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Original Research Article

A CROSS-SECTIONAL STUDY ON ASSESSMENT OF NUTRITIONAL STATUS AND ITS DETERMINANTS OF PRESCHOOL CHILDREN OF LUCKNOW DISTRICT

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Abstract

Background: Childhood period is of rapid growth and development, and nutrition is one of the influencing factors in this period. Their nutritional status is a sensitive indicator of community health and nutrition. And the pre-school children constitute the most vulnerable segment of any community. Undernutrition among them is one of the major public health problems in India. Objectives: 1) To study the nutritional status of preschool children. 2) To study the socio-demographic and maternal factors associated with nutritional status of children. 3) To study immunization status of preschool children. **Materials and Methods:** This community based cross-sectional study was conducted in urban and rural areas of Lucknow, Uttar Pradesh from June 2017 to August 2018. 420 children of age group 1 to 5 years were selected using multistage random sampling technique. The study tools used for data collection included a semi-structured questionnaire and clinical anthropometric examination and it was analysed using software M S Office excel and SPSS 17. **Results:** The most common form of malnutrition was stunting (48.8%) followed by underweight (28.4%) and wasting (22.6%). Malnutrition was seen maximum in age group 12-23 months than other groups which was highly significant (<0.001). 85.2% children had been completely immunized for their age. **Conclusion:** Significant association was observed between type of family, overcrowding and socio-economic status, age of mother with nutritional status of children. Statistically significant association was found with immunization status of preschool children with underweight, stunting and wasting.

INTRODUCTION

The nutritional status of a community is the sum of the nutritional status of individuals who form that community. Pre-school children constitute the most vulnerable segment of any community.[1] Nutrition is a key determinant of good health and is critical for survival, good quality of life and well-being.[2] Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development.[3] Malnutrition among children is often caused by the synergistic effects of inadequate or improper food intake, repeated episodes of infectious diseases, and improper care during illness. Improving families' care seeking behavior could contribute significantly to reducing child mortality in developing countries.[4] In 2017 globally, 50 million children under 5 were wasted and 16.[4] million were severely wasted. And half of all wasted children lived in South Asia and one quarter in sub-Saharan Africa, with similar proportions for severely wasted children. Between 1990 and 2017, the number of stunted children under 5 worldwide declined from 255 million to 151 million.5 As per the National Family Health Survey (NFHS)-4 (2015-16)6, 35.[7] per cent children below five years are underweight, 38.4 per cent are stunted and 21 per cent are wasted in the country.[7] The three main indicators used to define under nutrition, i.e., underweight, stunting and wasting represent different histories of nutritional insult to the child.

Occurring primarily in the first 2–3 years of life, linear growth retardation (stunting) is frequently associated with repeated exposure to adverse economic conditions, poor sanitation, and the interactive effects of poor energy and nutrient intakes and infection. Low weight-for-age indicates a history of poor health or nutritional insult to the child, including recurrent illness and/or starvation, while a low weight-for-height is an indicator of wasting (i.e. thinness) and is generally associated with recent illness and failure to gain weight or a loss of weight.[8] Somehow these factors differs in different regions. This fact justifies need for regional studies that allows more efficient action in regard to measures for intervention, based on knowledge of local reality. The present study is an attempt in this direction with an aim to evaluate the nutritional and immunization status and socio-demographic factors associated with nutritional status of preschool children of Lucknow district.

MATERIALS AND METHODS

This study was a community based cross-sectional study and was carried out in urban and rural areas of Lucknow, Uttar Pradesh from June 2017 to August 2018. This study was carried out in Era's Lucknow Medical College and Hospital in Lucknow district.

Sample size

Considering 48% prevalence of malnutrition in under five children in UP (according to NFHS-3), sample size was calculated based on formula

$n = (Z\alpha)^2pq / L^2$

where p = prevalence, q = l00-p, α = confidence level (Type I error) and L = Allowable error (in % of p). With 10 % of 'p' as allowable error and after adding 10% data loss sample size comes round to n = 420.

