INNOVARE JOURNAL OF FOOD SCIENCE

Vol 7, Issue 6, 2019

Research Article

THE EFFECT OF DIETARY PORTION CUT ON THE BODY FAT OF ADULTS

FIJI ANTONY[1], ANUKA SHARMA*[2]

[1.]NMC Speciality Hospital,Al Nahda UAE. [2.] NMC Genetics, Gurugram, India

Email-anuka.s@nmcgenetic.com

Received: 14 Dec 2019, Revised and Accepted: 26 Dec 2019

Abstract

Objective- The study was planned to determine the effect of dietary portion cut on the body fat of individuals with passage of time

Methods- Total 323adults with general good health underwent dietary intervention to decrease the portion size of the diet they were taking to reduce calorie intake to 1200kcal/day. In order to determine the effect of treatment, a newvariable i.e. rate of change of various dependent variables (BMI, body fat percent & muscle mass percentage) were determined for each individual. A multiple linear regression model was run to determine the effect of independent variables (age, gender, initial measurement of dependent variables) on the rate of change of dependent variables.

Results-The mean rate ofchange of BMI was hardly influenced by age, gender or initial BMI.The rate of change of body fat percent was hardly influenced by age as indicated by a low coefficient close to zero, although statistically significant (p=0.0236).The coefficient for female indicated that the mean rate of change of body fat percent in females was higher(-0.0532) as compared to males (-0.021) keeping other variables fixed, and the effect was statistically significant (p=0.0028).The initial body fat percent had also significant effect on the rate of change of body fat percent (p=< 0.0001).The initial muscle mass percent had significant effect on the rate of change of musclemass percent of individuals (p=0.0032).

Conclusion- The dietary intervention of portion cut to decrease calorie intake results in significant decrease in body fat percent in females in comparison to males.

Keywords:Diet, Portion cut, Body Fat

INTRODUCTION

Obesity is the most important risk factor for most prevalent non communicable diseases like insulin resistance, cardiovascular disorders and cancers[12]. Body fat is the main culprit behind these obesity associated metabolic disorders[34]. Despite so many adverse effects on health there is still no single dietary interventional approach for calorie restriction which can effectively tackle this epidemic of obesity[5]. Although calorie restriction can result in significant weight loss, the greatest problem is weight regain with the passage of time[678]. There is one study in the past where higher fat free mass loss due to calorie restriction was associated with weight regain; indicating that it is loss of body fat which may prevent the weight regain [9]. So, keeping this in mind dietary portion size of participating individuals was reduced to observe the effect of this dietary intervention approach on body fat.

MATERIALS AND METHODS

Three hundred twenty-three individuals coming to hospital OPD were recruited. Exclusion criteria were gastro intestinal diseases, type 2 diabetes mellitus, hypertension, hyperlipidaemia, lactation, pregnant, paediatric, bariatric surgery, underweight, chronic kidney disease, enteral feed, post op recovery andcancer. The subjects gave their written consent for the study andthe study was approved by ethical committee of the hospital.

Dietary Intervention:

The portion size of the diet of the subjects was reduced in a manner that average calorie consumption was limited to 1200kcal/day according to European guidelines for obesity management in Adults[10].

Anthropometric Measurements:

Table 1 provides the distribution of individuals according to age categories. Maximum 196 (60.68%) individuals were in the age range of 21-40 years, followed by 89 (27.55%) in the range 41-60 years. The mean age of individuals was 35.95 ± 10.65 years with a median of 35 years.

Table 1: Distribution of individuals according to **age** (n=323)

Age (years)	No. (%)
≤ 20	32 (9.91)
21-40	196 (60.68)
41-60	89 (27.55)
> 60	6 (1.86)
Mean ± SD	35.95 ± 10.65
Median	35

SD: Standard deviation

Table 2: Distribution of individuals according to **gender** (n=323)

Gender	No. (%)
Male	90 (27.86)
Female	233 (72.14)
Total	323 (100)

The gender distribution of the study individuals is given in Table 2. Out of 323 cases, 233 (72.14%) were females, while 90 (27.86%) were males.

