INTERMITTENT FASTING AND HYPOCALORIC DIETS : A STUDY FOR EMERGING TREND IN WEIGHT LOSS

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Abstract

The purpose of this study was to see the association of dietary and physical activity pattern in young adults. Further, experiments were conducted to determine the worth of the methods namely – cardio exercise for 30 minutes and intake of hypocaloric diet in form of intermittent fasting alongwith other methods adopted in weight loss by the obese young adults (18 - 25 years) in their past life. The study was carried out on five hundred obese subjects from the regions of Kurukshetra and Delhi (NCR).

The Obese subjects were frustrated of starving and with overburden of exercise. They were ready to follow any kind of regime to reduce weight and in the past also they had undergone many treatments also. The subjects were counseled about dietary pattern to be followed. The BMI , Total skin fold thickness and fat percentage was calculated before and after the interventions.

There was a positive correlation between anthropometric measures and their dietary intake before as well as after the study. The more they eat there was increase in Anthropometric parameters and vice versa.But in the past history indicated that forty per cent of the subjects had no results despite of following all the methods for weight loss. With the method of intermittent fasting combined with half an hour exercise resulted in weight loss upto 4-6 kgs per month. This was a significant ($P \leq 0.01$) result of the hypocaloric diets and intermittent fasting.

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Introduction & Review of Literature

Obesity is the abnormal body weight i.e. more than twenty per cent of normal body weight for particular age, height and bone structure (Anrig ,2003).There are other parameters also which identifies obesity such as Body Mass Index, percentage of body fat, skin fold thickness, waist circumference ,waist hip ratio etc.

Body Mass Index (BMI) of a person is his weight in kilograms divided by his height in metres square and when value of BMI exceeds more than 30 kg/m2 a person is said to be obese (WHO ,1998).

As Obesity is a growing serious medical condition demands a prevention and management of this epidemic (IOTF ,1997). The other indicator of obesity is waist circumference which exceeds 40 and 35 inches in obese males and females respectively. Skin fold thickness also indicates obesity.

Prevention strategies for obesity in young adults include reduction of energy dense foods, fast foods and alcohol intake. Further the patients should be encouraged to reduce sedentary behaviour that includes cutting down of TV viewing (Dietel,2007). Weight Management term generally encompasses the goals of prevention of excess weight gain, weight loss and optimizing health and reducing the risks of diseases (Walker,2003).

Weight loss of approximately 0.5 kg / week results from loss of adipose tissue that entails an energy deficit of 3500 kcal / week. This deficit could be achieved by curtailing the calorie intake of 500 kcal per day (Dietz ,1994)

Low Calorie diets (800 – 1200 kcal/day) and Very Low Calorie diets (less than 800 kcal /day) are associated with weight loss. And these diets achieve weight loss but a close medical and dietary supervision is required for very low calorie diets (Galloway ,2000) . In today's world the young adults are attracted towards different techniques for weight loss and the patients are following these techniques. The whole slimming industry has grown into a big market as they are result oriented and treat their patients psychologically as well medically (Sheth ,2006).

Materials & Methods :

The purpose of this study was to see the association of dietary and physical activity pattern and other factors with obesity, as well as effects of obesity in young adults. Further, experiments

were conducted to determine the worth of different methods namely – any cardio exercise, intake of hypocaloric diet, combination of Cardio exercise plus hypocaloric diet alongwith other methods adopted in weight loss by the young adults (18 - 25 years).

The methods and materials used for investigation are discussed under the following headings:

2.1 LOCALE OF THE STUDY:

The study was conducted on young adults belonging to the cities of Kurukshetra and Delhi (NCR).

2.2 Selection of the subjects :

1) One thousand young adults between 18 - 25 years of age were selected from different localities and institutions, namely - Kurukshetra (Ladwa), and Delhi (NCR) region and slimming centres .

2) The height and weight of all the subjects were measured to find the obese subjects among them.

3) From above the BMI was calculated by following the method of Quetelet (1835) and five hundred obese subjects were selected.

2.3 Experimental Plan:

a) **Field studies** : These studies consists of collection of data regarding general information, physical activity pattern , health record, assessment of nutritional status by using dietary survey, anthropometry and body fat measurement.

b) **Experimental group (E):** This study group was constituted of obese subjects who opted to reduce weight by following the suggested **hypocaloric diet along with work out / exercise for 30 minutes daily**. They were provided guidance and dietary counseling for selecting and consuming low calorie diet.

c) **Control group (C)** : This group was not engaged in any weight – reducing intervention. It followed with their existing dietary and activity pattern.

d) **Body mass index (BMI) :** BMI was used to classify the subjects into grades/classes of over weight/obesity as classified by WHO (1998).

