Prevalence of stunting and its determinants in under children in the rural field practice area of S.N. medical college, Bagalkot: A cross-sectional study

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Abstract

Introduction: Malnutrition is responsible for serious health, social and economic consequences throughout the life course as well as across generations, making it the leading risk factor among children under five. In recognition of the burden of malnutrition among under-five children, United Nations SDG's are specifically directed towards improving child health in developing countries. In India, like many developing countries, the most common nutritional problems in infancy and early childhood are stunting, wasting; iron-deficiency anaemia, poverty and low birth weight. When there is a failure to achieve the expected height/length as compared to the healthy well nourished children indicates stunting. It is an indicator of linear growth retardation that results from failure to receive adequate nutrition over a long period or recurrent infections. It is an indicator of past growth failure.

Objective: To study the prevalence of Stunting in under 5 children in the rural field practice area of S.N. Medicalcollege, Bagalkot.

Materials and Methods: According to the study done by Shreyaswi MS et al, taking prevalence of Stunting in Rural Karnataka as 63.16%, sample size was calculated using $N=4PQ/L.^2$ The sample size was calculated as 372.2 and a sample of 384 was collected. Stunting was assessed by anthropometric measurements and data regarding sociodemographic factors affecting Stunting were also considered. Data was compiled and tabulated by using MS EXCEL. Data was analysed using Spss. Binary logistic regression was applied.

Results: The prevalence of Stunting was 39% and 4.4% were severely stunted. Stunting was significantly associated with age, birth weight, socioeconomic status, ANC visits, pre-lacteal feeds, Place of delivery, Immunisation status and H/O diarrhoea or ARI in the past one year.

Conclusion: The prevalence of stunting in the rural areas still remains high despite the measures taken by the government to reduce undernutrition. The issues giving rise to undernutrition need to be addressed.

Keywords: Undernutrition, Stunting, Rural field practice area.

Introduction

One of the main health problems encountered in children below five years of age is undernutrition. There are many health programmes being implemented specifically aiming to reduce the child morbidity and mortality.[1] Children are the backbone of any country and their health is a major concern. The initial five years of life is an important period as the morbidity profile of this age group will have a far reaching consequence on the overall development and growth of the country. WHO has recognized this as an important indicator of child health and overall development of countries.[2] Children below five years of age constitute approximately 10% of the country's total population.[3] The initial few years of life are the most important period as this age is known for accelerated growth and development which warrants regular monitoring. During this period about 40% of the physical growth and 80% mental development take place. So any adverse influence during this period may result in severe limitations in their development. This group is also affected by various common and easily treatable illnesses.[4]

Nutritional status of under five children is one of the important indicator of overall development of the

community and thus the country. Children who are from the rural and tribal areas of India are the ones who are at high risk of undernutrition because of improper nutrition, sanitation coupled with low hygienic practices and other conditions.[5]

Stunting is the result of poor nutrition in early childhood. Children suffering from stunting may never achieve their full height and their brains may never develop to their full cognitive potential. Throughout the world, approximately 155 million children below the age of 5 years suffer from stunting. These children begin their lives at a marked disadvantage. They face learning difficulties in school, earn less as adults, and face barriers to participation in their communities.[6] Results of the recently released NFHS-4 survey shows that 41.2% were stunted in rural India and 31.0% were stunted in urban India in the age group below five years. In Rural Karnataka 38.5% were stunted and 32.6% were stunted in urban Karnataka in the same age group. This shows that undernutrition was prevalent more in rural areas of India and Karnataka than in the urban areas.[7] Inspite of many programmes to reduce stunting among children, it remains a challenge till date despite identification of the problem for more than a century. Efforts to prevent or control stunting have not

been very successful. Not much technical expertise is required to prevent most of the cases of stunting as they are due to lack of hygiene or lack of sufficient and appropriate nutrition. Despite having enough food to feed everyone on the face of earth, many are left to die due to hunger.[8] Hence a sincere attempt is made to assess the prevalence and identify the risk factors associated with stunting in the children below five years of age residing in the rural field practice area of S.N medical college and HSK hospital Navanagar, Bagalkot.

