Adherence to an overweight and obesity treatment: How to motivate a patient?

Objective: To explore anthropometric changes in normal-weight, overweight and obese subjects who did not dropout or failed a weight loss program over the 16 treatment weeks to improve patient's motivation and treatment adherence. Methods: A clinical intervention study was conducted among 271 (including 100 dropouts and/or failures) obese and overweight 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 initial and the final Body Mass Index (BMI, kg/m^2), photographs, food consumption patterns, percentage weight loss, waist and hip circumference were registered and grouped according to BMI, measuring treatment response. Data´s nonparametric statistical comparison was made. Results: In 62 patients from BMI<25 group, there is a weight loss of 2.6%(3.1SD), 5.5%(3.3SD) in waist circumference and 3.0%(2.5SD) in hip circumference. In 67 patients from 25≥BMI<30 group, there is a weight loss of 3.8%(4.1SD), 5.7%(4.5SD) in waist circumference loss and 3.7%(3.0SD) in hip circumference loss. In 42 patients from BMI>30 group, there is a weight loss of 4.8%(3.7SD), 7.0%(3.6SD) in waist circumference loss and 3.9%(2.4SD) in hip circumference loss. Monitoring is done every 4 weeks by the Friedman test, with significant differences between the three groups (p<0.001). Patients do not dropout treatment because they start to see physical results in waist decrease. Comparing initial waist/hip circumference ratio and waist/height ratio regarding to final values a clear decrease in the three BMI groups was observed (p<0.001). Conclusion: After three weeks of continuous treatment patients improved all overweight and obesity parameters indicators; there were not statistical significant differences in hip circumference (HC) and waist loss (WC) (%) among the three BMI groups (normal-weight, overweight, and obesity). In contrast, there were statistical significant differences in weight loss (%) and waist-to-hip ratio. Based on anthropometric outcomes and patient perception of their body image it can be concluded that the waist

circumference loss is the parameter that adhere obese patients to the weight loss program.

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16 **INTRODUCTION**

17 Overweight (body mass index, BMI 25-30 kg/m^2) and obesity (BMI ≥ 30 kg/m^2) are
18 preventable diseases defined as abnormal or excessive fat accumulation that
19 sometimes favours the onset of disease[1].

20 Over the years, the obesity prevalence significantly increases[2] thanks to a decrease in
21 caloric expenditure and increased energy consumption, resulting from poor diet and
22 sedentary lifestyle[3] coupled with the hormones physiopathology implication such as
23 leptin[4] and ghrelin[5].

24 There is a close relationship between waist circumference and cardiovascular risk in
25 obesity[6], making worried men and women to lose weight using as common strategy to
26 consume less fat but not fewer calories, which indicates they are not using the
27 recommended combination of hypocaloric diet associated with physical activity[7,8] to
28 achieve permanent changes in lifestyle[9,10] allowing a better obesity control[11].

29 Some studies references the marital status[12], level of education[13] and social classes[14]
30 with overweight and obesity, but it has been shown that these parameters are not
31 regarded as influential factors in the successful outcome of a treatment[15].

32 In some cases appetite suppressants that increase anorexigenic neurotransmitters in
33 the central nervous system[16] as sibutramine[17] and orlistat have been used, but only
34 maintained if patients responded slimming and keeping the weight achieved without
35 presenting significant side effects[18], currently these drugs are suspended[19] and with
36 consumption alerts[20].

37 Alternative overweight and obesity treatments are very popular and despite being widely
38 used, have not been shown to be safe and effective[21].

39 In morbid obesity (BMI ≥40 kg/m^2) sometimes lifestyle changes are not enough [22]
40 necessitating bariatric surgery to achieve effective weight loss[23].

41 In clinical practice it is important to predict nonabdominal, abdominal subcutaneous, and
42 visceral fat in patients by measuring BMI and waist circumference independently[24].

43 This study therefore seeks to determine which of the parameters monitored to improve
44 body image and overweight treatment: BMI decrease, weight percentage and waist and
45 hip circumferences loss, could serve for patient motivation.