Sampling Technique

A multi-stage random sampling technique has been used to select the required sample size. At first stage Sample size was divided according to Census 2011 of Govt. of India of Lucknow District i.e. 70% urban and 30% rural.8 So the sample size for urban was 294 urban and 126 in rural area of Lucknow. In rural Lucknow, there are 8 blocks, from which 2 blocks were randomly selected.From each block, 6 villages were selected by simple random sampling. Total 12 villages were surveyed to get required numbers of sample size. In urban Lucknow, there are 110 wards in which 10 wards were selected randomly. From each ward 2 mohallas were selected by simple random sampling. So total of 20 mohallas were elected randomly. Simple random sampling was used to select household.

Selection of subjects

Inclusion Criteria

- Children between age group of 1 year to 5 years of age.
- Children living in Lucknow district for 6 months or more. And their mother giving consent and willing to participate in this study.

Exclusion Criteria

- Children who are uncooperative and their mothers not willing to participate in the study.
- Children living in Lucknow district for less than 6 months.
- Children who are having congenital anomaly.

Data collection and tool of investigation

Door to door survey was done for collection of necessary information. Informed consent were obtained prior administration of tool of investigation. A structured pre-tested preformed interview schedule was used to record the following information: socio-demographic characteristics: age of children, gender of children, religion, Socio-economic status(SES), immunization status. Anthropometric parameters (weight and height) were obtained using standard procedure. The weight and height measurements were converted into three indices of nutritional status: weight-for-age, height-for-age, weight-for-height. These are interpreted by using the WHO Z-score classification system. Children were graded as underweight (weight for age Z score of -2 SD) and severe underweight (weight for age Z score -3 SD).Similarly, children were graded as stunted (height for age Z score -2), severely stunted (height for age Z score -3), wasted (weight for height Z score -2) and severely wasted (weight for height Z score -3). Socio-economic status has been calculated using Revised Modified BG Prasad Socio-economic classification 2017.

Statistical Analysis

Data was analysed using software M S Office excel and SPSS 17 for windows. Descriptive statistical analysis, which included frequency, percentages was used to characterise the data. The following statistics were calculated in present analysis Chi-square test: categorical (discrete) data from the groups was compared by chi-square test. Statistical Significance: A two-tailed p value less than 0.05 ($p< 0.05$) was considered statistically significant.

RESULTS

As depicted in table 1, total of 420 preschool children were studied. Of these 235 (56 %) children were males and 185 (44 %) females.294 (70%) children from urban area whereas 126 (30%) from the rural area. According to standard age stratification as recommended by WHO 128 (30.4%) children were in age group 12-23 months,78 (18.5 %) in age group 24-35 months,83 (19.7 %) in 36-47 months and 60 (14.2 %) in 48-60 months.204 (48.5%) families were Hindu and 214 (50.9%) were Muslim by religion. 229(54.5 %) children families were nuclear whereas 191(45.5) children were joint families. Economic status of the families was assessed using modified BG Prasad classification 2017.It was observed that in urban

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area a maximum of 53.1 % children belonged to SES-IV and in rural area a maximum of 54 % belonged to SES-IV.Strikingly none of the children belonged to SES-1.

Table 2 shows the nutritional status of children which depicts stunting is more common form of malnutrition in both rural and urban area. 66.9% children are normal for weight for age, 19.1% are moderately underweight 9.3% are severely underweight. 3.3% children are overweight and 1.4 % are obese. 51.2% children have normal height for age while only 28.8% are moderately stunted and 20% are severely stunted. 75.6% children have normal weight for height and 20% children are moderately wasted and 2.6% children are severely wasted while only 1.4% children have weight for height +2SD.

Table 3 shows that in age group 12-23 months 36.1% are underweight, 34.1% are stunted and 36.8% are wasted similarly in group 24-35 months 30.2% are underweight, 19% are stunted and 25.2% are wasted. In age group 36-47 months 23.5% are underweight, 20% are stunted and 16.8% are wasted. In age group 48-59 months 10.8% are underweight 26.3% are stunted and 21.1% are wasted.

Table 4 After looking at the association between nutritional status with gender, it was found that the proportion of underweight and stunting were higher in females as compared to males (37.9% vs 20.8% and 52.4% vs 46%) respectively. The highly significant association of sex was found with weight/age z score ($p<0.001$).The proportion of females lying in normal category of weight/height z score was more than the proportion of males (78.9% vs 73.7%). However, the association of sex was found insignificant with height/age z score ($p=0.050$).

