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To study the socio economic background and nutritional status of students residing at university of agricultural sciences hostel, Bengaluru, Karnataka, India

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Abstract
The study on "Health and Nutritional Status of Students Residing at University of Agricultural Sciences hostel, Bengaluru, Karnataka, India". Conducted during 2010-2011 in the campus of university of agricultural science bengaluru included 200 respondents of both sexes, of which 100 subjects from boys and 100 subjects from girls. Among boys subjects' majority of them were from farm background in the age group of 18-20 years old with joint family system and low family income, Majority of them followed three meal patterns a day and were non-vegetarian. About 5 per cent of boys were smoking and 9 per cent were consuming alcohol. With regard to girls residing in the university of agricultural sciences GKVK campus hostel, nearly 62.9 per cent of them were from nuclear families, 60.6 per cent of them were from high income group. The mean BMI of girls and boys were 20.5, 20.72 respectively. Risk assessment based on waist to Hip ratio exhibited that 3 boys (>0.95WHR) and 15 girls (>0.80WHR) were under risk. The mean body fat of boys and girls were 12.58 ± 1.84, 25.91 ± 2.35 respectively. Majority that is 13 boys and 14 girls students out of 20 each tested had normal blood sugar level. However, it was surprising to note that 6 boys and 5 girls did show above normal (>120mg/dl) range of random blood sugar level. 95 per cent of boys had healthy Hb percentage. Whereas 60 per cent of the girls showed lower level of Hb, indicating existence of anemia. The mean energy intake of boys and girls were 2299.75, 2017 respectively.

Key words: students, health, nutrition, respondents

1. Introduction

Modernization, change in lifestyle, stress and strain, improper eating habits, faster pace of life, less physical exercise etc., are creating conditions that affect the health of people leading to chronic disorders. In these circumstances, both in the advanced countries and in the metropolitan cities of India, with the changing life style the normal traditional pattern of food become inappropriate. This is considered to be one of the basic reasons leading to food related health problems (Chandrasekhar and Acharya., 1989). Several factors affect the nutritional status of adolescents. Among them, socio-economic and demographic factors associated with worldwide pattern of stunting and thinness in adolescent (Frongillo *et al.* 1997) [5] is more prevalent. According to WHO, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The health status is usually measured in terms of life expectancy at birth, infant mortality rate, fertility rate, crude birth rate and crude death rate. These indicators of health are determined by numerous factors such as per capita income, nutrition, housing, sanitation, safe drinking water, social infrastructure, health and medical care services provided by government, geographical climate, employment status, incidence of poverty and the like (Reddy, Selvaraju 1994; Dadibhavi and Bagalkoti 1994) [10]. Nutritional status is defined as the condition of health of an individual as influenced by the utilization of the nutrients. It can be assessed by using Anthropometric, clinical or biochemical methods. Biochemical methods have proved to be the most accurate of the three. Yet, anthropometry and clinical survey in combination have proved to be more efficient.

University students in every country constituent a large proportion of the total population. The students are usually within the age group of 17-25 years. Various factors such as social and cultural pressure, peer group influences, religion, finance and adequacy of fund, diverting the food finance to the other frivolities as keeping meal do influence the nutritional states both negatively and positively that is under and over nutrition. This calls for an in-depth research for assessing and identifying draw backs to create corrected set up and awareness to maintain health and academic performance of students at universities. (Achinihu 2009; Anon WHO, 2002).

University staff meeting held on 21.08.09 Item: 11 endorsed the need for compulsory health checkup for student followed by insurance. University at the student counselors meet held on 21.8.09 also stressed on student health condition at UAS, Bengaluru hostels. Considering the ill effects, UGC in their directions to universities No: F.1-8/2009 /17.11.2009 has indicated for monitoring health and also to act on de addiction measures through assessment, education on campus etc. The present study was therefore conducted to assess "health and nutritional status of students residing at University of agricultural sciences GKVK campus hostel Bengaluru" Karnataka, India.

2. Method and materials

2.1 Locale of the study

The study was conducted at University (boys and girls) Hostel, University of Agricultural Sciences, GKVK, Bengaluru, during the period 2010-2011.

2.2 Selection of the subjects

Subjects were selected from the University Hostels both boys and girls based on their willingness to participate as subject throughout the period of study. Thus, two hundred subjects were covered under the study (100 boys and 100 girls).