46 **MATERIAL AND METHODS**

47 **Subjects.** A clinical intervention study was conducted among 271 (233 women and 38
48 men) overweight and obese participants who consulted a nutrition clinic in Barranquilla
49 (Colombia) for the purpose of nutritional assessment.   They were subject to a
50 personalized weekly follow-up consultation over the course of 16 weeks. The inclusion
51 criteria were voluntary assistance, patient desire to improve their aesthetic image,
52 excluding those with chronic diseases such as diabetes, kidney failure, etc. since
53 patients came for aesthetic reasons. This study does not consider patients who have
54 done a diet to lose weight in the last month or earlier, as this aspect to analyse the
55 resistance/adherence to current treatment is not necessary. In turn, alcohol and tobacco
56 consumption do not affect actual results. 171(63.1%) overweight or obese patients
57 according to the WHO classification[1] continued the study. The sample was formed by
58 patients from 15 to 80 years of age collected over a period of 3 years.

59 The study was conducted according to Helsinki´s rules obtaining all patients informed
60 consent.

61 **Methods.** As previous studies[25], we consider that changes in a nutritional treatment
62 could be seen in 16 continuous weeks. The study included a patient´s complete medical
63 record and a weekly WHO´s recommended medical-nutritional assessment[26] by
64 obtaining height, weight, waist and hip circumference data, as well as its own
65 comparison of their initial and final treatment body image through photographs for self-
66 perception control.   We used an eating habits questionnaire similar to Dana-Farber
67 Cancer Institute questionnaire[27], asking about background and habits at home and work

68 that may relate to patient´s health focusing on eating habits. We made weekly low

69 calorie diets WHO-based[28] according to the questionnaire response.

70 With the obtained data we calculate the initial and final BMI according to WHO[1,26] criteria,

71 also weight, waist and hip loss percentages.

72 The data were treated using IBM SPSS Statistics version 22.0 software, checking the

73 normality and comparative nonparametric statistics on data that not showed a normal

74 distribution by Friedman´s test. A significance level of $p < 0.05$ is considered. This study

75 was approved by SEMI-Servicios Médicos Integrados of Barranquilla, Colombia.

76 **RESULTS**

77 63.1% of patients with successful loss in all the studied variables has been analysed.

78 36.9% dropouts were done during the first three visits with no medical reason and no

79 significant relationships regarding sex and BMI, we assume that patients discontinued

80 the treatment because they did not get immediate results in waist loss expected by

81 them. Changes begin to be perceived from the fourth week as shown in Figures. Table 1

82 shows that in 62 patients from BMI<25 group, there is a weight loss of 2.6%(3.1SD),

83 5.5%(3.3SD) in waist circumference loss and 3.0%(2.5SD) in the hip circumference loss.

84 In 67 patients from 25≤BMI<30 group, there is a weight loss of 3.8%(4.1SD),

85 5.7%(4.5SD) in waist circumference loss and 3.7%(3.0SD) in the hip circumference loss.

86 42 patients from BMI>30 group, there is a weight loss of 4.8%(3.7SD), 7.0%(3.6SD) in

87 waist circumference loss and 3.9%(2.4SD) in the hip circumference loss. There were

88 statistical significant differences in waist, hip circumference (HC), waist circumference

89 (WC), waist/hip ratio and waist/height ratio shown in table 1 paired test ($p<0.001$).

90 Friedman´s test monitoring for weight (Figure 1), waist (Figure 2) and hip (Figure 3) loss

91 is done every 4 weeks, with significant differences between the three groups ($p<0.001$).

92 Comparing initial waist/hip circumference ratio and waist/height ratio regarding to final

93 values a clear decrease in the three BMI groups was observed ($p<0.001$) (Table1).

94 When comparing self-perception data through initial and final week patient's treatment

95 photo, they clearly showed satisfaction verifying their waist loss perception (Figure 4.

96 Photograph week 1 and 16).

DISCUSSION

98 The concept of body image changes during life affecting individual behaviour[29], so it
99 cannot be separated from the weight loss. In the present study, we have obtained good
100 results in a high percentage (63.1%) of patients who attended the consultation to
101 improve their body image and/or weight loss. These success rates are highly variable in
102 the literature[30,31] and depends on many factors[32].

103 It is observed that even patients, who attended the consultation to improve their body
104 image but not overweight[1], lose BMI, weight, waist and hip, although it is noted that
105 weight stabilizes after 8 treatment weeks. Overweight[1] group also stabilizes weight at 8
106 weeks; only the obese[1] group maintains an on-going weight loss until the end of
107 treatment and may indicate the need to extend it for more weeks.

