



NUTRITIONAL STATUS OF SCHOOL GOING 6-10 YEARS CHILDREN IN RAMANATHAPURAM DISTRICT

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ABSTRACT:

Nutritional Status of Children of Ramanathapuram District has not been investigated. I want to compare the nutritional status of Government and Matriculation school children. One hundred students from each streams had been selected randomly. From 5 Government and 5 Matriculation schools (10 children from each streams) Two students/class from I to V(1 boy and 1 girl/class). Questionnaire to know their general profile and BMI assessment to know anthropometric status. , A majority (79.6%) of Government school children were found to be under thinness and 64.6% of Matriculation school children were found to be in same category. The daily nutrient intake was calculated to know the level of energy, protein, fat, calcium, iron, B' carotene and vitamin compared to RDA. When 6 years children intake was compared Government school children had higher (25.05%) deficit of Iron and 20.62 percent deficit of Vitamin C by Matriculation school children. The similarity among 10 years boys were the majority (36.02% and 22.67%) of Government and Matriculation school children had the Iron deficit. Haemoglobin level by cyanmethaemoglobin method to assess anemia in children. A majority, 56% of Government school children and 51 percent of Matriculation school children had haemoglobin levels between 7 g/dl – 9.99g/dl which showed they were suffered from anaemia moderately. The presence and absence of clinical signs and symptoms in eyes, mouth and skin were examined. Nine percent of Government school children's tongue were pale and coated whereas only five percent of Matriculation school children had pale and coated tongues.

KEYWORDS: Anthropometry, Haemoglobin, Anemia, Nutrient intake.

INTRODUCTION:

In the words of the 35th president of the United States, John F.Kennedy, "Children are the world's most valuable resource and its best hope for the future.

School age, also known as middle childhood (6-10 years of age) is the fourth developmental stage in one's life span after infancy, toddler and preschool stages. In this transition phase between childhood and adolescence marked by the active growth and development.(Klieman RM et al,2008)

Nutritional status is an important index for measuring quality of life especially for children. In this respect, understanding the nutritional status of children has far reaching implications on better development of future generations as well as future development of humanity.(Anurage S et al 2012)



Nutrition plays a vital role in growth and development of children. Inadequate nutrition may lead to malnutrition, growth retardation, reduce work capacity and poor mental and social development. (Manna et al.2011)

Sati et al 2012 mentioned that among all age groups, the school age period is nutritionally significant because this is a prime time to build up body stores of nutrients in preparation for rapid growth of adolescence.

Nutrition of primary school children determines their life time health strength and intellectual vitality. This span of life is a dynamic stage of physical growth and mental development (Bevans KB et al.2011). But still now in India, the position of health and status of school-age children are not satisfactory level (Sharma et al.2017)

It becomes very important to know the nutritional status of school going Government and Matriculation Schools with following objectives.

- To assess the nutritional status of 6-10year old school going children of Ramanathapuram district.
- To study the adequacy of food and nutrient intake in their diets.
- To investigate the prevalence of undernutrition and anemia in the selected children.

MATERIALS AND METHOD :

Schools were selected from the Ramanathapuram District. One hundred students randomly selected from the ten schools in each stream (five government and five matriculation) making the total sample size two hundred. Ten students were randomly selected from each of the ten schools . Two students per class (one boy and one girl) were selected randomly from I to V standard.

SURVEY SCHEDULE :

The schedule was used to collect the information on general profile, anthropometric status, dietary intake, clinical status and haemoglobin status.

DIET SURVEY :

The food consumption frequency was recorded in terms of cereals, pulses, green leafy vegetables, other vegetables, fruits, milk, meat, fish and egg, fats and oils , sugar and jaggery. The daily dietary recall for three consecutive days was taken and was averaged for one day. The average daily nutrient intake was calculated with the help of the food composition tables of Gopalan et al.2002. The calculated daily nutrient intake in terms of Energy, protein, fat, calcium, iron, B carotene and Vitamin C were then compared against recommended dietary allowances for Indians (ICMR,2000).

