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Original/*Obesidad*

Age group, menarche and regularity of menstrual cycles as efficiency predictors in the treatment of overweight

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Abstract

Objective: **To evaluate if there is a relation between age groups, menarche, menstrual cycles and previous pregnancies with the success of weight loss in obese patients at a nutrition clinic.**

Methods: **A clinical intervention study was conducted among overweight and obese patients who consulted a nutrition clinic in Barranquilla (Colombia) for the purpose of nutritional assessment. They were subject to a personalized weekly follow-up consultation over the course of 16 weeks in which food consumption patterns, anthropometric measures, body image and self-perception were registered.**

Results: **A total of 135 patients were evaluated. 41 (30,4%) of whom did not complete the study. 69,6% patients did lose weight and 83,7% did lose waist. These losses are lower in older ages (95,5% at <18y vs. 56,4% in ≥ 45y, p=0,0085), not varying between overweight and obesity. There are significant losses in the final BMI (2,2(1,5SD) kg/m² in <18years group vs. 1,1(0,7SD) kg/m² in >45years group; p=0,009), weight loss percentage (7,3(4,3SD)% vs. 3,8(2,1SD)%, p=0,013), waist loss percentage (8,8(4,1SD)% vs. 5,8(2.5SD)%, p=0,005) and hip loss percentage (5,4(3,8SD)% vs. 3,5(2,6SD)%, p=0,040). Age influence is confirmed by multivariate analysis with no considerable differences observed in relation to menarche, menstrual cycle regularity and previous pregnancy in success distribution. Influence of initial BMI is ≥5% among obese women, with an OR=3,9 (1,2 to 12,8, 95% CI) (p=0,026).**

Conclusion: **Based on these results, age groups and initial BMI are regarded as influential factors in the successful outcome of treatment in overweight and obese patients.**

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Keywords: *Obesity. Menarche. Menstrual cycles. Pregnancy. Treatment.*

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GRUPOS DE EDAD, MENARQUIA Y REGULARIDAD DE LOS CICLOS MENSTRUALES COMO PREDICTORES DE EFICACIA EN EL TRATAMIENTO DE SOBREPESO

Resumen

Objetivo: **Evaluar si existe una relación entre los grupos de edad, la menarquia, ciclos menstruales y embarazos previos con el éxito en la pérdida de peso en pacientes obesos en una clínica de nutrición.**

Métodos: **Se ha llevado a cabo un estudio entre pacientes con sobrepeso y obesidad que acudieron a una clínica de nutrición en la ciudad de Barranquilla (Colombia) con el fin de recibir un tratamiento nutricional. A todos los pacientes se les realizó un tratamiento nutricional semanal personalizado por 16 semanas continuas en los que se registraron los patrones de consumo de alimentos, medidas antropométricas, la imagen corporal y la auto-percepción.**

Resultados: **Se evaluaron un total de 135 pacientes. 41 (30,4%) de los cuales no completaron el estudio. 69,6% perdieron peso y 83,7% perdieron cintura. Estas pérdidas son menores en edades más avanzadas (95,5% <18a vs 56,4% en ≥45a, p=0,0085), no existiendo variación entre el sobrepeso y la obesidad. Hay pérdidas significativas en el IMC final (2,2(1,5DS)kg/m² en el grupo <18 años vs 1,1(0,7DS) kg/m² en el grupo >45 años, p=0,009), en el porcentaje de pérdida de peso (7,3%(4,3DS) vs 3,8% (2,1DS), p=0,013), en el porcentaje de pérdida de cintura (8,8%(4,1DS) vs 5,8%(2,5DS), p=0,005) y en el porcentaje de pérdida de cadera (5,4%(3,8DS) vs 3,5%(2,6DS), p=0,040). La Influencia de la edad es confirmada por el análisis multivariante, no apreciándose diferencias considerables en relación con la menarquia, la regularidad del ciclo menstrual y embarazo previos en la distribución de éxito. La influencia del IMC inicial es ≥5% entre las mujeres obesas, con un de OR=3,9 (1,2 a 12,8, IC del 95%) (p=0,026).**

Conclusión: **Basados en los resultados, los grupos de edad y el IMC inicial son considerados como factores influyentes en el éxito del tratamiento en pacientes con sobrepeso y obesidad.**

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Palabras clave: *Obesidad. Menarquia. Ciclos menstruales. Embarazo. Tratamiento.*

Introduction

Overweight and obesity are a growing threat to the population health in a growing number of countries[1]. Obesity prevalence increases with age[2,3]; and has also experienced an alarming global level increase, therefore, we can say that we are in the middle of a worldwide obesity epidemic[4]. Also increases the risk of mortality in circulatory, respiratory disease and cancer, so it is essential to do a prime diagnose[5]. Excess cardiovascular and musculoskeletal diseases related to body mass index (BMI) calculation are a good predictor of work disability in an early age[6]. As the population of a country[7] becomes obese, a higher total annual health expenditure proportion is spent on obesity and it´s related diseases[8].

