Original Article

Prevalence of Stunting and its Biosocial Determinants among Young Children Enrolled at Urban Anganwadi Centers in Rishikesh, Uttarakhand

Aakriti Jasrotia, Vartika Saxena, Yogesh Arvind Bahurupi, Pallavi Singh

Department of Community and Family Medicine, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

Abstract

Background: Stunting is a significant public health problem in childhood in developing countries. Sustainable Developmental Goals have mandated that each country reduce stunting by 50% by 2030. However, despite various nutrition and health programs, India still faces a massive burden of stunting. With the increasing urbanization in the country and its typical challenges related to health and nutrition, chronic malnutrition is a massive problem in urban areas, especially among people in the lower wealth quintile. Hence, current study has attempted to estimate the prevalence of stunting among children (0–6 years) and its determinants. **Methodology:** A cross-sectional study was conducted in the Urban Anganwadi centers of Rishikesh, Uttarakhand, for 6 months, from December 2021 to May 2022. Three hundred ten children from 13 selected Anganwadi centers were included using random sampling. Data were collected using a semi-structured validated and pretested questionnaire using Epicollect 5.0. Data were analyzed using the SPSS 23.0 version to estimate the prevalence of stunting and associated risk factors. **Results:** Out of 310 participants, 71 (22.9%) were stunted. Female children were slightly more stunted (24.7%) than males (21.1%). Maximum stunting (33.4%) was observed among children in the 5–6-year age group, and children with higher birth order were much more stunted. Stunting was reported more in children who were breastfed on demand (33.8%) than those fed every 2 hours (19.3%). **Conclusion:** Stunting prevalence in urban areas of Rishikesh is 22.9%, which is almost similar to the state average of 24.3% for urban areas; however, it was higher in comparison to the SDG 2030 global target of ending malnutrition of all forms. Stunting was significantly associated with feeding on demand and eating frequency less than twice a day.

Keywords: IYCF practices, stunting, urban, young children

Introduction

Nutrition holds utmost importance in human growth and development, and its significance cannot be overstated. Good nutrition is linked with improved maternal, neonatal, and child health and a stronger immune system, improved pregnancy outcomes, decreased risk of noncommunicable diseases (such as diabetes and cardiovascular diseases), and healthier aging.[1] However, chronic and recurrent undernutrition during in-utero and early childhood, repeated infection, and psychological stimulation lead to stunting.[2]

Currently, the World Health Organization has reported that 149 million children under 5 years of age are stunted globally.[3] As per the United Nations Children's Fund (UNICEF), stunting affects 22% of under-five children worldwide,[4] while Sustainable Developmental Goals (SDGs) have mandated each country to reduce stunting by 50% by 2030.[5]

India currently faces a massive burden of stunting, and despite many health programs targeting this issue, the progress is somewhat unsatisfactory. This sluggish pace of reduction continues to baffle policymakers and researchers.[6] The latest National Family Health Survey-V (2019–2020) revealed that

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Address for correspondence: Dr. Vartika Saxena, Department of Community Medicine, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India.
E-mail: Vartika.cfm@aiimsrishikesh.edu.in

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since 2015–2016 (NFHS 4), the prevalence of stunting has decreased by 2.9% to the current level of 35.5%.[7] This pace of slow reduction indicates that reaching the SDG goal may be very challenging for India.

Several studies conducted in different parts of the country have shown a varied prevalence of stunting as 43.3% in Wardha district of Maharashtra (Gaidhane A. *et al.* 2021),[8] Uttarakhand (Rehan A. *et al.* 2020).[9] 43.3% in Dehradun, 59% in Kolkata (Scopazzini M. *et al.* 2021),[10] This indicates inequalities in the reduction of stunting in different parts of the country.