ANTHROPOMETRIC SURVEY:

Susan2010 explained Anthropometry as the science of measuring the size, weight and height of a human body. Height and weight measured usually vary according to the person's age and sex and these measurements are used to derive indices such as body mass index, weight-for-age, weight-for-height as well as height-for-age. This index can be used to determine under weight, wasting and stunting respectively. Nutritional status of all the selected children was assessed by measuring body heights (cm) and weights (kg). Body mass index was compared with International Obesity Task Force (IOTF) body mass index (BMI) cut-offs were widely used to assess the prevalence of child overweight, obesity and thinness.

HEIGHT AND WEIGHT MEASUREMENT :

The accurate measurement of standing height was taken by using a non stretchable tape and measuring stick attached to a vertical surface and a movable horizontal or right-angled headboard, for reading. For measurement, the subject stand erect, without shoes, with weight equally distributed on both feet and heels together and touching the vertical board. Arms hang freely at the side of the trunk with palms facing the thighs. Looking straight ahead so that the line of vision is perpendicular to the body, the subject takes a deep breath and holds that position while the horizontal headboard is brought down firmly on the top of the head.

ANTHROPOMETRIC ASSESSMENT FOR UNDERNUTRITION :

Anthropometric assessment was conducted to identify children with moderate to severe undernutrition. BMI classes of the children were set using the cole et al.method. This allowed us to have specific cutoff points for males and females at every age as recommended by the International Obesity Task Force (IOTF). There are six classes of BMI; thinness grades 3, 2, 1, normal, overweight, obesity. Thinness 3- <16kg/m² ; Thinness 2-<17kg/m² ; Thinness 1-<18.5kg/m² ; Healthy- <25 kg/m² ; overweight -< 30 kg/m² ; obesity- ≥ 30 kg/m² ; Thinness 1-3 were collapsed as underweight (UW< 18.5 kg/m²) The obtained value was compared with the above values.

HAEMOGLOBIN ESTIMATION :

Haemoglobin level of subjects was estimated by using cyanmethaemoglobin method. The WHO cutoff values for assessment of anemia in the children was used for the study.

CLINICAL SURVEY :

All the selected two hundred children were examined for the presence or absence of any clinical signs and symptoms of diseases in eyes, mouth and skin by the Pediatrician and Primary health centre Doctors.

RESULTS AND DISCUSSION:

Data obtained was analyzed with respect to the objectives of the present study which were to find the prevalence of undernutrition and iron deficiency anemia among children. 6 to 10 years old 200 children were surveyed out of which 100 belonged to Matriculation Schools and 100 belonged to Government Schools.

I. Food consumption patterns of the selected respondents' families

Figure 1 - Relationship between Type of school and food consumption patterns.

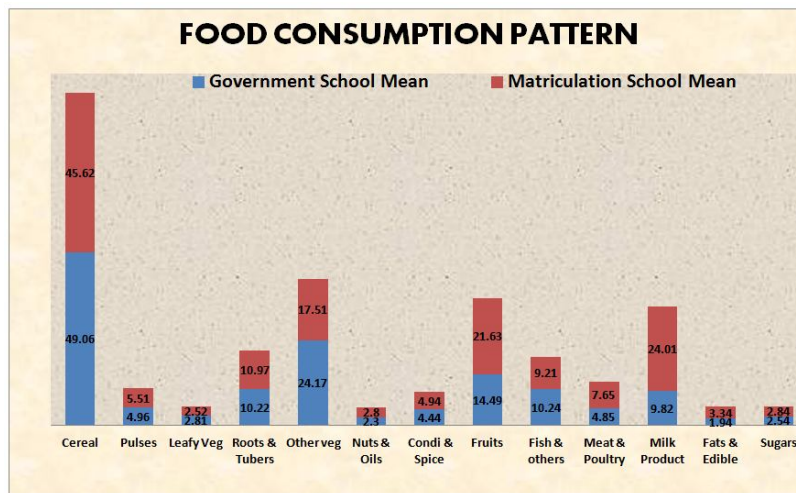


Table 1

Food Consumption Pattern	Government School		Matriculation School		't' Value	'P' Value
	Mean	SD	Mean	SD		
Total Food Items in Kg	141.84	17.71	158.55	16.21	15.56	0.000**