It was calculated by using the formula given by Quetelet (1835) –

$$\text{Body Mass index} = \frac{\textit{Weight}}{\textit{(Metres)2}}$$

e) Measurement of fat fold: Holtain skin fold caliper was used to measure the fat fold at triceps, biceps, subscapular and suprailiac regions.

f) Measurement of fat fold at triceps (FFT) : The left arm was used to measure FFT .With the left thumb and index finger a vertical fold of the skin was held , one inch above the mid-point (between the acromion process of scapula i.e. shoulder blade and the olecranon process of the ulna i.e. tip of the elbow) , on mid-line on the back of the left arm of the subject such that muscle should not be included. The caliper was held with right hand, horizontal to the ground and was pressed to open the contact surfaces. The caliper was applied to the skin-fold and was released slowly so that the contact surfaces touched the middle of the skin-fold, taking care not to be too close to the arm or too close to the edge of the skin-fold. The reading was noted immediately as any delay would have led to gradual decrease in the measurement. This procedure was repeated three times and a constant reading was recorded in mm upto the first decimal (Jelliffe, 1966; ICMR, 2005)

g) Measurement of fat fold at biceps : The measurement of fat fold at biceps was taken on the relaxed left arm, at the mid – point of the biceps muscle, anteriorly halfway between the shoulder and the elbow joint (directly above the centre of cubital fossa). The method of measurement was the same as for FFT.

h) Measurement of subscapular skin – fold: It was measured just below and laterally to the angle of the left scapula carefully so that the fold was in a line running at approximately 45^0 to the spine, in the natural line of skin cleavage. The method of measurement was the same as for FFT (Jelliffe, 1966; Verma and Mokha 1995, ICMR, 2005).

i) Measurement of suprailic skin-fold:The suprailiac skin-fold was taken obliquely just above the hipbone (iliac crest) at the mid axillary line. The method of measurement was the same as for FFT (Verma and Mokha, 1995; (ICMR, 2005).

3.5.2.6.3 Waist –hip ratio (WHR): WHR was derived using the formula:

$$\text{WHR} = \frac{Waistcircumference(cm)}{Hipcircumference(cm)}$$

The subjects with waist – hip ratio of $\geq$ 0.80 were recognised for having abdominal obesity (ICMR 2005).

2.4 Dietary Conseling:

After collecting the initial information regarding the subjects of experimental groups E ,who volunteered to be part of the study for weight loss through consumption of combination of hypocaloric diet plus cardio exercise respectively ,were provided dietary counselling and behavioural guidance . They were prescribed a diet of approximately 1000-1200 kilo calories with an aim of about 500-600g weight loss per week through a lesser caloric intake

The emphasis was primarily laid on lessening the amount of fat, sugar, salt and refined cereals in the diet and on the increase of consumption of fibre, in the form of whole cereals, fruits and vegetables, especially the green leafy variety. Besides the subjects were encouraged to study the guidelines regularly and to clear the queries by the investigator. A contact with the subjects, with diet plus cardio exercise group (E) was mantained 3-4 days/week. In addition, the queries of all the subjects were entertained through telephones or E-mails. Except the above groups all those subjects who were interested were counselled (Dietary and Behavioural) after the completion of study period of 3 months.

2.5 Statistical Analysis of the data:

The collected data were decoded, tabulated and statistically analysed using standard techinques such as arithmetic mean, standard deviation, frequencies and correlation coefficient. The statistical analysis was done using SPSS-Version 17.0 computer programme.

3. Results :

The subjects selected were already went through various weight loss methods in the past. The Table no.1 shows the methods followed but the subjects were not able to achieve the desired results due to following traditional diets.

The subjects were doing exercise as walking , cardio workout as well as climbing stairs daily as shown in the table 1.The Table no 2 indicates the methods adopted by subjects and their effectiveness as well. Dieting and starvation were the most common methods followed by the subjects and also they achieved weight loss to some extent. The methods adopted by the subjects were effective but 40 per cent of the subjects also achieved no results

There fore , the method of Intermittent fasting plus a half an hour regimen was implemented on the subjects selected of (E) group. Intermittent fasting involved the fast for 8 hours , 16 hours as followed by the subjects easily and without any psychological pressure. The weight was reduced at the rate of .5 – 1 kg per week by following the method of intermittent fasting.

