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Effect of High Calcium Intake to Balance Obesity

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ABSTRACT

Adolescence, as defined by The World Health Organisation (WHO), spans from 10 to 20 years of age. According to the Brazilian Health Ministry, adolescence is defined as the same age group as the World Health Organisation (WHO). It is characterised by significant growth and development, as well as transformations in anatomy, physiology, psychology, emotions, and social aspects. In addition, adolescence is a crucial period in which life patterns, including eating habits, are formed. Food consumption during this life stage is impacted by various factors, such as sociocultural values, the desire to achieve a new body image, fitting in with peer groups, the family's financial situation, the availability of food, eating meals outside the home, the consumption of processed foods, media influence, and the development of food preferences based on choice, variety, and preparation methods.

Keyword: Anatomy, Physiology, Psychology, Emotions, Adolescence

INTRODUCTION

Adolescence, as defined by The World Health Organisation (WHO), spans from 10 to 20 years of age. According to the Brazilian Health Ministry, adolescence is defined as the same age group as the World Health Organisation (WHO). It is characterised by significant growth and development, as well as transformations in anatomy, physiology, psychology, emotions, and social aspects. In addition, adolescence is a crucial period in which life patterns, including eating habits, are formed. Food consumption during this life stage is impacted by various factors, such as sociocultural values, the desire to achieve a new body image, fitting in with peer groups, the family's financial situation, the availability of food, eating meals outside the home, the consumption of processed foods, media influence, and the development of food preferences based on choice, variety, and preparation methods.

Scientific literature emphasises that teenagers' diets are characterised by their inclination towards high-energy foods, which have high levels of saturated fats and cholesterol, along with large amounts of salt and carbohydrates. These foods have limited nutritional value, leading to a failure to meet the minimum dietary recommendations for various food groups. The notable rise in non-communicable chronic diseases, such as osteopenia, osteoporosis, overweight, obesity, arterial hypertension, dyslipidemia, type 2 diabetes mellitus, and insulin resistance syndrome (IRS), can be attributed to changes in eating habits, lifestyle, and social behaviour. These conditions can affect individuals during adolescence or when they reach adulthood. Understanding food intake is crucial, since several studies have shown an association between diet composition and the risk of morbidity and death. Regarding the dysfunctions, calcium metabolism has garnered significant global interest, particularly in connection to osteoporosis, arterial hypertension, and weight management.

Regarding obesity, much attention has been dedicated to comprehending the overall energy equilibrium and the amounts of macronutrients in the diet. Nevertheless, only a limited number of research have investigated the influence of macronutrients on energy balance. In this context, dietary calcium has been acknowledged as a mineral that enhances the process of weight reduction. The likely metabolic process is that a decrease in calcium intake from the food leads to a rise in intracellular calcium levels, which is caused by changes in parathyroid hormone and 1,25 dihydroxyvitamin D levels.

Elevated intracellular calcium levels in adipocytes enhance lipogenesis and suppress the lipolytic process. Scientists have proposed that sufficient calcium absorption enhances the rates at which body fat is burned, however the precise processes behind this phenomenon remain incompletely comprehended, resulting in conflicting findings across various investigations. The recommended daily calcium intake for those aged 9 to 18, regardless of gender, is 1300mg. Nevertheless, it is important to acknowledge that there are still obstacles to eating foods that are rich in calcium. These obstacles include factors such as taste, discomfort, potential calorie content, and digestive issues, in addition to a lack of appropriate

understanding about its metabolic significance. This study aimed to assess the nutritional status of adolescents attending outpatient clinics, with a focus on their eating habits and calcium intake. The objective was to determine the prevalence of eutrophy, overweight, and obesity among these adolescents, and to investigate the potential relationship between low calcium intake and the prevalence of overweight and obesity.

REVIEW OF LITERATURE

Baataoui, Soumaya & Chakit, Miloud & Boudhan, M & Ouhssine, M. (2023) Obesity and vitamin D deficiency are recognised as significant global public health issues. The presence of excess weight and obesity may lead to several difficulties, such as cardiovascular issues, as well as disturbances in phosphocalcic metabolism. The primary goals of our research are as follows: The objective is to assess the phosphocalcic profile, lipid balance, and vitamin D dose in an obese and overweight population, and determine if vitamin D insufficiency is a cause or consequence of obesity. This research is a descriptive cross-sectional study. The event occurred at the Mimosas Kenitra, a medical analysis laboratory, and lasted for a duration of 18 months. The population in question comprises individuals. Individuals between the ages of 20 and 70, regardless of gender, have a body mass index (BMI) more than 25. Patients classified as morbidly obese had a 60% prevalence of vitamin D insufficiency, while 30% of obese patients with vitamin D deficiency had normal weight. This thesis assessed the phosphocalcic equilibrium and the levels of vitamin D.