The above figure showed that there was relationship between type of School and Food consumption pattern. The mean purchase of Pulses, Roots and Tubers, Nuts and Oils, Condiments and Spices, Fruits, Meat and Poultry, Milk and Milk Product, Fats and Edible oils and Sugars were greater among Matriculation school

families, whereas, the mean purchase of Cereals, Leafy Vegetables, Other Vegetables, Fish and other sea foods were greater among Government school children's families. Overall, parents of Matriculation school children seemed to purchase items in huge amounts due to their purchasing power and standard of living. Most of the families of Government school children purchased locally cultivated vegetables and available sea-foods at reasonable rates.

Menu patterns of the selected respondents.

Table 2. Difference between children of Government Schools and Matriculation Schools with respect to dietary intake.

Dietary Intake	Government School		Matriculation School		't' Value	'P' Value
	Mean	SD	Mean	SD		
Cereals	255.33	40.10	247.55	46.42	2.84	0.005**
Pulses	46.11	16.12	50.00	21.02	3.28	0.001**
Green Leaf Vegetables	39.10	11.81	34.80	12.88	5.50	0.000**
Other vegetables	81.20	23.94	75.93	29.69	3.09	0.002**
Fruits	40.22	13.81	42.26	17.00	2.08	0.038
Milk	261.20	123.55	279.00	114.78	2.36	0.018
Fat and oils	19.57	11.02	20.39	11.78	1.14	0.256
Qty of Meat, Fish and Egg	41.67	15.92	41.98	16.98	0.30	0.766
Qty of Sugar and Jaggery	17.15	8.23	17.51	8.54	0.68	0.495

Note:-

** Significance at 1% Level

* Significance at 5% Level

Details in the above table showed that there was relationship between type of school and dietary intake of cereals, pulses, green leafy vegetables and other vegetables. The higher intake of pulses, green leafy vegetables and other vegetables by Government school children was due to the provision of food at school. The intake of cereals was also higher because of easy availability and food practices.

Table values also showed that there was relationship between type of school and fruits and milk intake. The Government school children were found to consume seasonal and low cost fruits, whereas, Matriculation school children seemed to consume the fruits they liked. According to the economic condition, the quantity of milk intake appeared to differ in both the streams (respondents from Matriculation schools and Government schools).

Since P value was greater than 0.05, it indicated that there was no relationship between type of school and intake of fats, oils, meat, fish, egg, sugar and jaggery. Probably this was due to the similarities in the food habits of both the groups. (respondents from Matriculation schools and Government schools). Sati and Dahiya 2012 study on nutritional assessment of rural school going children of 7-9 years of Hisar District, Haryana revealed that daily mean intake of food groups i.e., cereals, pulses, fats and oils, sugar and jaggery, milk and milk products, green leafy vegetables, other vegetables, roots and tubers and fruits were found to be significantly lower than the recommended dietary intake, however the intake of pulses was adequate (60.98%)

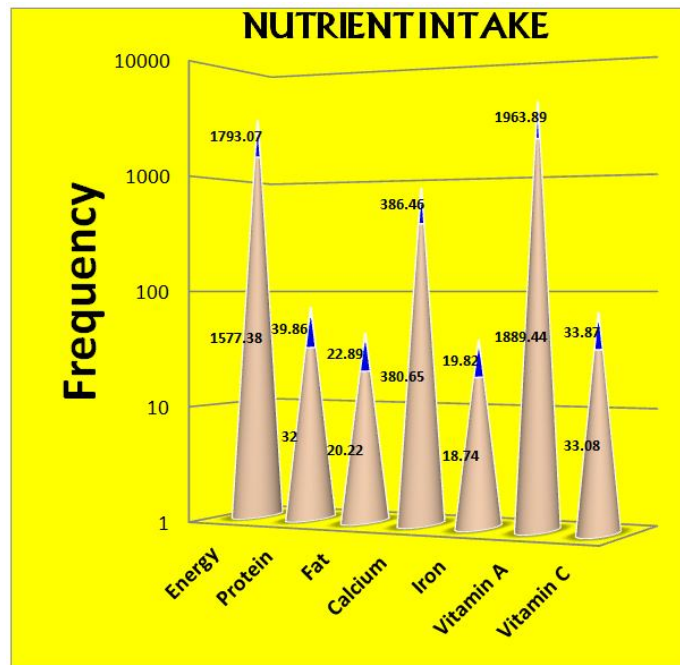
Table 3. Comparison of Nutrient Intake of Government School and Matriculation School Children with RDA