Table 5 depicts nutritional status of urban children was better than their rural counterparts. 29.4% of rural children were underweight whereas only 27.9% urban children were underweight. Wasting was present in 23.5% of urban children and 19.8% of rural children. Malnutrition was more common in Joint family. 35%, 52% and 27% children from joint family were found to be underweight, stunted and wasted respectively but difference was not found significant. Muslim children have poor nutritional status as compared to other religion. Social class has direct relation with nutritional status especially for underweight and wasting, as the social class increased nutritional status improved. The difference was found to be highly significant for wasting ($p<0.001$).

Table 6: Age of mother was significantly associated with underweight and wasting in children. Children of mothers of age < 20 years are found to have poor nutritional status than children of mother of age 20-30 years. No. of children was also significantly associated with nutritional status of children as higher the no. of children poorer the nutritional status. This difference was found to be highly statistically significant.($p<0.001$).Children whose mothers were housewife were significantly less underweight, stunted and wasted than children of working mothers($p<0.001$).children whose mother had not received the ANC were more significantly underweight and wasted ($p<0.001$).

Table 7: Children who have completed their immunization up to their age has found to be less underweight, stunted and wasted. This difference was highly significant.

Table 1: Distribution of children according to Demographic Profile

Variable	Urban (N=294)		Rural (N=126)		Total (N=420)	
	No.	%	No.	%	No.	%
Age						
12-23 month	91	31.0	37	29.3	128	30.4
24-35 month	55	18.7	23	18.3	78	18.5
36-47 month	57	19.4	26	20.6	83	19.7
48-60 month	91	30.9	40	31.7	131	31.1
Gender						
Male	166	56.5	69	54.8	235	56.0
Female	128	43.5	57	45.2	185	44.0
Religion						
Hindu	115	52.7	89	70.6	204	48.5
Muslim	177	60.2	37	29.4	214	50.9
Christian	1	0.3	0	0.0	1	0.2
Others	1	0.3	0	0.0	1	0.2
Family Type						
Nuclear	155	52.7	74	58.7	229	54.5
Joint	139	47.3	52	41.3	191	45.5
Social Class						
II	5	1.7	2	1.6	7	1.7
III	117	39.8	47	37.3	164	39
IV	156	53.1	68	54	224	53.3
V	16	5.4	9	7.1	25	6

Table 2: Distribution of children according to Nutritional Status

Variable	Urban (N=294)		Rural (N=126)		Total (N=420)	
	No.	%	No.	%	No.	%

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Weight for age (Z score)						
Normal (-2SD to +2SD)	198	67.3	83	65.9	281	66.9
Moderate underweight (-2SD to -3SD)	56	19.05	24	19.05	80	19.1
Severe underweight (< -3SD)	26	8.8	13	10.3	39	9.3
Overweight (+2SD to +3SD)	10	3.4	4	3.18	14	3.3
Obese (>+3SD)	4	1.4	2	1.6	6	1.4
Height for age (Z score)						
Normal (-2SD to +3SD)	154	52.4	61	48.4	215	51.2
Moderate stunting (-2SD to -3SD)	82	27.9	39	31.0	121	28.8
Severe stunting (<-3SD)	58	19.7	26	20.6	84	20.0
Weight for height (Z score)						
Normal (-2SD to +2SD)	221	75.17	98	77.7	319	75.6
Moderate wasting (-2SD to -3SD)	63	21.4	21	16.6	84	20.0
Severe wasting (<-3SD)	6	2.04	5	3.9	11	2.6
Obesity (>+2SD)	4	1.4	2	1.6	6	1.4

Table 3: Nutritional status of children according to age

Nutritional status	**Children Age group (months)**								**Chi-square**	**P value**
	12-23(128)		**24-35(78)**		**36-47(83)**		**48-59(131)**			
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Underweight (119) (W/A <-2 SD)	43	36.1	36	30.2	28	23.5	12	10.8	**27.969**	**<0.001**
Stunting (205) (H/A <-2 SD)	70	34.1	39	19.0	42	20.4	54	26.3		
Wasting (95) (W/H <-2 SD)	35	36.8	24	25.2	16	16.8	20	21.1		