Das, Sandeep & Choudhuri, Dipayan (2021) Metabolic disorders, such as hypertension, dyslipidemia, insulin resistance, nonalcoholic fatty liver, and cardiovascular illnesses, seem to impact individuals of all ages, regardless of national, economic, and demographic factors. Hence, the avoidance of metabolic diseases is seen as crucial. One of the suggested preventative strategies against metabolic illnesses in contemporary culture is the dietary role of nutrients, including vitamins and minerals. In recent times, there has been growing interest in the potential benefits of dietary calcium in managing weight and reducing the risk of metabolic diseases. While dietary calcium has been shown to have various positive benefits against metabolic diseases, there have also been reports of conflicting findings. The purpose of this study is to gather current information and explore the potential processes by which dietary calcium may have a role in preventing metabolic diseases.

This review also examines the adverse effects and potential benefits of calcium consumption on health-related matters. High calcium diet mitigates the detrimental effects of metabolic disorders by modulating hormonal actions, intracellular calcium levels, the renin-angiotensin system, intestinal fat absorption, faecal fat excretion, lipid metabolism, carbohydrate metabolism, inflammation, and oxidative stress. This collective action enhances an individual's metabolic well-being. Metabolic disease is a pervasive worldwide health concern affecting all segments of society and is increasing at a fast pace despite several efforts by the scientific community to mitigate its occurrence.

In recent years, there has been significant focus on the function of dietary calcium in the management and treatment of metabolic diseases. This review examines the positive impact of dietary calcium on various metabolic problems by investigating the biological processes involved. This study aims to provide valuable insights into the recommended dietary calcium intake for health policy and its incorporation into the dietary chart through calcium-rich foods and/or calcium supplements. This approach can be beneficial in mitigating the risk of metabolic disorders, depending on an individual's health status.

Daley, Denise & Myrie, Semone (2021) Calcium plays a crucial role in maintaining the health of bones and muscles. Insufficient calcium consumption is linked to negative consequences including osteoporosis. Recent research has also emphasised the notable impact of calcium on non-musculoskeletal functions, such as the cardiovascular system, obesity, and cancer. Calcium serves as an antagonist in the cardiovascular system, leading to a decrease in hypertension, an increase in vasodilation, and an improvement in blood vessel function when consumed as an organic source via food. Excessive use of calcium supplements, which include inorganic calcium, may have a detrimental effect on the cardiovascular system by promoting the formation of plaque deposits and atherogenesis.

Several studies indicate that calcium consumption may influence obesity by regulating adipogenesis and decreasing fat accumulation, leading to weight reduction. The aetiology of calcium's role in lowering obesity is believed to be somewhat linked to its influence on the composition of gut bacteria, suggesting that calcium may possess prebiotic characteristics. Animal and human studies suggest that calcium may have a role in preventing and treating cancer by influencing cell proliferation and hormone control. Therefore, more research is needed to investigate its potential benefits in the human population. Several preliminary and limited clinical trials indicate that cancer could have potential benefits for treating colorectal cancer. Overall, recent studies in several fields consistently emphasise the need of dietary calcium for optimal functioning at the molecular and biochemical level, leading to improvements in health and some chronic disease states.

RESEARCH METHODOLOGY

A sample is a miniature representation of and selected from a larger group or aggregate. The sample provides a specimen picture of a larger whole. It is a well defined group that may consist of individuals. Method of sampling used for this study was Non probability purposive sampling method.

A sample should not only provide representativeness, but should be adequate enough to render stability to its characteristics. The number of units or subjects sampled for inclusion in the study is called a sample size. Sample size taken for this study was of 300 subjects. They were enrolled in two groups, experimental and control, 150 in each group. The subjects were middle aged men of age group 30 - 45 years and BMI more than 23 working as executives at a steel and power company.

Techniques of motivation

To motivate the subjects for active and honest participation, audio visual aids were prepared and shared with the subjects. A fortnight follow up was taken by making phone calls, messages and emails. Face to face interaction was done with them at weight management clinic not only at the time of enrolment but also once in every month of the trial period. Moreover, the simplicity of the diet made it easier for them to stick to it successfully.

Research Tools for data collection

Data collection is an important part of research. In order to collect the required data for the study, appropriate tools and measuring techniques should be devised. The characteristics which can be exactly measured in terms of a quantity such as weight, height, blood sugar level etc. are said to be measured on metric scale. Research tools used in this study included oral questionnaire, closed end structured questionnaire, graphic rating scales, attitude scale, interview for past history and 24 hour dietary recall method. The information collected from various sources through the use of different tools is called data. For this particular study, Quantitative parametric data (height, weight, BMI, body fat %) were obtained by metric scale measurement.