Age	Nutrient	RDA	Government school		Matriculation school	
			Mean Nutrient Intake	Percentage Deficit / Surplus	Mean Nutrient Intake	Percentage Deficit / Surplus
6	Energy (Kcal)	1690	1373.95	-18.70	1567.9	-7.22
	Protein (g)	30	23.72	-20.93	33.69	+12.3
	Fat (g)	25	19.24	-23.04	22.35	-10.60
	Calcium (mg)	400	342.05	-14.48	347.9	-13.02
	Iron (mg)	18	13.49	-25.05	14.65	-18.61
	B-Carotene(µg)	1600	1347.85	-15.75	1420.04	-11.24
	Vitamin C (mg)	40	31.60	-21.00	31.75	-20.62
7-9	Energy (Kcal)	1950	1569.05	-19.53	1804.68	-7.45
	Protein (g)	41	31.08	-24.19	38.82	-5.31
	Fat (g)	25	20.33	-18.68	23.15	-7.40
	Calcium (mg)	400	367.03	-8.24	371.75	-7.06
	Iron (mg)	26	20.27	-22.03	20.76	-20.15
	B-Carotene(µg)	2400	2002.7	-16.55	2077.08	-13.45
	Vitamin C (mg)	40	33.51	-16.22	34.2	-14.50
10 (Boys)	Energy (Kcal)	2190	1807.30	-17.47	2050	-6.39
	Protein (g)	54	42.15	-21.94	48.36	-10.44
	Fat (g)	22	19.24	-12.54	23.29	+5.86
	Calcium (mg)	600	462.8	-22.86	470.7	-21.55
	Iron (mg)	34	21.75	-36.02	26.29	-22.67
	B-Carotene(µg)	2400	2102.27	-12.40	2176.58	-9.30
	Vitamin C (mg)	40	33.90	-15.25	35	-12.50
10 (Girls)	Energy (Kcal)	1970	1803.30	-8.46	1917.40	-2.67
	Protein (g)	57	43.89	-23.00	49.89	-12.47
	Fat (g)	22	19.58	-11.00	21.96	-0.18
	Calcium (mg)	600	457.4	-23.76	467.60	-22.06
	Iron (mg)	19	17.04	-10.31	17.98	-5.36
	B-Carotene(µg)	2400	2080.1	-13.32	2159.73	-10.01
	Vitamin C (mg)	40	32.50	-18.75	34.80	-13.00

The above table showed that there was a deficit in intake of nutrients by various age groups of two streams (Government and Matriculation) of school children. Though in Matriculation schools, 6 year children had surplus protein (12.3%) and 10 year boys had surplus fat (5.86%). This was due to their frequent intake of soya nuggets, egg and fried items. Other than that all the comparisons had deficits higher in Government schools than in Matriculation schools. When 6 years children intake was compared Government school children had higher (25.05%) deficit of Iron and 20.62 percent deficit of Vitamin C by Matriculation school children. 7-9 years age groups showed the maximum (24.19%) of protein deficit and the least (8.24%) of calcium in Government school children and 20.15 percent deficit of Iron and only 5.31 percent of deficit of protein by Government school children. The similarity among 10 years boys were the majority (36.02% and 22.67%) of Government and Matriculation school children had the Iron deficit and 10 years girls had higher calcium deficit (23.76 % and 22.06 %) by Government and Matriculation school children. Nehal Patel et al 2015 Concluded that Nutrition and health standards of government school children are still far inferior