On top of the above issue, India is facing a steady rise in urban population; the year 2019–2020 has shown a 2.32% increase in urban population with a total current urban population of 493,169,259.[11] As already known, urbanization is usually associated with overcrowding, lack of basic facilities, substandard housing, poor access to healthcare and safe water, and inadequate sanitation facilities. These challenges in the urban areas related to health, hygiene, and nutrition push women and children into the vicious cycle of undernourishment and infection. This further results in increases in stunting.[12,13]

Despite all the prevailing issues mentioned above, Uttarakhand is one of the few states in the country which has shown an exemplary decrease in stunting. This decrease has been more (8.2.%) in urban areas than (5.8%) in rural areas.[14,15] Hence, the present research article discusses the current estimate of stunting among children in the age group of 0 to 6 years enrolled in Anganwadi centers in urban areas and the different bio-social factors associated with it.

Methodology

This cross-sectional study was conducted on children below 6 years of age registered in Urban Anganwadi centers of Rishikesh City in district Dehradun, Uttarakhand. This study was conducted from November 2021 to April 2022. The study was approved by the institutional ethical committee with *IEC NO- AIIMS/IEC/21/601*. Data were collected after written informed consent of parents/guardians.

The sample size was calculated based on the prevalence of stunting as 43.3%, reported by Rehan A. *et al.* (2020) among under-five children in Rishikesh with a relative precision of 8%, design effect of 2 at 95% Confidence level. The sample size came out to be 292.

There are a total of 34 AWCs in the urban area of Rishikesh; one-third of Anganwadi centers, that is, 11 Anganwadi centers, were initially included in the study using Cluster Sampling Technique. So, it was decided to include 27 children from each Anganwadi center. However, two Anganwadi centers did not have the required number of children; hence, two more nearest AWCs were included to complete the sample size.

Finally, 310 children participated in the study, including all present at the Anganwadi center on the day of data collection.

Study tool

A semi-structured pretested and pre-validated questionnaire was used. The questionnaire included sociodemographic variables (age, religion, caste, type of family, birth order, etc.), feeding practices (breastfeeding, complementary feeding, frequency of feeding, etc.), history of previous or current ailment (diarrhea, pneumonia, any other disease, history of previous hospitalization, etc.), and anthropometric assessment—each child was assessed for height and weight. Length/height was measured using IndoSurgicals Infantometer/ Krups Stadiometer using standard protocol to the nearest of 0.1 cms. Weight for children less than 2 years was measured using a bar weighing scale as the salter scale was not provided in the Anganwadi centers, and for children above 2 years, calibrated Digital Samso Weighing scale using Standard protocol to the nearest of 0.1 kg was used.

A child was defined as stunted if their height/length-for-age was more than two standard deviations below the WHO Child Growth Standards median.[2]

Data was collected using Epicollect 5.0, and analysis was done using SPSS 23.0 for Windows. Descriptive statistics were calculated as mean and standard deviation, median (interquartile range) for numerical variables, and proportion and percentage for categorical variables. Pearson's Chi-square inferential statistics were used to determine the association between stunting and biosocial determinant characteristics. Fisher's exact test was applied whenever more than 20% of cells' expected frequency was less than 5 in a two-by-two table. *P* value less than 0.05 was considered as the level of significance.

Results

A total of 310 under six children participated in the study, with slightly more male children (50.3%) than female children (49.7%). The overall prevalence of stunting came out to be 22.9%. Female children were more stunted (24.7%) than male children (21.1%). Most of the participants in the study were Hindu by religion (98.4%), and 22.6% of them were stunted, while only four children were from the Muslim community, and two of them were stunted. Regarding caste, 61.9% of children were from the General category, followed by Other Backward Castes (29.7%) and SC/ST (7.1%). Prevalence of stunting was more in children belonging to the SC (36.4%)/ST (23.9%) category than children in the General category (20.9%); however, stunting was not significantly associated with caste. Prevalence of stunting was reported more in children aged 60–72 months (33.4%) than in the age group of 24–60 months (25.6%). Children in the birth order of 3 or more were more stunted (27.3%) than children in the birth order of up to 2 (22.2%), although no significant association was found between stunting and birth order [Table 1].

