



## **COMPARATIVE STUDY OF NUTRITIONAL STATUS OF ADOLESCENT GIRLS IN URBAN AND RURAL AREA OF NAGPUR CITY**

**Muskan Punshi & Shubhada Jambhulkar**

Department of Home Science, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur,  
Maharashtra

Email ID: dt.mpunshi11@gmail.com

### **ABSTRACT**

The present study investigates the nutritional status of adolescent girls of 13 to 16 years of age from urban and rural area of Nagpur city. The total sample for the study was 100 that is 50 from urban area and 50 from rural area of the city. Data was collected from the adolescent girls by interviewing them using predesigned questionnaire schedule. Anthropometric measurements i. e. height (cm), weight (kg) was recorded. BMI was calculated, biochemical examination such as Hb (g/dl), blood pressure (mm of Hg), pulse rate (per min) were also recorded. Information related to menstrual cycle, dietary information related to food habits and 72 hrs (3 days) dietary recall was collected. The result of the study found that as per the BMI range 46 % girls from urban area and 36 % girls from rural area observed under weight. The adolescent girls from both the areas observed shorter in height and low in weight as compared with the NCHS standards. The dietary intake showed very low consumption of all the nutrients than the required RDA. Further 100 % adolescent girls from urban area and 68 % from rural area were aware about menstrual cycle. From rural area 32 % girls did not attained menarche. Haemoglobin level of adolescent girls from rural and urban area was very less than the normal range so the girls were observed with mild to moderate anaemia. The study concluded that irrespective of the area the nutritional status of the adolescent girls observed poor.

**Keywords:** Nutritional status, Adolescent girls, Urban area, Rural area.

### **INTRODUCTION**

Adolescence is a vulnerable period in human lifecycle when nutritional requirements increase due to the adolescent growth spurt. Most girls begin a rapid growth spurt between the ages of 13 and 19 years (Parimalavalli R.

2011). In India poor nutrition, early childbearing and reproductive health complications compound the difficulties of physical development in adolescent girls. Increased physical activity combined with poor eating habits and the onset of menstruation



contributes to accentuating the potential risk for adolescent's poor nutrition (Bhaskaran, 2001). Dietary habits of adolescent girls are very poor (Parimalavalli et al. 2007). As compared with boys, the adolescent girl's health, nutrition, education and development are more neglected which has adverse effect on reproductive health. Most girls are not adequately aware of their increased nutritional needs for growth resulting in girls that are underweight and of short stature (Sharma S., 2009).

It is well established that nutritional status is a major determinant of the health and well-being among adolescent and there is no doubt regarding the importance of the study of nutritional status (NFHS, 2002).

With the above background, the present study was planned to assess the nutritional status of adolescent girls from rural and urban areas of Nagpur city.

### **METHODOLOGY**

A sample of 100 adolescent girls of 13 to 16 years of age group was purposely selected from urban

and rural area of Nagpur city in Maharashtra. The subjects were taken from the reputed schools from urban and rural area of the city. The exact age of the subjects was computed from the school records. A questionnaire was used to record the general information, anthropometric measurements, dietary intake and biochemical investigations. Anthropometric measurements- Height (cm), Weight (kg) of all the subjects were recorded and body mass index was calculated using standard formula. In dietary assessment 03 days food intake was taken and nutritive value was calculated and compared with Recommended Dietary Allowances. In biochemical assessment haemoglobin (g/dl) by Drabkins method, blood pressure (mm of Hg) by Sphygmomanometer, pulse rate (per minute) by Pulse Oximeter was taken with the help of medical practitioner.

The collected data was compiled in tabular form and statistically analyzed.



## RESULTS AND DISCUSSION

The age wise distribution of the adolescent girls is given in **table 1**, according to which among all the subjects from urban area 46 % girls were 15 years of age followed by 42 % and 12 % from 14 and 16 years of age respectively. From the rural area maximum of 50 % girls were 14 years of age followed by 22 %, 18 % and 10 % from 13, 15 and 16 years of age.

