World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Available online at: http://www.wjpsonline.org/
Original Article

A study on nutritional status and socio-economic determinants in school going children in Kumarapalayam, Tamil Nadu

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Received: 05-09-2019 / Revised Accepted: 17-10-2019 / Published: 05-11-2019

ABSTRACT

The objective of the study is to identify socio-economic status and nutritional status in children, the causes of malnutrition and to assess the economic category prone to nutritional deficiency. A prospective observational study was conducted in Schools and community in and around Kumarapalayam, Tamil Nadu in which 504 peoples were analysed for nutritional status during period of 6 months from January to June 2018. It was found that 154 children have no vitamin deficiency symptoms and 114 children have vitamin D deficiency symptoms. In the prevalence of non-stunted children are 271, moderate stunting are 168 and severe stunting is 65 children. In 292 children were found to have normal weight, 146 were found to be underweight and 66 were severely underweight. In 443 children were found to have no wasting, moderate wasting is found in 44 children and severe wasting is found in 17 children. In this study, it was found that children with high economic status has less nutritional status, the calcium deficiencies is high due to adequate consumption of milk and vitamin deficiency symptoms are more prone which can be improved by proper counselling and awareness about food habits.

Keywords: School children**,** nutritional status, stunting, underweight, wasting

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How to Cite this Article: Shanmuga Sundaram Rajagopal, Jomy Jacob and Jose Mathew. A study on nutritional status and socio-economic determinants in school going children in Kumarapalayam, Tamil Nadu. World J Pharm Sci 2019; 7(11): 72-79.

INTRODUCTION

Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism, and excretion. The diet of an organism is what it eats, which is largely determined by the availability and palatability of foods. For humans, a healthy diet includes preparation of food and storage methods that preserve nutrients from oxidation, heat or leaching, and that reduce risk of food borne illnesses [1]. In humans, an unhealthy diet can cause deficiency-related diseases such as blindness, anaemia, scurvy, preterm birth, stillbirth and cretinism, or nutrient excess health-threatening conditions such as obesity and metabolic syndrome; and such common chronic systemic diseases as cardiovascular disease diabetes, and osteoporosis. Under nutrition can lead to wasting in acute cases, and the stunting of marasmus in chronic cases of malnutrition[2]. As per world health organisation (WHO) the nutritional status should be determined by the following indicators underweight, stunting, wasting and overweight. These indicators are used to measure nutritional imbalance resulting in under nutrition (assessed from underweight, wasting and stunting) and overweight. Child growth is internationally recognized as an important indicator of nutritional status and health in populations [3]. The percentage of children with a low height for age (stunting) reflects the cumulative effects of under nutrition and infections since and even before birth. This measure can therefore be interpreted as an indication of poor environmental conditions or long-term restriction of a child's growth potential. The percentage of children who have low weight for age (underweight) can reflect ‘wasting’ (i.e. low weight for height), indicating acute weight loss, ‘stunting’, or both. Thus, 'underweight' is a composite indicator and may therefore be difficult to interpret[4]. Stunting is a reduced growth rate in human development. It is a primary manifestation of malnutrition (or more precisely under nutrition) and recurrent infections, such as diarrhoea and helminthiasis, in early childhood and even before birth, due to malnutrition during fetal development brought on by a malnourished mother. The definition of stunting according to the World Health Organisation (WHO) is for the "height for age" value to be less than two standard deviations of the WHO Child Growth Standards median[5]. An underweight of an individual is defined as whose body weight is considered too low to be healthy. Underweight people have a body mass index (BMI) of less than 18.5 or a weight 15% to 20% below that normal for their age and height group [6], globally in 2011, an estimated 101 million children under 5 years of age were underweight, or approximately 16 per cent of children under 5. Underweight prevalence is highest in South Asia, which has a rate of 33 per cent, followed by sub-Saharan Africa, at 21 per cent. South Asia has 59 million underweight children, while sub-Saharan Africa has 30 million. The prevalence of underweight children under age 5 is an indicator to measure progress towards MDG 1, which aims to halve the proportion of people who suffer from hunger between 1990 and 2015. Wasting is the process by which a debilitating disease causes muscle and fat tissue to "waste" away. Wasting is sometimes referred to as "acute malnutrition" because it is believed that episodes of wasting have a short duration, in contrast to stunting, which is regarded as chronic malnutrition. According to the latest UN estimates, an estimated 52 million children under 5 years of age, or 8%, were wasted in 2011. The vast majority, about 70%, of the world's wasted children live in Asia; most in South-Central Asia [7].The aim of the study is to assess the nutritional status and its socio-economic determinants of school going children in Kumarapalayam town in Namakkal District, Tamil Nadu.