Menstrual cycle is the preparation of a woman's body for a possible pregnancy; it occurs monthly during the woman's reproductive years (from puberty to menopause) and usually lasts about 25 to 32 days[9], out of this range may be considered as irregular cycles; however, women's menstrual cycles vary in their length and amount of bleeding, according to the woman's age, weight, diet, amount of physical activity, level of stress and genetics[9]. Menarche at an early age has a direct association with obesity and breast cancer[10]; also, obesity increases the risk of endometrial cancer in women after menopause[11] and may increase the incidence of asthma[12]. Women who are obese are more likely to experience infertility[13] in addition to being excluded from a fertilization program[14]; studies claim that women between 17 and 24 who were obese are less likely to have 1 or 2 children at age 47[15]. Obesity affects somehow the female gynaecological parameters causing menstrual disorders[16], weight reducing diet resulted in a decrease in LH levels, a reduction of LH / FSH and FSH ratio favouring folliculogenesis[17]. There is evidence of an interaction between obesity and age at menarche, which implies that the protective effect of late menarche may not apply to women who are overweight or late menarche may be harmful in in obese women[18].

The probability that a child will be obese in adulthood significantly increases if their parents are obese[19], are obese in childhood or early puberty[20], fully linked to the age at menarche among girls.

Weight loss and weight maintenance are common concerns for men and women, most people trying to lose weight as a common strategy used to consume less fat, but fewer calories, which indicates they are not using the recommended combination of hypocaloric diet associating physical activity[21,22].

Objetctive

The objective of this work is to evaluate if there is a relation between age groups, menarche, menstrual cycles and previous pregnancies with the success of weight loss in obese women at a nutrition clinic that must be considered when developing prevention programs.

Material and methods

Subjects. A clinical intervention study was conducted among overweight and obese patients who consulted a nutrition clinic in Barranquilla (Colombia) for the purpose of nutritional assessment. They were subject to a personalized weekly follow-up consultation over the course of 16 weeks in which food consumption patterns, body image and self-perception were registered. The inclusion criteria were voluntary assistance, patient desire to improve their aesthetic image, excluding males those with chronic diseases such as kidney failure, diabetes, etc. because patients came for aesthetic reasons. This paper has not considered patients who made a diet to lose weight in the last month or before, as this aspect to analyse the resistance/adherence to current treatment is not necessary. Alcohol and tobacco consumption have no impact on current results. Sample was stratified by age and gynaecological-obstetric record. 233 women were interviewed and 135 continued the study according WHO[23] classification. Participation age ranged between 12 and 80 years.

The study was conducted according to Helsinki rules obtaining all patients informed consent.

Methods. The clinical intervention study used data of patients who consulted a nutrition medical centre in Barranquilla (Colombia) for nutritional assessment and to improve their physical appearance for aesthetic reasons, which underwent a low-calorie personalized diet nutritional health program by food consumption patterns, anthropometric measures, body image and self-perception over the course of 16 consecutive weeks. The sample was formed by patients from 12 to 80 years of age collected over a 3-year period.

The study included an initial complete medical record (date accessed, date of birth, personal identification data, socioeconomic status, educational level, marital status and personal medical history, toxic precedents, etc., gynaecology-obstetrics record: menarche age, regular and irregular menstrual cycles, and previous pregnancies) and a weekly medical-nutritional assessment[24] (age, height and weight, waist and hip perimeter, and one photography).

Initial and final BMI was calculated from data. Patients were classified according to initial BMI according to WHO[23] cut-off criteria. Weight loss percentage was calculated from the initial weight, classifying patients into dropout or failure if no weight loss occurred, success grade 1 (<5% weight loss) and success grade 2 (≥ 5% weight loss), waist and hip percentages loss were also calculated.

