

To study and analyze the effect of Ketogenic diet, Intermittent fasting and simple energy restricted diet on fat loss and weight loss

Dhanjay Kumar Gorsil¹, Priyanka¹, Mansi², Meenu³, Jyoti³

¹ Department of Foods and Nutrition, Multani Mal Modi College, Patiala, Punjab, India

² Department of Foods and Nutrition, CCS HAU, Hisar, Haryana, India

³ Department of Extension, CCS HAU, Hisar, Haryana, India

Corresponding Author: Dhanjay Kumar Gorsil

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Abstract

The study was conducted in Patiala district, Punjab to analyze the effect of Ketogenic diet, intermittent fasting and simple energy restricted diet on fat loss and weight loss. For this study, 11 subjects were selected and were divided in three groups on random basis. Subjects of group A, B and C were made to follow Simple calorie deficit diet, intermittent fasting and Ketogenic diet respectively. At the beginning about 7 out of 11 subjects were normal, while remaining 4 were overweight. But at the end of the study only 2 out of 11 subjects were overweight. Body fat percentage of all the subjects was calculated using Skin Fold Caliper at the beginning and after 8 weeks also.

Keywords: Ketogenic diet, intermittent fasting, simple energy restricted diet, body fat and overweight

Introduction

Ketogenic low-carbohydrate (KLC) and non-Ketogenic low-carbohydrate (NLC) diets were equally effective in reducing body weight and insulin resistance, but the KLC diet was associated with several adverse metabolic and emotional effects. The use of Ketogenic diets for weight loss is not warranted. (Carol S.*et al.*, 2006)

Comparison of weight loss among named diet programs in overweight and obese adults: Significant weight loss was observed with any low-carbohydrate or low-fat diet. Weight loss differences between individual named diets were small. This supports the practice of recommending any diet that a patient will adhere to in order to lose weight. (Hami 2014)

Individuals assigned to a very-low-carbohydrate Ketogenic diet achieve a greater weight loss than those assigned to a low-fat diet in the long-term; hence, a VLCKD may be an alternative tool against obesity. (Bueno, N.*et al.*, 2013) [3].

Compared with a low-fat diet, a low-carbohydrate diet program had better participant retention and greater weight loss. During active weight loss, serum triglyceride levels decreased more and high-density lipoprotein cholesterol level increased more with the low-carbohydrate diet than with the low-fat diet. (William S.*et al.*, 2014)

Intermittent fasting in the form of alternate day fasting in many instances reduces overall energy intake, with no obvious adverse effects, and thus becomes a model of calorie restriction in both human and animal subjects. Secondary to reduced energy intake and weight loss, effects such as reduced risk factors for cardiovascular disease, and improved glucose metabolism have been demonstrated in both animal and human subjects on true and modified alternate-day fasting diet (Kostevski, B.2012).

Fasting enhances growth hormone secretion and amplifies the complex rhythms of growth hormone secretion in man. (Ho, K. Y. *et al.*, 1988)

Alternate-day fasting was feasible in non-obese subjects, and fat oxidation increased. However, hunger on fasting days did not decrease, perhaps indicating the unlikelihood of

continuing this diet for extended periods of time. Adding one small meal on a fasting day may make this approach to dietary restriction more acceptable. (Heilbronn L.K. and Smith S.R. 2005) [7].

Both intermittent and continuous energy restriction resulted in similar weight loss, maintenance and improvements in cardiovascular risk factors after one year. (Board, S. S. and SINU 2021)

Objectives

- To analyze the body composition of recruited persons of age group 18-40 years.
- To analyze their anthropometric measurements.
- To analyze the effect of Ketogenic diet, Intermittent fasting and simple energy restricted diet on fat loss and weight loss.

Materials and methods

The study was conducted to analyze the effect of Ketogenic diet, intermittent fasting and simple energy restricted diet on fat loss and weight loss.

Size and Selection of Subjects -

Generally healthy persons were recruited from the community. Inclusion criteria were age 18 to 40 years; desire to lose weight, normal lipid level, cholesterol level and no serious medical condition.

For this study, 11 subjects were selected and were divided in three groups on random basis. Subjects of group A, B and C were made to follow Simple calorie deficit diet, intermittent fasting and Ketogenic diet respectively. All participants were provided with written sample diet plans.

Methods of investigation-

- Questionnaire-cum-interview:** The questionnaire-cum-interview was formatted on taking aim and objectives keeping in mind. The questionnaire has a list of questions, which are arranged in systematic order to

communicate in smooth way conversation of data allocation.