MATERIALS AND METHODS

A prospective observational study was carried out in Schools and community in and around Kumarapalayam, Tamil Nadu. Ethical approval was obtained from the institutional review board (JKKNCP/ ETHICS_PRACTICE/ 018PDS13). In this study 504peoples were analysed for nutritional status during period of 6 months from January to June 2018.All children of 12-16 years age, studying from 6th standard to 10th standard were included in this study. All children below 12 years and above 16 years of age, children who are unwilling to participate, students undergoing any social or physiological stresses were excluded.

Study Procedure: The study was carried out in schools and community in and around Kumarapalayam town, Tamil Nadu, samples were collected based on inclusion and exclusion criteria and studied for a period of 6 months. After obtaining permission from school authority the children were selected randomly and socio economic and demographic data was collected using pre-designed questionnaire. A total of 512 students answered out of which 8 are excluded due to incomplete answering. The data were then sorted and entered into Microsoft Excel 2013, exported to WHO anthroplus software and converted into Z-score of indices: height- for- age, weight-for-height and weight-for-height. The data was then compared with socio economic parameters.

RESULT AND DISCUSSION

Table 1 shows the demographic and socio economic characteristics of households. We have analysed a total of 504 children in which the male respondents are found to have high nutritional status. It is found that 154 children contributing 30.7% of population has no vitamin deficiency symptoms and 114 children (22.7%) have vitamin D deficiency symptoms and 111 children (22%) are showing more than vitamin deficiency symptoms, the vitamin A deficiency symptom is shown by 64(12.7%) children and 37(7.3%) is showing vitamin B deficiency and 24(4.6%) having vitamin C deficiency symptom. Despite of having adequate sunlight exposure vitamin D deficiency symptom is predominant in children in this category.

Table 2 shows the prevalence of stunting in children which was on the basis of WHO recommended Z-score based classification. In the prevalence of stunting, non-stunted children are 271(53.7%) in which 142(51%) are boys and 129(57%) are girls,168(33.3%) children were moderate stunting out of which 96(34.7%) are boys and 72(31.8%) are girls and severe stunting is 65(13%) out of which 40(14.3%) are boys and 25(11.2%) are girls.

Table 3 shows the prevalence of underweight in children based on Z-score in which 292(28.9%) children were found to be normal weight out of which 150(53.9%) were boys and 142(62.8%) were girls, 146(28.9%) were found to be underweight out of which 88(37.6%) were boys and 58(25.4%) were girls and 66(13.2%) were severely underweight out of which 40(14.5%) were boys and 26(11.8%) were girls.

Table 4 shows the wasting of children based of HWZ score in which 443(88.8%) children were found to have no wasting in which 143(87.4%) are boys and 200(88.4%) are girls, moderate wasting is found in 44(8.7%) children out of which 25(8.9%) are boys and 19(8.4%) are girls and severe wasting is found in 17(3.5%) of children out of which 10(3.7%) are boys and 7(3.2%) are girls.