Association of young child feeding practices with stunting

The majority of the children included in the study (93.9%) had ever been breastfed, and 23% of them were stunted. Among

Table 1: Association of sociodemographic factors with stunting (*n*=310)

Sociodemographic factors	Total (310) *n*	Stunting (71/22.9)		*P*
		No.	%(95% CI)	
Age (in months)				
0–6	19	1	5.3 (0.1–26.0)	
6–12	22	2	9.1 (1.1–29.1)	
12–24	53	10	18.9 (9.4–32)	0.06
24–60	183	47	25.6 (19.5–32.6)	
60–72	33	11	33.4 (18–52)	
Gender of child				
Male	156	33	21.1 (15–28)	0.461
Female	154	38	24.7 (18-–32.3)	
Religion				
Hindu	305	69	22.6 (18–27.7)	
Muslim@	4	2	50 (6.7–93.4)	0.841
Sikh@	1	0	0 (0–97.5)	
Caste category				
General	196	41	21 (15.4–27.3)	
OBC@	92	22	23.9 (15.6–34)	0.275
SC/ST@	22	8	36.4 (17.2–59.3)	
Birth order				
Up to 2	266	59	22.1 (17.3–27.7)	0.457
3 or more than 3	44	12	27.3 (15–42.7)	
Total number of living siblings				
Up to 2	260	59	22.7 (17.7–28.3)	0.84
More than 2	50	12	24 (13.1–38.2)	
Types of family				
Nuclear	145	35	24.1 (17.4–32)	
Joint	86	20	23.2 (15–34)	0.8
Third generation	79	16	20.2 (12–31)	
A problem family				
Yes	108	20	18.5 (12–27.1)	0.179
No	202	51	25.2 (19.4–32)	

@ROWS are merged for computation purposes

291 (93.9%) who were ever breastfed, 60.8% were breastfed immediately after birth. The prevalence of stunting was more in children who were breastfed immediately (27.6%) than in children whose breastfeeding was delayed (16.6%), and stunting was significantly associated with the initiation of breastfeeding (*P* value = 0.03). About 68.4% of children who participated in the study were given colostrum, and 24.1% of them were stunted. More than half of the participants in the study were exclusively breastfed for 6 months (70%), and among them, 22.6% were stunted; however, stunting was not significantly associated with exclusive breastfeeding for 6 months. About 53.5% of children in the study were breastfed every 2 hours, while 22% were breastfed on demand. The prevalence of stunting was higher in the children 24 (35%) who were breastfeeding on demand, and a significant association was found between stunting and the frequency of breastfeeding (*P* value = 0.02). More than half of the children in the study had a food-eating frequency of 2–3 times a day (64%). The prevalence of stunting was more in children who eat <2 times a day (29.4%) than in children who eat 2–3 times a day (25.4%). Also, a significant association was found between stunting and food-eating frequency (*P* value = 0.024) [Table 2].

Association of stunting with different health conditions

Most children in the study were born with normal weight (78.1%), only 68 were born with low birth weight, and 20 were stunted; however, stunting was not significantly associated with low birth weight. Among 68 low birth weight babies, only six were ≥1500 g but ≤2200 g, and three were stunted. Most of the study participants had no history of chronic illness (99.0%), while only three had a history, and two of them were stunted. More than half of the children in the study had a history of illness in the last 6 months (57.4%), and 23.0% of them were stunted; however, no significant association was found between stunting and a history of illness in the past 6 months [Table 3].

In multivariate logistic regression, no significant association was found between initiation of breastfeeding, food eating frequency, and frequency of breastfeeding with stunting [Table 4].

Discussion

Estimation of the prevalence of stunting and its association with sociodemographic factors was intended among the study participants. The gender distribution of study participants was analogous to the sex ratio of the Dehradun district of Uttarakhand.[14]

The prevalence of stunting in the study population was almost similar to 24.3% stunting in urban Uttarakhand but lesser than the prevalence in India by 30.1%.[16] The variation can be attributed to sociodemographic variations among various geographical areas of Uttarakhand. Evidence from literature is available for children under five; however, we attempted to discuss findings to get an approximation for comparison. Comprehensive National Nutritional Survey Report (2019) reported similar findings about the prevalence of stunting in the urban area of Uttarakhand among under-five children.[17] Similar findings were reported in a secondary data analysis of NFHS-4 conducted by Dhami VM *et al.*[18] (2019) among 6–8-months infants. A nutritional survey conducted in Maharashtra by Aguayo MV *et al.*[19] (2016) reported the prevalence of stunting among children under 2 years to be 22.7%. A study conducted by Sserwanja Q *et al.*[20] (2019) in Sierra Leone reported the prevalence of stunting in the urban area among under-five children to be 24%. Meta-analysis conducted by Joulaei H *et al.*[21] (2021) found that 25.7% of children in the 2–5 age group were stunted in the Middle East north region. Unlike the present study, a study conducted by Gaidhane A. *et al.*[8] (2021) in Maharashtra reported that 43.09% of children were stunted. In a longitudinal study conducted among children under five in an urban slum, Kolkata, by Marcello S. *et al.* (2021),[10] 59% of children were stunted. The variations in the results may be attributed to the type of study, study setting, and differences in

