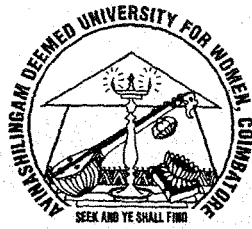


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ASSESSMENT OF NUTRITIONAL STATUS OF ADOLESCENTS

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Introduction

Adolescence is the most important period of child's life and it begins at the age of 13 years and continues up to 19 years. In girls it begins with the onset of puberty. During this period, physical and physiological changes occur including the appearance of secondary sexual characteristics and the attainment of biological sexual maturity (Kale,2008). Adolescence the second decade of life being a crucial and dynamic time when puberty is experienced. Physically, they begin to reach their adult size, their bodies become more sexually defined and reproductive capability is established (Jagadambal and Nalina Devi, 2002).

India is the second most popular country in the world with total population of over 1081 million. Adolescents form a large section of population-about 22.5 percent that is about 2.25 million and represent 26 percent of the world's total teenagers. In India this age group forms 21.4 percent of the total population. They are living in diverse circumstances and have diverse health needs.

Adolescents are full of energy, have significant drive and new ideas. They are positive force for a nation and are responsible for its future productivity provided they develop in a healthy manner (Population Action International, 2005).

It is sad that a large segment of this population, specially girls are not healthy, 50 percent are malnourished, 40 percent are stunted and 60-70 percent are anaemic. As adolescents are growing fast, they need a lot of food to grow. Statistics shows that as many as 30 percent of children aged 6-19 years in the upper income group are overweight or obese, which puts them at increased risk for chronic diseases such as heart disease, high blood pressure, diabetes and emotional problems in adolescents (Oliver et.al, 2002). The Institution of Home Economics, New Delhi, in association with the Indian Council of Medical Research (ICMR) conducted a survey on 800 adolescents in the age group of 13-18 years which showed alarming results that 25 percent of teenagers examined had high cholesterol levels, 35 percent were underweight and 1.3 percent overweight

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starting by. Obesity among alike children in India is higher than an affluent western society. Eating right and nutritious food during adolescence provides necessary nutrients to meet physical and intellectual growth; provides adequate stores in case of illness or pregnancy, prevents onset of adult diseases related to nutrition eg. hypertension, obesity and osteoporosis later in life, proportionally more fat tissue. Lifestyle is an important factor considered in the development of various health ailments. Diet and lifestyle play a significant role both in development and control of obesity (Amirtha Gowri and Surya, 2008). The growth spurt signaling the onset of puberty depends on the child's attaining a critical weight of 30kg and a critical body weight of 10 percent body fat however 22 percent of body fat is required to maintain regular ovulation. They attain the adult stature between 18-20 but bone mass continues to increase upto the age of 25 years (Sri Lakshmi, 2008). Growth however requires energy and adequate supply of essential micronutrients like iron, iodine and vitamins. Malnutrition especially anaemia, is common among adolescents. This is due to insufficient intake of iron rich foods like green leafy vegetables, fruits and milk (Singh et.al, 1998).

Thus nutrition needs receive adequate attention in bringing up adolescents. The nutritional status indicate both immediate

and long range effects. When left unchecked it might enter into the genetics and affects the secular trend. Recognizing adolescent girls as high risk group, initiating intervention programmes for implementing their nutrition are essential for achieving success in breaking the cycle of malnutrition and improving their health (Greenberg,2009).

Methodology

The study was carried out at Avinashilingam Deemed University for Women, Coimbatore with 100 adolescent girls in the age group of 17-19 years. To assess their nutritional awareness a questionnaire was developed which included aspects such as dietary consumption pattern, consumption of snacks and foods eaten outside. The nutritional status of the selected sample was assessed through anthropometric measurement, dietary intake by 24 hours recall method and biochemical estimation

Results and discussion

Dietary consumption pattern of the selected sample

Majority of the sample were non-vegetarians (80%) and only 20 percent were vegetarians. Majority of them (65%) consumed three meals a day which followed by two meals (19%) and four meals (16%).

Table 1 shows details regarding the consumption pattern of the sample of energy yielding foods.

