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ORIGINAL ARTICLE

Effect of Dietary Counselling on Anthropometric Measurements of Liposuction Patients

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ABSTRACT

OBJECTIVE: To observe the effects of dietary counselling on various anthropometric parameters in patients after liposuction.
METHODOLOGY: This non-randomized educational intervention study was performed at a cosmetic surgery centre in Islamabad, Pakistan, from July to December 2017. Among 83 subjects, 43 were in the intervention group, and 40 were in the control group from both genders. Patients undergoing primary liposuction, abdominal liposuction, and abdominoplasty with liposuction were included in this study; patients on any weight loss diet or pills in the last six months were excluded. The intervention group was followed up three months after dietary counselling, and the control group was without dietary advice. Anthropometric measurements of both groups were done before liposuction, just after liposuction, and then three months after surgery, which included body weight, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), and mid-upper arm circumference (MUAC). Data analysis was done with SPSS version 20.
RESULTS: Statistically significant changes were found in all parameters except for MUAC in the control group. Independent-sample T-tests showed no statistically significant difference in any parameter at any time.
CONCLUSION: Liposuction resulted in a reduction in weight, BMI, WC, WHR, and WHtR in both groups, but dietary counselling could not show its effect on any parameter in our study. Further reduction of these parameters in the intervention group could occur if the intervention lasted longer.

KEYWORDS: Liposuction, BMI, WC, WHR, MUAC, dietary counselling.

INTRODUCTION

Liposuction is not an obesity treatment[1]. Liposuction is used for the removal of genetically disturbed or diet-resistant fat[1]. It has been observed that liposuction patients regain fat after a certain period of time[2] because these patients do not follow dietary management following surgery. Logically speaking, without control of dietary intake and physical activity, the regain of excessive body fat cannot be avoided. In the literature, indications and general liposuction complications were encountered, but the effect of dietary modifications following liposuction could not be found.

There is a gap in the literature about the effect of dietary intervention following liposuction. The present study was conducted to observe the impact of dietary intervention on various anthropometric measurements of post-liposuction patients.

METHODOLOGY

The study was of the educational intervention category. It was carried out at a cosmetic surgery centre in Islamabad, Pakistan, from July to December 2017, with purposive sampling done. Permission was obtained from the clinic administration to carry out the study. Eighty-three candidates participated in this study, and all the participants signed informed consent.

Patients undergoing liposuction and abdominoplasty were followed for three months post-operatively. Eighty-three subjects from both genders were enrolled in the study (43 subjects in the intervention group and 40 in the control group). Subjects undergoing primary liposuction, abdominal liposuction, and abdominoplasty with liposuction were included in this study**.** Patients on any weight loss diet or pills during the last six months were excluded. The intervention group was followed after counselling for diet plans, but the control group was observed without any dietary counselling. Anthropometric measurements of both groups were done before liposuction, immediately after liposuction, and then three months after surgery.

BMI is the most commonly used measurement for obesity, but BMI is associated with total body fat and does not reveal body fat distribution. Central obesity, characterized by excessive abdominal fat, has been associated with a higher mortality risk. Other anthropometric measurements have been formulated to explain the extent of central obesity, like waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR).[3] Anthropometric measurements included body weight (Wt.), body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), and mid-upper arm circumference (MUAC). SPSS version 20 was used for data analysis.

RESULTS

The study was comprised of 83 participants. Fifty two percent of participants were in the intervention group, and 48% were in the control group. Twenty three percent of participants in both groups were males, and 77% were females (**Table I**). Two-thirds of the study participants were younger than 40, and the mean age of the whole sample was about 37±7.9 years. The youngest subject in the sample was 18 years old, and the oldest subject was 58 years old.

Table I: Characteristics of study participants

	Categories	Frequency	Percentage (%)
Groups	Intervention Group	43	51.8
	Control Group	40	48.2
Gender	Male	19	22.9
	Female	64	77.1
Age	<40 years	55	66.3
	≥40 years	28	33.7

The mean weight of the intervention group (males) was about 79 kg before surgery, about 78 kg immediately after liposuction, and about 72kg after three months of dietary counselling (**Table II**). The differences between all these readings were statistically significant (**Table II**). The mean BMI of the intervention group was about 31 kg/m² before surgery, 30.8 kg/m² immediately after liposuction, and about 28 kg/m² after three months of dietary management (**Table II**). The differences between all these observations were also statistically significant. Similarly, the differences between WC, WHR and WHtR observations were also statistically significant (**Table II**). However, the mean MUAC of the intervention group was about 34 cm before surgery, remained the same right after surgery, and then decreased to 32 cm after three months of dietary advice. Hence, the differences between MUAC pre- and post-liposuction were not different, but immediately after liposuction and after three months of dietary counselling were statistically significant (**Table II**). Similarly, the difference between MUAC before surgery and after three months of dietary counselling was substantial.

