Research Article

ASSESSMENT OFNUTRITIONAL STATUS AND ITS EFFECTS ON IQ LEVEL OF ADOLESCENT IN PALANPURCITY, BANASKANTHADISTRICT

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Abstract- This study was conducted to assess nutritional status and its effect on IQ level of adolescent ranging from 13 to 17 years, a total of 300 (193 boys and 107 girls) adolescent were randomly selected from three schools of Palanpur, Banaskantha district. Mean height and mean weight of adolescent was compared to ICMR standard value. The nutritional status was assessed by anthropometric measurements and categorized according to Water low's classification. There was no significant difference in mean height and weight of boys and girls, in age group of <14 and 14-15 years found highly significant difference was found in mean height of >15 years boys but no significant difference was found in their mean weight. The results further, highlighted that 48.66 % adolescent had normal nutritional status, while 32 % adolescent belonged to wasted category, 7.33 % adolescent were stunted and 12 % adolescent belonged to wasted and stunted category. Nutritional status was positively and highly significantly correlated (0.21**) with level of intelligence. Majority of the malnourished adolescent fell in lower level of intelligence. On the other hand, reverse trend was observed in case of normal adolescent who represented better level of intelligence. Thus, it can be concluded that the improved nutritional status increases the level of intelligence.

Keywords- Anthropometric measurement, Nutritional status, IQ level, Adolescent

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Introduction

The adolescence period is an important stage in everybody's life as it prepares a child for its adulthood life. However, the age from 13 to 19 is considered more crucial as far as the growth, mental maturity and development of reproductive system including health and nutritional status of individuals is concerned. Adolescence is a particularly unique period in life because it is a time of intense physical, psychosocial, and cognitive development. Nutrition is a fundamental pillar of human life, health and development across the entire life span. From the earliest stages of foetal development, at birth, through infancy, childhood, adolescence, and into adulthood and old age, proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being [1]. Malnutrition during this period results in inferior school performance, working ability and physical growth [2]. Evidence has shown that physical growth and cognitive development in children are faster during early years of life and that by the age of four years, 50 percent of the adult intellectual capacity has been attained and before thirteen years, 92 percent of adult intellectual capacity is attained [3].The most vulnerable to malnutrition are children under two and the adolescents [4]. The problem of malnutrition and under nutrition may hinder growth and development along with poor academic performance of the children. On the whole the effect of malnutrition delays physical growth and motor development which have impact on cognitive development resulting in lower intelligence quotient (IQ), impairment in memory, less attention span, deficiency in learning and lower educational achievement[5]. Information regarding the nutritional status of the adolescent and its effect on their intelligence level in the Gujarat state is again very scanty. Palanpur city, Banaskantha, has limited information available in this aspect. Keeping this point in

mind present study was planned to assess nutritional status and its effects on IQ level of adolescent in Palanpur city, Banaskantha district.

Methodology

This study was conducted in Palanpur city, Banaskantha district. The study sample consists of adolescents were selected by purposively related from there schools. Initially three hundred adolescents age ranged between 13-17 years were selected by simple random sampling. Nutritional status of adolescents was assessed by anthropometric measurements like weight (kg) and height (cm) measured by using weighing balance and stadiometer, which were compared with ICMR standard [6]. The prevalence of malnutrition was assessed byWater low's classification [7]. IQ level was measured by "Desai Bhatt Samuh Buddhi Kasoti (1990)" which was prepared and standardized by Dr. Krushnakant Desai. IQ test was administered individually to each boy and girl and scoring procedure was applied as per manual.

Statistical analysis

Mean, Percentage, 't' test and coefficient of correlation was used.