Table 2: Association of young child feeding practices with stunting

Infant and young child feeding practices (IYCF)	Total (310) *n*	Stunting (71/22.9)		*P*
		No.	% (95% CI)	
Ever breastfeed				
Yes	291	67	23 (18.3–28.3)	>0.99**
No	19	4	21 (6–45.6)	
Initiation of breastfeeding (*n*=67)				
Immediately[$]	177	48	27.1 (21–34.3)	0.039
Delayed hours/days	114	19	16.6 (10.3–25)	
Any prelacteal feeds				
Yes	139	25	18 (12–25.4)	0.063
No	171	46	26.9 (20.4–34.2)	
Colostrum				
Yes	212	51	24.1 (18.5–30.4)	0.477
No	98	20	20.4 (13–30)	
Exclusively breastfeed for 6 months				
Yes	217	49	22.6 (17.2–29)	0.836
No	93	22	23.7 (15.5–34)	
Frequency of breastfeeding				
On demand[@]	68	24	35.3 (24–47)	0.02
Two hourly	166	33	19.8 (14–26)	
Four hourly[@]	4	1	25 (0.6–81)	
Any time[@]	53	13	24.5 (14–38.2)	
Top feeding given				
Yes	102	24	23.5 (15.7–33)	0.854
No	208	47	22.6 (17.1–29)	
Top feeding was given via				
Bottle	76	20	26.3 (17–38)	0.257
Kattori - Chammach	26	4	15.4 (4.4–35)	
Age of start of complimentary feeding/weaning				
<6 months[@]	14	2	14.3 (1.8–43)	0.221
6 months	236	53	22.5 (17.3–28.3)	
>6 months and <1 year[@]	27	8	29.6 (18–50.2)	
>1 year[@]	12	7	58.3 (28-85)	
Food eating frequency				
Child is on breast feed/bottle feed only	26	0	0 (0–13.2)	0.024
<2 times a day	34	10	29.4 (15.1–47.5)	
2–3 times a day	201	51	25.4 (19.5–32)	
4–5 times a day	49	10	20.4 (10.2–34.3)	

[@]Rows are merged for computation purpose. [$]Within 1 h for normal delivery and within 4 h for Caesarean delivery. **Fischer's exact test

inter-state geographical, sociodemographic, and socio-cultural characteristics.[10]

The time of breastfeeding initiation was found to have a significant association with stunting with a *P* value of 0.039 [Table 2], which was comparable with findings of a similar study conducted in Maharashtra among children aged 1 to 60 months by Gaidhane A. *et al.* (2021).[8] A systematic review was conducted by Susianto S in which 12 studies were included to assess the effect of early initiation of breastfeeding of which eight studies were included in which early initiation of breastfeeding was found to be associated with stunting.[22] However, after adjusting for all possible confounders time of breastfeeding initiation was not found to be significantly associated with stunting with a *P* value of 0.06 [Table 4]. This may be attributed to the interplay of various factors which influenced the association between early initiation of breastfeeding and stunting. Breastfeeding every 2 hours was found significant with stunting with a *P* value of 0.02 [Table 2]. Mehlawat *et al.*[23] (2018) conducted a study among mother-child dyads in Gurugram in which no significant association was found. Interstate variations, cultural practices, study setting, and study population may be plausible attributes.