Table 1. Consumption pattern of energy yielding foods

Energy yielding foods	Daily	Weekly once	Weekly twice	Weekly thrice	Occasionally
Cereals	96	-	-	4	-
Rice	50	-	-	-	-
Wheat	19	-	-	-	48
Ragi					
Kambu	-	25	5	-	36
Semolina	6	51	10	-	46
Rice flakes	8	43	-	-	17
Fats and oils					
Sunflower oil	26	38	14	-	14
Gingelly oil	31	20	12	-	6
Coconut oil	54	8	10	-	28
Refined oil	96	-	-	-	-
Ghee	55	37	-	4	4
Butter	15	11	-	-	54
Sugar & Jaggery					
Sugar	100	-	-	-	-
Jaggery	-	28	-	24	28

It is inferred from the table that majority of them (96%) consumed rice daily which is no wonder as it is the staple food in Tamil Nadu. Half of them consumed wheat daily while 19 percent consumed ragi daily. Among the foods consumed weekly once, semolina(51%), rice flakes (43%) and kambu (25%) were in the first three orders, while nearly half of them consumed ragi(48%) semolina(46%) and kambu (36%) occasionally. Among nuts and oils, refined oil was used daily by most of them (96%) followed by coconut oil (54%) and gingelly

oil (31%). Sunflower oil was used weekly once by 38 percent, weekly twice and occasionally by 14 per cent each.

The percentage of the sample using oils occasionally was less. Only 28 percent of the sample used coconut oil occasionally followed by sunflower oil (14%). Sugar was consumed by all the sample whereas 28 percent each of the sample used jaggery in their diet weekly once and occasionally.

Consumption pattern of protein rich foods

The data regarding the consumption of protein rich foods are indicated in Table 2.

Table 2. Consumption pattern of protein rich foods

Foods	Daily	Weekly once	Weekly twice	Weekly thrice	Occasionally
Pulses					
Red gram dhal	48	20	-	14	78
Bengal gram dhal	96	4	-	-	-
Green gram dhal	-	36	16	-	48
Horse gram dhal	-	10	14	-	19
Cow pea	-	10	14	-	19
Black gram dhal	-	64	20	-	16
Fleshy foods					
Meat	5	27	5	-	42
Poultry	29	41	10	6	14
Fish	4	40	9	7	6
Egg	60	10	-	10	20
Milk and Milk products					
Milk	91	-	-	-	9
Curd/buttermilk	88	-	12	-	-

Bengal gram dhal (96%) and red gram dhal (48%) were used daily by the sample whereas majority of them used black gram dhal (64%), horse gram (42%) and green gram (36%) weekly once. Girls from rural area were seen using these pulses more often than urban girls, majority of whom used these pulses occasionally. Regarding fleshy foods, 60 percent were consuming egg daily followed by poultry (29%) while others were consuming weekly once. The percentage consuming fleshy foods weekly twice and

thrice was found to be less. It was also seen that 42 percent were consuming meat occasionally because of fat content and price. It is heartwarming to see that 91 percent were consuming milk daily and the rest occasionally. Curd/butter milk was consumed by 88 percent whereas the rest used it weekly twice.

Consumption pattern of the protective foods

The consumption of the protective foods is shown in Table 3.

Table 3. Consumption pattern of protective foods

Foods	Daily	Weekly once	Weekly twice	Weekly thrice	Occasionally
Green leafy vegetables	14	12	4	18	54
Other vegetables	100				
Roots and tubers	4	8	14	30	6
Fruits	20	34	10	16	20

The entire sample was using vegetables daily whereas green leafy vegetables and roots and tubers were used by a lesser percent of the sample. Only 30 percent were using roots and tubers weekly thrice. The daily consumption of the fruits was found to be poor. One third of them were consuming fruits weekly once which was followed by weekly thrice.

Majority of the sample(82%) indicated that they did not restrict any food in their diet while 18 percent restricted certain foods in their diet, the details of which are shown in Table 4.