Guided by previous studies[25,26] three groups were classified according to menarche age: before 12 years, between 12 and 14 years and from 15 years, as well as

Table I
Dropout, failures and success treatment distribution in women, grouped by age, overweight or obesity (n=135)

Age group (years)	Overweight		Obesity		Total	
	Dropout /fail	Success	Dropout /fail	Success	Dropout/fail	Success
<18	1 (6,2%)	15 (93,8%)	0 (0%)	6 (100%)	1 (4,5%)	21 (95,5%)
18-29	6 (25,0%)	18 (75,0%)	0 (0%)	7 (100%)	6 (19,4%)	25 (80,6%)
30-44	11 (36,7%)	19 (63,3%)	6 (46,2%)	7 (53,8%)	17 (39,5%)	26 (60,5%)
≥45	10 (52,6%)	9 (47,4%)	7 (35,0%)	13 (65,0%)	17 (43,6%)	22 (56,4%)
Total	28 (31,5%)	61 (68,5%)	13 (28,3%)	33 (71,7%)	41 (30,4%)	94 (69,6%)

Failures / successes in relation to nutrition level is not significant (χ^2 Test).
Failures / successes in relation to the age p=0,0085 (χ^2 Test).

menstrual cycles in two groups: regular and irregular, and previous pregnancy or not. Age has been grouped into <18 years old, between 18-29, between 30-44 and ≥ 45 years.

Data were treated using IBM SPSS Statistics version 22.0 software, checking the normality and comparative nonparametric statistics on data that not showed a normal distribution. The multivariate linear correlation was performed to the dependent variable percentage of weight loss and waist loss regarded to menarche group, regular menstrual cycles and BMI baseline. Distributions were analysed using the Chi square test with Epidat version 3.1 software. A significance level of p <0,05 is considered.

Results

A total of 135 patients were evaluated. 13 (9,6%) of whom did not complete the study. 122 (90,4%) women followed the treatment of whom 94 (69,6%) were successful and 28 (20,7%) failed.

In regards of nutritional status (Table I), 61 (68,5%) overweight and 33 (71,7%) obese women are successful to lose weight. According to age groups, there is a 95,5% success rate in the <18 years group compared to a 56,4% success rate in the ≥ 45 years group (Chi square test p = 0,0085).

Table II shows age-grouped women who succeeded losing weight according to initial BMI, weight loss percentage, waist circumference and hip circumference. There is a greater final BMI loss and higher weight percentage loss, waist loss and hip loss in <18 years women, also differences between age groups that are statistically significant according to Kruskal-Wallis test (p=0,009 (BMI loss), p=0,013 (weight loss), p=0,005 (waist percentage loss) and p=0,040 (hip percentage loss)).

To corroborate age influence and possible influences of other inherent factors a success or failure multinomial logistic regression analysis study was performed in Table III, showing that menarche, regularity of menstrual cycles and previous pregnancy are not predictors factors for failure or success in the weight loss treatment. Also there is less success chance in weight loss (grades 1 and 2) according age increasing, with a success grade 1 OR of 0,5 (95%CI: 0,3-0,9; p=0,020) and a success grade 2 OR of 0,2 (95%CI: 0,1-0,5, p=0,000). There is a waist loss OR of 0,5(95%CI: 0,3-1,0) for success grade 1 and an OR of 0,4 (95%CI: 0,2–0,8, p=0,007) for success 2 grade, showing a lower success lower probability according age increasing.

Only an influence of initial BMI was observed in the highest probability of success grade 2 in women classified as obese, with an OR of 3,9(95%CI 1,2 to 12,8, p=0,026).

Table II
BMI and initial weight loss percentage, waist circumference and hip circumference in regards to the age group of women following a successful treatment (n= 94)

Age group (years)	n	Age(SD)	Initial BMI	BMI loss	Weight loss%	Waist loss%	Hip loss%
<18	21	15,2(1,6)	29,7(4,7)	2,2(1,5)	7,3(4,3)	8,8(4,1)	5,4(3,8)
18-29	25	23,6(4,2)	29,0(4,2)	1,2(1,0)	3,9(3,5)	5,7(3,0)	3,8(2,6)
30-44	26	38,5(4,4)	29,0(2,6)	1,1(1,0)	3,8(3,1)	5,0(3,5)	2,8(2,5)
>45	22	50,3(8,5)	29,9(2,5)	1,1(0,7)	3,8(2,1)	5,8(2,5)	3,5(2,6)
Kruskal-Wallis *p*		0,000	ns	0,009	0,013	0,005	0,040