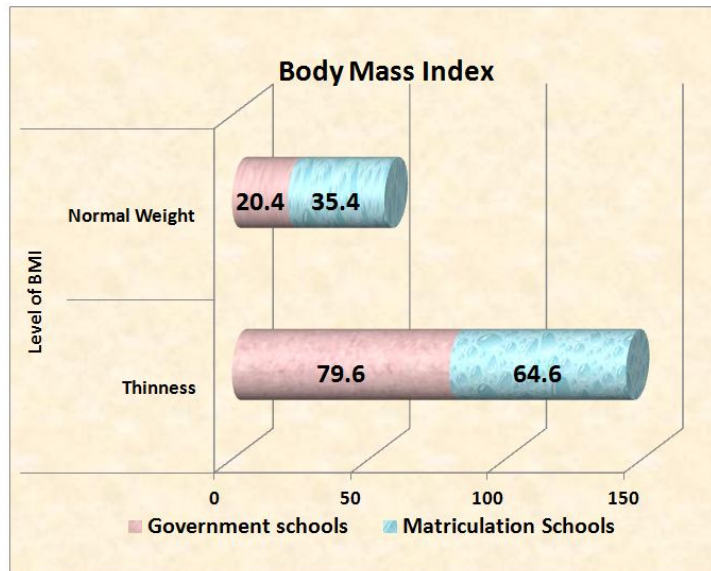
to the ICMR Standards and Kamran Shaikh et al, 2016 concluded that mean caloric intake of children was deficit in relation to reference standards for all age groups and both sexes which support the study.

Figure 2: Difference between Government School and Matriculation School children with respect to nutrient intake.



With respect to energy, protein and fat intake, there was significant difference between children from Government schools and their counterparts from Matriculation schools. Compared to Government school children, Matriculation school children seemed to have a better intake of nutrients viz. calories, protein and fat. However there was no significant difference between Government school children and Matriculation school children with respect to the intake of Calcium, Iron, Vitamin A and Vitamin C, the P value being greater than 0.05.

Figure 3 - Chi-square test for relationship between Type of school and Body Mass Index (BMI).



The above figure showed that there was relationship between type of school and level of Body Mass Index. A majority (35.4%) of Matriculation school children had BMI of normal whereas only 20.4% of Government school children had the normal weight. A majority (79.6%) of Government school children were found to be under thinness and 64.6% of Matriculation school children were found to be in same category. From their dietary intake, it might be argued that this BMI was often due to the lack of intake of nutritious food and absence of health awareness .Study by Haque et al 2014 supported the present study by reporting 93.60 percent of 6-12 years children had BMI below normal , 6.40 percent of children had normal BMI and no overweight had found.

Table 4: Chi-square test for relationship between Age of children and Body Mass Index (BMI)

Age / Gender	Thinness – III		Thinness – II		Thinness – I		Total	%	Normal		Total	%	Chi – Square	‘P’ Value
	Govt . school	Matric School	Govt School	Matric School	Govt School	Matric School			Govt . School	MatricSchool				
6-Boys	4	2	12	18	21	21	78	39	12	19	31	15.5	6.880 15	0.1424 No Significance
6-Girls	7	2	16	4	19	18	66	33	8	17	25	12.5		
7-Boys	3	2	17	19	19	17	77	38.5	9	16	25	12.5		
7-Girls	1	-	19	9	15	15	59	29.5	11	28	39	19.5		
8-Boys	-	-	14	24	29	10	77	38.5	7	13	20	10.0		
8-Girls	-	-	19	17	25	13	74	37.0	12	17	29	14.5		
9-Boys	-	-	18	8	18	21	65	32.5	13	21	34	17.0		
9-Girls	-	-	22	9	16	24	71	35.5	12	18	30	15.0		
10-Boys	-	-	15	10	24	22	71	35.5	9	13	22	11.0		
10-Girls	-	-	24	12	21	26	83	41.5	9	15	24	12.0		