Table 3: Distribution of individuals according to **initial BMI** (n=323)

BMI (kg/m^2)	No. (%)
18.5-24.9	9 (2.79)
25.0-29.9	93 (28.79)
30.0-34.9	120 (37.15)
35-39.9	69 (21.36)
≥ 40	32 (9.91)
Mean ± SD	32.81 ± 5.43
Median	31.9

SD: Standard deviation

Table 3 gives the distribution of individuals according to initial BMI. There were maximum 120 (37.15%) cases in the BMI category of 30-34.9 kg/m^2, followed by 93 (28.79%) in the range 25-29.9 kg/m^2, 69 (21.36%) in the range 35-39.9 kg/m^2. There were 32 (9.91%) cases with BMI above 40 kg/m^2. The mean BMI was 32.81 ± 5.43 kg/m^2 with a median of 31.9 kg/m^2.

Table 4: Distribution of individuals according to initial **body fat** (n=323)

Body fat (%)	No. (%)
< 21	3 (0.93)
21-40	100 (30.96)
41-60	218 (67.49)
> 60	2 (0.62)
Mean ± SD	43.08 ± 8.15
Median	44.6

SD: Standard deviation

Table 4 gives the distribution of individuals as per initial body fat percent. Maximum i.e. 218 (67.49%) cases had the parameter value between 41-60%, while 100 (30.96%) had it in the range 21-40%. The mean body fat percent was 43.08 ± 8.15% with a median of 44.6%.

Table 5: Distribution of individuals according to initial **muscle mass percentage** (n=323)

Muscle mass (%)	No. (%)
Low	158 (48.92)
Normal	132 (40.87)
High	21 (6.50)
Very High	12 (3.72)
Mean ± SD	27.32 ± 6.63
Median	25.6

SD: Standard deviation

Table 5 gives the distribution of individuals as per initial muscle mass percentage. Maximum i.e. 132 (40.87%) cases had normal percentage, while 158 (48.92%) had low percentage. The mean muscle mass percent was 27.32 ± 6.63% with a median of 25.6%.

Calculations:

In order to determine the effect of treatment on the of individuals over time, a new variable i.e. rate of change of dependent variable (BMI, fat content, body fat percent & muscle mass percentage) determined for each individual and was defined as:

$$\textit{Rate of change of dependent variable} = \frac{\textit{Value of dependent variable at last visit} - \textit{Value of dependent variable at initial visit}}{\textit{Number of days}}$$

This variable was treated as dependent variable and age, gender, initial value of dependent variable were regarded as independent variables. A multiple linear regression model was run to determine the effect of independent variables on the rate of change of weight.

RESULTS

The effect of demographic and initial BMI levels on the rate of change of BMI was determined using multiple linear regression with the results shown in Table 6.

Table 6: Relationship of different parameters with rate of change in **BMI** of individuals

Model	Unstandardized Coefficients		P-value
	B [95% CI]	SE	
Constant	0.0191 [-0.0074,0.0455]	0.0134	0.1565
Age (Years)	-0.0002 [-0.0006, 0.0001]	0.0002	0.1764
Gender: Female	-0.0038 [-0.0120, 0.0043]	0.0041	0.3524
BMI (kg/m^2)	0.0005 [-0.0001, 0.0012]	0.0003	0.1017

SE: Standard error; Values in bold indicate statistical significance; R^2:0.015; Adj. R^2: 0.06

Table 6 shows the coefficients, standard error and the statistical significance of coefficients in deciding the effect of independent predictors on the dependent variable i.e. rate of change of BMI. The rate of change was hardly influenced by age as indicated by a low coefficient close to zero, which was statistically insignificant (p=0.1764). The coefficient for female indicated that the mean rate of change of BMI in females was negative indicating weight loss as compared to males keeping other variables fixed but this difference was statistically insignificant (p=0.3524). The initial BMI had also insignificant effect on the rate of change of BMI (p=0.1017).