2.3 Schedule and data collection

A detailed schedule was formulated to elicit information on various aspects such as family background, socio economic profile of the respondent, nutritional anthropometry.

2.3.1 Socio economic profile

This comprised the type of family, age, education, occupation and family income of subjects. Respondents were classified into two groups according to type of family i.e. nuclear and joint with respect to their family members. The age of the subjects were classified in to four groups the groups were 18-20, 21-23, 24-26, 27 and above. The previous education background of student's such as formal schooling of an respondents was measured in years of schooling and college completed and grouped as primary, middle, high school, PUC, degree and PG. Family income comprised of total monthly income from the main respondent parents occupation. The categorization of income was based on mean ± standard deviation.

2.3.2 Nutritional anthropometry

Anthropometric measurement is the measurement of variations of the physical dimensions of the gross composition of the human body at different age levels and degrees of nutrition and was carried out as follows (Jellife, 1966) [8].

a) Height (cm)

Height was measured accurately to the nearest 0.1 cm on standard vertical height rod. The subjects were made to remove the shoes and stand on the height plat form by the scale with foot parallel with heals, shoulder and back of head in up right posture (Jellife, 1996) [8].

b) Weight (kg)

Body weights of subjects were taken to the nearest 0.1 on a portable weighing scale; calibration was checked regularly before taking each measurements. Subjects were made to stand on the center of the balance plat form without shoes and with regular clothing (Jellife, 1966) [8].

c) Waist / hip ratio

Defines the distribution of adipose tissue in the body. The waist is measured with the subject standing erect; the circumference is measured either at an anatomical reference point such as 12 cm below the xipthisternum, the hip circumference is also measured with the subject standing erect, taking in the maximal gluteal circumference (Rao, 1995). Further they were assessed for establishing Risk level (Lean *et al.*, 1995) (Table 3).

d) Mid arm circumference (cm)

The subjects were asked to flex their left arm at the elbow such that, the lower arm should be at a right angle to the elbow. The site of measurements was taken exactly mid-way down the upper arm. Each of the subjects was asked to hang the arm relaxed by the side and the tape passed gently. But firmly around the arm at the selected midpoint, the arm circumference was measured twice to the nearest 0.1 cm (Jellife, 1966) [8].

e) Triceps (mm)

The site selected for measuring mid-arm circumference was used i.e. mid way down the length of left arm with the arm hanging relaxed at the side skin fold parallel to the long away from the under lying muscle and skin fold calipers. Measurements were taken twice to ensure accuracy (Jellife, 1966) [8].

f) BMI

Height and weight of the subjects were used to calculate the body mass index the subjects were classified based on the standard BMI (Devenberg *et al.*, 1991).

$$BMI = \frac{\text{Weight (kg)}}{\text{Height}^2\text{(cm)}}$$

Standard classification

Under nourished	< **18.5**
Normal	**18.5-25**
Overweight	**25 - 30**
Obese	**>30**

g) Body fat

Body fat per cent was calculated for all the subjects using the formula (Devrenbergefa., 1991).

Body fat % = 1.2 x BMI + (0.23 x age) (-10.8 X Sex-5.4)
Where: Male (1) Female (0)

Classification

Normal	= 19-23
Moderate	= 24-29
Obesity	= > 30

h) LBMI: lean body mass index was calculated by using the formula (Rao, 1995).

$$LBMI = \frac{\text{Height}^2}{\text{Weight (kg)}}$$

Standard LBMI

Chronic energy deficiency (CED):	(> 500)
Normal:	(500-300)
Obese:	(<300).

i) Basal metabolic Rate

The basal metabolic rate was computed using the formula (ICMR 2004) given below:
Boys: 14.5XBody Weight in Kg-645.
Girls: 14.0X Body Weight in Kg-471.

j) Clinical status

Clinical status was assessed by the investigator by visual method with the help of UAS doctors (presence of any deficiency symptoms at the time of survey). A modified ICMR guideline was used for the same. Pulse rate & Blood Pressure of the students was also recorded using the B.P apparatus with the help of Doctors at UAS. Bengaluru Dispensary.

