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ORIGINAL RESEARCH

Evaluating nutritional status and physiological health parameters in college going Indian females

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ABSTRACT

Background: Indicators for physiological health including BMI (body mass index), weight, and height depict the overall development of a population and are linked closely to the pattern of nutritional intake. Assessment of PEFR (Peak Expiratory Flow Rate) and blood pressure helps in assessing the disease-related health status. Existing literature data is scarce concerning anthropometric data on respiratory fitness in college-going females of India. **Aim:** The present study aimed to evaluate the nutritional status and physiological health parameters in college-going Indian females. **Methods:** The study assessed 222 college-going females aged 18-22 years who were randomly selected. In all the females, handgrip strength, PEFR, respiratory rate, body temperature, pulse rate, DBP (diastolic blood pressure), SBP (systolic blood pressure), BMI, weight, and height were assessed. All females were examined clinically for vitamin A deficiency and anemia. In these subjects, dietary practices were also assessed. **Results:** The study results showed that the mean BMI and PEFR in study subjects were 21.21±3.92kg/m2 and 315.5±61.04l/min. Mean handgrip strength was lesser in the non-dominant hand compared to the dominant hand with 16.20±3.98kg and 18.38±4.74kg. Mean weight and height were elevated slightly in study subjects compared to standard ICMR data. The regular diet must include a more nutritional diet as Grade I goiter and anemia were seen in 3.6% and 6.3% of study subjects respectively. **Conclusion:** The present study concludes that nearly half of the college-going Indian females have a healthy weight and 33% are underweight owing to various nutritional deficiencies. PEFR has poor respiratory fitness which could be improved with regular exercise. Further studies are needed to assess nutritional status and health patterns in various geographical areas.

Keywords: Blood pressure (BP), Body Mass Index (BMI), Peak Expiratory Flow Rate (PEFR), Handgrip strength, Indian females

INTRODUCTION

Presently, anthropometric assessment is the way used for the evaluation of growth and nutritional status by assessing body composition and dimensions. This approach is used widely owing to its low cost and simplicity which allows nutritional status and growth to be compared against a standardized growth curve. Anthropometric data, particularly, weight and height depict the health status of a specific segment or national population affected by environment and heredity.[1]

Growth patterns as assessed by these measurable parameters are significantly influenced by endocrine profiles and nutritional status. Females play a vital role in society, however, they usually lack adequate nutrition and healthcare making them highly susceptible. The nutritional and health status of females is vital not only for ensuring healthy children and families but, also for allowing global economic

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growth. Various factors affect the health of females including insufficient awareness and knowledge, domestic violence, inadequate healthcare facilities, gender inequality, early pregnancy and marriage, lack of nutritional facilities, poverty, and malnutrition.[2]

Considering these issues is vital for improving the health of females and further the well-being of the society as a whole.[3] Considering this emerging issue, the present study aimed to assess the nutritional status, conduct clinical assessment, and assess physiological health parameters in college-going Indian females.

MATERIALS AND METHODS

The present study aimed to assess the nutritional status, conduct clinical assessment, and assess physiological health parameters in college-going Indian females.The study subjects were from the Outpatient Department of the Institute. Verbal and written informed consent were taken from all the subjects before participation.

The present study assessed 222 female college-going students who were selected randomly for the study. The exclusion criteria for the study were alcoholics, smokers, on treatment for any respiratory diseases/conditions, subjects with chest wheezing, persistent cough, chest surgeries or chest injuries, pneumonia, chronic bronchitis, or asthma history.

Female students aged 19-22 years were randomly included in the study. Physiological and anthropometric parameters including handgrip strength, PEFR (peak expiratory flow rate), respiration rate, body temperature, pulse rate, DBP (diastolic blood pressure), SBP (systolic blood pressure), BMI (body mass index), weight, and height were assessed. Patterns of food intake were also assessed in the study subjects.

The body weight and height were measured barefoot and in light-weighted clothing using a standard weighing machine and stadiometer. Blood pressure was assessed using a standard sphygmomanometer and stethoscope. PFER was evaluated with Wright's peak flow meter in standing position with nose of the subject clipped and values were depicted as BTPS (body temperature and pressure saturated with vapor).