The data from **table 2**, showed that majority of parents (40 % fathers & 28 % mothers) from urban area had their education up to H.S.C. and S.S.C. From rural area (06 % fathers and 12 % mothers) were studied till graduation and 22 % fathers and mothers were studied up to primary level. From **table 3**, it is observed that maximum parents (62 % father and 40 % mother) from rural area were labourers by occupation. Parents of the adolescent girls living in urban area (28 % fathers and 04 % mothers) working in a private sector job. 84 % mothers were housewives. With respect to the

total family income it is observed from the **table 4**, that maximum of 36 % girls belong to the families earning Rs. 31,000-60,000/- annually from the urban area. From the rural area maximum of 54 % girls belong to the families earning Rs. 31,000-60,000/- annually.

### Information Regarding Menstruation Cycle

From **table 5**, it is observed that 100 % adolescent girls from urban and rural area aware about the menstruation cycle. From the urban area 100 % girls have attained menarche and from rural area 34 5 girls have attained menarche while 16 % girls did not attain menarche. From the urban and rural area 74 % and 44 % girls have regular menstruation cycle. 48 % girls from urban and 40 % girls from rural area go through 3-4 days of menstruation with 76 % and 34 % girls go through moderate menstrual flow respectively. 68 % girls from urban area and 36 % girls from rural area experienced pain during menstruation period. While 74 %



girls from urban and 18 % girls from rural area experienced mild abdominal pain during menstruation.

### **Anthropometric Measurements**

From **table 6**, the observations are clearly indicated that as age progressed, the mean height also increased. The mean height of the girls from both the areas for the age of 13, 14, 15 and 16 years is observed less than the NCHS standards. There is a significant difference ( $p < 0.01$ ) noted when student's 't' test was applied to see the difference in the height of the girls from both the groups at 14, 15 years independently. Though both the groups show less height than the NCHS standards the girls from urban area have better height than the girls from rural area. At the age of 16 years girls from both the groups show similar height and insignificant difference ( $P > 0.05$ ) was observed between them. Zanvar et al. (2007) compared 500 adolescent (13-18 years) from urban, rural and tribal areas of Marathwada region, found that

urban adolescent girls had better height ( $152.26 \pm 8.6$  cm) than rural and tribal counterparts ( $150.19 \pm 7.11$ ,  $145.51 \pm 9.38$  cm respectively).

From **table 7**, it is observed that the weight of adolescent girls (13, 14, 15 and 16 years of age) irrespective of the areas show less weight than the NCHS standards. At the age of 13 years the girls from rural area observed 31.36 kg mean weight which is very less than the standard that is 44.0 kg. The weight of girls from 14 years of age though less than the standard but to compare the weight between these two group student's 't' test was applied and there is a significant difference ( $p < 0.01$ ) observed in their weights. Rest of the girls from the age group of 15 and 16 years shows insignificant difference ( $P > 0.05$ ) in their weights.

BMI is shown in **table 8**, it is observed that the 72 % adolescent girls from the rural area and 46 % girls from the urban area were underweight. Chaudhari, et al have reported 68.52 % of



adolescents having a BMI less than 18.5 kg/square meter in rural area of Varanasi.

### **Bio-chemical Examination**

Observations from **table 9**, regarding mean haemoglobin levels of adolescent girls revealed the clear cut presence of mild anaemia \*(10-12 gm/dl) among all the girls irrespective of the area. The range of haemoglobin level of the adolescent girls show the presence of severe anaemia \*(upto 7 gm/dl) and moderate anaemia \*(7-10 gm/dl) among them (\*Dhingra R. 2011). The result of the students 't' test show the significant difference ( $p < 0.01$ ) between haemoglobin level of adolescent girls from urban and rural area.

Palta et al. (2003) observed that 86 girls were anaemic whereas the remaining had normal haemoglobin level. Of the 86 girls 31 suffered from mild anaemia, 46 moderate anaemia and 09 with severe anaemia.