As shown in table no. 3 , the Correlation between different anthropometric parameters with energy, protein, fat, carbohydrates and fibre intake of the young female human adults belonging to Kurukshetra & Delhi (NCR) after the commencement of weight reducing interventions was found out. The correlation was significant ($P \leq 0.01$) between various parameters. The table no 3 indicates that the weight , BMI , TSF & Fat % was totally related to the carbohydrate , protein and fat intake of the subjects.The correlation was significant ($P \leq 0.01$) between Anthropometric parameters and Dietary intake of the subjects.

4 . Discussions :

An event of intermittent fasting is currently one of the world's most popular health and fitness trends. It involves alternating cycles of fasting and eating. It involves eating of healthy foods at a specific intervals of time. There are several different intermittent fasting methods, all of which split the day or week into eating periods and fasting periods. (Barnosky et.al.2014)

There are several different intermittent fasting methods. Three popular ones are:

1. **The 16/8 Method:** Skip breakfast every day and eat during an 8-hour feeding window, such as from 12 noon to 8 pm.
2. **Eat-Stop-Eat:** Do one or two 24-hour fasts each week, for example by not eating from dinner one day until dinner the next day.
3. **The 5:2 Diet:** Only eat 500-600 calories on two days of the week, but eat normally the other 5 days.(Gunnars , 2014)

Fasting :

Humans have been fasting for thousands of years due to various reasons such as religious beliefs in religions such as Islam , Hinduism , Christianity etc. Humans and other animals also often instinctively fast when sick. Therefore , there is nothing "abnormal" about fasting process, and our bodies are very well equipped to handle extended periods of not eating.

Effect of Intermittent fasting on Hormonal status of human body :

Body fat is the body's way of storing energy (calories). When we don't eat anything, the body changes several things to make the stored energy more accessible. This has to do with changes in nervous system activity, as well as a major change in several crucial hormones. Here are some of the things that change in your metabolism when you fast:

- **Insulin:** Insulin increases when we eat. When we fast, insulin decreases dramatically (4). Lower levels of insulin facilitate fat burning.
- **Human growth hormone (HGH):** Levels of growth hormone may sky rocket during a fast, increasing as much as 5-fold. Growth hormone is a hormone that can aid fat loss and muscle gain, among other things . (Takahashi , 1968)
- **Norepinephrine (noradrenaline):** The nervous system sends norepinephrine to the fat cells, making them break down body fat into free fatty acids that can be burned for energy .

Interestingly, despite what the 5-6 meals a day proponents would have you believe, short-term fasting may actually *increase* fat burning. (Patel.et.al , 2002)

The intermittent fasting helps to reduce the weight successfully and also the metabolism of the body is also under control. This method combined with the exercise of half an hour daily enabled the subjects to lose 5-6 kgs weight after first month and 3-4 kgs in the next two months.

5.Conclusion :

As its already established that hypocaloric diets leads to weight loss as once the human body becomes calorie deficit the weight drops down. Well for one, weight loss isn't a linear event over time. When you cut calories, you may drop a pound or so each week for the first few weeks, for example, and then something changes. You eat the same number of calories but you lose less weight. And then the next week you don't lose anything at all. That's because when you lose

weight you're losing water and lean tissue as well as fat, your metabolism slows, and your body changes in other ways. So, in order to continue dropping weight each week, you'll need to continue cutting calories.

Secondly, while in essence a calorie is a calorie, your body reacts differently to different types of food. So eating 100 calories of high fructose corn syrup, for example, will have a different effect on your body than eating 100 calories of broccoli. The trick for sustained weight loss is to ditch the foods that are packed with calories but don't make you feel full (like candy) and replace them with foods that fill you up without being loaded with calories (like vegetables).

Thirdly, losing weight in a healthy, sustainable way often takes time. It requires patience and commitment. Extreme diets may promise rapid results but they're more likely to leave you feeling starving and losing more cash than weight.

Finally, there are emotional aspects of eating that can trip you up. Many of us don't always eat simply to satisfy hunger. We also turn to food for comfort or to relieve stress—which can derail any weight loss efforts before they begin.

The good news is that by making smarter choices every day, adopting healthy lifestyle changes, and developing new eating habits, you'll not only lose weight and be able to keep it off, you'll also improve your outlook and mood and have more energy.