Objectives

1. To study the prevalence of Stunting in under 5 children in the rural field practice area of S.N. Medical College, Bagalkot.
2. To find out the determinants of stunting.

Materials and Methods

This was a cross sectional study done among children below 5 years in the rural field practice area of S. Nijalingappa medical college, Bagalkot, Karnataka.

Study Population: The study was conducted in the rural field practice area of S.N Medical college, Bagalkot (Rural health and training centre). Population in the age group 0-5 years living in the rural field practice area (Shirur) was included in the study.

Study Period: 3 months (August-October 2016)

Estimation of Sample Size: Based on the study done by Shreyaswi MS et al[9], sample size was calculated by using the formula $n= 4pq/l^2$ where p= prevalence of stunting, q= 100-p and l was the allowable error for p. Taking p=63.16% , l=5% and q=36.84, sample size was calculated to be 380.

Desired sample size (N) was obtained by formula-
$N=4PQ/l^2$

where P is prevalence of Low Birth Weight (63.16%),
     Q =100-P,
     l is absolute error
= 4x63.16x36.84/ (5)2
= 372.2 it was rounded of to 380.
So, a total of 380 study subjects were taken.

Selection of Study Participants: The study participants comprised of children below 5 years of age residing in the rural field practice area of S. Nijalingappa Medical College, Bagalkot, Karnataka.

Inclusion Criteria:
1. Children below 5 years of age in the rural field practice area of S. Nijalingappa medical college Navanagar, Bagalkot.

Exclusion Criteria:
1. Parents who did not give consent.
2. Children who were severely ill.

Sample Collection:

The rural field practice area of Shirur was divided into 4 quadrants in such a way that they covered all the anganwadis. Data was collected in a manner that each quadrant covers an equal population and none of the anganwadi areas in rural field practice area were missed in order to ensure uniformity. The data was collected in a systematic random method of sampling. The first house was selected randomly by lottery method and from then on every 5th house was selected. If the 5th house did not have a child below 5 years of age then the next house which had the child was selected. This was done in all the quadrants until the necessary sample size was collected. The data was collected with the help of interview technique by approaching mothers/ caretakers of the children in their houses by using a predesigned and pretested semi-structured questionnaire. Health education as and when necessary was provided.

Stunting: When there is a failure to achieve the expected height/length as compared to the healthy well nourished children indicates stunting. It is an indicator of linear growth retardation that results from failure to receive adequate nutrition over a long period or recurrent infections. It is an indicator of past growth failure. A child who has a height for age Z score of less than 3 SD"s below the median for WHO growth standards is called Stunted.[10]

Length/Height: If a child was less than 2 years old the length needs to be measured. Equipment needed to measure length is a length board also called an infantometer, which was placed on a flat, stable surface such as a table. Standing height was measured without any foot wear to the nearest 0.5 cm using a standard calibrated bar.

Data was entered in Microsoft Excel 2007 spread sheet, and subsequently it was analyzed using SPSS (trial version 20) and Open Epi software. Percentage and proportions were used for descriptive statistics. Odds ratio was used for expressing the strength of association. P value of <0.05 was considered statistically significant and <0.001 as highly significant.

Results

Table 1: Distribution according to the socio-demographic characteristics

Socio-demographic variables	Numbers	%
Age (in completed years)		
0-12	68	17.7%
13-24	127	33.1%
25-36	94	24.4%
37-48	74	19.3%
49-60	21	5.4%
Gender		
Male	159	41.4%
Female	225	58.6%

Religion		
Hindu	353	91.9%
Muslim	31	8.1%
Type of family		
Nuclear	127	33.1%
Joint	221	57.5%
Three generation	36	9.4%
Mother's Education		
Illiterate	112	29.2%
Primary	120	31.3%
Middle	61	15.9%
Secondary	60	15.6%
Higher Secondary/PUC	16	4.1%
Graduate	15	3.9%
Mother's Occupation		
Housewife	305	79.4%
Farmer	32	8.3%
Govt employee	5	1.3%
Labourer	34	8.6%
Self-employment	8	2.1%
Father's education		
Illiterate	64	16.7%
Primary	112	29.2%
Middle	39	10.15%
SSLC	83	21.6%
PUC/Diploma	47	12.2%
Graduate	39	10.1%
Fathers Occupation		
Farmer	195	50.7%
Govt employee	25	6.5%
Labourer	106	27.7%
self employed	58	15.1%
Socio-economic status		
II	50	13%
III	105	27.3%
IV	136	52.5%
V	93	45.7%