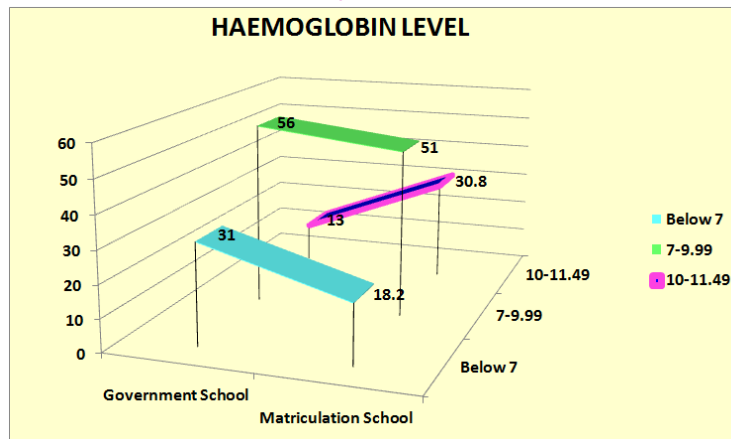
The above table indicated the age wise level of Body Mass Index. A majority 77% of 10 years children was found to be under thinness. Thirty two percent (32%) of 7 years and 9 years children were found to have healthy weight. From the result, it was found that no children came under overweight. Study by Chitra and Jaiganesh 2012 revealed that Government primary schools children in Pulianthope zone Chennai were underweight by 54.3 percent, 39.6 percent were under normal and 6.1 percent had overweight. The age wise percentage of underweight was much lower than my present study.

Table 5. Chi-square test for relationship between Gender and Body Mass Index (BMI).

Gender	Level of BMI				Total	Chi-square value	'p' value
	Thinness	Normal weight	Over weight	Obese			
Male	368 73.6	132 26.4	0 0	0 0	500	1.11852	0.2902
Female	353 70.6	147 29.4	0 0	0 0	500		
Total	721	279	0	0	1000		

Since P value being greater than 0.05. the null hypothesis was accepted at the 5% level of significance. Hence there was no relationship between Gender and level of Body Mass Index. A majority (73.6%) of male children had the BMI of thinness and 29.4% of female children were found to come under normal weight. There was a contradiction in the studies of Dhanasekaran et al 2013 and Punitha and Sivaprakasam 2014 which showed prevalence of underweight was higher among girls than boys. The study by Kumath R et al 2007 reported that underweight was observed among 6.87 percent boys and 3.12 percent girls whereas in the present study 73.6 percent boys and 70.6 percent girls. It had been assumed that earlier puberty in girls was the reason for increase in height and weight of the girls when compared to boys.

Figure 4 - Chi-square test for relationship between Type of school and Haemoglobin Levels of the respondents.



From the above figure, there seemed to be a relationship between type of school and haemoglobin levels of the children. Haemoglobin levels of Government school children were lower than those of Matriculation school children. A majority, 56% of Government school children and 51 percent of Matriculation school children had haemoglobin levels between 7 g/dl – 9.99g/dl which showed they were suffered from anaemia moderately whereas 30.8% of Matriculation school children had haemoglobin levels between 10 – 11.49 g/dl which showed that they were suffered from mild anaemia. The study by Srivastava et al 2012 reported that anaemia was detected in 37.5 percent of children which was more than in the children of rural schools in Punjab(22.5%) which was contrary to the present study.

Table 6. 1, 2 and 3 - Chi-square test for relationship between Type of school and prevalence of xerosis, pigmentation and discharge.

