

Prevalence of Anemia among Street Children in Kolkata, West Bengal, India

Research Article

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Article Information: Submission: 09/09/2016; Accepted: 05/10/2016; Published: 10/10/2016

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Abstract

Street children are the most neglected and vulnerable population and are at risk of micronutrient deficiency syndrome like anemia. The aim of this study was to assess the nutritional status and prevalence of anemia among street children aged from 3 to 18 years living in Kolkata metropolitan city. Presence of pallor, koilonychias, and blood hemoglobin level were assessed in this survey. A cross sectional study was conducted on 480 street children aged from 3 to 18 years in selected 10 zones in Kolkata. Period of study was ten months. Their body weight and height were measured and information about socio economic status and food habit was accumulated through a pre structured questionnaire. Blood sample was collected to estimate hemoglobin level of the children. In the study the prevalence of pallor was 41.04%, koilonychia 33.96% and low hemoglobin level was 51.25%. Substance abuse, mother's qualification, per capita monthly income, duration of breast feeding, health consciousness (includes not skipping meal, not having tea or beetle nut after meal), gender, fruits and vegetable intake, age, protein intake and BMI had great influence on prevalence of anemia. Hemoglobin level of the street children was quite poor. Reasons for such findings can be lack of awareness regarding proper meal, financial constraints to afford iron rich food stuff, substance abuse and also lack of nutrients like vitamin and protein. The hemoglobin status of the street children in Kolkata strongly highlights the requirement of awareness programme for preventing anemia.

Keywords: Street children; Pallor; Koilonychias; Hemoglobin

Introduction

Street children are a term for children experiencing homelessness who live on the streets of a city, town, or village. Homeless youth are often called street kids and street youth; the definition of street children is contested, but many practitioners and policymakers use UNICEF's concept of boys and girls, aged under eighteen years, for whom "the street" (including unoccupied dwellings and wasteland) has become home and/or their source of livelihood, and who are inadequately protected or supervised [1]. The street children in India choose to leave their families and homes for three strategic reasons - urban poverty, families, and urbanization. They are result of increasing poverty & unemployment, increased migration of families, broken families,

neglect, abuse and violence, armed conflicts, natural and manmade disaster, decreasing resources in rural areas and the attraction of cities [2]. Not only they are exposed and susceptible to disease, they are also unlikely to be vaccinated or receive medical treatment [3]. Street children in India face additional vulnerability because of their lack of access to nutritious food, sanitation, and medical care. Street children lack access to nutritious food because many are dependent on leftovers from small restaurants or hotels, food stalls, or garbage bins. Studies on the prevalence of street children in Bandung shows that the incidence of anemia was 29.3% [4].

A cross sectional study hemoglobin status of street children in South India, conducted by Indrapal I Meshram, Stephen Gade, PothuRaju Battina found that prevalence of anemia was 54% [5].

A cross sectional study of addictions and nutritional deficiencies in street children in Pune concluded 40% anemia among them [6]. Hence the present study aims to assess the prevalence of anemia, health consciousness, food intake and personal habits of street children in Kolkata city, West Bengal.

Objective

The objective of this study was to assess the prevalence of anemia among street children aged from 3 to 18 years living in Kolkata metropolitan city. Prevalence of pallor, koilonychias, and blood hemoglobin level were estimated in this survey.

Methodology

It was a cross sectional study in 10 randomly selected zones of Kolkata, West Bengal conducted during August 2015 to February 2016. The selected zones (Kolkata port, Bhabanipur, Rashbehari, Ballygunge, Chowranghee, Entally, Belegghata, Jorasanko, Shyampukur and Maniktala) were considered according to various Assembly area of Kolkata. Street children living outside Kolkata and those who were not willing to participate were excluded.

Considering the prevalence of anemia as 76% (obtained from pilot study of 30 street children outside the selected zones of Kolkata, 23 were found to have under nutrition problem like anemia), allowable error 10% and 95% level of confidence, estimated sample size (n) was 480. A total of 480 street children aged between (3-18) years considered in the study.

Clearance from University Bio ethics committee for Animal and Human Research studies, Calcutta University, was obtained. Consent was taken from the children or parents before survey.

A self administered, predesigned and pretested semi structured anonymous questionnaire was used for collecting information. Suitable time schedule was fixed for the survey without hampering their daily working schedule.

Information regarding the demographic factors, personal habits and eating practices was obtained from 10-15 study subjects in a day by interview method using the questionnaire in a private area away from other participants. Guardians of the children aged 3-10 years were allowed with them. 20 µL finger prick blood sample was collected for hemoglobin estimation.