Table 7: Relationship of different parameters with rate of change in **body fatpercent** of individuals

Model	Unstandardized Coefficients		P-value
	B [95% CI]	SE	
Constant	-0.0210 [-0.0760, 0.0341]	0.028	0.4547
Age (Years)	-0.0009 [-0.0016, -0.0001]	0.0004	**0.0236**
Gender: Female	-0.0322 [-0.0531, -0.0112]	0.0107	**0.0028**
Initial body fat (%)	0.0024 [0.0013, 0.0036]	0.0006	**< 0.0001**

SE: Standard error; Values in bold indicate statistical significance; R^2:0.071; Adj. R^2: 0.062

Table 7 shows the coefficients, standard error and the statistical significance of coefficients in deciding effect of independent predictors on the dependent variable i.e. rate of change of body fat percent (BF). The mean rate of change of BF of the individuals was -0.021% per day. The rate of change was hardly influenced by age as indicated by a low coefficient close to zero, although statistically significant (p=0.0236). The coefficient for female indicated that the mean rate of change in females was higher (-0.0532) as compared to males (-0.021) keeping other variables fixed, and the effect was statistically significant (p=0.0028). The initial BF had also significant effect on the rate of change of BF (p=< 0.0001).

Table 8: Relationship of different parameters with rate of change in **muscle mass percent** of individuals

Model	Unstandardized Coefficients		P-value
	B [95% CI]	SE	
Constant	-0.0647 [-0.1351, 0.0058]	0.0358	0.072
Age (Years)	-0.0002 [-0.0009, 0.0006]	0.0004	0.6689
Gender: Female	0.0101 [-0.0157, 0.0359]	0.0131	0.4427
Muscle mass (%)	0.0026 [0.0009, 0.0043]	0.0009	**0.0032**

SE: Standard error; Values in bold indicate statistical significance; R^2:0.038; Adj. R^2: 0.029

Table 8 shows the coefficients, standard error and the statistical significance of coefficients in deciding effect of independent predictors on the dependent variable i.e. rate of change of muscle mass percent (MM). The rate of change was hardly influenced by age as indicated by a low coefficient close to zero, which was statistically insignificant (p=0.6689). The coefficient for female indicated that the mean rate of change in females was lower (-0.0546) as compared to males (-0.0647) keeping other variables fixed, and the effect was statistically insignificant (p=0.4427). The initial MM had significant effect on the rate of change of MM (p=0.0032).

DISCUSSION

Overall the results indicate that there is significant loss of body fat in females in comparison to maleswhen the portion size of the diet is reduced to limit the calorie intake. Although there was no significant difference in decrease in BMI in males and females, but this weight loss strategy seems to helps females more due to significant loss of body fat which prevents weight regain[9].

It becomes difficult for people to follow any fancy fad diets prevalent these days for weight loss for long term. The juicing or detoxification diet severely limit the calorie intake which is sustainable for only short-time frame and lead to rebound weight regain[1112]. While other diets like Palaeolithic diet are expensive with their own side effects associated with low calcium intake[13]. So, this dietary restriction strategy is convenient as the people have to reduce the potion size of the diet they are already consuming without any additional expenditure on fancy diets and it is easier to follow for a longer time.

In this study, there was no significant decrease in muscle mass percent which is good as the muscle mass contributes mainly to the resting energy expenditure. Loss of muscle mass can lead to decreased energy expenditure which may lead to weight regain[1415].

CONCLUSION

So, overall the decrease in portion size of diet is a very convenient approach for individuals to decrease body fat percentage while maintaining the muscle mass percentage which decrease the chances of weight regain. This strategy of weight loss is more beneficial to females who face difficulty in weight management due to hormonal fluctuation in comparison to men.