- Questionnaire was pretested by sample of some subjects in order to check any flaws in it. It was further modified in accordance to the problems.
- The questionnaire was given to all the subjects personally and all were briefed clearly about nature and purpose of study. The important information was noted down and respondents were assured about secrecy of their data.

Anthropometric measurements

Anthropometric measures like height, weight etc. were taken and recorded for each subject.

Dietary Survey - Directory server contains question related to food habits. Dietary survey is used to check the pattern of diet intake of 24 hours.

Interventions

The intervention for all three groups included group meetings, diet instruction, and an exercise recommendation. Group meetings took place after every 4 weeks monthly for 2 months. These meetings consisted of diet instruction, supportive counseling, questionnaires, and biomedical measurements. During the study, participants selected their own menus. Participants were encouraged to exercise for 45 minutes at least 5 times weekly.

Tabulation of Data: The presentation of data in form of tables and graphs is known as Tabulation of data. It is done to express data clearly and to avoid misunderstanding of data. The given statistical measurements were taken for data interpretation of data:

- Arithmetical Mean:** Its value is obtained by dividing the sum of total observation with the total number of observations. (Gupta 2017)

$$\text{Arithmetic Mean } (\bar{X}) = \frac{\sum x}{N}$$

Where, X = Sum of observations

N = Total number of observations

- Percentage Distribution:** It is a toll used to describe the percentage for data on parameter like: Age, gender etc.

$$p = \frac{x}{n} \times 100$$

Where, p= percentage of quantity

x = given quantity

n = total amount

Results and discussion

The study was undertaken to analyze the effect of Ketogenic diet, intermittent fasting and simple energy restricted diet on fat loss and weight loss. For this study, 11 subjects were selected and were divided in three groups on random basis. Subjects of group A, B and C were made to follow Simple calorie deficit diet, intermittent fasting and Ketogenic diet respectively.

The results obtained by performing various experiments are described –

General Information

1. Gender

Table 1	Gender	
	Males	Females
Group A	4	0
Group B	4	0
Group C	3	0

Table 1 shows the distribution of subjects according to their gender and groups assigned. In which all are males i.e. of same gender, as to avoid the conflict of different testosterone and hormone levels in males and females.

2. Locality

Table 2: shows data related to distribution of subjects according to locality in which 64% subjects belong to urban locality and remaining 36% to rural locality.

Locality	Number	Percentage
Urban	7	64
Rural	4	36

(n= 11)

Anthropometric Measurement

1. BMI

The distribution of subjects according to their BMI is given in table:

Table 3

Health Status	Week 0	After Week 8
Underweight	0	0
Normal	7	9
Overweight	4	2
Obese	0	0

(n= 11)

At the beginning about 7 out of 11 subjects were normal, while remaining 4 were overweight. But at the end of the study only 2 out of 11 subjects were overweight.

2. Body Weight

The physical quantity of subjects was recorded on weighing machine. The mean body weight of all three groups to subjects was assigned randomly is shown in the

Table 4

	Mean body weight in kg		
	Week 0	After Week 4	After Week 8
Group A	76.7 kg	75 kg	73.2 kg
Group B	82.1 kg	80.4 kg	78.4 kg
Group C	80.3 kg	77.9 kg	75.7 kg

(n=11)

In group A (keto-diet) early mean body weight is 76.7kg and after eight week it reduces the 3.5kg weight.

In group B (intermittent fasting) after eight-week weight it decreases 3.7kg and in group C 4.6kg weight reduced after eight weeks.

3. Body Fat Percentage

Body fat percentage of all the subjects was calculated using Skin Fold Caliper at the beginning and after 8 weeks also. After that mean body fat percentage was calculated for the subjects assigned to different groups A, B and C.

Table 5: shows the mean body fat percentage of the subjects belonging to Group A, B and C:

Table showing mean body fat percentage		
	Week 0	After Week 8
Group A	21.1	17.9
Group B	21.3	17.7
Group C	22.5	18.6

(n= 11)

In group A (keto-diet) early mean body fat percentage is 21.1 and after eight week it reduces the 3.2 percent. In group B (intermittent fasting) after eight-week body fat percentage is decreases3.6 percent and in group C 3.9 percent it reduced after eight weeks.