3. Results and discussion

Socio economic profile of subjects

The socio economic profile of subjects covers the age distribution among subjects, type of family, parent's education status (father and mother independently observed).Regional difference in previous education background of students, family background and family income status.

i) Age

More number of boys residing in the hostel (30.5%) were in the 18-20 years of age group, followed by (12.5 %) between 21-23 years,(6.5 %) 24-26 years of age group and only 0.5 per cent was above 27 years of age. Whereas more number of the girls that is 35 (17.5%) residing in the university hostel were between 24-26 years of age, followed about 17.0% (34) were in the 21-23 years of age group and (15.5%) that is 31 were between 18-20 years (Table 1).

ii) Type of family

It was observed that overall 63.5 per cent of students were from nuclear family and 62.9 per cent of them were mainly girls that is higher percentage (26.5%) of boys studying in agriculture university and residing in the hostel were from joint family background when compared to only 10 % of the girls being from joint family setup (Table 1).

iii) Parents education level

Study shows that in general 35.5 % (71 parent) of parents were uneducated and major representation was by mothers (20.5 %) that too mainly boys mothers. While only 15 % of fathers in general were uneducated and major representation was fathers of girls. Interesting observation was 35 % of fathers and 24.5 % of mothers of girls & 21.5% of fathers and13.0% of mothers of boys were graduates. Greater percentage of parents in general had dropped out after school level education (Table 1).

iv) Family background

Students residing in university hostel were from both farm and non-farm background. About 89 student that is 44.5 % in general and mainly boys 63 were from farm family, while out of 55.5 % from nonfarm group greater number that is 74 (37 %) were girls and only 18.5% of boys were from non-farmer families (Table 1).

v) Family income levels

Income ranged from Rs 6317.00 to Rs 11088. On grouping them into low, medium and high income group (Table 1), majority (38.5 %) of them were from low income, 28.5 % from medium income group and 33.0 % from high income group. Further only 39.4 % of boys represented high income group while 60.6 % of girls from high income group. (Table 1) Income classification is based on ± Sd of actual income.

Table 1: Socio economic profile of Students

Variable	Classification	Boys		Girls		Total	
		N	%	N	%	N	%
Age	18-20	61	30.5	31	15.5	92	46
	21-23	25	12.5	34	17	59	29.5
	24-26	13	6.5	35	17.5	48	24
	>27	1	0.5	0	0	1	0.5
Total		100	50	100	50	200	100 %
Type of family	Nuclear	47	23.5	80	40	127	63.5
	joint	53	26.5	20	10	73	36.5
Total		100	50	100	50	200	100
Parents education level							
Father	Uneducated	22	11	8	4	30	15
	School	33	15.5	19	9.5	52	26
	UG	43	21.5	70	35	113	56.5
	PG	2	1	3	1.5	5	2.5
Total		100	50	100	100	200	100
Mother	Uneducated	33	16.5	8	4	41	20.5
	school	40	20	37	18.5	77	38.5
	UG	26	13	49	24.5	75	37.5
	PG	1	0.5	6	3	7	3.5
Total		100	50	100	50	200	100
family background	Farm	63	31.5	26	13	89	44.5
	Non-farm	37	18.5	74	37	111	55.55
Total		100	50	100	50	200	100
family income level*	Low(<6317)	42	21	35	17.5	77	38.5
	Medium(6317-11088)	32	16	25	12.5	57	28.5
	High(>1108)	26	13	40	20	66	33
Total		100	50	100	50	200	100

*Income classification is based on ±

vi) Regional education background of students

Out of 200 students covered under the study, 110 were under graduate students, 90 were post graduate students. Further out of 110 under graduate 58 were boys and 52 were girls. Out of 90 post graduate students 42 were boys and 48 were girls. It was observed that girls in greater number throughout had education in urban based institutions as compared to Boys who in greater number had rural education background (Table 2).

