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ORIGINAL ARTICLE

Prevalence of Chronic Energy Deficiency in Ethnic Adult Punjabi Population According to Weight for Height Criteria

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ABSTRACT

Introduction: Chronic energy deficiency (CED) is a state where energy intake is less than what is required by the body over prolonged period of time. Overall prevalence of CED in India is 30%. **Objectives:** The objectives of the study were to find the prevalence of CED in Ethnic Punjabi Population of Amritsar. **Materials and Methods:** It was a cross-sectional study using stratified sampling technique. A total of 400 study subjects were chosen in the age group of 20–60 years, 200 were taken from rural and 200 were taken from urban areas. **Results:** Total CED in Punjab was found out to be 19% and maximum number of CED cases were found in the age group of 20–29 years. The prevalence of CED was more in females (23.9%) than males (13.1%). Maximum cases were of mild grade CED at 12.5%. **Conclusion:** Reckoning the burden of CED in Punjab, special public health interventions are the need of hour.

Key words: Body mass index, chronic energy deficiency, malnutrition

INTRODUCTION

Ever since, the beginning of life on earth, food remains the basic necessity to survive and grow. Everything on earth, regardless of belonging to animal or plant kingdom, needs some kind of nutrition to survive, grow, and reproduce.[1]

Food is defined as a substance of either animal or plant origin, consumed to provide nutritional support to human body. All body functions, metabolic, hormonal, mental, physical, or chemical are performed by the body with proper nutritive food.[2] A well-balanced, nutritive, and correct diet is thus of utmost importance for the maintenance of good health and the healing of diseases.

For a person with an adequate amount of food, health is not impaired and physiological functions are not compromised. However, when there is energy imbalance, it leads to marked changes in body weight as well as the quantity and quality of energy output. If the energy imbalance is severe enough and prolonged over a long period of time, leisure and socially desirable activities are affected.[3]

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At present, many countries in the world are facing the triple burden of communicable diseases, non-communicable diseases, and malnutrition. Malnutrition is a double-edged sword with overnutrition on one side and undernutrition on other side. It refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.[4] Overnutrition leads to obesity and obesity is a major risk factor for chronic diseases like cardiovascular diseases. Whereas, undernutrition is a very complex phenomenon and is influenced by a host of factors such as education, occupation, poverty, inadequate food consumption, food habits, inadequate food distribution, marital status, poor sanitary, and environmental conditions.

Malnutrition in all its forms is a global problem. Malnutrition affects people in every country. Globally, about one out of three people is affected by some form of malnutrition. Around 1.9 billion adults worldwide are overweight, while 462 million

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are underweight.[5] The term malnutrition also conjures up images of about 800 million people who go hungry every day.[4] Malnutrition also extends to the 42 million children and 1.9 billion adults around the world who are overweight or obese.[5]

Chronic energy deficiency (CED) refers to an intake of energy less than the requirement, for a period of several months or years. The individual suffering from CED has low body weight due to decreased energy sources and thus has limited physical activity and performance.[6]

According to the National Family Health Survey-3 (NFHS-3) report, in India, overall prevalence of CED is around 30%. Around 28% of males have body mass index (BMI) less than normal while 33% of females have BMI less than normal. The prevalence of CED is higher in the rural population as compared to urban population. About 33.1% of males are suffering from CED in rural areas while in urban areas, its prevalence is 17.5%. Similarly, in rural areas, 38.8% of females suffer from CED while in urban areas, 19.8% of females suffer from CED.

Punjab being the food cradle of India is highly assumed to be free from CED. Obesity levels in Punjab are over 40%, but according to NFHS-3, 12.75% of Punjabi population has BMI less than normal. The problem of energy deficiency is deeply seeded in all the strata of population in Punjab.

MATERIALS AND METHODS

The study done was a cross-sectional type of study. Using stratified sampling technique, 200 subjects were taken from the rural area and 200 were taken from the urban area. The study subjects in the age group of 20–60 years who were ethnic Punjabis were randomly chosen from the baseline registers maintained at Rural Health Training Centre and Urban Health Training Centre of Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar.