After two practices, three attempts were made in succession with a rest period of a minimum of 3-5 minutes in 2 successive exhalations were recorded, and the highest values were accepted.[4] Body temperature was measured by standard hand grip Dynamometer of both dominant and non-dominant hands. All females in the specific age group underwent clinical assessment for vitamin A deficiency and anemia including signs like beta spots. These subjects were also assessed for goiter and other iodine deficiency disorders, such as squints and gait defects. The grading of the goiter was done following the guidelines of WHO/UNICEF/ICCIDD.[5]

Information was also collected concerning the duration and regularity of their menstrual cycle verbally. Dietary habits were also assessed for students to understand their diet patterns. Typically, students consumed 2 meals each day. Data for food intake was gathered for 7 days and 14 meals.

The data gathered were analyzedstatistically using SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk. NY, USA) for assessment of descriptive measures, Student t-test, ANOVA (analysis of variance), and Chi-square test. The results were expressed as mean and standard deviation and frequency and percentages. The p-value of <0.05 was considered.

RESULTS

The present study aimed to assess the nutritional status, conduct clinical assessment, and assess physiological health parameters in college-going Indian females. The study assessed 222 college-going females aged 18-22 years who were randomly selected. The mean height of study subjects was 154.53±5.05cm, the mean weight was 50.77±9.89kg, and the mean BMI was 21.21±3.92kg/m2. The mean pulse rate was 86.79±13.81 beats/min. In the left hand, SBP and DBP were 105.65±10.79 and 69.90±8.92mmHg, whereas, in the right hand, mean SBP and DBP were 105.55±10.03 and 70.00±9.02mmHg. Mean body temperature, RR 9 respiratory rate), and PEFR were 96.24±1.70°F, 24.54±7.17/min, and 315.75±61.04 L/min. Hand grip strength in non-dominant and dominant hands was 16.21±3.98and 18.39±4.74kg respectively (Table 1).

On assessing the PEFR distribution in study subjects, it was noted that PEFR of <320 L/min was seen in 47.7% (n=106) study subjects, PEFR of 320-470 L/min was seen in 52.3% (n=116) study subjects, and PEFR of >470 L/min was not seen in any study subject (Table 2).

It was seen that for clinical findings in the study subjects, hypomenorrhea, squint, gait defect, grade 2 goiter, and vitamin A deficiency were not seen in the study subject. However, menorrhagia, Grade 1 goiter, and anemia were seen in 4.5% (n=10), 3.6% (n=8), and 6.3% (n=14) study subjects respectively (Table 3).

The study results showed that for Pearson's correlation of diastolic and systolic blood pressure in the right and left hand of study subjects, a left-hand significant correlation was seen in systolic blood pressure of the left hand and diastolic and systolic blood pressure both from the right hand. For left-hand DBP, a significant correlation was seen for both DBP and SBP of the right hand. Also, a significant association was seen in SBP to SBP and DBP in the left hand and SBP of the right hand. For, DBP in the right hand, a significant correlation was seen for BP and DBP in the left hand and DBP in the right hand (Table 4).

Concerning the total meal intake, 84% of meal intake was dependent on rice, whereas, 15.7% was dependent on wheat, and 72% on pulses. A higher intake of eggs was noted compared to fish with 22% and 20% respectively. Red meat was included in the

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diet of only 2.38% of subjects and 12% had chicken. Vegetable items only intake was reported by 41% of subjects and these subjects did not consume any non-vegetarian item in their main meal. Among all the meals, 29% of subjects took leady vegetables and preferred to take cucumbers.

Table 1: Physiologic parameters in college-going Indian females (n=222)

S. No	Parameters	Mean ± S. D
1.	Handgrip strength (dominant) Kg	18.39±4.74
2.	Handgrip strength (non-dominant) Kg	16.21±3.98
3.	PEFR (l/min)	315.75±61.04
4.	RR (per min)	24.54±7.17
5.	Body temperature (^{o}F)	96.24±1.70
6.	DBP-RH (mmHg)	70.00±9.02
7.	SBP-RH (mmHg)	105.55±10.03
8.	DBP-LH (mmHg)	69.90±8.92
9.	SBP-LH (mmHg)	105.65±10.79
10.	Pulse rate (per min)	86.79±13.81
11.	BMI (kg/m2)	21.21±3.92
12.	Weight (kg)	50.77±9.89
13.	Height (cm)	154.53±5.05

Table 2: PEFR distribution in study subjects

S. No	PEFR (L/min)	Number (n)	Percentage (%)
1.	<320	106	47.7
2.	320-470	116	52.3
3.	>470	-	-

Table 3: Clinical findings in study participants

S. No	Clinical abnormalities	Number (n)	Percentage (%)
1.	Hypomenorrhea	-	-
2.	Menorrhagia	10	4.5
3.	Squint	-	-
4.	Gait defect	-	-
5.	Grade 1 Goitre	8	3.6
6.	Grade 2 goitre	-	-
7.	Vitamin A deficiency	-	-
8.	Anemia	14	6.3