Table 1 shows the distribution of Children according to their socio-demographic characteristics:

Age – out of 384 children included in the study, majority of the study participants belonged to 13-24 months of age 127 (33.1%). 94(33.1%) participants were in 25-36 months age group and 71(19.3%) in 37-48 months age group. Least number of children 21(5.4%) participants were in the age group of 49-60 months. Out of 384 children 159(41.4%) were male children and 225(58.6%) were female children.

Religion – out of all, majority of participants were of Hindu religion i.e. 353 (91.9%) and only 31(8.1%) participants were of Muslim religion. Type of family – majority of the participants belonged to joint family 221 (57.5%), while 127(33.1%) participants were residing in nuclear family and 36 (9.4%) were from three generation family. Mother's education – among the study participants mothers of 112(29.2%) were illiterate, while 120 (31.3%) were educated till primary school, 61(15.9%) were educated till middle school, 60 (15.6%) till secondary, 16 (4.1%) higher secondary or PUC and 15 (3.9%) were graduates. Mother's occupation – majority of participants mothers were housewives 305 (79.4%), while 34(8.6%) were labourers, 32 (8.3%) were farmers, 8(2.1%) were involved in self – employment, 5 (1.5%) were in government service. Father's education – among the study participants fathers of 64(16.7%) were illiterate, while 112(29.2%) were educated till primary school, 39(10.1%) were educated till middle school, 83(21.6%) till secondary, 47(12.2%) higher secondary or PUC and 39(10.1%) were graduates. Father's occupation – majority of participants fathers were farmers 195(50.7%), while 106(27.7%) were labourers, 58(21.1%) were self employed and 25(6.5%) were government employees. Socio-economic status – majority belonged to class IV i.e. 136 (52.5%) followed by class III 105(27.3%), then class V i.e. 93(45.7%) and class II 50(13%). No participants belonged to class I SES.
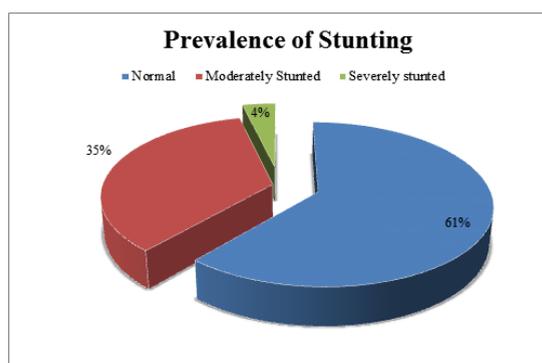

Fig. 1: Prevalence of Stunting

The prevalence of stunting was found to be 150(39%). Out of the 150 children, 133(35%) were moderately stunted, 17(4.4%) were severely stunted.

Table 2: Results of binary logistic regression analysis of independent risk factors with stunting

Risk factors	Stunting		
	OR	95%CI	P value
SES			
Class 2	1		
Class 3	1.556	0.64-3.76	0.327

Class 4	4.531	1.98-10.36	0.000*
Class 5	6.956	2.94- 16.44	0.000*
Type of House			
Kutcha	6.944	3.76-12.81	0.000
Semipucca	3.045	1.79-5.16	0.000
Pucca	1		
Family size			
>2	1.909	1.24-2.98	0.003
0-2	1		
Overcrowding			
Present	1.689	1.06-2.66	0.025
Absent	1		
No of ANC visits			
0-3	3.547	2.27-5.53	0.000
>4	1		
Gestation period			
Preterm	4.641	2.083-10.338	0.000
Term	1		
Place of Delivery			
Home Delivery	4.323	1.638 – 11.411	0.003
Institutional Delivery	1		
Birth weight			
Low birth weight	2.839	1.61-4.99	
Normal	1		0.001
Pre-lacteal feeds			
Yes	2.746	1.494-5.047	0.001
No	1		
Exclusive Breastfeeding			
No	1.273	0.531- 3.052	0.589
Yes	1		
Immunisation status			
Partially Immunised	15.960	6.11-41.66	0.000
Fully Immunised	1		
H/0 Diarrhoea in the past year			
Present	4.111	2.391-7.095	0.000
Absent	1		
H/0 ARI in the past year			
Present	5.286	2.743-10.184	0.000
Absent	1		