Information collected through this schedule which included general information pertaining to study subjects like Name, Date of Birth, Age, and Gender. Clinical assessment includes recording of pallor, koilonychias was done.

Operational definitions used for the study were:

Pallor: Pallor is a pale color of the skin that can be caused by illness, emotional shock or stress, stimulant use, or anemia, and is the result of a reduced amount of oxyhaemoglobin and is visible in skin or mucous membrane.

Koilonychias: Koilonychias also known as spoon nails, is a nail disease that can be a sign of hypo chromic anemia, especially iron-deficiency anemia. It refers to abnormally thin nails (usually of the hand) which have lost their convexity, becoming flat or even concave in shape.

Hemoglobin: Hemoglobin is the iron-containing oxygen-transport metalloprotein in the red blood cells of all vertebrates as well as the tissues of some invertebrates.

On the day of the survey participants were briefed about the objective of the study as well as the questionnaire. Their willingness to participate in the study was obtained and questionnaires were filled by obtaining information from them and their guardian within specific time period. After collection of data, the children were sensitized regarding harmful effects of anemia and they were advised to follow some healthy practices like regular taking green vegetables, not skipping meal and avoiding substance abuse. The data obtained from the survey was analyzed by Vassar stats: Website for Statistical computation.

Results

Out of the 480 street children 301 (62.71%) were boys and 179 (37.29%) were girls. The number of participants belonged to the age group of 3 to 10 years (59.37%) was more than the age group 11 to 18 years (40.63%). Majority (56.67%) of their mothers was illiterate and rests (43.33%) studied up to primary. Most (85.83%) of the street children belonged to lower socio-economic status (using Prasad's socio economic status classification for 2015) [7]. Majority of the children (62.92%) did not have sufficient breast milk (exclusive breast feeding up to 6 months from delivery) from mother during their childhood.

The present study reveals that 41.04% children were suffering from pallor. Prevalence of pallor is more (42.11%) for the age group 3-10 Years than 11-18 (39.49%), though the difference was not significant ($p=0.566$). Among the children boys suffered less (24.92%) from pallor than girls (68.16%) and the difference was significant statistically ($p=0.000$). It has been observed that children of illiterate mothers suffered less (38.55%) than of literate mothers (44.04%) but statistically the difference was not significant ($p=0.224$). This study shows that the children whose family's monthly per capita income is \leq Rs 866 suffered less (40.78%) than the children of $>$ Rs 866 (42.65%) and the difference was statistically not significant ($p=0.777$). The children having exclusive breast feeding, suffered from pallor less than (17.42%) the children who had insufficient breast milk (54.97%) and the difference was statistically significant ($p=0.000$). Majority of the children who were not health conscious suffered from pallor more (50.34%) than the children obeying consciousness about oral health (25.82%) and the difference was significant ($p=0.000$). According to the present study 35% were indulged in substance abuse any time in their life. The most common substance abuse was tobacco in the form of cigarettes or bidis, gutkha and an inhalant substance, 'whitener' – a white fluid containing organic solvents, used to erase errors in hand written, printed papers. Multiple responses to the type of substance abuse were observed. Pallor was observed 42.86% for substance abuser and 40.06% for non abuser and the difference was statistically not significant ($p=0.554$). Presence of pallor was more (57.24%) among the children consuming insufficient fruit and vegetable than the children having sufficiently (13.07%). The difference was significant ($p=0.000$). Our study shows that pallor was more prevalent (72.06%) among the children consuming insufficient protein than the children having sufficiently (08.15%) but the difference was significant

($p=0.000$). 47.42% suffered from low hemoglobin level having BMI <18 (Table 1).

Our study shows that 33.96% children were suffering from koilonychia. Prevalence of koilonychia is less (30.53%) for the age group 3-10 Years than 11-18 years (38.97%), though the difference was not significant ($p=0.055$). Among the children boys suffered less (17.28%) from koilonychia than girls (62.01%) and the difference was significant statistically ($p=0.000$). It has been observed that children of illiterate mothers suffered less (29.77%) than of literate mothers (38.99%) but statistically the difference was not significant ($p=0.034$). This study shows that the children whose family's monthly per capita income is \leq Rs 866 suffered more (35.44%) than the children of $>$ Rs 866 (25.00%) and the difference was not statistically significant ($p=0.093$). The children having exclusive breast feeding, suffered from koilonychia less than (17.98%) the children who had insufficient breast milk (43.38%) but the difference was statistically significant ($p=0.000$). Majority of the children who were not health conscious suffered from koilonychia less (31.54%) than the children obeying consciousness about oral health (37.91%) and the difference was not significant ($p=0.153$). Koilonychia was observed 28.57% for substance abuser and 36.86% for non abuser and the difference was statistically not significant ($p=0.068$). Presence of koilonychia was less (13.64%) among the children consuming sufficient fruit and vegetable than the children not having sufficiently (45.72%). The difference