**Table 10**, shows the vital signs that is, blood pressure and pulse rate of the adolescent girls. Observation show that majority (90

%) of girls from rural area were having their systolic blood pressure below 100, followed by (10 %) of girls having blood pressure between 101-120. The maximum number of the girls that is (90 %) had their diastolic blood pressure between 61-80, followed by (10 %) had their diastolic blood pressure above 100. Adolescent girls (59 %) from urban area were having their systolic blood pressure below 100 followed by (42 %) girls having blood pressure between 101-120. (100 %) adolescent girls had their diastolic blood pressure between 81-100.

Observations of the pulse rate show that (100 %) of the girls from urban area were having their pulse rate between 81-100/minute. (72 %) adolescent girls from rural area were having their pulse rate between 81-100/minute while (28%) of the girls were having between 101-120/minute.

### **Nutrient Intake**

From the **table 11**, it is observed that, the intake of all the nutrients was found to be below



the recommended dietary allowances. The mean energy and protein intake of the adolescent girls from urban and rural area was ( $957.30 \pm 208.1$  &  $872.38 \pm 129$ ), ( $36.84 \pm 2.83$  &  $23.14 \pm 3.74$ ) respectively. These values for intake of calories and proteins were very much lower than that of RDA by ICMR. The iron intake of adolescent girls of the 13-15 years of age from urban and rural area was very less ( $10.8 \pm 2$  &  $5.69 \pm 1.5$ ) respectively than that of RDA. Intake of calcium and folic acid were also less than RDA. Contrary to this consumption of fat by the girls from the urban area and the consumption of vitamin C by the girls of urban and rural areas were higher than the RDA.

Student's 't' test was applied to compare the difference of nutrient intake of adolescent girls from urban and rural area. The result shows the significant difference ( $p < 0.01$ ) at both the level in all the nutrients except energy. It means though the actual intake of adolescent girls of both the areas is less than the RDA but

the nutrient consumption of the girls from the urban area is better as compared with the Intake of girls from rural area.

**Table 12**, show the mean nutrient intake of adolescent girls from the age of 16 years. The result shows that the consumption of all the nutrients was very low as per the RDA. The energy intake of the adolescent girls from urban and rural area was very less ( $957.3 \pm 208.1$  &  $872.38 \pm 129$ ) than the RDA respectively. The protein intake also shows % deficit ( $-33.75$  &  $-61.38$ ) in the diet of the girls from urban and rural area respectively. Like calorie and protein, the consumption of calcium, iron and folic acid were low by the girls from urban and rural area.

The values show the inadequate store of iron and protein which is not adequate to acquire substantial iron stores during this time. The result of the student's 't' test shows the significant difference ( $p < 0.01$ ) for protein, carbohydrate, vitamin C and folic acid consumption of



adolescent girls from urban and rural area while calcium and fat show significant difference at 5 % level and insignificant at 1 % level ( $0.01 < p < 0.05$ ). Intake of iron and energy show insignificant difference at both the level ( $P > 0.05$ ). The study concluded that the rural adolescent girls are undernourished as compared with

the urban girls. The nutritional status of the adolescent girls from both the areas was poor but the reasons are different. There were other contributory factors also which were responsible for their poor nutritional status. The awareness of nutrition education is important among these girls irrespective of the area.

**Table 1: Age Wise Distribution of the Adolescent Girls**

| Sr. No.      | Age (years) | Urban (N=50) |                | (Rural N=50) |                |
|--------------|-------------|--------------|----------------|--------------|----------------|
|              |             | Number       | Percentage (%) | Number       | Percentage (%) |
| 1.           | 13+         | 00           | 00             | 11           | 22             |
| 2.           | 14+         | 21           | 42             | 25           | 50             |
| 3.           | 15+         | 23           | 46             | 09           | 18             |
| 4.           | 16+         | 6            | 12             | 05           | 10             |
| <b>Total</b> |             | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |

**Table 2: Distribution According to their Parent's Literacy Status**

| Sr. No.      | Educational Status        | Urban (N=50) |                | Rural (N=50) |                |
|--------------|---------------------------|--------------|----------------|--------------|----------------|
|              |                           | Number       | Percentage (%) | Number       | Percentage (%) |
| 1.           | <b>Father's Education</b> |              |                |              |                |
|              | Illiterate                | 00           | 00             | 03           | 06             |
| 2.           | Primary                   | 01           | 02             | 11           | 22             |
| 3.           | Middle School             | 02           | 04             | 07           | 14             |
| 4.           | S.S.C                     | 08           | 16             | 09           | 18             |
| 5.           | 11 <sup>th</sup>          | 01           | 02             | 01           | 02             |
| 6.           | H.S.C                     | 20           | 40             | 11           | 22             |
| 7.           | Diploma                   | 02           | 04             | 00           | 00             |
| 8.           | Graduate                  | 11           | 22             | 06           | 12             |
| 9.           | Post-Graduate             | 02           | 04             | 00           | 00             |
| 10.          | Father not alive          | 03           | 06             | 02           | 04             |
| <b>Total</b> |                           | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |
| 1.           | <b>Mother's Education</b> |              |                |              |                |
|              |                           | 00           | 00             | 06           | 12             |





|              |                  |           |            |           |            |
|--------------|------------------|-----------|------------|-----------|------------|
|              | Illiterate       |           |            |           |            |
| 2.           | Primary          | 02        | 04         | 11        | 22         |
| 3.           | Middle School    | 00        | 00         | 10        | 20         |
| 4.           | S.S.C            | 14        | 28         | 17        | 34         |
| 5.           | H.S.C            | 21        | 42         | 5         | 10         |
| 6.           | Graduate         | 10        | 20         | 01        | 02         |
| 7.           | Post-Graduate    | 01        | 02         | 00        | 00         |
| 8.           | Mother not alive | 02        | 04         | 00        | 00         |
| <b>Total</b> |                  | <b>50</b> | <b>100</b> | <b>50</b> | <b>100</b> |

**Table 3: Distribution According to the Occupation of the Parents**

| Sr. No.      | Occupation                                   | Urban (N=50) |                | Rural (N=50) |                |
|--------------|--|--------------|----------------|--------------|----------------|
|              |  | Number       | Percentage (%) | Number       | Percentage (%) |
| 1.           | <b>Father's Occupation</b><br>Government Job | 08           | 16             | 00           | 00             |
| 2.           | Private Sector Job                           | 14           | 28             | 09           | 18             |
| 3.           | Business                                     | 12           | 24             | 03           | 06             |
| 4.           | Farmer                                       | 01           | 02             | 01           | 02             |
| 5.           | Labor  | 04           | 08             | 31           | 62             |
| 6.           | Worker                                       | 08           | 16             | 04           | 08             |
| 7.           | Not Alive                                    | 03           | 06             | 02           | 04             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |
| 1.           | <b>Mother's Occupation</b><br>Housewife      | 42           | 84             | 25           | 50             |
| 2.           | Government Job                               | 02           | 04             | 00           | 00             |
| 3.           | Private Sector Job                           | 02           | 04             | 04           | 08             |
| 4.           | Business                                     | 02           | 04             | 01           | 02             |
| 5.           | Labor  | 00           | 00             | 20           | 40             |
| 6.           | Not Alive                                    | 02           | 04             | 00           | 00             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |



**Table 4: Distribution of Total Annual Family Income of Parents of Adolescent Girls**

| Sr. No.      | Income Level    | Urban (N=50) |                | Rural (N=50) |                |
|--------------|-----------------|--------------|----------------|--------------|----------------|
|              |                 | Number       | Percentage (%) | Number       | Percentage (%) |
| 1.           | 10,000-30,000   | 10           | 20             | 20           | 40             |
| 2.           | 31,000-60,000   | 18           | 36             | 27           | 54             |
| 3.           | 61,000-90,000   | 08           | 16             | 03           | 06             |
| 4.           | 91,000-1,20,000 | 05           | 10             | 00           | 00             |
| 5.           | >1,20,001       | 02           | 04             | 00           | 00             |
| 6.           | Don't Know      | 7            | 14             | 00           | 00             |
| <b>Total</b> |                 | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |

**Table 5: Awareness of Adolescent Girls Regarding Menstrual Cycle**

| Sr. No.      | Parameters                             | Urban (N=50) |                | Rural (N=50) |                |
|--------------|--|--------------|----------------|--------------|----------------|
|              |  | Number       | Percentage (%) | Number       | Percentage (%) |
| 1            | <b>Knowledge About Menstrual Cycle</b> |              |                |              |                |
| a            | Yes                                    | 50           | 100            | 34           | 68             |
| b            | No                                     | 00           | 00             | 16           | 32             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |
| 2            | <b>Menarche Not Attained</b>           | --           | --             | 16           | 32             |
| a            | <b>Menarche Attained</b>               | 50           | 100            | 34           | 68             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>50</b>    | <b>100</b>     |
| 3.           | <b>Menstrual History</b>               |              |                |              |                |
| a.           | Regular                                | 37           | 74             | 22           | 44             |
| b.           | Irregular                              | 13           | 26             | 12           | 24             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>34</b>    | <b>68</b>      |
| 4            | <b>Menstrual Days</b>                  |              |                |              |                |
| a            | 0-4 Days                               | 24           | 48             | 20           | 40             |
| b            | >4 Days                                | 26           | 52             | 14           | 28             |
| <b>Total</b> |  | <b>50</b>    | <b>100</b>     | <b>34</b>    | <b>68</b>      |



|              |                         |           |            |           |           |
|--------------|-------------------------|-----------|------------|-----------|-----------|
| 5.           | <b>Menstrual Flow</b>   |           |            |           |           |
| a.           | Scanty                  | 3         | 06         | 10        | 20        |
| b.           | Moderate                | 38        | 76         | 17        | 34        |
| c.           | Heavy                   | 9         | 18         | 7         | 14        |
| <b>Total</b> |                         | <b>50</b> | <b>100</b> | <b>34</b> | <b>68</b> |
| 6.           | <b>Menstrual Pain</b>   |           |            |           |           |
| a.           | Yes                     | 34        | 68         | 18        | 36        |
| b.           | No                      | 16        | 32         | 16        | 32        |
| <b>Total</b> |                         | <b>50</b> | <b>100</b> | <b>34</b> | <b>68</b> |
| 7.           | <b>Severity of Pain</b> |           |            |           |           |
| a.           | Mild                    | 25        | 74         | 09        | 18        |
| b.           | Severe                  | 09        | 26         | 09        | 18        |
| <b>Total</b> |                         | <b>34</b> | <b>100</b> | <b>18</b> | <b>36</b> |

Table 6: Mean Height (cm) of Adolescent Girls

| Sr. No. | Age (Years) | Urban (N= 50)              |             | Rural (N=50)               |             | NCHS Standards | Student's 't'test |
|---------|-------------|----------------------------|-------------|----------------------------|-------------|----------------|-------------------|
|         |             | Mean & S.D.                | Range       | Mean & S.D.                | Range       |                |                   |
| 1.      | 13+         | --                         | --          | (n=11)<br>147.90±<br>4.16  | 143-<br>159 | 155            | --                |
| 2.      | 14+         | (n=21)<br>154.47 ±<br>4.89 | 145-<br>162 | (n=25)<br>147.32 ±<br>4.97 | 139-<br>159 | 159            | 5.03*             |
| 3.      | 15+         | (n=23)<br>155.69 ±<br>2.94 | 145-<br>164 | (n=9)<br>147.88<br>±7.70   | 140-<br>168 | 161            | 4.08*             |
| 4.      | 16+         | (n=6)<br>153.66 ±<br>9.08  | 143-<br>164 | (n=5)<br>154.4 ±<br>8.77   | 141-<br>168 | 162            | 0.12              |

\*values indicate significant difference at 5 % and 1 % level (p < 0.01).

