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TO STUDY THE EFFECT OF SMOKING ON LOW WEIGHT AND BMI OF AN ADULT MAN

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Abstract

When smokers are stratified by smoking intensity, there was no dose-response relationship between smoking and body weight. This study explained the relationship between dietary intake, body weight and body mass index in adult smokers. Over the years it has been supported by many findings that smokers tend to weigh less, have a lower body mass index (BMI) and are leaner than non smokers. An analytical review of relationship between smoking and nutrient intake demonstrated that smoker had high fat along with alcohol consumption and lower intakes of fruits and vegetables. This study was conducted to review the relationship of smoking with low BMI and under nourished weight of the adult smokers. The mechanism of smoking decreases body weight which is mediated by nicotine. Smoking a cigarette serve as a behavioural alternative to eating, resulting in decreased food intake. Body weight is determined by balance of calorie intake and daily energy expenditure (metabolic rate +physical activity + thermic effects of food). Nicotine acts as a sympathomimetic drug which increase energy expenditure suppressing food intake and increasing metabolic rate during work output than at rest. It was found out that the diet of respondents included high intakes of protein and fats but was lower in energy and carbohydrates. The additional protein contributed to energy requirements and additional fats contributed little to weight management.

Keywords: BMI, Energy expenditure, Nicotine, Smoking

Introduction

Initially a child may start smoking just to play a game of lighting a cigarette. Then he may like to show off the feat of blowing out the smoke and pretty soon the habit develops.

Smoking causes serious hazards of health if one persists with this habit. Smoking not only reduces the span of life but makes the life more miserable and not worthy for living. Heart diseases, lung cancer, other respiratory diseases ,brain bleed, stomach bleed are common causes of early and untimely death due to smoking, besides many day to day health problems faced by smokers.

Smokers consume less food as nicotine has a hunger suppressing effect and hence weigh less.

Smoking was positively related to meat consumption in males. Both males and female smokers consumed fewer vegetables and fruits but more alcohol and coffee than did people whom never smoked.

Smokers had higher fat and alcohol consumption and lower intakes of fruit and vegetable than non-smokers.[5,16]

Males who smoked were more likely to have lower fruit and carbohydrate intakes but had higher vegetable and total fat intakes. In addition, they had lower weights than their non-smoking counterparts[8].

Smoking may increase energy expenditure by raising the basal metabolic rate or it may decreases calorie intake[17].

However, there is no evidence that smoking increases energy expenditure related to physical activity [1].

Nicotine in cigarettes may increase metabolic rate rather than change energy intake or physical activity[9].

Smoking's effect on body weight could lead to weight loss by increasing the metabolic rate, decreasing metabolic efficiency, or decreasing caloric absorption (reduction in appetite), all of which are associated with tobacco use. The metabolic effect of smoking could explain the lower body weight found in smokers [7].

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Smokers weighed less than nonsmokers, and body leanness increased with the duration (but not with the intensity) of smoking[1].

Smoking's effect on body weight could lead to weight loss by increasing the metabolic rate, decreasing metabolic efficiency, or decreasing caloric absorption (reduction in appetite), all of which are associated with tobacco use. The metabolic effect of smoking could explain the lower body weight found in smokers. Smoking a single cigarette has been shown to induce a 3% rise in EE within 30 min [6,4].

Besides its metabolic properties, nicotine could induce an acute anorexic effect: during a 2-h period, hunger and food consumption were negatively associated and satiety and fullness were positively associated with increasing doses of nicotine[13]. Physical activity increases metabolic rate and may help to control body weight, but smokers tend to be less physically active[14]. Overall, whereas an acute metabolic effect of smoking that favors weight control appears probable, the effect on caloric intake remains disputable.

In addition, they had lower weights than their non-smoking counterparts[7]. Changes in fat oxidation and in adipose tissue metabolism (eg, lipoprotein activity) may also be involved in postcessation weight gain.