Anthropometric measurements such as height, weight, waist circumference, and waist–hip ratio were noted down and BMI was calculated for each individual. Other parameters such as nutritional intake and physical activity were taken besides the general physical examination.

Anthropometry is the single most portable, easily applied, inexpensive, and non-invasive method of assessing body composition.[7,8] Anthropometric measurements are well established and are widely used as indicators of health and nutritional status in both children and adults. Despite some limitations, anthropometry remains the most practical tool for the assessment of nutritional status among members of the community in developing countries such as India.

The height of the subjects was measured using a narrow, flexible non-stretchable, metal measuring scale. The measurements were taken with the subject wearing no shoes, standing erect on a horizontal surface with heels together, the shoulders relaxed, and arms on the sides against a wall. The subject was made to look straight so that the infraorbital margin and tragus of the ear fell in the same horizontal plane. The reading was taken by standing on the left of the subject. In case of the subjects with the turbans, the height was taken after asking them to remove their turbans.

The weight assessment provides important data in assessing nutritional status of an individual. The weights of the subjects were measured using a standard weighing machine with a total weighing capacity of 200 kg. The balance was calibrated and corrected for zero error before taking the measurement of each individual. The weight was measured with the subject wearing light clothes and without foot wear.

The waist circumference was recorded to the nearest 0.5 cm from the anterior aspect of the level of the natural waist in a standing position with abdomen relaxed, arms at the sides, and feet together.

BMI was calculated from the following equation;

$$\text{BMI}\left(\text{kg}/\text{m}^2\right)=\frac{\text{Weight}\ (\text{kg})}{\text{Height}\ \left(\text{m}^2\right)}$$

The BMI value ranging from 18.5 to 24.9 is considered as normal, <18.5 indicates the status as under nourished, while value >25.0 as overweight and above 30.0 as obese.

According to the BMI, the study subjects were categorized into different grades as following;

- Grade III CED <16.0
- Grade II CED 16.0–16.9
- Grade I CED 17.0–18.4
- Normal 18.5–24.99
- Overweight >25.0.

Observations and the epidemiological correlates of all 400 individuals were recorded. The results were analyzed using Microsoft Excel and SPSS statistical software.

RESULTS

Table 1 shows the distribution of study subjects according to their BMI levels. Overall prevalence of CED in ethnic Punjabi adults came out to be 19%. Out of these cases of CED, maximum number of cases, 50 (12.5%) were found to be of mild grade CED. There were 13 (3.25%) cases of moderate grade CED and 13 (3.25%) cases of severe degree CED also. Out of the 400 study subjects taken in this study, there were 203 (50.75%) subjects, who were having the normal BMI, while 121 (30.25%) were either overweight or obese [Figure 1].

Table 2 shows the association of CED according the area of residency. The prevalence of CED was found to be higher in rural areas 22.0% and compared to 16.0% in urban areas. On comparison, based on the area location, the results were found to be insignificant statistically.

Table 3 shows the association of age with CED. Out of the total of 76 cases of CED found in the study group of 400, maximum numbers of CED cases, 34 (44.7%) were found in the age group of 20–29 years. In the next age group of 30–39 years, there were a total of 25 (32.9%) CED cases while in the age group of 40–49 years, there were 10 (13.2%) respondents. In the age group of 50–60 years, there were a total of 5 (9.2%) CED cases [Figure 2].

Table 4 shows the prevalence of CED in both the sexes. Of the 76 cases found of CED in the study, CED was found to be 52 (23.9%) in females while it was only 24 (13.1%) in males. It was evident from the study that females were found to be more susceptible to develop CED. Statistically, this was found to be significant.

DISCUSSION

According to this study, the overall prevalence of CED in ethnic Punjabi adults came out to be 19% and the overall CED in Punjab according to NFHS-3 is 14%. Hence, our results are somehow similar to the national level statistics.

According to NFHS-3 overall CED in India is 33% among females and 28.1% in males.[9,10] A study done in Bihar (India) also shows that similar results of a larger proportion of females were CED than their male counterparts.[11,12] Thus, our study resembles with the above studies as the higher percentage of CED has been found in females in all studies.