Table 5 shows the association of stunting with annual income in which children belongs to lower class house hold 87.5% (56) are stunted and children belongs to lower class 59.1%(111) are not stunted and lower middle class 33.3% (55) and middle class 19.3%(11) are stunted and no children in upper class is stunted. This shows a linear decrease in stunted frequency when we go up in income scale. The association with religion in which maximum percentage of stunted frequency is in Christian community 51.1% which is followed by Hindu community 46.7% and Muslim community 12%. The association of stunting with junk food intake shows that intake of junk foods has no direct relationship between nutritional stunting among children in this area. The association of stunting with intake of milk and milk products shows that about 45% of children take milk and milk products on daily basis and 51% children take on 4-6 times per week and 33% of children take on 1-3 times per week and 41% takes 1-4 times per week. The frequency of stunting is similar in all categories and there is no direct relationship between stunting and intake of milk and milk products.

Table 6 shows the association of underweight with annual income of the house hold children belong to which 75% of children in lower class are underweight and 45.7% of children in, lower middle class and 41.2% in middle class are under weight. The child from upper middle class and upper class shows underweight about 15.7% and 3.3% only. This shows a linear relationship between children weight and economic category. The maximum number of underweight is from Christian community (51.8%) followed by Hindu community 40% followed by Muslim (16%). The percentage of underweight is low in children intake daily junk food (18.2%) where as high in children who does not have the intake of junk food never in a month is 71%.

Table 7 shows the association of wasting with annual income in which maximum number of wasting is from children belongs to lower class 35.9% which may be due to decreased intake of nutrient rich foods and followed by lower middle class 5.5% and no wasting is seen in children in upper middle class and upper class. Maximum number of wasting is found in Hindu and Christian community at a percentage of 12.9% and 12.4%. There is no wasting is found in muslin community. This may be due to increased consumption of meat and meat products in Muslim families. The association of junk food consumption with wasting in which maximum number of wasting is found in children consuming junk food and never in a month 29% and followed by children consuming 1-4 times per month is 17.6% and this may be due to decreased calorie intake of children in this area. The percentage of wasting in daily intake of junk food and children taking 4-6 times per week is very low as 1.5% and 6.9% respectively. The association of intake of milk and milk products and maximum number of children wasting is found in less frequent taking of milk and milk products. Our study results shows that 1-4 times a month is 33.3%, followed 26% in 1-3 times a week intake and 86% in daily intake. The frequency of wasting is more in less frequent intake may due to less nutrition they are getting.

DISCUSSION

Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism, and excretion. We have evaluated the nutritional status in which our study results seems to be similar to the study conducted by Ramukalajiam et al.,[8] in South Chennai where the most prevalent vitamin deficiency is vitamin D comprising of 33.3% of studied population. In our study most of the children belongs to lower middle class from which our study result seems to be similar to the study conducted by Priya et al.,[9] in rural and semi urban areas of Tamil Nadu where most of the children were from lower middle class and middle class.

A study conducted by Messay et al., [10] in which the data article presents child nutritional status and its socioeconomic determinants in Ethiopia with special reference to Nonno District, Oromia Region showed the prevalence of stunting is 46.3% in studied population which is similar to our study. In a study conducted by Kumari et al.,[11] in Patna showed the prevalence of underweight was found to be 44.6% which is resemble to our study. In our study the wasting of children was found out in which 443(88.8%) children were found to have no wasting followed by moderate and severe which is similar to the study conducted by Messay et al., [10] out of which prevalence of wasting is 11.5%.

The study shows the association of stunting with annual income in which children belongs to lower class house hold is 87.5% are stunted which is similar to the study of Manjunath et al.,[12] in which the maximum number of stunted frequency is from lower class house hold. The association with religion in which maximum percentage of stunted frequency is in Christian community 51.1% followed by Hindu community 46.7% and least is from Muslim community 12% which seems to deviate from the study conducted by Kanjilal et al.,[13] in which maximum number of stunted frequency is from Hindu family. The association of stunting with junk food intake shows the intake of junk foods has no direct relationship between nutritional stunting among children in this area. Our study results seems to deviate from the study conducted by Kavale et al., [14] in Egypt in which intake of junk food has direct relation with Stunting. The association of stunting with intake of milk and milk products shows that about 45% of children take milk and milk products on daily basis. In this area our study results seems to be comparable to the study conducted by Sangitha et al., [15] in Bengaluru.