Table 4: Association of Sex of children with Nutritional Status

Z score	**Category**	**Male (N=235)**		**Female (N=185)**		**chi sq**	**p-value**
		No.	**%**	**No.**	**%**		
Weightfor age z score	Normal (-2SD to +2SD)	175	74.5	106	57.3	**15.37**	**<0.001**
	Underweight (<-2SD)	49	20.8	70	37.9		
	Overweight (>-2SD)	11	4.7	9	4.8		
Height for age z score	Normal (-2SD to +3SD)	127	54.0	88	47.6	**2.35**	**0.308**
	Stunting (<-2SD)	108	46.0	97	52.4		
Weight for height z score	Normal	173	73.7	146	78.9	**3.32**	**0.343**
	Underweight (<-2SD)	59	25	36	19.4		
	Overweight (>+2SD)	3	1.3	3	1.6		

Table 5: Association of Socio-demographic characteristics with malnutrition

Variable	**Underweight (119)**		**Stunting (205)**		**Wasting (95)**	
	No.	**%**	**No.**	**%**	**No.**	**%**
Place of residence						
Urban (294)	82	27.9	140	47.6	69	23.5
Rural(126)	37	29.4	65	51.6	25	19.8
Chi-square	**0.052**		**0.189**		**0.258**	
P value	**0.819**		**0.663**		**0.611**	
Type of family						
Nuclear (229)	52	22.7	104	45.4	43	18.8
Joint (191)	67	35.1	101	52.8	52	27.2
Chi-Square	**4.355**		**0.796**		**2.666**	
P value	**0.036**		**0.372**		**0.102**	
Religion						
Hindu (204)	53	25.9	113	55.3	41	20.1
Muslim (214)	66	30.8	92	42.9	54	25.2
Christian (1)	0	0.0	0	0.0	0	0.0
Others (1)	0	0.0	0	0.0	0	0.0
Chi-square	**1.246**		**3.180**		**1.446**	
P value	**0.742**		**0.364**		**0.694**	
Socioeconomic Class						
II (7)	3	42.8	2	28.5	1	14.3
III (164)	43	26.2	94	57.3	34	20.7
IV (224)	56	25.0	93	41.5	42	18.7
V (25)	17	68.0	16	64.0	18	72.0
Chi-square	**9.536**		**4.448**		**17.320**	
P value	**0.022**		**0.217**		**<0.001**	

Table 6: Association of maternal characteristics with nutritional status of children

Variable	**Underweight (119)**		**Stunting (205)**		**Wasting(95)**	
	No.	**%**	**No.**	**%**	**No.**	**%**
Mother Age						

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<20 (194)	78	40.2	98	50.5	43	22.1
20-30 (222)	39	17.5	107	48.1	52	23.4
Don't know (4)	2	50.0	1	25.0	0	0.0
Chi-square	**18.286**		**0.725**		**0.971**	
P value	**<0.001**		**0.696**		**0.615**	
No. of Children						
1 (102)	26	25.5	24	23.5	22	21.5
2 (193)	38	19.6	89	46.1	37	19.2
3 (99)	35	35.3	76	76.7	25	25.2
>3 (26)	20	76.9	16	61.5	11	42.3
Chi-square	**18.002**		**13.61**		**4.266**	
P value	**<0.001**		**0.003**		**0.234**	
Occupation						
Housewife (374)	88	23.5	167	44.6	61	16.3
works outside (46)	31	67.4	38	82.6	34	73.9
Chi-square	**17.262**		**6.811**		**67.183**	
P value	**<0.001**		**0.009**		**<0.001**	
ANC received						
Yes (363)	77	21.2	156	42.9	68	18.7
No (57)	42	73.6	49	85.9	27	47.3
Chi-square	**29.18**		**10.44**		**61.97**	
P value	**<0.001**		**0.001**		**<0.001**	

Table 7: Association of immunization status with nutritional status of children

Variable	Underweight(119)		Stunting(205)		Wasting(95)	
	No.	%	No.	%	No.	%
Immunization Status						
Complete (358)	72	20.1	154	43.0	61	17.0
Incomplete (51)	39	76.4	45	88.2	31	60.7
dont know (11)	8	72.7	6	54.5	3	27.2
Chi square	**35.17**		**10.397**		**24.72**	
P value	**<0.001**		**0.0055**		**<0.001**	