Problems with eyes	Government School	Matriculation School	Total	Chi-square Value	'P' Value
I. Xerosis				.00000	1.00000
a. Normal	95 95	95 95	190		
b. Lack of lustre	5 5	5 5	10		
Total	100	100	200		
II. Pigmentation					
a. Normal	100 100	100 100	200		
Total	100	100	200		
III. Discharge				.00000	1.00000
a. Normal	99 99	99 99	198		
b. Excessive lachrymation	1 1	1 1	2		
Total	100	100	200		

An equal number of children from both the streams viz. Government and Matriculation schools were found to suffer from xerosis and excessive lachrymation

Table 7 1, 2 and 3 - Chi-square test for relationship between Type of school and Mouth Condition (Lips condition, Tongue colour and condition of Gums)

Lips	Government School	Matriculation School	Total	Chi-square Value	'P' Value
a. Normal	95 95	98 98	193	1.332	.24839
b. Incidence of Angular stomatitis	5 5	2 2	7		
Total	100	100	200		

Tongue	Government School	Matriculation School	Total	Chi-square Value	'P' Value
Normal	91 91	95 95	186	1.228	.26763
Pale and coated	9 9	5 5	14		
Total	100	100	200		

Gums	Government School	Matriculation School	Total	Chi-square Value	'P' Value
Normal	92 92	94 94	186	.307	.57939
Bleeding	8 8	6 6	14		
Total	100	100	200		

The above table shows that there was relationship between type of school and mouth condition (lips condition, tongue colour and condition of gums). 5 percent of Government school children were suffered from angular stomatitis and only 2% of Matriculation school children were suffered by the same. Likewise 9% of Government school children’s tongue were pale and coated whereas only 5% of Matriculation school children had pale and coated tongues. Among the children from Government school 8% were suffered from bleeding gums and 6% of Matriculation school children were suffered from the above mentioned deficiency.

Table 8 - Chi-square test for relationship between Type of school and condition of hair.

Hair	Government School	Matriculation School	Total	Chi-square Value	‘P’ Value
Normal	82 82	95 95	177	8.560	.01384*
Lack of luster	10 10	2 2	12		
Discoloured and Dry	8 8	3 3	11		
Total	100	100	200		

The table above showed that there was relationship between type of school and condition of hair. While 10% of Government school children had lusterless hair whereas, only 2% of Matriculation school children had lusterless hair. While 8% of Government school children had discoloured and dry hair only 3% of Matriculation school children had discoloured and dry hair. The practice of applying oil seems to vary from family to family, probably influenced by their economic conditions and concerned about the personal hygiene and personal grooming of their young children.

Table 9 Chi-square test for relationship between Type of school and appearance and elasticity of skin.

Skin appearance	Government School	Matriculation School	Total	Chi-square Value	‘P’ Value
Normal	87 87	91 91	178	.817	.36601
Loss of luster	13 13	9 9	22		
Total	100	100	200		

Skin Elasticity	Government School	Matriculation School	Total	Chi-square Value	‘P’ Value
Normal	94 94	98 98	192	2.083	.14891
Diminished	6 6	2 2	8		
Total	100	100	200		

The data reflected in the above table showed that there was no relationship between type of school and appearance and elasticity of skin. Thirteen percent of Government school children had lusterless skin and 9% of Matriculation school children had the same skin condition. However, while 6% of the Government school children had diminished skin elasticity only 2% of Matriculation school children had the same extent of lusterless and diminished skin elasticity.

CONCLUSION:

To sum up all the observations among 6-10 years school going Matriculation and Government school children of Ramanathapuram District on Anthropometric status of the children that a majority (79.6%) of Government school children were found to have underweight whereas only 35.4% of Matriculation school children were of normal weight. When agewise comparison was made, it was found that majority(32%) of 7 years and 9 years children have the Body Mass Index of healthy weight and 77% of 10years children were found to be under thinness category. When Body mass index was calculated genderwise, it was found that 73.6% of male children had thinness and 70.6% of female children came under the same category. Haemoglobin level revealed that fifty six percent of Government school children had haemoglobin content between 7mg/dl – 9.99mg/dl whereas 30.8% of Matriculation school children had haemoglobin content between 10-11.49mg/dl indicating anemia . Poor anthropometric indices, thinness and anemia may be due to lower intake of food and nutrients than recommended.

ACKNOWLEDGEMENTS:

I am highly indebted to Dr.Sushila James M.Sc.,Ph.D Rtd. Professor of Meenakshi college, Madurai for having been supported me mentally to prepare this paper and sincere thanks to Mr.Rajamarthandan, my husband who has supported me physically by typing the matters for publication.

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