108 Regarding waist loss, in all cases is superior to other examined parameters, keeping this
109 continuously loss for 16 weeks and being higher in the obese[1] group, not stabilized in
110 either of the three groups, thus is a parameter in which many patients seek superior
111 tracking time, being an appreciated body image index[33], with a very visual and
112 comparative results with respect to its initial state[34]. Hip losses are lower and
113 temporarily behaving similarly to weight loss. Analysing waist/hip ratio loss, at the end of
114 16 treatment weeks the behaviour is similar to waist loss in all BMI groups. Improved
115 nutritional status is evident in the three BMI groups, all indicative body image
116 parameters (waist, hip and waist/height ratio) have significantly improved, and also must
117 notice the waist/height ratio as an important parameter of nutritional improvement status
118 and its relationship to health thus this ratio is effective for predicting relative fatness
119 simplifying the diagnosis of overweight and obesity[35].

CONCLUSION

121 After three weeks of continuous treatment patients improved all overweight and obesity
122 parameters indicators; there were not statistical significant differences in hip

123 circumference (HC) and waist loss (WC) (%) among the three BMI groups (normal-

124 weight, overweight, and obesity). In contrast, there were statistical significant differences

125 in weight loss (%) and waist-to-hip ratio. Based on anthropometric outcomes and patient

126 perception of their body image it can be concluded that the waist circumference loss is

127 the parameter that adhere obese patients to the weight loss program.

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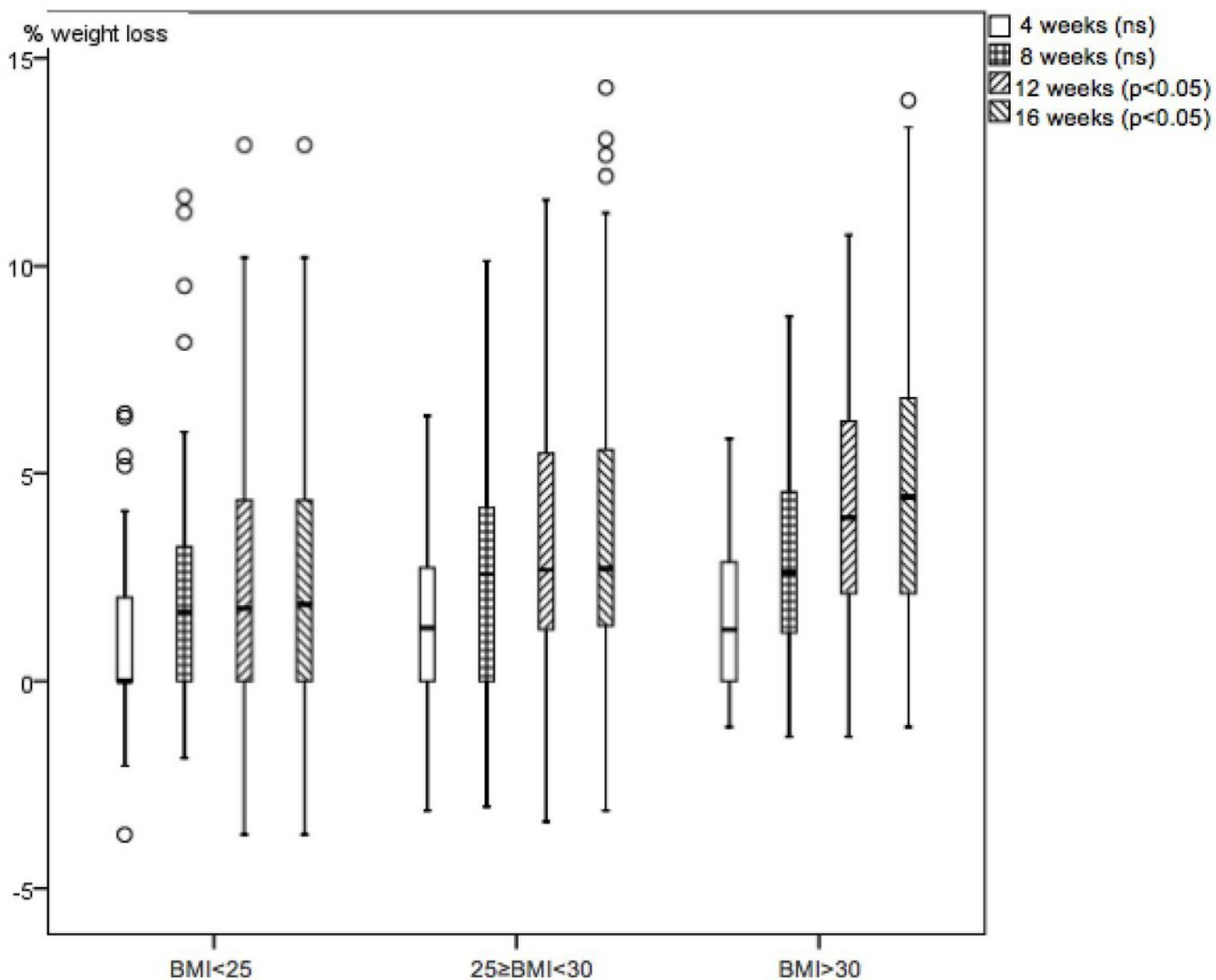# Table 1<superscript>(on next page)</superscript>