REFERENCES

1. O'Neill S, O'Driscoll L. Metabolic syndrome: a closer look at the growing epidemic and its associated pathologies. *Obes Rev*. 2015;16(1):1-12. doi:10.1111/obr.12229
2. Engin A. The Definition and Prevalence of Obesity and Metabolic Syndrome. *Adv Exp Med Biol*. 2017;960:1-17. doi:10.1007/978-3-319-48382-5_1
3. Zhang M, Hu T, Zhang S, Zhou L. Associations of Different Adipose Tissue Depots with Insulin Resistance: A Systematic Review and Meta-analysis of Observational Studies. *Sci Rep*. 2015;5. doi:10.1038/srep18495
4. Lee MJ, Wu Y, Fried SK. Adipose tissue heterogeneity: Implication of depot differences in adipose tissue for obesity complications. *Mol Aspects Med*. 2013;34(1):1-11. doi:10.1016/j.mam.2012.10.001
5. Obert J, Pearlman M, Obert L, Chapin S. Popular Weight Loss Strategies: a Review of Four Weight Loss Techniques. *Curr Gastroenterol Rep*. 2017;19(12):61. doi:10.1007/s11894-017-0603-8
6. Purcell K, Sumithran P, Prendergast LA, Bouniu CJ, Delbridge E, Proietto J. The effect of rate of weight loss on long-term weight management: a randomised controlled trial. *lancet Diabetes Endocrinol*. 2014;2(12):954-962. doi:10.1016/S2213-8587(14)70200-1
7. McGuire MT, Wing RR, Hill JO. The prevalence of weight loss maintenance among American adults. *Int J Obes Relat Metab Disord*. 1999;23(12):1314-1319. http://www.ncbi.nlm.nih.gov/pubmed/10643690. Accessed October 23, 2019.
8. Wing RR, Phelan S. Long-term weight loss maintenance. *Am J Clin Nutr*. 2005;82(1):222S-225S. doi:10.1093/ajcn/82.1.222S
9. Vink RG, Roumans NJT, Arkenbosch LAJ, Mariman ECM, van Baak MA. The effect of rate of weight loss on long-term weight regain in adults with overweight and obesity. *Obesity (Silver Spring)*. 2016;24(2):321-327. doi:10.1002/oby.21346
10. Yumuk V, Tsigos C, Fried M, et al. European Guidelines for Obesity Management in Adults. *Obes Facts*. 2015;8(6):402-424. doi:10.1159/000442721
11. Klein A V., Kiat H. Detox diets for toxin elimination and weight management: A critical review of the evidence. *J Hum Nutr Diet*. 2015;28(6):675-686. doi:10.1111/jhn.12286
12. Mazurak N, Günther A, Grau FS, et al. Effects of a 48-h fast on heart rate variability and cortisol levels in healthy female subjects. *Eur J Clin Nutr*. 2013;67(4):401-406. doi:10.1038/ejcn.2013.32
13. Genoni A, Lo J, Lyons-Wall P, Devine A. Compliance, Palatability and Feasibility of PALEOLITHIC and Australian Guide to Healthy Eating Diets in Healthy Women: A 4-Week Dietary Intervention. *Nutrients*. 2016;8(8). doi:10.3390/nu8080481
14. Sparti A, Delany JP, De La Bretonne JA, Sander GE, Bray GA. Relationship between resting metabolic rate and the composition of the fat-free mass. *Metabolism*. 1997;46(10):1225-1230. doi:10.1016/S0026-0495(97)90222-5
15. Dériaz O, Fournier G, Tremblay A, Després JP, Bouchard C. Lean-body-mass composition and resting energy expenditure before and after long-term overfeeding. *Am J Clin Nutr*. 1992;56(5):840-847. doi:10.1093/ajcn/56.5.840