < 0.01; Mann–Whitney U test. Each bar represents the mean ± SD of 10 (early-intervention group) and 7 (late-intervention group) individuals.

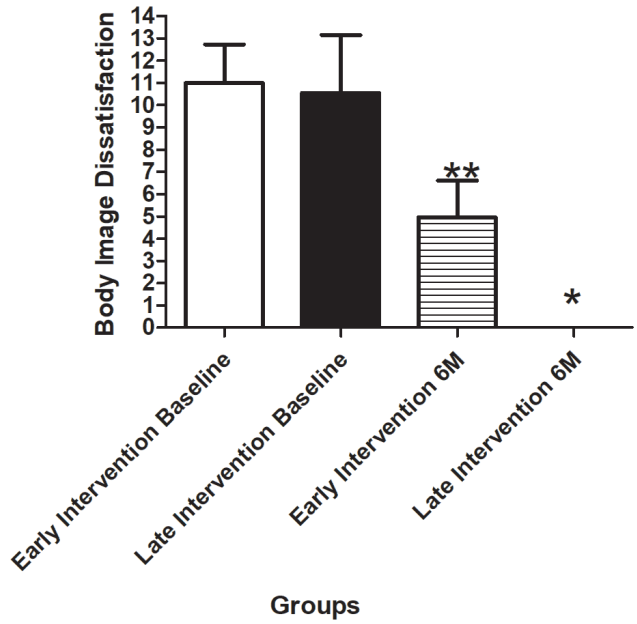

FIGURE 3. Body image dissatisfaction of the assessed groups. Late-intervention group showed a higher improvement. *p < 0.01 vs baseline values; Wilcoxon test. ** p < 0.05 vs baseline values; Wilcoxon test. Each bar represents the mean ± SD of 10 (early-intervention group) and 7 (late-intervention group) individuals.

show a significant difference in any group (p > 0.05). With respect to the psychological variable (body image dissatisfaction), the groups presented similar values of dissatisfaction from the beginning (p > 0.05). Six months later, there was a significant improvement in both groups. In this case, the late-intervention group improved more as compared to the early-intervention group (p < 0.01; Figure 3).

DISCUSSION/CONCLUSION

According to the results, the early-intervention participants showed improvement in physical (BMI, AMA) and emotional (body image dissatisfaction) variables, while there was only emotional improvement in the late-intervention group. These observations allow understanding the importance of an early intervention. Additionally, the results suggest that psychological intervention could be an important therapeutic element to improve the patients' physical features and their emotional perception of themselves, a key aspect in AN therapy. This could be supported by the results observed in the late-intervention group, where the emotional perception of their image improved despite the absence of important changes in physical variables. This topic should be deeply studied in future research since this improvement likely favors a change in physical parameters in the long term as compared with the early intervention. To date, there are no works comparing anthropometric indicators (BMI, AMA) and emotional changes in AN patients and the time treatment starts with respect to the onset of the disease. Further research is suggested in this regard.

The Academy of Nutrition establishes that, within nutritional management, the first thing to do when faced with AN is to determine whether it can be managed from an outpatient setting or meets hospitalization criteria.[17] For the purposes of this study, all cases met the criteria for outpatient treatment.[17] In line with this, Roob et al. suggest that treatment for patients with early AN must be through outpatient programs, in the company of a multidisciplinary team.[18] This observation supports our finding that AN patients are treated by a multidisciplinary team.

It has been observed that AN patients tend to choose the same types of foods at each meal for fear of eating foods they consider caloric or inappropriate. These eating behaviors persist during short-term recovery. Therefore, the participants in our study were able to modify their eating habits, reducing the restriction by normalizing their eating pattern. They consumed portions according to their eating plan, including a greater variety of foods, complying with the meal schedules and liquid consumption.[19] In addition, it has been seen that those responsible for providing food at home should be included to achieve a better compliance with the meal plan and the nutritional indications. Therefore, nutrieducational sessions for the families were carried out; in them, portion sizes and food groups were taught, as well as the reason for the nutritional indications. Similarly, it has been suggested that

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nutritional indications should be followed at the treatment location and at home.[7]

In the present study, the participants became aware of some situations that triggered unpleasant emotions; for example: weighing themselves, exam periods at school, getting grades, discussions/arguing with relatives at home, discussions/arguing with their partner. Then, they learned to recognize and express their emotional states without having to control their diet and their body by being able to differentiate and separate them from eating. Consequently, body dissatisfaction decreased and the participants showed improvement because they managed to positively relate to their body while they restructured distorted thoughts.

In conclusion, the nutritional intervention with psychological support decreased the physical and emotional symptoms associated with AN. The present study was carried out in a Mexican population and included nutritional and psychological variables. It acquires a particular relevance since the studies that are typically carried out are only psychological. In summary, it is advisable that the restoration of both the nutritional status and body weight be gradual, according to each patient's tolerance. In addition, there should be a focus on nutrient intake and not calorie intake, along with psychotherapy, to encourage increased quantity and diversity in food selection. The aim is to restore the nutritional status, restructure thoughts, and modify behaviors characteristic of an eating disorder.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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