Nutritional anthropometry

Respondents height, weight, mid upper arm circumference, triceps skin fold thickness, waist circumference, waist hip ratio were recorded and on the further BMI, body fat percentage and lean body mass index were calculated. The mean values are presented in table 3. The mean height, weight, waist, circumference, waist hip ratio, mid upper arm circumference, triceps skin fold thickness, body mass index, body mass index, lean body mass index was 168.22 cm, 59.48 kg, 77.26cms, 0.872,27.95cms, 10.42mm, 20.72, 12.56%, 488.60 respectively for boys covered under the study. Similarly it was 154.43cms, 48.9kg, 71.56cms, 0.7656, 25.69cms, 16.67mm, 20.5, 25.46%, and 494 respectively among girls. It was interesting to note that body fat percentage was higher (51.5%) for girls when compared to boys although girl's weight recorded lesser than boys in the same age group. (Table 3)

Distribution (Table 4) of students based on body mass index showed that irrespective of boys and girls, majority of them were in the normal categories (18.5-25 BMI) followed by 22 % of boys and 15 % of girls exhibited undernourishment (<18.5 BMI). Study revealed that greater numbers of girls were in the overweight categories based on BMI as compared to Boys. Similar higher prevalence of overweight (Body mass index (BMI) 25 kg/m2) has been observed nationally in females of reproductive ages in urban areas (24%) (Anon, 2001) The statistical analysis indicated significant differences in all anthropometric parameters between boys and girls at 0.01 percent level.

Table 2: Previous (Regional) education background of boys and girls

	Boys					
	Primary	**Middle**	**High**	**PUC**	**UG**	**PG**
Urban	28	33	44	59	95	42
Rural	72	67	56	41	5	-
	Girls					
	Primary	**Middle**	**High**	**PUC**	**UG**	**PG**
Urban	57	80	57	77	96	48
Rural	43	20	43	23	4	-

It also clearly showed that mid upper arm circumference among girls was attributed to higher body fat percentage (21.91%), while among boys body fat was low(12.58 %) and lean body mass index was on par with girls.

Classification of nutritional status based on lean body mass index showed that 67 % of the boys were normal (300-500 LBMI); 33 % were with chronic energy deficiency, but none of them were obese. Among girls 53 % were normal (300-500 LBMI), 47 % were with chronic energy deficiency and none of them were obese (Table 5).

Nutrition status classification based on body fat was carried out on two types of guidelines (Devrenbergefa., 1991 and Perry, 2010) is presented in Table 7. It was observed that 17 and 18 % of boys respectively from ideal range of body fat were in the age group 18 -20 and 21-25 years, followed by 46 % of 18-20 were in the average range for that age group. While in case of girls 11 % and 18 % were in the ideal range at 18-20 and 21-25 years; 47 % in the average range where they were 21-25 years. About 3 % of girls in the age group 21-25 were in the above average fat percentage. The findings were confirmed when they were categorized as normal, moderate and obese, that is 3 % were confirmed obese, 70 per cent were in the moderate. This suggests the impact could be because of greater percentages are from urban nuclear families with higher income group. Studies on women of varied age group including 15-24 years suggest that nutrition transition is underway in Karnataka, with large differences in overweight prevalence between socio-economic groups, rural and urban areas, and socio-economic variations in lifestyle and diet within urban Bengaluru (Griffiths and Bentley, 2005) [6]. The anthropometry measures of boys as affected by various independent variables are presented in Table 8 Family income had a positive significant correlation with body weight (r=0.197) BMI (r=0.828) at 0.05 level of the boys, Higher the income of the family higher were the BMI. Age had a direct impact on waist circumference (r=0.279) and waist hip ratio (r=0.319) of the subject at 0.01 level. There was direct positive relationship between height (r=0.261) and weight at 0.01 level. Studies show greater impact of waist circumference, hip circumference on body weight and body mass index. It was interesting to observe height and weight of the body reflected with a significant relation between mid-upper arm circumference and lean body mass at 0.01 level. Triceps skin fold thickness had significant positive correlation with body weight (r=0.517), height (r=0.294), waist circumference (r=0.660), hip circumference (r=0.613) waist hip ratio (r=0.366), mid upper arm circumference (r=0.477) at 0.01 level but it was not correlating with food habit. Similarly observations were noted between body mass index and food habit.. Table 9 shows the anthropometric measures of girls as affected by various independent variables. It was observed that weight of the respondents had a significant correlation with height (r=0.420), waist circumference (r=0.447), hip circumference, (r=0.556), mid upper arm circumference (r=0.632), triceps skin fold thickness (r=0.744), body mass index (0.916), lean body mass index (0.895) at 0.01 level and food habit (r=0.224) at 0.05 level. It was interesting to observe that waist circumference had a significant correlation with hip circumference (r=0.84), waist hip ratio (0.481), mid upper arm circumference (0.212), triceps skin fold thickness (0.451), body mass index (0.419), and a negative correlation with lean body mass index (-0.374) mid upper arm circumference was correlated at 0.05 level while the others were correlated at 0.01 level. Food habit had a positive correlation with mid upper arm circumference (0.199) at 0.01 level, triceps skin fold thickness (0.264) and body mass index (0.253) at 0.05 level but it had a negative correlation with lean body mass index (-0.238) at 0.05 level. Hip circumference had a positive correlation with mid upper arm circumference (0.316), triceps skin fold thickness (0.472) and body mass index (0.513) at 0.01 level but it had a negative correlation with lean body mass index (-0.505) at 0.01 level. Mid upper arm circumference had a positive correlation with triceps skin fold thickness (0.591) and body mass index (0.574) at (0.01 level) but there was a negative correlation at 0.01 levels with lean body mass index (0.620). Triceps skin fold thickness had a positive correlation with body mass index (0.814) and there was a negative correlation with lean body