Table 4. Foods restricted by the sample

Food Restricted	Percent
High cholesterol food	55.5
Ice cream	50.0
Pizza, Pastry	44.4
Spicy crunchy foods (vadai,bonda)	44.4
Soft drinks	44.4
Chips	38.8
Ghee/butter	33.3
Potato items	27.7

High cholesterol food (55.5%) followed by ice cream (50%), pizza, pastry, spicy crunchy food and soft drinks (44.4% each) were avoided by the sample which was followed by chips and ghee/butter. They avoided these foods as they lead to obesity (72%), increase the cholesterol level (40%) and not good for the skin(28%).

Consumption pattern of snacks by the sample

It was found that 80 percent consumed snacks because of their taste (43%) for time

passing (19%) and easy availability(18%). Only 20 percent did not consume any snacks. The reasons mentioned were obesity (48%), not good for health (93%) and skin (35%). The variety of snacks consumed by the sample is shown in Table 5.

Table 5. Snacks consumed by the sample

Snacks	Percent
Biscuits	85
Cutlet	65
Murukku	63
Somasa	57
Puff	50
Pakoda	40
Potato chips	40
Bhujia & mixture	31
Chocolate	21
Bhajji	16
Bonda	12

* multiple response

For majority of the sample, the main snack was biscuit (85%). The other snacks consumed were cutlet (65%), murukku (63%), somasa(57%) and puff (50%). Pakoda, potato chips, bhujia and mixture and chocolate were also consumed by the sample (20-40%). It was surprising to see that above half of them consumed one packet of the chips/mixture items (56.5%) and 37.5 percent consumed two packets whereas two and three packets were consumed by each of only 2.5 percent of the sample. It was also noticed that 50 percent consumed the snacks daily whereas 34 percent had consumed weekly thrice. Very few consumed the snacks once in two weeks.

Habit of eating out by the sample

Details regarding the food eaten out by the sample are briefed in Table 6.

Table 6. Habit of eating out by the sample

Details	Percent
Habit of eating out	
i yes	52
ii No	48
Frequency	
i Daily	35
ii Weekly once	39
iii Once in two week	19
Place of eating	
i Hotel	29
ii Canteen	29
iii Mess	42
Foods liked to eat	
i Noodles	27
ii Paratha	23
iii Biriyani	19
iv Dosa/masal roast	23
v Idly	8
Type of food preferred	
i. Noodles	35
ii. Spicy crunchy foods (Bonda, Bhajji)	67
iii. Cake	78
iv. Biriyani	73
v. Puff	62
vi. Cutlet	48
vii. Coconut bun	42
viii. Murukku	25
ix. Chocolate	69
x. Soft drinks	81

More than 50 percent of the sample had the habit of eating food outside. It was seen that 30 percent had gone out to eat weekly once while 35 percent ate outside daily. The

rest ate once in two weeks (19%) and only seven percent ate outside rarely. Majority of them (42%) ate food in the mess while others ate in hotel (29%) and canteen (29%). Soft drinks (81%), cake (78%) followed by biriyani (78%), chocolate (69%), spicy crunchy food (bonda, Bhajji) (67%) and puff (62%) were the common food items preferred by the sample.

Similar trend was observed in a study by Yunsheng Ma, (2003) and www. surgeongeneral.gov. (2001). The studies revealed that eating breakfast or dinner away from home on a frequent basis had about two times the risk for obesity.

Awareness on nutritional status

It was seen that majority of the sample were conscious about nutritional status. When they were asked about the maintenance of nutritional status, 40 percent mentioned a healthy life and 28 percent mentioned eating nutritious food were essential for the maintenance of nutritional status, keeping the body healthy and proper hard work were the other ways of maintaining nutritional status mentioned by each of 16 percent which shows that the sample did not have any awareness on maintenance of their nutritional status. Nutrition education can help the adolescents to know better about the nutritional aspects of foods, their functions and need for good nutrition during this stage.

Assessment of nutritional status of the sample

Body Mass Index of the selected sample

Table 7 shows details regarding body mass index of the selected sample.

Table 7. Body mass index of the selected sample

Body Mass Index	No	Percent
> 18.5 - < 20.0 below normal	12	12
> 20.00 - < 25.0 Normal	64	64
> 25.0 - < 30.0 Overweight	19	19
> 30 Obesity	5	5

From the Table, it is observed that majority of the girls had normal BMI (64%). It is also observed that 12 per cent of the girls had below normal BMI while 19 per cent of girls had overweight and only five percent of the girls were obese.