RESULT AND DATA INTERPRETATION

Table No.4.1 Comparison of Pre Post Mean Weight (kg) among Obese Middle Aged Men belonging to Experimental and Control Group

Groups	N	Gain Score for Weight		Mean Difference	't'
		Mean	S.D.		
Experimental	150	-9.47	2.55	7.50	29.90**
Control	150	-1.97	1.71		

** Significant at .01 level

Table No. 4.1 for comparison of pre post mean test gain scores of weight (kg) among obese middle aged men belonging to experimental and control group shows mean reduction of 9.47 kg in experimental group and 1.97 kg in control group. Mean difference in reduction of weight between both the groups was 7.50 kg with a 't' test score of 9.90 significant at 0.01 level

Analysis of tables for weight indicated that diet intervention reduced the weight of obese middle aged men by approximately 10 kg in a times period of 3 months thereby supporting the hypothesis.

Due to increasing prevalence of obesity , Delahanty LM did her study on evidence based research studies and concluded that most of the diet researchers focused on weight reduction by using very low calories diet which provided the result as larger weight loss. Her analysis included 1,800 subjects from 89 studies to review different types of weight-loss strategies including diet pattern, behavior, physical activity, drugs for inducing anorexia, and surgical treatment. It was found that,

apart from surgery, dietary strategies showed the highest rate of weight loss. Study done by her suggested that according to evidence-based research trends weight-loss strategies should include the use of meal to help people prevent and treat the overweight and obesity problems (Delahanty 2002). In view of above conclusions, this study was based on providing a healthy meal replacement and easy to stick diet plan through DASH diet and effect of this diet was observed on the weight of the subjects. Average weight reduction due to the diet intervention was about 9.47 kg. There was a significant decrease in the weight of subjects of experimental group as compared to the subjects of control group as depicted in the tables above.

Table No. 4.2 Mean Pre-Post BMI Scores of Obese Middle Aged Men belonging to Experimental Group

Variable	N	Experimental Group				Mean Difference	't'
		Pre Test		Post Test			
		Mean	S.D.	Mean	S.D.		
BMI	150	28.65	1.12	25.45	0.81	3.20	46.03**

** Significant at .01 level

Table No. 4.2 for mean pre post test BMI scores of obese men belonging to experimental group shows that mean BMI score of obese men before intervention was 28.65 and mean BMI score after intervention was 25.45 The mean difference in BMI scores before and after intervention was 3.2 The 't' test score obtained was 46.03 significant at 0.01 level.

Table No. 4.3 Mean Pre Post BMI Scores of Obese Middle Aged Men belonging to Control Group

Variable	N	Control Group				Mean Difference	't'
		Pre Test		Post Test			
		Mean	S.D.	Mean	S.D.		
BMI	150	28.58	1.17	27.90	1.08	0.68	14.29**

** Significant at .01 level

Table No. 4.3 for mean pre post test BMI scores of obese men belonging to control group shows that mean BMI score of obese men was 28.58 before the trial and 27.90 after the trial. The mean difference in BMI score after trial period was found to be 0.68 The 't' test score obtained was 14.29 significant at 0.01 level.

Table No. 4.3 for comparison of pre post test mean gain scores of BMI among obese men belonging to experimental and control group shows that reduction in mean BMI score after the trial was 3.20 in experimental group and 0.68 in the control group. The difference in reduction of BMI scores between the two groups was 2.52 The value obtained for 't' test was 29.93 significant at 0.01 level

CONCLUSION

Obesity can be defined as the generalized accumulation of fat in the body (Antia & Abraham, 2006).It is a state of generalized accumulation of excess adipose tissue in the body leading to more than 20% of desirable weight (Srilakshmi,2004).The prevalence of obesity in developing countries has increased. This is because communities have

emerged from a lifestyle of subsistence towards a lifestyle of affluence. Usually obesity is due to positive energy balance. That is, the intake of calories is more than the expenditure of calories. Obesity is most common after age of 35 years, largely because of less physical work & exercise. Executive jobs involve longer sedentary hours at desk. Food consumption remains the same or may even increase leading to irregular dietary pattern and hence weight gain. (Antia & Abraham, 2006). Eating habits of certain people may lead to obesity. Genetic inheritance of parents' BMI, that too basically from biological mother, is about 33%. (Mathur, 2006). A mutation in the human gene for the B3 receptor in adipose tissue, involved in lipolysin and thermo genesis markedly increase the risk of obesity. (Srilakshmi, 2004). Research has shown that risk for medical problems is related to the size of fat cells present more than the number of fat cells or persons' weight. (Srilakshmi, 2004)**.** As the measurement of direct body fat is difficult, we use an indirect method, a ratio called BMI, also called Quadlet index.

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