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Childhood obesity in selected school children (7-12 Years) of Ziro, Arunachal Pradesh, India

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Abstract

Childhood obesity reached its extensive levels in developed as well as also in developing countries. Under nourish with overweight and obese children more likely to be obese from adulthood and have more increased risk of developing Non- Communicable Diseases (NCD) like DM and CVD at a younger age. Since the present study aims at evaluating the dietary habits of the selected school children (7-12yrs) and its influence on body weight.

Methodology: A total of 100 children between the age of seven to twelve years comprising both boys (n=49) and girls (n=51) were selected from the Ziro Valley of Arunachal Pradesh through purposive sampling. Using a structured interview schedule, the background information (age, sex, income of the parents, educational status of both parent and children), anthropometric measurements (weight and height), dietary habits (dietary habits, food frequency and 24hour dietary recall) were collected using standard procedure. BMI was calculated for all the 100 children and was compared with age specific standards (WHO, 2018). All the obtained data from the survey was recorded and were further analysed Using SPSS version 20.0 and Microsoft Excel 2010.

Results: Seventy-five percent of the selected children from Ziro, Arunachal Pradesh had normal BMI with the z score ranging between -2 and +2. It was also observed that 1% and 0.7 of selected school children were found to be overweight and obese respectively. To conclude, consistent monitoring of dietary intake for quantum and quality of nutrients can prevent obesity of children. The strategies include for preventing childhood obesity are healthy eating behaviour and regular physical activity which should be encouraged by school and limiting children from screen time like videotapes and computer games etc.

Keywords: Childhood obesity, overweight, behavioural changes of school children, eating habits of Arunachal Pradesh

Introduction

Obesity is an abnormal condition of excess storage of body fat which seriously affects a health condition of an individual also as a long-term adverse health outcome such as BP, CVD, stroke, type 2 DM, osteoarthritis, sleep apnea and some types of cancer, it also leads to social, psychological problems which includes stigmatization and poor self-esteem. (Aggarwal, B., & Jain, V. 2018) [1]. According to Sashindran V.K., and Dudeja P., (2020) the prevalence of obesity among 5 to 19 year old children from India, ranges from 3.6 and 11.7%. In 2025 it is predicted that 17 million children are obese in India. Dietary, epigenetic and familial, psychological, parental education and parental occupation are other important factors (Boumtje I. Pierre 2005) [2]. In recent years a drastic dietary transformation from a balanced wholesome nutritious meal to western' diets which rich in saturated fat, refined cereals, sugar, low fibre, frequent consumption of junk food has become a cause of concern for the onset of obesity at earlier stage of childhood (D. R. Bharati, P. R. Deshmukh, and B. S. Garg 2008) [3]. 'The rising childhood obesity and its prevalence poses a major public health cause in the state by increasing burden of chronic non-communicable disease. Also, dearth of scientific evidences on the nutritional and physical fitness status of children among the population of Ziro the kindled the interest of the investigator to evaluate the dietary habits of the selected school children (7-12) and its influence on body weight.

Methodology

A total of 100 school going children at the age of 7 to 12 years comprising both boys (n=49) and girls (n=51) were selected from the Ziro Valley as purposive sampling.

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An interview schedule is constructed and tested to obtain, background information of the selected school children for age, sex, income of the parents, size of the family, educational and income status. Body weight and height was measured using calibrated electronic weighing balance and Stadiometer respectively. BMI of the children was calculated and compared with ICMR Z score for specific age group. The quantum and frequency of consumption of basic food group such as cereal and cereal products (consume adequately), fruits and vegetables (eat liberally), meat and poultry (eat moderately), nuts and oil seeds (eat sparingly) were elicited with a pre tested food frequency table and was compared with NIN guideline (2020) for adequacy of intake food groups. The school children were asked to recall their food intake for the past 24 hours in house hold measure. The cooked volume of food is equal to mean nutrient intake. It has been calculated and compared with recommended dietary allowance NIN (2020). The data collected was calculated for mean standard deviation and correlation using Statistical Package for Social Sciences (SPSS) 20.0

Result and Discussion

Background information

Table I: Background information of school children

Background information	Total
Age (in years)	
7-9	17
10-12	76
Sex	
Boys	39
Girls	54
Family	
Nuclear	57
Joint	36
Income status	
Economically weaker – less than Rs 2101/-	0
Income level Low – Rs 2101 to 4500/-	0
Middle – Rs 4501 to 7500/-	7
High – more than 7500/-	86
Literacy rate	
Primary	34
Secondary	50
Higher secondary	28
Undergraduate	55
Post graduate	10
Illiterate	6
Occupation (Both Mother and Father)	
Profession	38
Employment	65
Business	16
Vocation	20
Unemployed	47

The above table shows the distribution of school children according to age and gender. The highest number of selected school children was found to be in the age ten to twelve years, out of which girls outnumbered boys by a margin of 5%. The data also reveals an escalating prevalence of nuclear family in

the Ziro Valley of Arunachal Pradesh in recent years. A total of 91 school children out of 100 including boys and girls fell under the category of high-income group with a monthly earning ranging more than Rs.7500. The monthly earning of the parents can be attributed to their educational status. The monthly earning of the parents can be attributed to their educational status.