was significant ($p=0.000$). Our study shows that koilonychia was present among 44.94% children consuming insufficient protein and 38.87% among the children having protein sufficiently 28.76% but the difference was not significant ($p=0.019$). Koilonychia was present 51.35% among the children having BMI >23.5 (Table 2).

It has been observed from the study 51.25% children were suffering from low hemoglobin level. Prevalence of low hemoglobin level is less (48.42%) for the age group 3-10 Years than 11-18 years (55.38%), and the difference was not significant ($p=0.134$). Among the children boys suffered less (32.56%) from low hemoglobin level than girls (82.68%) and the difference was significant statistically ($p=0.000$). It has been observed that children of illiterate mothers suffered less (50.38%) than of literate mothers (52.29%) but statistically the difference was not significant ($p=0.680$). This study shows that the children whose family's monthly per capita income is \leq Rs 866 suffered 51.21% and children of monthly per capita income $>$ Rs 866 is 51.47% and the difference was statistically not significant ($p=1.000$). The children having exclusive breast feeding, suffered from low hemoglobin level less than (29.21%) the children who had insufficient breast milk (64.24%) but the difference was significant ($p=0.000$). Majority of the children who were not health conscious suffered from low hemoglobin level less (49.66%) than the children obeying consciousness about oral health (53.85%) and the difference was statistically not significant ($p=0.374$). Low hemoglobin level was observed 51.79% for

Table 1: Prevalence of Pallor among the street children.

Variables	Type	Pallor				Total(%)		P Value
		Yes(%)		No(%)				
Age (Year)	3-10	120	(42.11%)	165	(57.89%)	285	(59.38%)	0.566
	11-18	77	(39.49%)	118	(60.51%)	195	(40.63%)	
Gender	Boy	75	(24.92%)	226	(75.08%)	301	(62.71%)	.0001
	GIRL	122	(68.16%)	57	(31.84%)	179	(37.29%)	
Mother's Qualification	Illiterate	101	(38.55%)	161	(61.45%)	262	(54.58%)	0.224
	LITERATE	96	(44.04%)	122	(55.96%)	218	(45.42%)	
Monthly Per Capita Income	≤ Rs 866	168	(40.78%)	244	(59.22%)	412	(85.83%)	0.777
	> Rs 866	29	(42.65%)	39	(57.35%)	68	(14.17%)	
Breast Feed Duration	≥ 6 Months	31	(17.42%)	147	(82.58%)	178	(37.08%)	0.0001
	<6 MONTHS	166	(54.97%)	136	(45.03%)	302	(62.92%)	
Health Conciousness*	Yes	47	(25.82%)	135	(74.18%)	182	(37.92%)	0.0001
	No	150	(50.34%)	148	(49.66%)	298	(62.08%)	
Substance Abuse	Yes	72	(42.86%)	96	(57.14%)	168	(35.00%)	0.554
	No	125	(40.06%)	187	(59.94%)	312	(65.00%)	
Fruits & Vegetables Intake	≥1 Serving Daily	23	(13.07%)	153	(86.93%)	176	(36.67%)	0.0001
	< 1 SERVING DAILY	174	(57.24%)	130	(42.76%)	304	(63.33%)	
Protien Intake	Rda** For Age	19	(8.15%)	214	(91.85%)	233	(48.54%)	0.000
	<RDA FOR AGE	178	(72.06%)	69	(27.94%)	247	(51.46%)	
Bmi	18-23.5	30	(26.32%)	84	(73.68%)	114	(23.75%)	0.0001
	<18	156	(47.42%)	173	(52.58%)	329	(68.54%)	
	>23.5	11	(29.73%)	26	(70.27%)	37	(7.71%)	

*Health consciousness includes taking meal at regular interval, eating leafy vegetables and not having tea just after taking a meal.

**RDA is Recommended Dietary Allowances.

Table 2: Prevalence of Koilonychia among the street children.