DISCUSSION

In this study 66.9% children were normal for weight for age, 19.1% were moderately underweight 9.3% were severely underweight. 4.7% children had more than +2SD weight for age. 51.12% children had normal height for age while only 28.8% were moderately stunted and 20% were severely stunted. 75.6% children had normal weight for height and 20% children had weight for height between -2SD to -3SD and 2.6% children were severely wasted while only 1.4% children had weight for height +2SD. In the similar study conducted by Nigatu G et al (2018),[9] in Ethiopia it was found that the prevalence of underweight, stunting, and wasting were 126 (19.5%), 236 (36.5%), and 52 (8%), respectively. The proportion of severe and moderate underweight children was 53 (8.2%) and 73 (11.3%), respectively. Underweight was higher (76.9%) among rural dwellers than among urban residents (23.1%). Similarly, in our study severe underweight, stunting and wasting were higher in rural area than urban area. As per NFHS-4 (2015-16) in India 35.7% children below 5 years are underweight which is quite higher than our study showing Lucknow children nutritional status is better than the other cities. Percentage of wasting was close to the NFHS-4 data which is 22%. Nutritional status of urban children was better than their rural counterparts. But there was no significant association of area of residence on the nutritional status of children; though the various studies have shown the similar findings like Yadav SS et al (2016),[10] and Senbanjo IO et al (2016),[11] and NFHS-4 (2015-16). In our study it was found that the overall nutritional status of males children were better than the females children. John JM et al (2018),[12] and Khanna P et al (2017),[13] while Meshram II et al (2012),[14] found that risk of underweight, stunting and wasting is higher in boys as compared to girls.In our study it was observed that malnutrition was more common in Joint family than the nuclear family. Type of family is significantly associated with weight for age of preschool children. Ansuya et al (2018),[15] in their study also found that children from low socio-economic family have 2 times more odd of developing malnutrition which was statistically significant. In present study 46.2% of mothers are less than 20 years of age and 52.8% are in age group of 20-30 years while 1 % mothers don't know their age.Age of mother was significantly associated with underweight and wasting in children. Children of mothers of age < 20 years are found to have poor nutritional status than children of mother of age 20-30 years. Similar finding was found by Amritanshu K et al (2013),[16] .While Panigrahi A et al (2014),[17] in their study found that the mother's age at child's birth appeared to be significant risk factor for stunting.In present study 86.4% mothers received ANC services in which 86.1% from urban area and 87.3% from rural area respectively. Children whose mother had not received the ANC were more significantly underweight and wasted (p<0.001). Abuka T et al (2017),[18] observed that controls' mothers, 85.7% utilized ANC which was higher as

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compared to 54.3% cases' mothers utilized ANC (OR=5.05,CI=2.93-8.7).In present study 62% mothers had less than 4 visits. Tette et al (2015),[19] found that inadequate number of antenatal visits (20.9 %, n = 38) and postnatal visits of less than two (27.5 %, n = 50) were reported in mothers of malnourished children. Immunization provides protection against morbidity and this in long run improves nutritional status as repeated illness leads to deterioration of health. This is also corroborated by our study in which fully Immunized children had significantly better nutritional status than partly Immunized children (p<0.001).Similar findings were observed by the Madhusudhan K et al (2017),[20] and Ghane VR et al (2017).[21]

CONCLUSION

Thus, we conclude through our study that mothers having a history of abortion are associated with an increased risk of adverse pregnancy outcomes. Health care providers should identify and counsel women who have recent history of abortion and investigate for other risk factors. A careful pre-conceptional counselling and regular antenatal check-up will minimize the adverse feto-maternal outcome and will help to have a healthy outcome for both the mother and the baby.

However, to accept the study results as a conclusive evidence, a multicentric study and with a larger sample size is essential. Another limitation of the study is that early pregnancy complications were not evaluated here because we chose our study population beyond 24 weeks period of gestation. Psychological differences and their effect on feto-maternal outcome in pregnancies following either a previous abortion or a vaginal delivery needs elaborate subjective and objective evaluation. Also the molecular correlation in the pathogenesis of miscarriage, placental dysfunction and subsequent adverse pregnancy outcomes leave scope for future research.

Conflicts of Interest- None.

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