Food eating frequency was significantly associated with stunting with a *P* value of 0.024 [Table 2]. A systematic review in Ethiopia among school-going children reported that ≤3 meal frequency was associated with stunting (OR = 3.02).[24] Urban area in Nepal by Sangroula and Uprety (2020) reported similar findings where <3 food frequency in a day was statistically significantly associated with stunting (*P* value = 0.003).[25]

Table 3: Association of stunting with different health conditions

Biological factors	Total (310) *n*	Stunting (71/22.9)		*P*
		No.	% (95% CI)	
Low birth weight				
Yes	68	20	29.4 (19–42)	0.051*
No	242	51	21.1 (16.1–27)	
Birth weight (g) (*n*=20)				
≤1500 g[@]	9	2	22.2 (2.8–60.)	0.934
≥1500 g but ≤2000 g[@]	6	3	50.0 (12–88.2)	
≥2000 g but <2200 g[#]	42	14	33.3 (19.6–49.6)	
≥2200 g but <2500 g[#]	11	1	9.1 (0.2–41.3)	
History of any chronic illness				
Yes	3	2	66.7 (9.4–99.2)	0.26*
No	307	69	22.5 (18–27.6)	
History of illness in the past 6 months				
Yes	178	41	23.0 (17.1–30)	0.949
No	132	30	22.7 (16–31)	
Frequency of the illness (*n*=41)				
Once in 15 days[@]	6	3	50.0 (12–88.2)	0.460
Once a month[@]	15	4	26.7 (7.8–55.1)	
Once 3 months	65	15	23.1 (13.5–35.2)	
Once in 6 months	92	19	20.7 (13–30.1)	
Hospitalized in last 6 months				
Yes	33	7	21.2 (9–39)	0.783
No	145	34	23.4 (17–31.2)	

[#,@,^]Rows are merged for computation purposes. *Fisher's exact test

Table 4: Multivariate logistic regression

Variables	*B*	Odds 95% CI		*P*
		Ratio	(L-U)	
Initiation of breastfeeding (*n*=67)				
Immediately[$]	0.57	1.76	(0.96–3.25)	0.06
Delayed hours/days	-	-	-	Reference
Frequency of breastfeeding				
On demand	0.19	1.21	(0.11–12.50.)	0.87
Two hourly	−0.27	0.76	(0.07–7.71)	0.81
Four hourly	-	-	-	Reference
Any time	0.12	1.12	(0.10–12)	0.92
Food eating frequency				
Child is on breast feed/bottle feed only	−19.8	0.00	-	0.99
<2 times a day	0.19	1.21	(0.42–3.5)	0.71
2–3 times a day	0.16	1.17	(0.53–2.5)	0.68
4–5 times a day	-	-	-	Reference

Low birth weight was not associated with stunting [Table 3]. A similar study among 0–59-month children in India reported that low birth weight was significantly associated with stunting with a *P* value of <0.001.[26] We did not find any association between stunting and a history of chronic illness, with a *P* value of 0.26 [Table 3]. Evidence from literature reported that chronic diarrhea was significantly associated with stunting (*P* value <0.001). This difference with the present study can be attributed to the type of study, study setting, and differences in international geographical, socio- demographic, and socio-cultural characteristics.[27]

After adjusting for all possible confounders, on multivariate analysis, initiation of breastfeeding, food eating frequency, and frequency of breastfeeding was not associated with stunting [Table 4]. A study conducted by Muldiasman *et al.*[28] (2018) in Indonesia among 6–59-month children reported that delayed breastfeeding initiation was significantly associated with stunting with a *P* value of 0.024. A similar study conducted by Dranesia *et al.*[29] (2019) reported that eating restriction was significantly associated with stunting with a *P* value of 0.03. This difference with the present study can be attributed to the type of study, study setting, and

differences in international geographical, sociodemographic, and socio-cultural characteristics. Evidence from literature reported that frequency of breastfeeding <8 times/day was not significantly associated with stunting (OR = 0.75).[30]

Conclusion

Stunting in the urban area of Rishikesh was 22.9% in the present study, which was high compared to the SDG 2030 global target of ending malnutrition of all forms. More female children were stunted than male children. Stunting was significantly associated with feeding on demand and eating frequency less than twice a day.

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Conflicts of interest

There are no conflicts of interest.

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