The mean weight of the control group (males) was about 76.5 kg before surgery, 75.5 kg immediately after surgery, and about 70 kg three months after surgery. The mean BMI of the control group was approximately 31.4 kg/m² before surgery, about 31 kg/m² immediately after surgery, and 30.6 kg/m² three months after surgery (**Table II**). Differences between values of both these parameters at different points in time were statistically significant. Similarly, differences in values of WC, WHR, and WHtR of the control group at different points in time were also statistically significant (**Table II**). But the mean value of MUAC of the control group before, right after, and three months after surgery had almost no differences (**Table II**).

All these parameters were also compared between interventional and control groups at these three points, i.e. before liposuction, immediately after surgery, and three months after surgery. A statistically significant difference was found only in body weight because there was already a statistically significant difference between mean body weight between the intervention and control group before liposuction (**Table II**). No statistically significant difference was found between any parameter at any point in time.

All parameters were also compared between interventional and control groups at these three points in time in females (**Table III**). Results were similar to those in males, except for body weight (**Table III**).

Table II: Comparison of means (Male participants)

Measures	Groups	Before liposuction	After liposuction	Three months after liposuction	p-value:	P-value: Post-liposuction and three months after liposuction	P-value: Pre-liposuction and three months after liposuction	Intervention group Vs control group (Before liposuction):	Intervention group Vs control group (After liposuction):	Intervention group Vs control group (Three months after liposuction):
Weight (kg)	Intervention n=10	79.25±9.28	78.57±8.84	72.03±8.34	**<0.05**	**<0.001**	**<0.001**	**<0.005**	**<0.005**	**<0.005**
	Control n=9	76.44±10.33	75.65±10.05	70.24±9.67	**<0.005**	**<0.001**	**<0.001**			
BMI*	Intervention n=10	31.07±3.01	30.81±2.74	28.20±2.31	**<0.05**	**<0.001**	**<0.001**	--	--	--
	Control n=9	31.39±5.75	31.01±5.58	30.67±5.70	**<0.005**	**<0.001**	**<0.001**			
WC† (cm)	Intervention n=10	114.54±12.41	111.60±11.64	106.46±12.46	**<0.005**	**<0.01**	**<0.005**	--	--	--
	Control n=9	107.01±6.63	104.68±6.46	100.24±6.11	**<0.001**	**<0.001**	**<0.001**			
WHR‡	Intervention n=10	1.01±0.11	0.99±0.11	0.95±0.12	**<0.005**	**<0.05**	**<0.005**	--	--	--
	Control n=9	0.94±0.01	0.92±0.01	0.89±0.02	**<0.001**	**<0.001**	**<0.001**			
WHtR§	Intervention n=10	0.67±0.07	0.65±0.07	0.62±0.07	**<0.001**	**<0.05**	**<0.005**	--	--	--
	Control n=9	0.63±0.04	0.62±0.04	0.59±0.04	**<0.005**	**<0.005**	**<0.001**			
MUAC‖ (cm)	Intervention n=10	33.85±1.59	33.85±1.59	32.88±2.7	--	**<0.05**	**<0.05**	--	--	--
	Control n=9	35.72±4.02	35.72±4.02	35.72±4.02	--	--	--			

Body mass index, †Waist circumference, ‡Waist-to-hip ratio, §Waist-to-height ratio, ‖Mid-upper arm circumference,* ***Bold=statistically significant values*

Table III: Comparison of means (Female participants)

