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Energy intake, energy expenditure and BMI of 1st year medical and paramedical students

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Abstract

Introduction: Medical and paramedical students are the backbone of health sector. They generally skip the meals due to their hectic schedule. So the aim of present study was to examine the Energy Intake (i.e. calorie intake), Energy Expenditure (i.e. REE) and BMI of 1st Year Medical and Paramedical Students.

Methods: 80 medical and 80 paramedical students were assessed for BMI, CI and REE. BMI was calculated using the measurements of height and weight. Calorie intake was assessed with the help of modified food frequency questionnaire (FFQ) and resting energy expenditure (REE) was obtained using indirect calorimetry.

Results: Mean ages of participants under the medical and paramedical groups were 19.9±2.11 and 19.72±1.46 years respectively. Age and height of the participants from both the groups were not significantly different, but a significant difference existed in weight of them. Participants from both the groups were falling under the normal category of BMI, but still a significant difference existed in the BMI of 2 groups. Similarly, per day calorie intake of both groups was not significantly different, but there was a significant difference in resting energy expenditure (kcal/day) in both the groups.

Conclusion: Though the calorie intake was almost similar in the medical and paramedical students, BMI and REE were found to be higher in medical students than in paramedical students. Reason behind it may be that the medical students have a busier schedule or more of a sedentary lifestyle than the paramedical students.

Keywords: Resting energy expenditure, calorie intake, food frequency questionnaire, indirect calorimetry

1. Introduction

Young adulthood is generally considered healthy times of life, several important public health and social behaviors and problems either start or peak during these years. Most part of this population is college going. College-attending young adults face a variety of risk factors for poor mental health, including high stress and high rates of food insecurity. Food insecurity is defined as the lack of consistent access to a sufficient quantity of healthy affordable foods; on college campuses. A report of World Health Organization (WHO) [1] stated that the adult disease burden is due to health risk behaviors (unhealthy eating practices) that start during adolescence. Nutrients that we obtain through food have vital effects on physical growth and development, maintenance of normal body function, physical activity and health. Nutritious food is, thus needed to sustain life and activity. Our diet must provide all essential nutrients in the required amounts. Requirements of essential nutrients vary with age, gender, physiological status and physical activity. Dietary intakes lower or higher than the body requirements can lead to undernutrition (deficiency diseases) or overnutrition (diseases of affluence) respectively. An adequate diet, providing all nutrients, is needed throughout our lives [2]. The National Sample Survey office's (NSSO) 2011-12 data on nutritional intake shows that per capita calorie consumption has raised to 2099 kilocalories per day in rural areas and 2058 kilocalories per day in urban areas. Both numbers are still below India's Planning Commission benchmark of 2,400 kilocalories per day [3]. In India, on the one hand there are mountains of food grain stocks and on the other hand there are deaths from starvation, and widespread stunting from malnutrition. Studies have shown that medical and paramedical students especially who stay in hostels away from their home are susceptible to irregular dietary habits, lack of exercise, and addiction [4].

The academic demands and challenges of medical college can make it difficult for physicians-in-training to maintain healthy behaviors over the course of their 4-year program, with potential adverse consequences on their physical and psychological health^[5]. Studies have suggested a decline in physical activity, diet quality, life satisfaction, and general health during medical school^[6,7]. The aim of this study was to assess the energy Intake, Energy Expenditure and BMI of 1st Year Medical and Paramedical Students.

Materials and Methods:

The present study was a cross sectional study conducted over a period (January - April) in 2019. Ethical clearance (EC/P-47/2018) of RUHS College of Medical Sciences, Jaipur and written consent were taken from all students participated in the study. Through a meeting students were briefed about the study. 80 - 80 students of both medical and paramedical were selected after taking voluntary consent. The weight (kg) and height (cm) were measured by using calibrated weighing machine and stadiometer respectively according to the NHANES guidelines^[8]. BMI was calculated by using the formula weight (kg)/height (m²). Subjects were categorized in different categories according to BMI (Table 1)^[9].

Calorie intake was assessed by using modified food frequency questionnaire (FFQ). FFQ contains a list of food items that are mainly eaten in Western region of India and common food items eaten by an appreciable part of the population. FFQ relies primarily on the generic memory of an individual to recall the frequency and quantity of intake of a food over a reference period of time. FFQ is used to obtain frequency and, in some cases, portion size information about food and beverage consumption over a specified period of time, typically the past month or year. Based on the response from the participant, the interviewer filled in the number of times the food was consumed per unit time, and the average portion size in the following format (Table 2).

The questionnaire had a food list which covered >90% of the intake of calories. Records were taken as per day dietary intake and proportion of that food is eaten in references of portion size of cup, spoon and glass. And through this record the total energy intake were calculated. As calorific value of food. Energy content (Kilo calorie) of food items have been summed up and total energy intake were calculated. (Nutritive value of Indian foods, 1978)^[10].

Resting energy expenditure (REE) was assessed by using indirect calorimetry (AD instruments Gas Analyzer, model-ML206), which calculates REE using weir equation^[11]:

$$REE = 3.9 (VO_2) + 1.1 (VCO_2) \times 1.44$$

For this, participants were instructed to fast overnight and not to exercise for 48 hours prior to the measurement. Once the participants arrived in the laboratory, they were asked to rest for at least 30 minutes, and were made to wear the mask through which only they were allowed to breathe in and out, while lying on the couch comfortably. Mask was connected to the gas analyzer with the help of a connecting pipe via gas mixing chamber. Measurement was taken for 40 minutes and steady state data was averaged and used for the purpose of measurement of REE, data from first 5 minutes was discarded as this much of time is supposed to be utilized by the participants to adjust comfortably on the

couch. The calorimeter measures the amount of O₂ consumed and the amount of CO₂ produced while at rest by comparing the concentrations of O₂ and CO₂ in the air inspired by the participant with the concentration in the air expired by the participant.