According to the area of residency, the prevalence of CED was found to be higher in rural areas (22.0%) and compared to urban areas (16.0%). Similar results were reported in the DLHS-4 survey, in which the prevalence of CED was found to be higher in the rural areas than the urban areas.

Similar results were obtained in a study done by Sengupta and Syamala which show that there was a higher prevalence of CED in rural areas as compared to the urban areas.[11] Another study shows that the prevalence of CED is found to be more in rural areas than urban areas.[9] Still another study done among Indian females show that there are significant differences in CED in rural and urban areas. It shows results of higher incidence of CED in the rural areas than urban areas.[7]

On comparing our results with above studies, the results were similar with higher prevalence of CED in rural areas. On comparing the prevalence of CED with age, maximum number of cases were found out in the younger age group. Out of the total of 76 cases found in the study, maximum numbers of CED cases, 34 (44.7%) were found in the age group of 20–29 years. In the next age group of 30–39 years, there were a total of 25 (32.9%) CED cases while in the age group of 40–49 years, there were 10 (13.2%) respondents. In the age group of 50–60 years, there were a total of 5 (9.2%) CED cases.

According to NFHS-3, CED was found to be 35.6% in the age group of 20–29 years, in 30–39 years, it was 28.2% and in the age group of 40–49 years, it was 26.3%. In Punjab, CED in 20–29 years was 21.3%, 10.6% in 30–39 years, and 8.4% in 40–49 years.[10]

Table 1: The distribution of the study subjects according to the body mass index

Category	BMI (Kg/m²)	Number	Frequency (% age)
CED-III	<16.0	13	3.25
CED-II	16-16.9	13	3.25
CED-I	17.0–18.4	50	12.50
Normal	18.5–24.9	203	50.75
Overweight	>25	121	30.25
Total		400	100

BMI: Body mass index, CED: Chronic energy deficiency

Table 2: Association of area with CED

Area	CED (%)		Total (%)
	Present	Absent	
Rural	44 (22.0) [57.9]	156 (78.0) [48.1]	200 (100.0) [50.0]
Urban	32 (16.0) [42.1]	168 (84.0) [51.9]	200 (100.0) [50.0]
Total	76 (19.0) [100.0]	324 (81.0) [100.0]	400 (100.0) [100.0]

χ^2: 2.34, df: 1, P=0.104, CED: Chronic energy deficiency

Table 3: Association of age with CED

Age	CED (%)		Total (%)
	Present	Absent	
20–29	34 (32.1) [44.7]	72 (67.9) [22.2]	106 (100) [26.5]
30–39	25 (30.9) [32.9]	56 (69.1) [17.3]	81 (100) [20.3]
40–49	10 (13.2) [13.2]	66 (86.8) [20.4]	76 (100) [19.0]
50–60	7 (5.1) [9.2]	130 (94.9) [40.1]	137 (100) [34.2]
Total	76 (19) [100.0]	324 (81) [100.0]	400 (100.0) [100.0]

CED: Chronic energy deficiency

Table 4: Association of sex with CED

Sex	CED (%)		Total (%)
	Present	Absent	
Male	24 (13.1) [31.6]	159 (86.9) `49.1]	183 (100) [45.75]
Female	52 (23.9) [68.4]	165 (76.1) [50.9]	217 (100) [54.25]
Total	76 (19) [100]	324 (81) [100]	400 (100.0) [100.0]