BMI has been shown to be significant risk factor for all-causes. Hazard ratios for BMI are quite low when compared with those of conventional risk factors (Timothy, 2003). According to National Institute of Health (2000), clinical guidelines classify individuals with a BMI of 25 as overweight. The risk for some co-morbidities increases at a BMI less than 25.

Majority of the girls (65%) had risk for obesity based on waist hip ratio, which ranges from 0.85-1. The rest had normal waist hip ratio. The waist-hip ratio more accurately defines with waist measuring 35 inches or more among women and men with waist 40 inches or more, are considered "apple-shaped". "Apples" are considered to be at greater risk for certain health conditions, including heart disease (Zelman, 2005). Hence there is an urgent need for educating adolescent girls on health and nutrition.

Mean nutrient intake of the selected sample

Table 8 gives information on the mean nutrient intake and the difference as against the ICMR recommended dietary allowances (RDA).

Table 8. Mean nutrient intake of the selected sample

Nutrients	RDA * (ICMR 2004)	Mean intake (N:10)	Difference percent
Energy (kcal)	2060	2354	14.27
Protein (g)	63	63	+15
Fat (g)	22	54	+14.5
Calcium (mg)	500	943.31	+88.6
Iron (mg)	30	12.5	-91.7
Vitamin A (IU)	2400	1082.48	-54.90
Thiamine (mg)	1.0	2.11	+1.11
Riboflavin (mg)	1.2	1.75	+45.83
Vitamin C (mg)	40	41.85	+0.05

It is inferred from the table that the calculated nutrients were found to be above the recommended nutrient allowances except vitamin A and iron which showed deficit of 54.9 and 91.7 percent respectively. Prabhakaran (2003) also found similar finding in her study where the daily mean intake of iron and β -carotene were lower than RDA.

Biochemical analysis

One of the methods of assessing nutritional status is biochemical analysis and estimation of haemoglobin is found to be important for adolescents as Table 9 shows the haemoglobin level estimated for the sample.

Table 9. Estimation of haemoglobin level of the sample

Range (gm/dL)	Percent (N:100)
Normal	44
Anaemic grade 1	28
Anaemic grade 2	28

A majority of 56 per cent of them were found to be anaemic while the rest were found to have normal haemoglobin level. Grade 1 and grade 2 level of anaemia were found among an equal number of sample (28 per cent each).

A study by Prabhakaran (2003) revealed that 50 percent of the adolescent girls had mild anemia, 16.7 percent had moderate anemia while 33.3 per cent were non anemic. Prevalence of anemia among adolescent girls

is a matter of great concern. It is evident from the reports of several research studies the incidence of anaemia in adolescent girls appear to be higher than the other age group. Hence, there is increasing concern regarding the nutritional status of young women who are at threshold of adulthood and contribute an important segment to the vulnerable group. The under nutrition among young women is likely to limit nation's labour and are more likely to give birth to low birth weight babies. If those infants are girls, they are likely to contribute the cycle by being stunted in adulthood (Devadas, 2001). So optimum nutritional status of young women can be considered as an indicator of national development.

Women who have low iron diets, who are at an additional risk, iron deficiency should be guided in optimizing the dietary iron intake. Adolescent girls and women should be encouraged to eat iron rich foods and foods which enhance iron absorption. It is imperative to promote appropriate dietary habits through effective nutrition education. Hence, adolescence is an appropriate time for intervening to address anaemia. In addition to growth needs, they need to improve their iron status before pregnancy. Thus preventing and controlling anaemia is essential in adolescence stage.

Conclusion

The awareness of the selected adolescent girls on nutrition was found far from satisfactory. Hence there is a

increasing concern regarding the nutritional status of young women who are at threshold of adulthood and contribute an important segment to the vulnerable group. Under nutrition among young women is likely to

limit nations labour and are more likely to give birth to low birth weight babies. So optimum nutritional status of young women can be considered as an indicator of national development.

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