Shivaprakash et al., [16] conducted a study in Karnataka which showed 60.6% of children show underweight which is similar to our study which shows the association of underweight with annual income of the house hold. This shows a linear relationship between children weight and economic category. The maximum number of underweight is from Christian community which seems to be similar to that of study conducted by Hunda et al., [17] in Allahabad. The percentage of underweight is low in children intake daily junk food (18.2%) where as high in children who does not have the intake of junk food never in a month is 71%. Our study results seems to deviate from that of Kavla et al.,[14] in Egypt.

In our study the association of wasting with annual income in which maximum number of wasting is from children who belongs to lower class and no wasting is seen in children in upper middle class and upper class. Our study results seems to similar to that of study conducted by manjunath R et al.,[12] in Non no district Ethiopia. Maximum number of wasting is found in Hindu and Christian community. There is no wasting is found in muslin community. This may be due to increased consumption of meat and meat products in Muslim families. Our study results seems to similar to study conducted by Kumari et al.,[11] in Patna. The association of junk food consumption with wasting in which maximum number of wasting is found in children consuming junk food and this may be due to decreased calorie intake of children in this area. The percentage of wasting in daily intake of junk food and children taking 4-6 times per week is very low as 1.5% and 6.9% respectively. Our study results seems to be similar to that of study conducted by Yankanesh et al.,[18] in Vijayapura and the association of intake of milk and milk products and maximum number of children wasting is found in less frequent taking of milk and milk products. Our study results shows that 1-4 times a month is 33.3%, followed 26% in 1-3 times a week intake and 86% in daily intake. The frequency of wasting is more in less frequent intake may due to less nutrition they are getting. Our study results seems similar to the study conducted by Kanjilal et al.,[13] in Indian households.

CONCLUSION

In this study, it was found that children with high economic status has less nutritional status, the calcium deficiencies is high due to adequate consumption of milk and vitamin deficiency symptoms are more prone which can be improved by proper counselling and awareness about food habits.

Table 1: Demographic and socio economic characteristics of households

Characteristics	Number of respondents	Percentage
Head of household		
Male	470	93.2
Female	34	6.8
Current marital status of household		
Married	474	94.1
Divorced	5	0.9
Separate/widowed	25	5
Family or household size		
≤ 5	309	61.3
6+	195	38.7
Paternal occupation		
Farmer	101	20.1
Other	403	79.9
Maternal occupation		
Housewife	408	80.1
Other	96	19
Annual income		
Below poverty line	64	12.7
Lower class	188	37.4
Lower middle class	165	32.6
Middle class	57	11.3
Upper class	30	6
Number of children		
≤2	423	83.9
2+	81	16.1
Source of drinking water		
Public	125	24.8
Boiled	201	39.8
Water can/ purifier	178	35.4
Waste disposal		
Open	211	41.8
Pit /burning	153	30.3
Municipality/cooperation	140	27.7
Area of house		
Town/city	193	38.2
Village	311	61.8
Livestock		
Yes	289	57.3
No	215	42.7
Vitamin deficiency symptoms		
Normal	154	30.7
Vit A Deficiency symptoms	64	12.7
Vit B Deficiency symptoms	37	7.3
Vit C Deficiency symptoms	24	4.6
Vit D Deficiency symptoms	114	22.7
Multivitamin symptoms	111	22

Table 2: Prevalence of stunting

Stunting	Total (n=504)	Boys (n= 278)	Girls (n = 226)
Prevalence of Non-stunting	271 (53.7%)	142 (51%)	129 (57%)
Prevalence of moderate stunting(< -2 Z-score and ≥ -3 Z-score)	168 (33.3%)	96 (34.7%)	72 (31.8%)
Prevalence of severe stunting (< -3 Z-score)	65 (13%)	40 (14.3%)	25 (11.2%)