Rest of the values indicates insignificant difference at both 5 % and 1 % levels (P > 0.05).

**Table 7: Mean Weight (kg) of Adolescent Girls**

| Sr. No. | Age (Years) | Urban (N= 50)             |       | Rural (N=50)               |            | NCHS Standards | Student's 't'test |
|---------|-------------|---------------------------|-------|----------------------------|------------|----------------|-------------------|
|         |             | Mean & S.D.               | Range | Mean & S.D.                | Range      |                |                   |
| 1.      | 13+         | --                        | --    | (n=11)<br>31.36 ±<br>11.79 | 25 -<br>35 | 44.0           | --                |
| 2.      | 14+         | (n=21)<br>43.80 ±<br>6.71 | 43-56 | (n=25)<br>36.04 ±<br>5.88  | 25 -<br>47 | 48.0           | 3.88*             |
| 3.      | 15+         | (n=23)<br>42.04 ±<br>7.27 | 33-60 | (n=9)<br>39.77 ±<br>8.70   | 33-60      | 51.4           | 0.73              |
| 4.      | 16+         | (n=6)<br>44.16 ±<br>4.88  | 38-52 | (n=5)<br>45 ±<br>5.47      | 35-50      | 53.0           | 0.24              |

\*values indicate significant difference at 5 % and 1 % level ( $p < 0.01$ ). Rest of the values indicates insignificant difference at both 5 % and 1 % levels ( $P > 0.05$ ).

**Table 8: Body Mass Index (BMI) of Adolescent Girls**

| Sr. No. | *BMI Range  | Category      | Urban (N= 50) | Rural (N= 50) |
|---------|-------------|---------------|---------------|---------------|
|         |             |               | No.           | No.           |
| 1.      | >17.50      | Under weight  | 23 (46)       | 36 (72)       |
| 2.      | 17.50-22.99 | Normal weight | 27 (54)       | 14 (28)       |
| 3.      | 23.00-27.99 | Over weight   | --            | --            |
| 4.      | 28-00<      | Obese         | --            | --            |

\*WHO, 2011. S.D. - Standard Deviation. Figures in bracket indicate percentage.

**Table 9: Haemoglobin Level of the Adolescent Girls**

| Sr. No. | Age (Years) | Urban (N=50)           |           | Rural (N=50)           |           | Student's 't'test |
|---------|-------------|------------------------|-----------|------------------------|-----------|-------------------|
|         |             | Mean & S.D.            | Range     | Mean                   | Range     |                   |
| 1.      | 13+         | 00                     | 00        | (n=11)<br>11.68 ± 0.83 | 10.4-12.7 | --                |
| 2.      | 14+         | (n=21)<br>11.45 ± 1.60 | 7.3-13.8  | (n=25)<br>10.57 ± 1.69 | 4.73-12.1 | 04*               |
| 3.      | 15+         | (n=23)<br>11.29 ± 1.32 | 9-13.6    | (n=09)<br>10.77 ± 1.11 | 9.1-12.4  | 1.08              |
| 4.      | 16+         | (n=06)<br>10.89 ± 1.62 | 7.6-12.07 | (n=05)<br>11.12 ± 1.51 | 8.3-12.6  | 0.22              |

\*values indicate significant difference at 5 % and 1 % level ( $p < 0.01$ ).

Rest of the values indicates insignificant difference at both 5 % and 1 % levels ( $P > 0.05$ ).