Table III
Multinomial logistic regression analysis of the failure and success degree in the overweight treatment, as weight loss or waist loss, by age group, menarche, menstruation cycles, previous pregnancy and BMI groups. (OR, 95%CI)

Weight loss Failure (n=41) vs.		*Sig.*	*OR (95% CI)*
Success 1 (n=64)	<5% weight loss		
	Age group	**0,020**	**0,5 (0,3-0,9)**
	Menarche	0,221	0,7(0,3-1,3)
	Regular menstruation	0,129	1,9(0,8-4,2)
	Previous pregnancy	0,108	2,2(0,8-5,6)
	BMI groups	0,620	1,3(0,5-3,2)
Success 2 (n=30)	≥5% weight loss		
	Age group	**0,000**	**0,2(0,1-0,5)**
	Menarche	0,908	1,1(0,4-2,5)
	Regular menstruation	0,115	0,4(0,1-1,3)
	Previous pregnancy	0,507	0,7(0,2-2,2)
	BMI groups	0,026	3,9(1,2-12,8)
Waist loss (n=22) vs.		*Sig.*	*OR (95% CI)*
Success 1 (n=53)	<5% waist loss		
	Age group	**0,042**	**0,5 (0,3-1,0)**
	Menarche	0,891	1,1(0,5-2,4)
	Regular menstruation	0,786	0,9(0,3-2,3)
	Previous pregnancy	0,126	2,4(0,8-7,7)
	BMI groups	0,677	1,3(0,4-4,1)
Success 2 (n=60)	≥5% waist loss		
	Age group	**0,007**	**0,4(0,2-0,8)**
	Menarche	0,553	1,3(0,6-2,9)
	Regular menstruation	0,584	1,3(0,5-3,4)
	Previous pregnancy	0,884	0,9(0,3-2,8)
	BMI groups	0,076	2,9(0,9-9,3)

Discussion

The present study has used a non-invasive clinical approach and has searched if four factors can be determinants in the success of a treatment for obesity in a Caribbean population. Patients who completed treatment and therefore have lost weight in 16 weeks are 69,6% of the total that looked at first despite the great difficulties that arise in the overweight and obesity treatment. Moreover, the treatment must be performed moderately and continuously in order to avoid dropout and initial weight recovery. Patients were satisfied with their new body image comparing previous and post-treatment photographs.

A dietary control has been combined with a continuous and weekly monitoring customized to the patient´s tastes, socioeconomic conditions, etc., in addition to promoting the same idea about the positive achievements with their body image. Food patterns and advice provided by promoting local fruits and vegetables have been pursued, not generating long period rejection so achievements remain in time[27].

Final anthropometric outcomes, both in BMI, weight, waist and hip percentage loss shows an encouraging response to treatment, with weight loss percentages similar to losses reported by a review of several studies[28]. It therefore shows that the weekly monitoring of these patients is more effective in short-term treatments than others more deferred.

In the present study, adherence and treatment success are high, with a low dropout rate maybe, because the initial attendance is voluntary and for aesthetic reasons without a clinical condition similar to other studies[29].

Late menarche in women has a protective effect which is not in the overweight or obese[30], although the results presented, success in the treatment of overweight or obesity is higher among young women, it is important to establish a treatment for obesity in women regardless of age at menarche, as this, according to these results, it is no cause for treatment failure. Irregular menstruation or previous pregnancy did not affect the treatment success.

Body image concept varies throughout life, depending on the social influences and life situations that affect behaviour[31]. Dissatisfaction with physical appearance related to body weight is higher in women than in men, but in addition, adolescence is a crucial time in accordance with their own body image. This may be a cause to support the <18 years group fact shown in this study.

Some authors find no relationship between dissatisfaction with body appearance and body mass index in obese and overweight women[32].

Conclusion

From the study we could suggest that in regards to the correct design of a 16 weeks follow up weight loss program directed to obesity among women in northern Colombia, the program should be focused so that, the sooner the overweight problem is addressed, greater success guarantees, being the right time before during adolescence (<18 years), increasing its appeal in older women because dropouts and failures increase with age. And finally, waist circumference loss is a parameter to consider as an element of patient motivation without taking into account menarche, menstrual cycles and previous pregnancies which are not proven to be influential factors in the successful outcome in overweight and obese patients.

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