Anthropometric measurement included the measurements of body weight and height, with participants wearing indoor clothes without shoes, and the measurement of waist and hip circumferences. BMI was calculated as weight (kg) divided by height squared (m^2).

Most of the effects of cigarette smoking on body weight are mediated by nicotine, although smoking a cigarette may also serve as behavioural alternative of eating, resulting in decreased food intake. Nicotine acts on nicotinic receptors in the brain. The binding of nicotine to nicotinic receptors opens ion channels, allowing entry of sodium and calcium, which, in turn release various neurotrassmitters in central nervous system[3].

Body weight is determined by the balance of caloric intake and daily energy expenditure. Daily energy expenditure is determined by resting metabolic rate, physical activity and thermic effects of food. Nicotine reduces body weight by raising the resting metabolic rate while blunting the expected increase in food intake in response to the increase in metabolic rate. Nicotine is a sympathomimetic agent which increase energy expenditure via action on peripheral tissue and through regulation of metabolism in the brain. Nicotine increases thermogenesis in adipose tissue, partly by increasing lypolysis and subsequent recycling of fatty acids into triglycerides [2,8].

Smoking increases energy expenditure by 10% more during exercise than while at rest BMI). This shows that energy consumption is more than corresponding Basal Metabolic rate at rest.Thus resulting in weight loss[17].

Nicotine has many potential effects on central nervous system regulation of eating and energy expenditure. The regulation of eating behaviour and metabolic rate by the brain occurs in the hypothalamus, which integrates peripheral signals of satiety and adiposity as well as central motivational and emotional influences. Leptin is released from adipose tissue in proportion to the amount of adipose and acts centrally to suppress food intake and increases metabolic rate[19].

The release of some hormones by the central nervous system influences brain chemicals to suppress eating and increase metabolic rate as well as those that suppress eating and decrease metabolic rate. Nicotine has complex effects on these hormones which suppress appetite and facilitates weight loss [20,12].

The mechanisms of weight gain after smoking, cessation include decreased metabolic rate and increased caloric intake, effects opposite to those produced by nicotine. Appetite supresent effects of nicotine on the brain are reversed[18].

Hence smokers tend to weigh less, have a lower body mass index (BMI)

Objectives

1. To know the nutritional status of the all the three macro nutrients i.e. protein, carbohydrates and fats.
2. To know the difference between BMI (Basal metabolic rate at rest) and energy expenditure during work output of smokers.
3. To know the correlation between macro nutrients, height and weight.

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Vol-22-Special-Issue-27-December-2019

Methodology:

Survey method was used to study the nutritional status of 40 smokers. The diet and nutrient intake were reliable parameters to determine the nutritional status of the population. The questionnaire was formulated according to the requirement of the study to maintain the sample and detailed record of daily food intake and Anthropometric measurements.

Nutritional status was assessed by:

1.Dietary intake and frequency of consuming food items

2.Anthropometric measurements:

Body measurements such as height, weight were important tools in evaluation of overall health status of individual. Anthropometric measurements genetically determined are strongly influenced by nutrition. They reflect the pattern of growth and physical state of individuals deviate from the average at various ages in the body size and build.

Parameters included in the study:

1. Weight: Portable weighing scale was used. The subjects were weighed were minimum of clothing and without shoes. The weight was recorded in kilograms. Mean of three readings were taken.
2. Height: Height was measured using measuring tape. Mean of three readings were taken.
3. Body Mass index: Anthropometric measurements like height, weight indexes based on these measurements were evolved by different workers.

Dietary intake of the respondents was calculated using 24 hour method. Calculations for the amount of protein, carbohydrate, fat, energy were made using book on "Nutritive value of Indian foods" [(10)].

Statistical analysis were performed by the process of classification and tabulation and the responses were analysed.

The data was classified and tabulated for statistical analysis with simple frequencies, percentages, arithmetic mean and correlation.