It was observed that there was 4.5 times higher risk of being stunted if the child was in the class 4 SES [OR-4.531 (95% CI 1.980-10.368) P-0.000] and it was statistically highly significant. Children belonging to class 5 SES had a 6.9 times higher risk of being stunted as compared to children of class 2 SES. [OR-6.956 (95% CI 2.943- 16.444) P-0.000]. As the socioeconomic status decreases, the prevalence of stunting increases. Children who were staying in kutcha houses had a 6.9 times higher risk of being stunted when compared to children who were staying in pucca houses. [OR 6.944(95% CI 3.762-12.815) P-0.000].

Children who were staying in semi-pucca houses had 3 times higher risk of being stunted when compared to children staying in pucca houses. [OR 3.045(95% CI 1.795-5.164) P-0.000]. This was statistically highly significant. Children who were living in houses with more than two children had 1.9 times higher risk of being stunted when compared to children who were living in houses with less than two children. This was statistically significant. [OR 1.909(95% CI 1.244-2.989) P-0.003]. Children who were living in houses which were overcrowded houses had a 1.6 times higher risk of being stunted when compared to children who

were not living in overcrowded houses. It was statistically significant. [OR 1.689(95% CI 1.069-2.668) P-0.025]. Children whose mothers had less than four ANC visits had 3.5 times higher risk of being stunted when compared to children of mothers who had more than three ANC visits. This was statistically highly significant. [OR 3.547(95% CI 2.275-5.531)P-0.000]. Children who were born preterm had 4.6 times higher risk of being stunted when compared to children who were born at term. This was statistically highly significant. [OR-4.641 (95% CI 2.083-10.338) P-0.000]. Children who were delivered at home had a 4.3 times higher risk of being stunted when compared to children who had institutional deliveries and it was statistically significant. [OR-4.323 (95% CI 1.638-11.411) P-0.003]. Children who were born with a low birth weight had 2.3 times higher risk of being stunted when compared to children who had institutional deliveries and it was statistically significant. [OR-2.839 (95% CI 1.614 - 4.995) P-0.000]. Children who were given pre-lacteal feeds had 2.7 times higher risk of being stunted when children who were not given pre-lacteal feeds. It was statistically significant. [OR 2.746(95% CI 1.494-5.047) P-0.001]. Children who were not given exclusive breast feeding for six months had a 4.9 times higher risk of being stunted when compared to children who were given exclusive breast feeding. This was not statistically significant. [OR 4.985(95% CI 2.405- 10.331)P-0.589]. Children who were partially immunized had a 15.9 times higher risk of being stunted when compared to children who were immunized till date. This was statistically highly significant. [OR 15.960(95% CI 6.113-41.668)P-0.000]. Children with a H/O of diarrhea in the past one year had 4.1 times higher odds of being stunted when compared to children with no H/O diarrhea in the past year. This was statistically highly significant. [OR-4.111 (95% CI 2.391-7.095) P-0.000]. Children with a past H/O of ARI in the past year had 5.2 times higher odds of being stunted when compared to children with no H/O ARI in the past year. This was statistically highly significant. [OR-5.286 (95% CI 2.743-10.184) P-0.000].