Activity Patterns

The activity patter of the subjects is given below

Table 6: Distribution of subjects according to their activity

Activity Pattern	Number	Percentage
Sedentary	5	46
Moderate	4	36
Heavy	2	18

(n=11)

As table 6 highlight that majority distribution of subjects is in sedentary activity that is 46 percent as compared that moderate and heavy activity.

Regularity of Walk and Exercise

Data related to distribution of subjects according to regularity of walking/exercising is given below in Table 7 –

Table 7

Frequency of walk/exercise	Number	Percentage
Daily	4	36
3-5 days/week	4	36
Rarely	3	28
Never	0	0

(n=11)

As table 7 shows that equal percent of subjects (36) were doing walk / exercise on daily basis and 3-5 days per week and 28 percent were doing rarely.

Dietary Assessments

1. Food Habits

The data related to distribution of subjects according to food habits is given below

Table 8

Food Habits	Number	Percentage
Veg	6	54
Non-Veg	3	28
Ova Veg	2	18

(n=11)

As table 8 shows that majority of subjects were vegetarian that is 54 percent and only 18 percent subjects were ova vegetarian.

2. Consumption of Alcohol-

Table 9

Distribution of subjects according to their alcohol consumption		
Consumption of Alcohol	Number	Percentage
Daily	0	0
Occasionally	4	36
Never	7	64

(n=11)

According to table 9 thirty six percent of subjects were taking alcohol occasionally and 64 percent of subjects were not taken.

3. Consumption of Fruits

Table 10

Distribution of subjects according to fruits consumption		
Frequency of Fruits	Number	Percentage
Daily	4	36
Alternative days	5	46
Occasionally	2	18
Never	0	0

(n=11)

In table 10 it was shown that frequency of fruit consumption on daily, alternative days and occasionally basis that is 36, 46 and 18 percent respectively.

4. Consumption of Green Leafy vegetables

Table 11

Distribution of subjects according to green leafy vegetables consumption		
Consumption Pattern	Number	Percentage
Daily	2	18
Alternative Days	3	28
Occasionally	6	54
Never	0	0

(n=11)

As table 11 shows that out of 11 subjects only 2 were taking green leafy vegetables on daily basis and 3 were taking on alternate days. Majority of subjects (6) were taking green leafy vegetables occasionally.

5. Consumption of Fast Food

The data related to distribution of subjects according to food habits is given below

Table 12

Frequency of Fast Food	Number	Percentage
Daily	3	28
Alternative Days	4	36
Occasionally	4	36
Never	0	0

(n=11)

Table 12 shows that equal number of subjects (4) were taken fast food alternate days and occasionally. Only 3 subjects were taking on daily basis.

Response after the end of 8 Week diet schedule

Respondents have different experience during to their 8-week long diet journey. Subjects belonging to different groups (A, B and C) assigned to various diets felt different changes in their body both physically and emotionally. While some adverse effects were felt for 2-3 days fater being assigned to a particular diet but in some cases these signs and symptoms prevailed for longer time period. So, all of the subjects' experience were recorded down at the end of the diet schedule i.e. Week 8.

Table 13: Changes/symptoms felt by the number of subjects in different groups

Sign/Symptoms	Group A	Group B	Group C
Headache	0	1	3
Bloating	0	2	1
Weakness	1	2	2
Nausea	0	0	1
Cravings for particular food items	0	1	2
Lethargy	1	2	3
Fever	0	0	0
Constipation	0	0	1
Struggling to adhere to diet	1	2	3
Drop outs	0	0	1

Conclusion

Subjects of Group C (Keto diet) lost more weight i.e. -4.6kg as compared to Group A (Simple calories restricted) i.e. -3.22kg and Group B (Intermittent fasting) i.e. -3.65kg. This greater weight lost in case of Group C can be because of the loss of water weight from the body as in case of Group C carbs are much restricted as compared to Group A and B. While the percentage of body of fat lost was pretty much similar in case of all the three groups i.e. -3.25%, -3.65% and -3.75% in Group A, B and C respectively. Adverse effects were occurring more often in case of Group C (Keto-diet) as compared to Group A and B. Ketogenic diet was leading more often leading to weakness from the prospecting of powerlifting and strength training and subjects were struggling to adhere to it in longer run. In the end it can be concluded that while subjects of all three groups experienced almost similar amount of fat loss, subjects were struggling to adhere to Ketogenic diet in longer run due to more often adverse effects/symptoms. Instead of assigning a particular diet to the individual for better results, his/her adherence to that diet should be considered.

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