Results and Discussion

Adolescents were divided in two groups i.e., boys (193) and girls (107) within the age group of 13-17 years. The Mean height and weight of adolescents were compared with ICMR standard values are given in [Table-1]. The mean height of <14 years, 14-15 years and >15 years of boys was found 148.24, 155.46 and 163.40 cm respectively and their weight was 36.81, 41.77 and 48.80 kg respectively, while mean height of girls was found to be 146.40, 154.36 and 152.8

cm respectively and 37.18, 44.79 and 46.17 kg. Thus over all 154.77 and 158.81 cm mean height and 41.67 and 43.59 kg mean weight of boys and girls. Similar findings of the study is supporting these results by Pande*et al*[8] (2000) found that girls of all age groups except the 14 years had lower mean weight for age compared to ICMR standard. The height for age was also less in both boys and girls than the standard. Sharma and Kalia [9] also found similar results in Himachal Pradesh. Maiti *et al[10]* (2011) also shown the weight and height of

these girls were below those of NCHS standard value. In the present study, there was no significant difference found in the mean height and weight of boys and girls between the age groups of less than 14 and 14-15 years. In age group of more than 15 years, mean height of boys and girls, who highly significant difference was found. This result is supported by a study by Suvarna and itagi [11] (2007) showed that there was no significant difference in the mean height and weight of boys and girls.

Table-1 *Anthropometric measurements of adolescent by age and gender of Palanpur city, Banaskantha district*

Age (years) Anthropometric Measurement	<14		14-15		>15		Total	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Mean Height (cm) ICMR standard*	148.24	146.40	155.46	154.36	163.40	152.87	154.77	158.81
	153.00	150.00	162.88	159.58	171.00	162.29	161.32	158.52
t value	1.06NS		0.61NS		7.16**		2.57**	
Mean Weight (kg) ICMR standard*	36.81	37.18	41.77	44.79	48.80	46.17	41.67	43.59
	40.90	44.00	49.69	50.67	58.00	53.29	48.57	50.26
t value	-0.20NS		-1.64NS		1.31NS		-1.63NS	
Note: *ICMR: Indian Council of Medical Research (1990) **. Significant at the 0.01 level								

The adolescent were divided into four categories according to nutritional status Water low's by utilizing respondent's height for age and weight for height indicators. The adolescent were distributed according to their nutritional status by age and gender as given in [Table-2]. Nearly half of the adolescent (48.66) belonged to normal nutritional status category. While 32,7.34 and 12 % adolescent belonged to wasted, stunted and Wasted and stunted category respectively. It is also clearly seen that 59.34 %of adolescent in age group of >15 years belonged to normal nutritional status, while 31.86 % and 6.59 % had wasted, wasted and stunted nutritional status. Only 2.19 % adolescent belonged to stunted category. In age group of <14 and 14-15 years 41.48 and 46.08%

belonged to normal nutritional status, while 29.78 and 33.91 % in wasted nutritional status, 18.08 and 11.30% in wasted and stunted nutritional status followed by 10.63 and 8.69 % in stunted nutritional status. On the whole43.52 % boys and 57.94 % girls belonged to normal nutritional status. On the other hand 34.29 and 28.03% of boys and girls in wasted category, 15.02 and 6.54 %of boys and girls respectively fell in wasted and stunted category. Only 7.25 % boys and 7.47 % of girls were found in stunted category. In age group of more than 15 years adolescent were well -nourished than remained two age groups (<14 and 14-15 years). It was also found that girls were comparatively better nourished than boys.

Table-2 *Nutritional status of the respondents according to Water low's classification by age and sex*

Age (years)	Normal	Nutritional status			Total
		Wasted (SDM)	Stunted (LDM)	Wasted and stunted (Cand LDM)	
<14	39 (41.49)	28 (29.78)	10 (10.64)	17 (18.09)	94 (31.33)
14-15	53 (46.08)	39 (33.92)	10 (8.69)	13 (11.31)	115 (38.34)
>15	54 (59.35)	29 (31.87)	2 (2.19)	6 (6.59)	91 (30.33)
Sex					
Boys	84 (43.53)	66 (34.19)	14 (7.25)	29 (15.03)	193 (64.34)
Girls	62 (57.95)	30 (28.03)	8 (7.47)	7 (6.55)	107 (35.66)
Overall	146 (48.66)	96 (32.00)	22 (7.34)	36 (12.00)	300 (100)
Note: Figures in the parenthesis indicate percentage SDM – Short duration malnutrition, LDM – Long duration malnutrition, C and LDM – Current and long duration malnutrition					

[Table-3] represented the relationship between nutritional status and level of intelligence of the adolescent. Majority of adolescent with normal nutritional status 45.20 % belonged to average intelligence (109-90 IQ) and 22.44% belonged to inferior intelligence level (89-80 IQ),While 15.06 % , 8.90 % and 6.16 % belonged to additional intelligence, superior and very inferior intelligence level. It is

important to note here that a few (2.05 %) genius respondents belonged to normal nutritional status. None of the adolescent belonged to very inferior and mentally retarded. Further it was found that in wasted category 40.62 % of the adolescent belonged to average intelligence 26.04 % , 14.58 % , 11.45 % and 6.25 % belonged to inferior intelligence, very inferior intelligence, additional intelligence

and superior level respectively.