Discussion

Nutritional stunting, which is height for age below that expected on the basis of international growth reference, is a very serious type of malnutrition in that it develops slowly through time before it is evident. In the present study, the number of children were more in the age group of 13-24 months (127) followed by children in the age group of 25-36 months (94). The least number of children were in the age group of 49-60 months. In a study done by Jawaregowda SK et al[11] in the year 2013 showed that highest percentage of the children i.e 25% were in the 12-23 months age group followed by 22% in the 24-35 months age group. Lowest number of children was in the 48-59 months

age group (21). The results were similar to that of the present study. In the present study, percentage of female children (58.6%) was high when compared to the percentage of male children (41.4%). In a study done by Priyanka R et al[12] in 2016 showed that the percentage of female children (51.1%) were higher than the percentage of male children (48.9%). This was similar to the results of the present study. In the present study, the percentage of Hindus (91.9%) was high when compared to that of Muslims (8.1%) in the present population. In a study done by Mathad V et al[13] in the year 2010 in Belgaum also showed that the majority of the study population were Hindus (89.6%). This was similar to characteristics of the study population in the present study. In the present study, joint families made up a majority of the study population (57.5%) followed by nuclear families (33.1%) and the least was the percentage of three generation families (9.4%). In a study done by Meshram II et al[14] in Surat, Gujarat the highest percentage of the study population was made up of nuclear families (45.5%) followed by joint families and the least percentage was made up of three generation families. The number of nuclear families might be low in the present study because of different socio-cultural practices.

In the present study, majority of the participants belonged to the lower socio-economic status that is class IV and class V. In a study done by Matariya ZK et al[15] in Rajkot, Gujarat a majority of the study population were from the socio-economic status III and below. This was similar to the distribution in the present study. In the present study, the prevalence of stunting was 39.0%. A study of under five children carried out in the rural areas of Bijapur, Karnataka by Jawaregowda SK et al[11] showed that prevalence of stunting was 38%. This result was similar to the results obtained from our study. A study of under five children carried out in a rural area of Kakati, Belgaum, Karnataka by Mathad V et al[13] from March to December 2010 showed that prevalence of stunting was 31.38%. This result also found to be similar to our study results. A community based cross sectional study of under five children carried out in a rural area of Jhalawar Rajasthan by Sharma AK et al[16] in 2014 showed that 64% were stunted out of which 3.2% were severely stunted. This was very high when compared to the present study.

In the present study, stunting was found to be more in the class IV and class V socioeconomic status. This was found to be in agreement with the study done by Singh H et al[17] in Uttar Pradesh and Chakarvathy KB et al[18]. Meshram et al[14] and Sharma AK et al[16] reported high rates of stunting in children living in a kutcha house and the same was shown in our study. Children living in overcrowded houses were found to be stunted replicating previous findings of Sharma AK et al.[15] Children whose mothers had less than four ANC visits had a higher risk of being stunted when compared to

children of mothers who had more than three ANC visits. This is in accordance with the study by Meshram et al[14] and Asfaw M et al.[19] Sharma AK et al[16] did a similar study in Rajasthan and reported a higher rate of stunting in preterm delivered children and same was found in our study. Meshram et al[14] and Sharma AK et al[16] reported home deliveries to be a risk factor for stunting, similar co-relation was found in our study. Priyanka R et al[12] and Meshram et al[14] reported high rates of stunting in children with low birth weight. Our study also found low birth weight to be a significant factor in determining stunting. Stunting was found to be more in children who have received prelacteal feeds and more research in the aspect is required. The prevalence of stunting was found to be less in children who had received exclusive breastfeeding in the present study. These findings were in agreement with the findings of Priyanka R[12] et al. We found partial immunization to be highly significant in determining stunting. Similar were the findings of Shamanewadi AM et al[4] and Priyanka R et al.[12] Stunting was found to be more in children with a history of diarrhea and acute respiratory infections in studies done by Asfaw M et al,[19] Priyanka R et al[12] and the same was replicated in our study too. Stunting was found to be more in families with more than two children in accordance with findings in Meshram II et al.[14]

Conclusion

The study shows that stunting still continues to be a public health problem among children under five years of age in the rural areas. It is understood that the risk of stunting begins in a child in the womb itself which is shown by the high prevalence of stunting in children who were born with low birth weight. Inappropriate feeding practices like giving prelacteal feeds and improper weaning were also associated with stunting. A number of factors like socio-economic status, family size, number of ANC visits, type of house, place of delivery, immunization status, H/O diarrhea and ARI in the past one year were found to be significantly associated with stunting. It may be concluded that adequate care of pregnant women, newborns and infants, full immunization of children, prevention of recurrent infections will help reduce the problem of stunting in this locality.

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