Table 3: Prevalence of underweight

Underweight	Total (n = 504)	Boys (n=278)	Girls (n=226)
Prevalence of normal weight	292 (57.9%)	150(53.9%)	142(62.8%)
Prevalence of moderate underweight (< -2 Z-score and ≥ -3 Z-score)	146 (28.9%)	88(31.6%)	58(25.4%)
Prevalence of severe underweight(< -3 Z-score)	66 (13.2%)	40(14.5%)	26(11.8%)

Table 4: Prevalence of wasting

Wasting	Total (n=504)	Boys (n=278)	Girls (n=226)
Prevalence of normal children	443(87.8%)	243(87.4%)	200(88.4%)
Prevalence of moderate wasting (-2 Z-score and ≥ -3 Z-score)	44(8.7%)	25(8.9%)	19(8.4%)
Prevalence of severe wasting (< -3 Z-score)	17(3.5%)	10(3.7%)	7(3.2%)

Table 5: Association of stunting

Characteristics	Stunted frequency	Non stunted frequency
Annual Income		
Below poverty line	56(87.5%)	8(12.5%)
Lower class	111(59.1%)	77(40.9)
Lower middle class	55(33.3%)	110(66.7%)
Middle class	11(19.3%)	46(80.7%)
Upper class	0	30(100%)
Religion		
Hindu	160(46.7%)	182(53.3%)
Muslim	3(12)	23(88%)
Christian	70(51.1)	167(48.9%)
Other	0	0
Junk food		
Daily	14(21.2%)	52(78.8%)
4-6 times per week	88(50.2%)	87(49.8%)
1-3 times per week	45(44.5%)	56(54.5%)
1-4 times per month	76(58%)	55(42%)
Never in a month	20(55%)	11(45%)
Milk and milk products		
Daily	136(45%)	166(55%)
4-6 times per week	82(51.3%)	78(48.7%)
1-3 times per week	10(33.3%)	78(48.7%)
1-4 times per month	5(41.6%)	7(58.4%)

Table 6: Association of underweight

Characteristics	Under Weight Frequency	Not Under Weight Frequency
Annual Income		
Below poverty line	48(75%)	16(25%)
Lower class	86(45.7%)	102(54.3%)
Lower middle class	68(41.2%)	97(58.8%)
Middle class	9(15.7%)	48(84.3%)
Upper class	1(3.3%)	29(96.7%)
Religion		
Hindu	137(40%)	205(60%)
Muslim	4(16%)	21(84%)
Christian	71(51.8%)	66(48.2%)
Other	0	0
Junk food		
Daily	12(18.2%)	54(81.8%)
4-6 times per week	24(23.8%)	77(76.2%)
1-3 times per week	75(42.9%)	100(57.1%)
1-4 times per month	79(60.3%)	52(39.7%)
Never in a month	22(71%)	9(29%)
Milk and milk products		
Daily	79(26.2%)	166(55%)
4-6 times per week	114(71.3%)	78(48.7%)
1-3 times per week	12(40%)	78(48.7%)
1-4 times per month	7(58.3%)	7(58.4%)

Table 7: Association of wasting

Characteristics	Wasted Frequency	Not Wasted Frequency
Annual Income		
Below poverty line	23(35.9%)	41(64.1%)
Lower class	32(17%)	156(83%)
Lower middle class	9(5.4%)	156(94.6%)
Middle class	0	57(100%)
Upper class	0	30(100%)
Religion		
Hindu	44(12.9%)	298(87.1%)
Muslim	0	25(100%)
Christian	17(12.4%)	120(87.6%)
Other	0	0
Junk food		
Daily	1(1.5%)	65(98.5%)
4-6 times per week	7(6.9%)	94(93.1%)
1-3 times per week	21(12%)	154(88%)
1-4 times per month	23(17.6%)	108(82.4%)
Never in a month	9(29%)	22(71%)
Milk and milk products		
Daily	26(8.6%)	276(91.4%)
4-6 times per week	23(14.4%)	137(85.6%)
1-3 times per week	8(26.7%)	22(73.3%)
1-4 times per month	4(33.3%)	8(66.7%)

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