Mean height and weight of the selected school children

On comparing with the ICMR standards for weight for age it was observed for children between age 7 to 9 were overweight with an excess of 6.4kg for boys and 4.3kg for girls.

Table 2: Mean height and weight of the selected school children (N=100)

Age group (N=100)	Mean height(cm)		Mean weight(kg)		Standard weight(kg) for age	
	Boys	Girls	Boys	Girls	Boys	Girls
7-9(n=22)	130.4	129.5	31.7	29.6	25.3	25.3
10-12(n=78)	136.3	137.8	37.7	34	34.9	36.4

Body Mass Index (BMI) of the selected school children

BMI of selected school children was calculated and classified as normal, underweight, severely underweight, overweight and obese using WHO z-score, 2007.

It is evident from the table (3) that out of 100 selected school children, 75 of them had a normal BMI with the Z- score ranging from -2 to +2. It was also observed that ten, seven and eight children between the age of 7 to 12 were found to be overweight, obese and underweight respectively.

Table 3: BMI of the selected school children

BMI Classification (S.D.)	Age classification(N=100)				Total
	7-9y(n=22)		10-12y(n=78)		
	Boys	Girls	Boys	Girls	
Severely underweight (<-3)	0	0	0	0	0
Underweight (≥-3 to <-2)	0	1	2	5	8
Normal (≥-2 to $\leq+2$)	6	8	26	35	75
Overweight ($>+2$ to $\leq+3$)	3	1	6	0	10
Obese ($>+3$)	3	0	3	1	70
Total	12	10	37	41	100

Dietary Assessment

Quantum of consumption of food groups of the selected school children

On the whole the actual mean intake (Table 4) of all the food groups was found to be lesser than the Recommended Dietary Allowance (RDA) of food group suggested by NIN for both boys and girls of 7 - 9 years and 10-12 years except a meagre increase in mean intake of cereal by five grams for boys 7-9 years. Deficit intake was observed in both boys and girls of 7-9 years for milk and milk products, followed by intake of green leafy vegetable. In contrary to the above observation the girls from age group 10-12 years showed balanced intake of cereals. However greater intake of cereals was also observed among boys.

Table 4: Quantum of consumption of food groups of the selected school children

Food Groups	N=100											
	7-9years(n=22)						10-12years(n=78)					
	Boys			Girls			Boys			Girls		
	RDA (gm/ml)	Actual intake(gm/ml)	Deficit/excess(gm/ml)	RDA (gm/ml)	Actual Intake (gm/ml)	Deficit/Excess (gm/ml)	RDA (gm/ml)	Actual Intake (gm/ml)	Deficit/Excess (gm/ml)	RDA (gm/ml)	Actual intake	Deficit/excess
Cereals and millets	180	185	+5	180	173	-7	300	245	-55	240	240	0
Pulses	60	46	-14	60	46	-14	60	51	-9	60	52	-8
Roots and tubers	100	80	-20	100	83	-17	100	98	-2	100	97	-3
Green leafy vegetables	100	79	-21	100	78	-22	100	82	-18	100	85	-15
Other vegetables	100	97	-3	100	95	-5	200	155	-45	200	148	-52
Fruits	100	84	-16	100	81	-19	100	81	-19	100	81	-19
Non-veg items	50	47	-3	50	47	-3	50	51	+1	50	50	0
Milk and milk products	500	236	-264	500	205	-295	500	242	-258	500	244	-256
Nuts and oilseeds	15	11	-4	15	11	-4	15	10	-5	15	10	-5
Fats and oils	30	29	-1	30	29	-1	35	30	-5	35	29	-6
Sugar	20	20	0	20	20	0	30	20	-10	30	20	-10

School children's mean nutrient intake

24hours dietary recall were done through the structured interview schedule. The investigator asked the children to record their dietary intake of the previous day for 24 hours starting from early morning till bed time. The students were asked to recall in household measures. Further the nutritive values of the raw ingredients were calculated for both macro and micro nutrient using nutritive software. The mean nutrient intake was then compared with the RDA.