**Table 10: Observations of Vital Signs among Adolescent Girls**

| Sr. No. | Vital Signs               | Group            | Urban (N=50) | Rural (N=50) |
|---------|---------------------------|------------------|--------------|--------------|
| 1.      | Blood Pressure (mm of Hg) | <b>Systolic</b>  |              |              |
|         |                           | Below 100        | 29 (59)      | 45 (90)      |
|         |                           | 101-120          | 21 (42)      | 05 (10)      |
|         |                           | 121-140          | --           | --           |
|         |                           | Above 140        | --           | --           |
|         |                           | <b>Diastolic</b> |              |              |
|         |                           | Below 60         | --           | --           |
|         |                           | 61-80            | 50 (100)     | 45 (90)      |
| 2.      | Pulse Rate (per minute)   | 81-100           | --           | --           |
|         |                           | 101-120          | 50 (100)     | 36 (72)      |
|         |                           | Above 100        | --           | 05 (10)      |
|         |                           | Above 120        | --           | --           |

Figures in bracket show percentage.



**Table 11: Mean Nutrient Intake of Adolescent Girls for 13 to 15 years of Age Group**

| Sr. No. | Nutrients               | Parameters        | Urban (N=50)   | Rural (N=50)   | Student's 't' test |
|---------|-------------------------|-------------------|----------------|----------------|--------------------|
| 1.      | Energy(kcal)            | Mean & S.D.       | 957.30 ± 208.1 | 872.38 ± 129   | 1.28               |
|         |                         | Range             | 704.8 - 1109.8 | 603.61-1084.01 |                    |
|         |                         | <b>R.D.A</b>      | 2330           | 2330           |                    |
|         |                         | % Deficit/Excess  | -63.37         | -62.09         |                    |
| 2.      | Protein(g)              | Mean & S.D.       | 36.84 ± 2.83   | 23.14 ± 3.74   | 19.19*             |
|         |                         | Range             | 32.19 - 41.44  | 14.61-28.03    |                    |
|         |                         | <b>R.D.A</b>      | 51.9           | 51.9           |                    |
|         |                         | % Deficit/Excess  | -29.01         | -55.414        |                    |
| 3.      | Carbohydrate(g)         | Mean & S.D.       | 185.17 ± 26.29 | 133.85 ± 11    | 11.8*              |
|         |                         | Range             | 107.97-172.89  | 162.75-209.74  |                    |
| 4.      | Fat(g)                  | Mean & S.D.       | 46.99 ± 3.78   | 39.21 ± 4.99   | 8.17*              |
|         |                         | Range             | 40-54          | 29.99-48.505   |                    |
|         |                         | <b>R.D.A</b>      | 40             | 40             |                    |
|         |                         | % Deficit/ Excess | 17.47          | -1.97          |                    |
| 5.      | Iron(mg)                | Mean & S.D.       | 10.8 ± 2       | 5.69 ± 1.5     | 4.15*              |
|         |                         | Range             | 6—13           | 3.33-10.61     |                    |
|         |                         | <b>R.D.A</b>      | 27             | 27             |                    |
|         |                         | % Deficit/Excess  | -60            | -78.9          |                    |
| 6.      | Vitamin C (mg)          | Mean & S.D.       | 71.77 ± 6.13   | 56.48 ± 9.31   | 14.93*             |
|         |                         | Range             | 69 – 89        | 37-72          |                    |
|         |                         | <b>R.D.A</b>      | 40             | 40             |                    |
|         |                         | % Deficit/Excess  | 79.42          | 41.2           |                    |
| 7.      | Calcium(mg)             | Mean & S.D.       | 285.53 ± 6.13  | 236.32 ± 9.31  | 23.60*             |
|         |                         | Range             | 270-315        | 165.82-333.43  |                    |
|         |                         | <b>R.D.A</b>      | 800            | 800            |                    |
|         |                         | % Deficit         | -64.30         | -70.46         |                    |
| 9.      | Folic Acid (total) (µg) | Mean              | 89.77 ± 3.46   | 87.11 ± 3.6    | 3.5*               |
|         |                         | Range             | 85-95          | 00             |                    |
|         |                         | <b>R.D.A</b>      | 150            | 150            |                    |
|         |                         | % Deficit         | -40.15         | -41.92         |                    |

\*values indicate significant difference at 5 % and 1 % level ( $p < 0.01$ ).