There fore the process of Intermittent fasting leads to weight loss rapidly and sustainably. The subjects followed the process of intermittent fasting and also they were given wide range of food choices as well so that they do not starve.

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Table.No. 1: Type of exercise regimen followed by obese subjects before interventions (n=500)

Daily Exercise Regime Or Activity	Number of the Subjects* (n= 500)			
	Male		Female	
	Kurukshetra (n=125)	Delhi (n=125)	Kurukshetra (n=125)	Delhi (n=125)
Exercise a)Walking (3-5 times/week)	49	46	59	62
10– 15 minutes				
15 minutes – 25 minutes	33	31	29	38
➢25 minutes	9	8	6	4
a)Cardio Exercise Like Jogging, Running etc. (3-5) Times/ Week)	48	42	55	51
Upto 0.5 kms				
0 .5 – 1.5 kms	12	15	10	12
➢ 1.5 kms	5	2	4	2
Climbing Stairs (3-4 Times a day)	64	62	68	72

2 floors				
➢ 3-4 floors	12	18	13	19
➢ 4 floors	2	1	3	3
No Exercise	10	12	9	8

*Multiple response

Table.No .2: Methods adopted for reducing body weight and their effectiveness obese subjects in past life (n=500)

Attempts (1)	Response (2)	Number & Percentage			
		Male		Female	
		Kurukshetra (n=125) (3)	Delhi (n=125) (4)	Kurukshetra (n=125) (5)	Delhi (n=125) (6)
Extent of Attempts	Grossly excess	20 (40%)	18 (36%)	19 (38%)	14 (28%)
	Extreme	18 (36%)	16 (32%)	18 (36%)	17 (34%)
	Normal	12 (24%)	16 (32%)	13 (26%)	19 (38%)
Attempted OR	Yes	22 (44%)	32 (64%)	33 (66%)	35 (70%)

NOT	No	28 (56%)	18 (36%)	17 (34%)	15 (30%)
Methods adopted by the subjects for weight loss	Dieting	20 (40%)	21 (42%)	18 (36%)	26 (52%)
	Starvation	28 (56%)	18 (36%)	24 (48%)	22 (44%)
	Power Yoga	2 (4%)	10 (20%)	-	12 (24%)
	Kick Boxing	-	13 (26%)	-	14 (28%)
	Walking	10 (20%)	22 (44%)	19 (38%)	19 (38%)
	7 (14)	29 (58%)	9 (18%)	32 (64%)	
	Drugs	5 (10%)	2 (4%)	2 (4%)	3 (6%)

Effectiveness the Methods followed (n = 260)*	Very Effective	17 (34%)	13 (26%)	12 (24%)	14 (28%)
	Effective	28 (56%)	26 (52%)	21 (42%)	19 (38%)
	No Results	10	20	17	17

		(20%)	(40%)	(34%)	(34%)

*Multiple response

Table No.3: Correlation between different anthropometric parameters with energy, protein, fat, carbohydrates and fibre intake of the young female human adults belonging to Kurukshetra & Delhi (NCR) after the commencement of weight reducing interventions

Anthropometric Parameter	Kurukshetra					Delhi				
	Energy	Protein	Total Fat	Carbohydrate	Fibre	Energy	Protein	Total Fat	Carbohydrate	Fibre
Weight	0.878**	0.628**	0.738**	0.854**	0.223**	0.936**	0.965**	0.980**	0.880**	0.888 NS
BMI	0.448*	0.477*	0.537**	0.481*	0.403 NS	0.637**	0.666**	0.703**	0.541**	0.341 NS
WHR	0.883**	0.572**	0.718**	0.831**	0.365 NS	0.727**	0.741**	0.800**	0.635**	0.252 NS
Fat fold at triceps	0.913**	0.484**	0.819**	0.812**	0.813 NS	0.669**	0.703**	0.718**	0.589**	0.304 NS
Total Skin fold TSF ***	0.972**	0.556**	0.775**	0.914**	0.202 NS	0.766**	0.762**	0.787**	0.656**	0.247 NS
Fat %	0.911**	0.594**	0.790**	0.863**	0.672 NS	0.605**	0.619**	0.665**	0.538**	0.270 NS

NS - Non Significant

** Significant value at ($P \leq 0.01$)

* - Significant value at ($P \leq 0.05$)

*** TSF -Total sum of skin folds (biceps & triceps & suprailiac and subscapular)