From the table (5) it was observed that an excess intake of macronutrient namely for energy (girls-180kcal, boys-83kcal), protein (girls-10g, boys-7g) and fat (girls-6g, boys-2g) was observed in general for children from the age of seven to nine years compared to RDA. Also, a deficit intake

of macronutrient namely for energy (girls-222kcal, boys-240kcal) and protein by girls (1.9g), excess intake of protein by boys (0.4g) and adequate intake of fat by both girls and boys was observed in general for children between the age group of 10-12 year in comparison to RDA. On the whole the mean micronutrient intake was found to be better among boys compared to girls except for thiamine and magnesium in children of 10-12 years of age group. The better nutrient intake among selected school children can be attributed to good dietary practice and informed food choices compared to children of 7 to 9 years old. Also, particularly suggested the intake of all food groups in accordance to the NIN dietary guidelines.

Table 5: Mean nutrient intake of the selected school children

Nutrients	N=100											
	7-9years(n=22)						10-12years(n=78)					
	Boys			Girls			Boys			Girls		
	RDA	Actual intake	Deficit/Excess	RDA	Actual Intake	Deficit/Excess	RDA	Actual Intake	Deficit/excess	RDA	Actual intake	Deficit/excess
Energy(kcal)	1690	1780	+180	1690	1773	+83	2190	1950	-240	2010	1788	-222
Protein(g/d)	29.5	39.7	+10.2	29.5	36.5	+7	39.9	40.3	+0.4	40.4	38.5	-1.9
Fat(g/d)	30	36	+6	30	32	+2	35	35	0	35	35	0
Calcium (mg/d)	600	597	-3	600	605	+5	800	637	-163	800	595	-205
Iron(mg/d)	16	18.7	2.7	16	17	+1	21	21	0	27	19	-8
Vitamin A-Retinol (µg/d)	400	490	+90	400	491	+91	600	497	-103	600	470	-130
Vitamin A- β-carotene (µg/d)	3200	3673	+473	3200	3737	+537	4800	4096	-704	4800	3874	-926
Thiamine (mg/d)	0.8	1.0	+0.2	0.8	0.9	+0.1	1.1	0.9	-0.2	1.0	1.0	0
Riboflavin (mg/d)	1.0	1.0	0	1.0	0.9	-0.1	1.3	1.0	-0.3	1.2	0.9	-0.3
Niacin(mg/d)	13	10	-3	13	10	-3	15	11	-4	13	11	-2
Pyridoxine (mg/d)	1.6	1.3	-0.3	1.6	1.3	-0.3	1.6	1.6	0	1.6	1.3	-0.3
Ascorbic acid(mg/d)	40	32	-8	40	33	-7	40	33	-7	40	31	-9
Folate(µg/d)	120	132	+12	120	133	+13	140	137	-3	140	131	-9
Vit 12(µg/d)	0.2-1.0	0.3	0	0.2-1.0	0.3	0	0.2-1.0	0.2	0	0.2-1.0	0.3	0
Magnesium (mg/d)	100	131	+31	100	136	+36	120	173	-53	160	146	-14
Zinc(mg/d)	8	10	+2	8	9	+1	9	9	0	9	9	0

Summary and conclusion

The prevalence of childhood obesity in Ziro Valley of Arunachal Pradesh was found to be 1% and 0.7% to be overweight and obese respectively. Underweight reported among 8%, We found that the school children of Ziro, Arunachal Pradesh showed poor intake of macro and micro nutrients compared to RDA which can be attributed to inadequate intake of fruits and vegetables as per the

requirement suggested by NIN. The above observation calls for multicentre approach. Followed by that, judicious choice of complementary feed inclusion of fruits and vegetables in the children right from the preschool age and good dietary practices coupled with monitored physical activity and restricted screen time can pave way for healthy growing. Early detection of maternal malnutrition in gestational women, exclusive breast feeding of infants during the period

of six months of life and it is more important to storage of excess fat in baby. Encouraging home-made food, inclusion of fruits and vegetables and exclusion of sweetened drinks, sugary foods, fatty food to children and eating slowly is important in preventing childhood obesity among school children. Apart from promoting a healthy eating habit, including an active way of life, adequate sleep, limited screen time and less stress can be helpful. Therefore, childhood obesity has become a challenge of all time. Predicting the risk and preventing our children from becoming obese is the need of the day, As the present study has been carried out with the objective to develop and validate an AI assisted risk assessment index for childhood obesity.

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Conflict of Interest: The authors have declared that there is no conflict of interest.

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