Rest of the values indicates insignificant difference at both 5 % and 1 % levels ( $P > 0.05$ ).



**Table 12: Mean Nutrient Intake of Adolescent Girls for 16 years of Age Group**

| Sr. No. | Nutrients               | Parameters        | Urban (N=50)    | Rural (N=50)   | Student's 't' test |
|---------|-------------------------|-------------------|-----------------|----------------|--------------------|
| 1.      | Energy(kcal)            | Mean & S.D.       | 957.3 ± 208.1   | 872.38 ± 129   | 0.75               |
|         |                         | Range             | 780.26-1206.78  | 675-1024.25    |                    |
|         |                         | <b>R.D.A</b>      | 2440            | 2440           |                    |
|         |                         | % Deficit/Excess  | -60.76          | -64.24         |                    |
| 2.      | Protein(g)              | Mean & S.D.       | 36.73 ± 2.7     | 21.43 ± 3.96   | 6.79*              |
|         |                         | Range             | 32.48-40.23     | 16.23-23.2     |                    |
|         |                         | <b>R.D.A</b>      | 55.5            | 55.5           |                    |
|         |                         | % Deficit/Excess  | -33.75          | -61.38         |                    |
| 3.      | Carbohydrate(g)         | Mean & S.D.       | 183.23 ± 14.3   | 130.16 ± 20.42 | 4.5*               |
|         |                         | Range             | 155.26-201.63   | 107.97-151.07  |                    |
| 4.      | Fat(g)                  | Mean              | 48.808 ± 3.33   | 43.018 ± 2.47  | 3.08**             |
|         |                         | Range             | 42.93 - 52.89   | 40.29 - 47.56  |                    |
|         |                         | <b>R.D.A</b>      | 35              | 35             |                    |
|         |                         | % Deficit/ Excess | 39.45           | +22.90         |                    |
| 5.      | Iron(mg)                | Mean & S.D.       | 10.31 ± 2.62    | 8.15 ± 2       | 1.46               |
|         |                         | Range             | 6.73 - 13.56    | 5.85 - 11.01   |                    |
|         |                         | <b>R.D.A</b>      | 26              | 26             |                    |
|         |                         | % Deficit/Excess  | -60.33          | -68.65         |                    |
| 6.      | Vitamin C (mg)          | Mean & S.D.       | 77.70 ± 6.64    | 59.50 ± 9.61   | 3.45*              |
|         |                         | Range             | 268.88 - 82.92  | 49.80 -76.32   |                    |
|         |                         | <b>R.D.A</b>      | 40              | 40             |                    |
|         |                         | % Deficit/Excess  | 94.25           | 48.765         |                    |
| 7.      | Calcium(mg)             | Mean S.D.         | 305.83 ± 26.26  | 266.76 ± 26.86 | 2.69**             |
|         |                         | Range             | 275.36 - 342.01 | 223 - 301.01   |                    |
|         |                         | <b>R.D.A</b>      | 800             | 800            |                    |
|         |                         | % Deficit         | -61.77          | -66.65         |                    |
| 9.      | Folic Acid (total) (µg) | Mean & S.D.       | 93.01 ± 3.85    | 84.01 ± 4.09   | 3.54*              |
|         |                         | Range             | 88.76 - 94.86   | 79.02 - 86.39  |                    |
|         |                         | <b>R.D.A</b>      | 200             | 200            |                    |
|         |                         | % Deficit         | -53.49          | -57.99         |                    |

\*values indicate significant difference at 5 % and 1 % level ( $p < 0.01$ ).

\*\*values indicate significant difference at 5 % but insignificant at 1 % level ( $0.01 < p < 0.05$ ).

Rest of the values indicates insignificant difference at both 5 % and 1 % levels ( $P > 0.05$ ).

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