Results and Discussion

Table 1: Comparison of mean nutrient intake of macro nutrients

Sr. No.	Nutrients	RDA	Mean Actual Intake	Deviation	Percentage(%) intake from RDA
1.	Energy	2730 kcal	2566.004	-161.996	93.99
2.	Protein	60 g	92.11	+32.11	153.51
3.	Fat	55 g	67.8	+12.8	123.27
4.	Cho	499 g	383.66	-115.34	76.88

Table 1 reveals that mean intake of energy was 2566.004 kcal as compared with the recommended allowances of 2730 kcal. Hence respondents were consuming 93.99% of their RDA for energy. This difference between the mean intake of the RDA was found to be statistically significant. When energy intake is low there is possible behavioural adaptation to adjust work output to energy intake.

This mean protein of the respondents was 92.11g as compared with RDA of 60g. They resumed 32.11g of protein more than required. The difference was found statistically significant. The respondents were consuming 153.51% of their RDA's. Thus the diet was adequate in terms of both quality and quantity of protein. Whatever extra protein was present helped to provide energy through gluconeogenesis and adequately performed its primary function of repair and maintenance.

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Vol-22-Special-Issue-27-December-2019

The mean total fat consumption was 67.8g as compared with RDA of 55g. The visible and the invisible fat believed to contribute significantly to the total fat and the essential fatty acids content of the diet. Some amount of 12.8% extra fat was contributed to small amount of energy balance by increasing the work output level.

Carbohydrates were consumed less in the diets. They were consuming 383.66g as compared to 499g. Thus the subjects were consuming only 76.88% of their RDA of carbohydrates, but their diets were deficient to provide sufficient energy.

Table 2: Distribution on the basis of The Anthropometric indices

Sr No.	BMI classification Kg/m^2	No. Of persons	Percentage	Presumption diagnosis
1	< 18.5	31	77.5	Underweight
2	18.5- 22.9	6	15	Normal
3	23- 24.9	2	5	Overweight
4	25- 29.9	1	2.5	Obese

Table 2 reveals that 77.5% of the respondents were underweight. Only 15% of the respondents had ideal normal weight. 5%of the respondents were Overweight and 2.5%of the respondents fall under obese category. Thus we conclude that mostly the respondents were underweight

Table 3: Relationship of various parameters of respondents

Sr No.	Parameters	Correlated
1.	Calorie – Protein	0.16
2.	Calorie – Fat	0.11
3.	Calorie – Carbohydrate	0.21
4.	Height – protein	0.19
5.	Weight – Fat	0.22

Table 3 reveals that calorie and protein are positively correlated. Calorie and fat are little positive correlated. And calorie and carbohydrate have little positive correlation. When height was correlated with protein, the result was little positive and when height was correlated with protein, the result little positive and when weight was related to fat, correlation was positive. From yhe above table we conclude that if any one parameter increases then the other correlated parameter also shows positive aspect. Hence Correlation were positive in nature.

Conclusion

The study on effect of smoking on underweight and low BMI of an adult man was conducted on 40 smokers.

Majority of the smokers were non vegetarians and had preference of fried foods. The liking and consumption of these foods was reflected in their nutrient intake. They were consuming low calorie, low carbohydrate and high protein and fat diet. Less intake of energy was reflected in the diets of the respondents resulting in low BMI and underweight. Though high intake of protein and fat compensated this low energy intakes but did’nt prove to manage their ideal body weight and BMI. This ultimately led to undernourished respondents with low BMI and low weight.

Since there is positive correlation between macronutrients, weight and height, but still respondents weighed less due to lack of some essential fatty acids in their total fat intake constituting to only one type every time and more work output. These differences in body weight could not be explained by the differences in physical activity or dietary intake pattern. It is possible that nicotine intake may increase resting metabolic rate and therefore increase energy expenditure enough to affect BMI.

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Vol-22-Special-Issue-27-December-2019

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