Table 4: Pearson's correlation of diastolic and systolic blood pressure in the right and left hand of study subjects

S. No	Pearson correlation (r)	Left hand		Right hand	
		DBP (mmHg)	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)
1.	Left hand				
a)	SBP	1	**0.49**	**0.62**	**0.35**
b)	DBP	**0.49**	1	**0.45**	**0.53**
2.	Right hand				
a)	SBP	**0.62**	**0.45**	1	**0.55**
b)	DBP	**0.35**	**0.53**	**0.55**	1

DISCUSSION

The present study assessed 222 college-going females aged 18-22 years who were randomly selected. The mean height of study subjects was 154.53±5.05cm, the mean weight was 50.77±9.89kg, and the mean BMI was 21.21±3.92kg/m2. The mean pulse rate was 86.79±13.81 beats/min. In the left hand, SBP and DBP were 105.65±10.79 and 69.90±8.92mmHg, whereas, in the right hand, mean SBP and DBP were 105.55±10.03 and 70.00±9.02mmHg. Mean body temperature, RR (respiratory rate), and PEFR were 96.24±1.70^{o}F, 24.54±7.17/min, and 315.75±61.04 L/min. Hand grip strength in non-dominant and dominant hands was 16.21±3.98and 18.39±4.74kg respectively. These data were comparable to the previous studies of Ranu H et al[6] in 2011 and Walankar P et al[7] in 2016 where authors assessed subjects with demographics similar to the present study in college-going females to assess nutritional status.

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The study results showed that on assessing the PEFR distribution in study subjects, it was noted that PEFR of <320 L/min was seen in 47.7% (n=106) study subjects, PEFR of 320-470 L/min was seen in 52.3% (n=116) study subjects, and PEFR of >470 L/min was not seen in any study subject. These results were consistent with the findings of Massy-Westropp NM et al[8] in 2011 and Bandyopadhyay A et al[9] in 2007 where PEFR results comparable to the present study were also reported by the authors in their respective studies.

Concerning the assessment of the clinical findings in the study subjects, hypomenorrhea, squint, gait defect, grade 2 goiter, and vitamin A deficiency were not seen in any study subject. However, menorrhagia, Grade 1 goiter, and anemia were seen in 4.5% (n=10), 3.6% (n=8), and 6.3% (n=14) study subjects respectively. These findings were in agreement with the results of Mahajan D et al[10] in 2023 and Ghosh J et al[11] in 2022 where clinical findings in college female students reported by the authors in their studies were comparable to the results of the present study.

It was also seen that for Pearson's correlation of diastolic and systolic blood pressure in the right and left hand of study subjects, in left-hand significant correlation was seen in systolic blood pressure of the left hand and diastolic and systolic blood pressure both from the right hand. For left-hand DBP, a significant correlation was seen for both DBP and SBP of the right hand. Also, a significant association was seen in SBP to SBP and DBP in the left hand and SBP of the right hand. For, DBP in the right hand, a significant correlation was seen for BP and DBP in the left hand and DBP in the right hand. These results were in line with the findings of Nuttall FQ[12] in 2015 and Gupta A et al[13] in 2012 where a similar correlation to the present study was also reported by the authors in their respective studies.

The study results also showed that for the total meal intake, 84% of meal intake was dependent on rice, whereas, 15.7% was dependent on wheat, and 72% on pulses. A higher intake of eggs was noted compared to fish with 22% and 20% respectively. Red meat was included in the diet of only 2.38% of subjects and 12% had chicken. Vegetable items only intake was reported by 41% of subjects and these subjects did not consume any non-vegetarian item in their main meal. Among all the meals, 29% of subjects took leady vegetables and preferred to take cucumbers. These findings correlated with the results of Pandey S et al[14] in 2013 and Harshala R[15] in 2000 where data for meal intake reported by the authors in their studies was comparable to the results of the present study.

CONCLUSIONS

Considering its limitations, the present study concludes that nearly half of the college-going Indian females have a healthy weight and 33% are underweight owing to various nutritional deficiencies. PEFR has poor respiratory fitness which could be improved with regular exercise. Further studies are needed to assess nutritional status and health patterns in various geographical areas.

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