Table 1.

Results of initial and final BMI, weight, waist and hip circumference, and percentage loss in BMI groups at 16 treatment weeks (mean. standard deviation and 95% confidence interval).

BMI (kg/m²)	<25	25≥BMI<30	>30	p (Kruskal-Wallis)
n	62	67	42	
i BMI mean (SD)	23.1(1.3)	27.5(1.5)	32.9(3.5)	<0.001
(CI 95%)	(22.7-23.4)	(27.2-27.9)	(31.8-34.0)	
f BMI mean (SD)	22.5(1.4)	26.5(1.7)	31.3(3.3)	<0.001
(CI 95%)	(22.1-22.8)	(26.1-26.9)	(30.3-32.3)	
Paired test (p)	<0.001	<0.001	<0.001	
i BMI - *f* BMI mean (SD)	0.6(0.7)	1.0(1.1)	1.6(1.3)	< 0.001
(CI 95%)	(0.4-0.8)	(0.8-1.3)	(1.2-2.0)	
weight loss % mean (SD)	2.6(3.1)	3.8(4.1)	4.8(3.7)	< 0.05
(CI 95%)	(1.8-3.3)	(2.8-4.8)	(3.6-5.9)	
i waist mean (SD)	76.3(5.6)	86.7(7.3)	100.8(11.4)	< 0.001
(CI95%)	(74.9-77.7)	(85.0-88.5)	(97.3-104.4)	
f waist mean (SD)	72.1(5.4)	81.6(6.5)	93.7(10.0)	< 0.001
(CI95%)	(70.7-73.5)	(80.0-83.2)	(90.5-96.8)	
Paired test (p)	< 0.001	< 0.001	< 0.001	
waist loss % mean (SD)	5.5(3.3)	5.7(4.5)	7.0(3.6)	ns
(CI 95%)	(4.6-6.3)	(4.6-6.8)	(5.9-8.1)	
i hip mean (SD)	96.4(5.3)	105.8(5.5)	115.3(7.3)	< 0.001
(CI95%)	(95.0-97.7)	(104.4-107.1)	(113.0-117.6)	
f hip mean (SD)	93.5(5.5)	101.9(5.9)	110.8(7.5)	< 0.001
(CI95%)	(92.1-94.9)	(100.5-103.4)	(108.5-113.1)	
Paired test (p)	< 0.001	< 0.001	< 0.001	
hip loss % mean (SD)	3.0(2.5)	3.7(3.0)	3.9(2.4)	ns
(CI 95%)	(2.4-3.6)	(2.9-4.4)	(3.2-4.7)	
i waist / *i* hip ratio	0.79(0.06)	0.82(0.07)	0.88(0.09)	<0.001
mean (SD) (CI95%)	(0.78-0.81)	(0.80-0.84)	(0.85-0.90)	
f waist / *f* hip ratio	0.77(0.06)	0.80(0.06)	0.85(0.07)	<0.001
mean (SD) (CI95%)	(0.76-0.79)	(0.79-0.82)	(0.82-0.87)	
Paired test (p)	<0.001	<0.001	<0.001	
i waist / *i* height ratio	0.48 (0.04)	0.53(0.04)	0.62(0.06)	<0.001
mean (SD) (CI95%)	(0.47-0.49)	(0.52-0.54)	(0.60-0.64)	
f waist / *f* height ratio	0.45(0.03)	0.50(0.03)	0.57(0.06)	<0.001
mean (SD) (CI95%)	(0.45-0.46)	(0.49-0.51)	(0.56-0.59)	
Paired test (p)	<0.001	<0.001	<0.001	

Figure 1

Boxplot diagram.