Measures:	Groups	Before liposuction	After liposuction	Three months after liposuction	p-value: Pre- and post-liposuction	P-value: Post-liposuction and three months after liposuction	P-value: Pre-liposuction and three months after liposuction	Intervention group vs control group (Before liposuction)	Intervention group Vs control group (After liposuction)	Intervention group Vs control group (Three months after liposuction)
Weight (kg)	Intervention n=33	85.39±16.35	84.39±16.26	79.05±16.38	**<0.001**	**<0.001**	**<0.001**	--	--	--
	Control group n=31	78.90±13.68	78.05±13.43	76.63±13.62	**<0.001**	**<0.001**	**<0.001**			
BMI*	Intervention n=33	31.73±4.29	31.25±4.41	29.28±4.39	**<0.001**	**<0.001**	**<0.001**	--	--	--
	Control n=31	30.65±4.46	30.40±4.39	29.81±4.40	**<0.001**	**<0.001**	**<0.001**			
WC†(cm)	Intervention n=33	101.62±9.50	98.44±8.90	93.16±8.22	**<0.001**	**<0.001**	**<0.001**	--	--	--
	Control n=31	99.61±6.33	96.31±6.23	92.33±6.09	**<0.001**	**<0.001**	**<0.001**			
WHR‡	Intervention n=33	0.93±0.07	0.90±0.07	0.87±0.05	**<0.001**	**<0.001**	**<0.001**	--	--	--
	Control n=31	0.94±0.02	0.91±0.02	0.88±0.02	**<0.001**	**<0.001**	**<0.001**			
WHtR§	Intervention n=33	0.63±0.06	0.61±0.05	0.58±0.05	**<0.001**	**<0.001**	**<0.001**	--	--	--
	Control n=31	0.62±0.04	0.60±0.04	0.57±0.03	**<0.001**	**<0.001**	**<0.001**			
MUAC‖ (cm)	Intervention n=33	35.23±2.92	34.58±5.13	34.71±2.98	--	--	**<0.001**	--	--	--
	Control n=31	33.90±2.19	33.90±2.19	33.90±2.19	--	--	--			

Body mass index, †Waist circumference, ‡Waist-to-hip ratio, §Waist-to-height ratio, ‖Mid-upper arm circumference,* ***Bold=statistically significant values*

DISCUSSION

In our study, about 77% of study participants were females, and about 66% of participants were below 40 years of age (**Table I**). These findings aligned with the literature[1,4], where primarily young females opted for liposuction.

Many studies showed that liposuction could cause a decline in body weight and BMI, as well as WC and WHR, in obese patients[1,3,5,6]. Some studies showed the effects of specific alternative procedures to liposuction, like cryolipolysis and lipocavitation, along with dietary intervention on these parameters of interest. Significant effects of the dietary intervention were found on body weight, BMI, and WC, with or without these procedures, after three months[7,8]. No such study was done in liposuction patients in the past. Our study also found a significant change in all anthropometric measures in the control group after liposuction, except for MUAC. Both groups expected weight and BMI to change right after the liposuction procedure, as a large amount of fat was removed. WC, WHR, and WHtR were also expected to decrease as most fat removed during liposuction was from the waist area. But MUAC was not expected to drop immediately after surgery. Weight loss requires a negative energy balance where energy intake is lower than energy expenditure.[9] Our study observed three months of dietary restriction in the intervention group. In the intervention group, all anthropometric measures significantly decreased right after liposuction, except for MUAC. But after three months of dietary intervention, all anthropometric measurements dropped, along with MUAC. A decrease in MUAC possibly occurred due to an overall effect of dietary intervention on the body.

Although our study showed that liposuction reduced weight, BMI, WC, WHR, and WHtR in both groups, no statistically significant difference could be found between both groups during different points in time. But it is evident from Fig.1 that the weight decline was similar pre- and post-liposuction in both groups, but the decline was steeper in the intervention group as compared to the control group (**Figure I**). However, the decline in WC was similar in both groups (**Figure II**). Literature showed that dietary intervention alone, done for at least six months, could result in statistically significant changes in weight, BMI, WC, WHR, and WHtR.[10] As Fig.1 shows, the difference in the decline in weight between these two groups could have widened further. It could have become statistically significant if the intervention had lasted for longer. The effects of dietary intervention possibly could not reflect significantly in our study because the intervention lasted only three months.

Figure I: Comparison of a trend of weight reduction between groups:

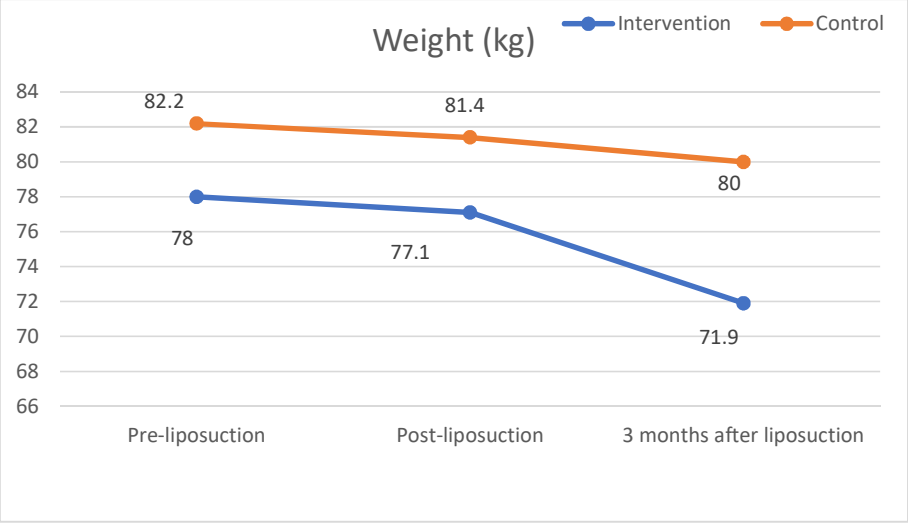
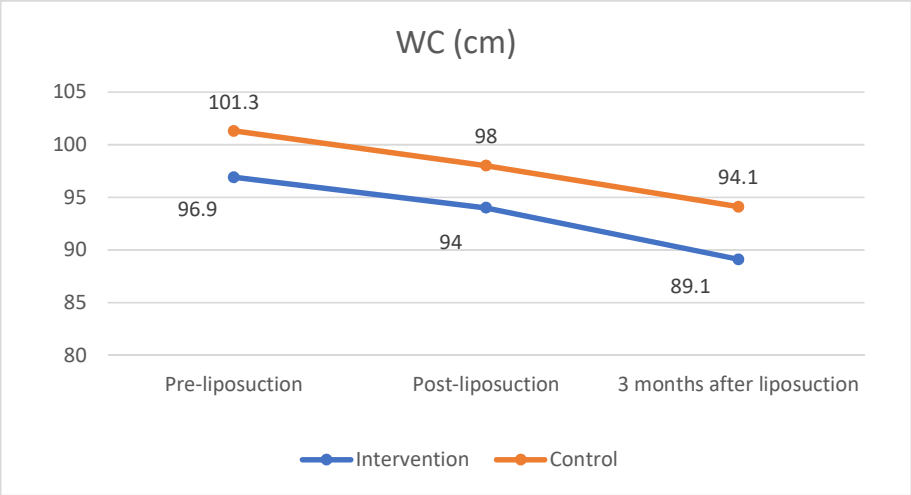


Figure II: Comparison of a trend of waist circumference (WC) reduction between groups



Logically speaking, the effects of liposuction cannot persist for long without lifestyle changes. There is always a risk of weight regaining after liposuction. It happens because the fat condition, related to the concurrent obesity status, becomes a reference point where the metabolism becomes focused[2]. It means that the energy balance regulates the metabolism to keep the fat content at a level when obesity develops. This results in increased food intake and decreased energy expenditure. Hence, preventing weight regain means going against this biological mechanisms[2]. Results from short- and long-term outcomes after liposuction showed that patients have an initial fat mass loss lasting up to three months, and then body fat gradually restores, usually in one year[6,11]. As our study lasted for only three months, and the control group was also showing a decline in all anthropometric measures, probably the patients were still in the phase of losing fat mass rather than regain of fat.

It should be emphasized that liposuction is a cosmetic procedure[12]. It can be utilized as a feasible method for aesthetic purposes and improving insulin resistance with appropriate diet and exercise[13,14]. Although liposuction should be used only as an adjunct to bariatric surgery in massively obese patients, many patients are only interested in changing their appearance rather than their behaviours. It should always be emphasized that the effects of the procedure are reversed if the lifestyle is not changed. Patients who want to benefit from liposuction in the long term should try to improve their appearance through diet and exercise.[1]

CONCLUSION

Liposuction definitely reduced weight, BMI, WC, WHR, and WHtR in both groups, but dietary counselling could significantly affect any of these parameters. Dietary counselling could have probably resulted in a further reduction of these parameters compared to the control group if the diet restriction was prolonged for an adequate period, like six months or more.

Ethical Permission: Allama Iqbal Open University, Islamabad, IRB letter No. AIOU-6-2017-IRB-A-006.
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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publically.

AUTHOR CONTRIBUTIONS

Khan AJ:	Conception, drafting, final approval
Mohmand H:	Conception, drafting, final approval
Bushra S:	Data collection, revision, final approval
Sajid S:	Data collection, revision of the manuscript, final approval
Jehan T:	Analysis, revision of the manuscript, final approval
Kashif S:	Analysis, revision of the manuscript, final approval

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