Genius and mentally retarded were not found in wasted category. While38.88 % and 41.66 % wasted and stunted (C and LDM belonged to average intelligence

and inferior intelligence, 36.36 % stunted belonged to average intelligence and inferior intelligence level.

Table-3 *Relation between nutritional status and level of intelligence of the adolescent*

IQ range / Nutritional status	Level of Intelligence								Total	'r' value
	Genius	Very superior	Superior	Addition alIntelligence	Average Intelligence	Inferior Intelligence	Very Inferior intelligence	Mentally Retarded		
	>140	139-130	129-120	119-110	109-90	89-80	79-70	<70		
Normal	3 (2.05)	-	13 (8.90)	22 (15.06)	66 (45.20)	33 (22.44)	9 (6.16)	-	146	
Wasted	-	1 (1.04)	6 (6.25)	11 (11.45)	39 (40.62)	25 (26.04)	14 (14.58)	-	96	
Stunted	-	-	1 (4.54)	-	8 (36.36)	8 (36.36)	5 (22.72)	-	22	0.21**
Wasted and stunted	-	-	1 (2.77)	3 (8.33)	14 (38.88)	15 (41.66)	2 (5.55)	1 (2.77)	36	
Overall	3 (1.00)	1 (0.33)	21 (7.00)	36 (12.00)	127 (42.33)	81 (27.00)	30 (10.00)	1 (0.33)	300 (100)	

Note: Figures in the parenthesis indicate percentage
**. Significant at the 0.01 level

In stunted category, 22.72 % and 4.54 % adolescent belonged to very inferior intelligence and superior level. None of the adolescent belonged to additional intelligence, very superior, genius and mentally retarded in stunted category. In case of wasted and stunted (C and LDM) category 8.33 % and 5.55 % belonged to additional intelligence and very inferior intelligence followed by 2.77 % belonged to superior and mentally retarded level respectively. None of the adolescent belonged to genius and very superior level. Nutritional status was positively and highly significantly correlated (0.21**) with their level of intelligence. This study was supported by Suvarna and Itagi[11](2007)found that the nutritional status was positively and significantly correlated with level of intelligence and it highlights that the children with normal nutritional status exhibited better level of intelligence than wasted and stunted children.Naik et al[12] (2015) stated that there was significant association between nutrition status and intelligence quotient and nutrition status and academic achievement of children. No significant correlation was observed between academic achievement and intelligence quotient. Joshi et al (2016)[13] found that dietary pattern indicated low consumption of foods and diet was also found poor in terms nutrition. In another study conducted by Chamar et al. (2016) [14], it was found that majority of the malnourished children fell in lower level of intelligence.

Conclusion

The present study focused on nutritional status of adolescents and its effects on IQ level of adolescent in some selected schools in Palanpur city, Banaskantha district. Anthropometric measurement wereused to assess nutritional status and "Desai Bhatt Samuh Buddhi Kasoti" used for measured IQ level of selected adolescents. Anthropometric indicators revealed that on the whole highly significant difference was found in the mean height of boys and girls, but in case of mean weight no significant difference was found in boys and girls. Out of total, 48.66% adolescent had normal nutritional status, 32% adolescent had wasted category, 7.33% adolescent had stunted category and 12% adolescent had wasted and stunted category. It was important to note that malnourished adolescent represented lower level of intelligence. On the other hand, reverse trend was observed for adolescent with normal nutritional status who showed better level of intelligence. It can be stated that nutritional status washighly significantly correlated with level of intelligence.

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Abbreviations: IQ: intelligence quotient

Conflict of Interest: None declared

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