Mean±SD was calculated for normally distributed data. And unpaired student t- test was to administered to assess significant difference between medical and paramedical group. Whole the analysis was done in Microsoft excel 2007.

Result

The present study was conducted on 80 medical and 80 paramedical 1st year students of RUHS college of medical sciences, Jaipur. Their mean±SD of age (years), height (cm), weight (kg), BMI (kg/m²), calorie intake (kcal/day) and REE (kcal/day) were depicted in table 3. There was not a significant difference in age and height of both the groups. But the significant difference exist was in weight. Both the groups were in normal BMI category. But the significant difference was exist in the BMI of both the groups. Per day calorie intake of both the groups was not significantly different. But there was a significant difference in resting energy expenditure (kcal/day) in both the groups.

Discussion

In this cross sectional study we want to assess the BMI, CI and REE of 1st year medical and paramedical students of western India. The energy required by humans for bodily functions is obtained from the environment through the consumption of food, specifically lipid, protein and carbohydrate. These energy substrates undergo oxidative reactions within the body producing carbon dioxide (CO₂), heat and the energy molecule adenosine triphosphate (ATP) (Ferranini *et al.*, 1988)^[12]. An individual gains, loses, or maintains body weight depends on the balance between caloric intake and physical activity, body size, body composition, and probably metabolic efficiency (Sims *et al.*, 1973)^[13].

Energy balance in the lean is a long-term phenomenon, conditioned by large day-to-day fluctuations in energy intake" (Naismith *et al.*, 1995)^[14]. A reduction in body weight, the lost energy is replaced by alterations in physiology and changes in the nature of the food consumed (Poppitt *et al.*, 1996)^[15]. So, energy intake is dependent on energy expenditure which is utilized for various body functioning's. Resting energy expenditure required to maintain the basic metabolic activities including maintaining the body temperature and keeping the functioning of vital organs such as brain, kidneys, heart, and lungs. REE is utilized for growth and development in resting state^[8]. College life is full of challenges and stress. Its reasons are mainly future insecurities, competition, demanding curriculum, new responsibilities, expectations, financial concerns, increased workload^[16, 17]. Show that many young adults have the habits of skipping meals especially breakfast^[18]. The intense academic pressure coupled with hectic schedules of medical curriculum has been suggested as a cause for higher mood disturbances, meal skipping and physical inactivity among medical student^[19]. And paramedical students also have the same busy environment (lab postings, classes) in the hospitals and colleges, but less than the medical students. These two branches are the backbone of health sector. So this was the

first study done to see their BMI which is best indicator body fat and gauge of risk diseases that can occur with more body fat. We found that medical students have more BMI than paramedical students. Per day calorie intake of both the groups was not significantly different. In the present study the mean per day calorie consumption were 2406.77 ± 615.91 kcal in medical students and 2386.94 ± 588.46 kcal in paramedical students. These values were compatible to India's Planning Commission benchmark of 2,400 kilocalories per day^[3]. Beaton *et al.* (1979) found that the mean daily energy intake was 2,639 kcal/day for men and 1,793 kcal/day for women by using 24 h recall method^[20]. Among 20-year-old men, the intake reported between 1972 and 1978 in the Lipid Research Clinics Prevalence Study (LRC, 1980) ranged from 2,800 to 3,500 kcal/day, but for 59-year-old men, this range was 1,900 to 2,600 kcal/day. Intakes for 20-year-old women during the same period ranged from 2,000 to 2,200 kcal/day^[21]. Which were more than the per day calorie intake result of present study. This variation may be due to geographical variability. Resting energy expenditure was significantly higher in medical group. It can be due more weight and BMI of medical group subjects than paramedical group subjects. Because medical group subjects have more body surface area and body composition than the other paramedical group. So their resting metabolic rate was high. Body weight is a most common factor influencing REE. Obese people have a modestly, but significantly, higher 24-hour energy expenditure than do normal-weight subjects (James, 1983)^[22]. There is a positive and significant relationship between energy expenditure and fat-free mass, body surface area, or body weight (Jequier, 1984; Ravussin *et al.*, 1988)^[23]. Since body weight is more readily determined than specific components of body composition, basal energy needs can be estimated from body weight using the some formulas (Owen *et al.*)^[24, 25]. So the resting energy expenditure was determinant of BMI, as was seen in the present study results. But in the present study all the subjects were of normal BMI category and their per day calorie intake was also normal according to India's Planning Commission benchmark^[3]. But their REE was significantly difference as the BMI difference exist between two groups.

Conclusion

In conclusion, we observed that the medical students have more BMI and REE than paramedical students. Yet the both group's calorie intake was almost same and normal as per capita demand. It can be due to medical students have more busy schedule or their sedentary lifestyle than the paramedical students.

Limitation

In the present study, the sample size was a little smaller for providing a substantial evidence of effect of lifestyle stress over BMI and resting energy expenditure. Thus, future study is required to be conducted in order to make an effort to prevent the ill effect of stressful lifestyle over normal physiological parameters. Also, the current study, only considered the effect of hectic professional routine on normal BMI individuals, it is needed to be studied further in underweight, overweight as well as in obese subjects.

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Conflict of interest

There are no conflicts of interest.

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