Weight loss percentage monthly variation in the three studied nutrition groups. Friedman test p<0.001
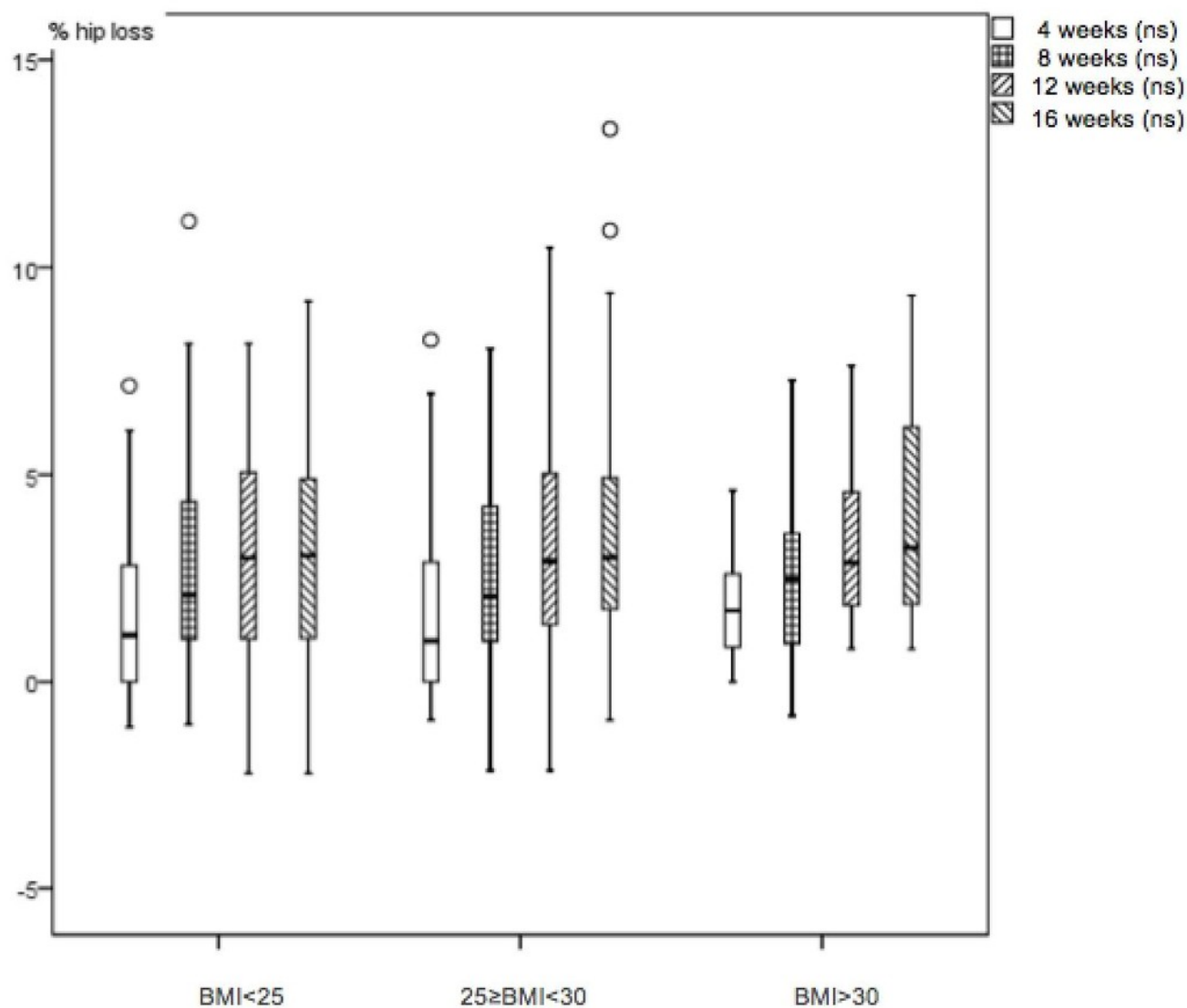
Figure 2

Boxplot diagram.

Waist loss percentage monthly variation in the three studied nutrition groups. Friedman test p<0.001

Figure 3

Boxplot diagram.

Hip loss percentage monthly variation in the three studied nutrition groups. Friedman test $p < 0.001$

Figure 4

Treatment photograph.

Patient´s photographs at week number 1 and week number 16: helps to motivate the patient, demonstrating body image and self-perception changes. Photo A: week number 1. Photo B: week number 16.