mass index (-0.781) at 0.05 level. Body mass index had a negative correlation with lean body index (-0.967) at 0.01 level. Co-efficient correlation between anthropometric indices and biochemical parameters in university of agricultural sciences boys' hostel that body mass index had a negative correlation with blood sugar, body fat, mid upper arm circumference and lean body mass index. Further lean body mass index had negative correlation with mid upper arm circumference. This clearly depicts that higher the lean body mass, lower was the body fat which was show with lower mid upper arm circumference and therefore weight of the individual was mainly due to muscles mass and not fat storage of the boys. This indicates the harmful effect of under nutrition and over nutrition among student's subjects. Similar observation in boy's age had negative correlation with blood sugar; lean body mass index.

Table 3: The anthropometric measurements of the students

Variables	Girls N=100 Mean ± SD	Boys N=100 Mean ± SD	't' value
Height (cm)	154.3 ± 4.31	168.22 ± 11.841	275.42**
Weight (kg)	48.9 ± 7.03	59.48 ± 7.72	76.99**
Waist	71.56 ± 6.51	77.26 ± 7.52	102.68**
Waist/Hip ratio	0.76 ± 0.038	0.872 ± 0.052	147.43**
MUAC (cm)	25.69 ± 3.6	27.59 ± 3.22	85.56**
T.S.F.T (mm)	16.67 ± 4.28	10.42 ± 3.793	27.47**
BMI	20.5 ± 2.52	20.72 ± 2.75	75.20**
Body fat %	25.91 ± 2.35	12.58 ± 1.84	68.03**
LBMI	494 ± 64.42	488.6 ± 63.14	77.38**

** Significant at 0.01% level of significance.

Table 4: Distribution of students according to BMI and LBMI

BMI classification	Girl		Boys	
	N	%	N	%
Under nourished (<18.5)	22	22	15	15
Normal (18.5-25)	69	67	80	80
over weight (25-30)	9	9	5	5
	100	100	100	100
Category*	**GIRILS**		**BOYS**	
LBMI	N	%	N	%
CED (>500)	47	47	33	33
Normal (300-500)	53	53	67	67
obesity (<300)	0	0	0	0
Total	100	100	100	100

*(Rao, 1995)

Table 5: Classification of respondents according to body fat percentage

Boys									
	Ideal			Average			above average		
Age	**Range**	**No**	**%**	**Range**	**No**	**%**	**Range**	**N**	**%**
18-20	(8.5-12.5)	17	17	(14.3-18.9)	46	46	(20.2-24.9)	Nil	Nil
21-25	(9.5-13.6)	28	28	(15.4-21.2)	8	8	(22.3-25.8)	Nil	Nil
26-30	(10.6-14.6)	1	1	(16.4-22.3)	Nil	Nil	(23.4-26.9)	Nil	Nil
Girls									
	Ideal			**Average**			**above average**		
Age	**Range**	**No**	**%**	**Range**	**No**	**%**	**Range**	**N**	**%**
18-20	(19.7-23.2)	11	11	(24-29)	21	21	(30.2-34.6)	Nil	Nil
21-25	(20.3-24)	18	18	(25-30)	47	47	(30.8-35.2)	3	3
26-30	(20.9-25)	Nil	Nil	(26.1-31.5)	Nil	Nil	32.55-35.5)	Nil	Nil

(Peery marc. 2010).

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