χ^2: 7.6, df: 1, $P < 0.005$, CED: Chronic energy deficiency

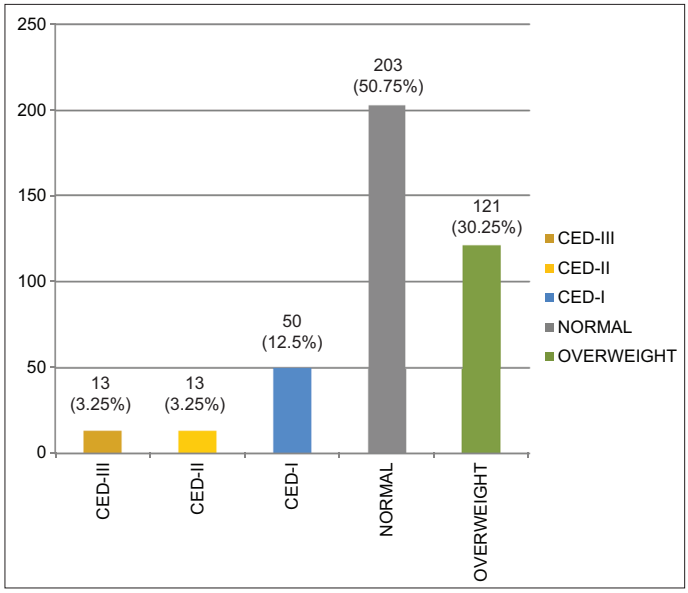

Figure 1: Bar diagram showing the prevalence of different grades of chronic energy deficiency (n = 76)

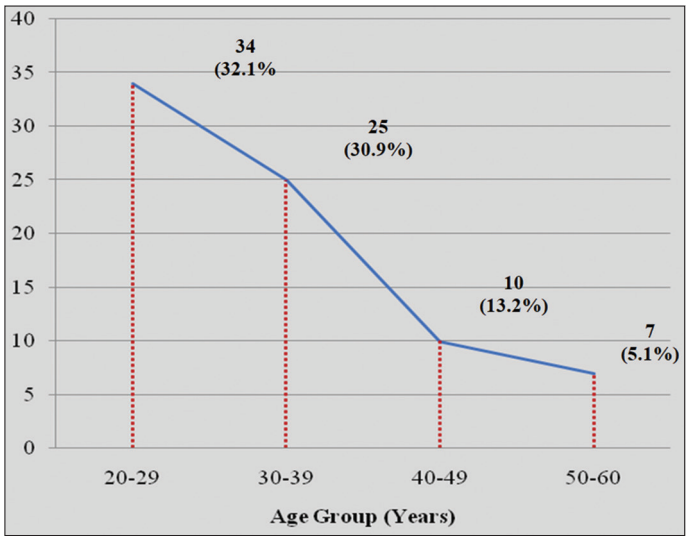

Figure 2: Frequency polygon showing the association of chronic energy deficiency with age group (n = 76)

On comparing our study with state statistics as well as NFHS-3 report, results are found to be nearly similar, highlighting the maximum prevalence of CED in 20–29 years of age group. It raises the concerns of nutritional deprivation in younger age group of the study subjects that need to be addressed at priority. One can indeed sight the reasons for such nutritional deficit pertaining to sociological reasons as this age group bears more burdens for being the most productive age group among all age groups. This age group is seen as prime age for family, career, and financial settlement; hence, the burden takes its toll.

When we compare the prevalence of CED in males and females, the results are higher in females than males. There were 76 cases of CED out of a total of 400 study subjects. There were 52 (23.9%) CED cases in females while there were only 24 (13.1%) cases in males. It is evident that from the study that females are found to be more susceptible to develop CED and that too of severer grade. This might be due to poor eating habits contributed by the family customs in which females are discouraged to eat non-vegetarian food, eat leftover food, made to eat last in family, etc., making them easy prey for CED.

According to the NFHS-3, overall CED in India is 33% among females and 28.1% in males.[10] Another study done in Bihar (India) also shows that similar results of a larger proportion of females were CED than their male counterparts.[12] Thus, our study resembles with the above studies as the higher percentage of CED has been found in females in all studies.

CONCLUSION

This study was conducted to find out the prevalence of CED in the ethnic Punjabi adults in the age group of 20–60 years. The total prevalence of CED in adults came out to be 19%. Of these, maximum cases were of mild grade CED-I at 12.5% while CED-II and CED-III were at 3.25% each. The prevalence of CED was found more females than males. It was 23.9% in females while in males, it was 13.1%. The maximum number of CED cases were found in the age group of 20–29 years. Judging the burden of CED, special public health programs are needed that can address the situation. Prevention of CED in individuals should be strengthened by information, education, and communication activity including promoting awareness than CED is preventable by taking adequate amounts of food along with the proper nutrients. Behavior change communication therapy should be applied for preventing the CED right from childhood.

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