Variables	Type	Koilonychia				Total		P Value
		Yes		No				
Age (Year)	3-10	87	30.53%	198	69.47%	285	59.38%	0.055
	11-18	76	38.97%	119	61.03%	195	40.63%	
Gender	Boy	52	17.28%	249	82.72%	301	62.71%	0.000
	GIRL	111	62.01%	68	37.99%	179	37.29%	
Mother's Qualification	Illiterate	78	29.77%	184	70.23%	262	54.58%	0.034
	LITERATE	85	38.99%	133	61.01%	218	45.42%	
Monthly Per Capita Income	≤ Rs 866	146	35.44%	266	64.56%	412	85.83%	0.093
	> Rs 866	17	25.00%	51	75.00%	68	14.17%	
Breast Feed Duration	≥ 6 Months	32	17.98%	146	82.02%	178	37.08%	0.000
	<6 MONTHS	131	43.38%	171	56.62%	302	62.92%	
Health Conciousness*	Yes	69	37.91%	113	62.09%	182	37.92%	0.153
	NO	94	31.54%	204	68.46%	298	62.08%	
Substance Abuse	Yes	48	28.57%	120	71.43%	168	35.00%	0.068
	NO	115	36.86%	197	63.14%	312	65.00%	
Fruits & Vegetables Intake	≥1 Serving Daily	24	13.64%	152	86.36%	176	36.67%	0.000
	<1 SERVING DAILY	139	45.72%	165	54.28%	304	63.33%	
Protien Intake	Rda** For Age	67	28.76%	166	71.24%	233	48.54%	0.019
	<RDA FOR AGE	96	38.87%	151	61.13%	247	51.46%	
Bmi	18-23.5	21	18.42%	93	81.58%	114	23.75%	0.000
	<18	123	37.39%	206	62.61%	329	68.54%	
	>23.5	19	51.35%	18	48.65%	37	7.71%	

* Health consciousness includes taking meal at regular interval, eating leafy vegetables and not having tea just after taking a meal.

**RDA is Recommended Dietary Allowances.

substance abuser and for non abuser 50.96% and the difference was statistically not significant ($p=0.863$). Presence of low hemoglobin level was less (24.43%) among the children consuming sufficient fruit and vegetables than the children not having sufficiently (66.78%). The difference was significant ($p=0.000$). Our study shows that low hemoglobin level was more prevalent (80.16%) among the children consuming insufficient protein than the children having sufficiently (20.60%) and the difference was statistically significant ($p=0.000$). 54.71% suffered from low hemoglobin level having BMI <18 (Table 3).

Discussion

Out of 480 study subjects, boys were 62.71% and girls were 37.29%. This is accordance to the study conducted by FK Kahabuka et al. [3] reported 68% boys and 32% girls and in contrast to the study conducted by Elsa K Delgado et al. [8] and Pisarn et al. [9] who observed 48.6% boys and 53.3% girls, 42.9% boys and 57.1% girls respectively.

Among the children interviewed is the present study 35% had indulged in substance abuse anytime in their life. The most common substance abused was tobacco in the form of cigarettes, bidis, gutkha and an inhalant substance, whitener. This is lower than the results

obtained by C Malhotra et al. [50]. (56.7%) and Deepti Pagare et al. [11]. (57.4%). Our result (35%) is higher than the result of the study conducted by Munevver et al. [12]. (02%). The higher ratio of substance abuse among the street children in Kolkata could be due to easy availability and accessibility of substances and Socio- Cultural environment.

The present study concluded that 41.04% of the street children had pallor as anemic symptom which was less than the result (65%) obtained by Sarfaty M et al. [13].

According to our study the prevalence of koilonychias was 33.96%. The results are higher than the results obtained by Sameena S (17.4%) [14]. This might be because of avoiding leafy vegetables, skipping meals and faulty food habits. Hookworm infection may be a causative factor for anemia during 3-10 years.

Blood hemoglobin level represents the blood's ability to deliver oxygen to all parts of the body, which among others is determined by good nutrition. Anemia or the hemoglobin level which is less than 12 mg/dl is mostly caused by poor intake of both macro and micro nutrients. In the present study 51.25% low hemoglobin level was found in children, which is in contrast to study quoted by Patriasih R et al. [4] reported that the incident of anemia was 29.3%. Based on

Table 3: Prevalence of low hemoglobin level among the street children.

Variables	Type	Low Hemoglobin Level				Total		P Value
		Yes		No				
Age	3-10	138	48.42%	147	51.58%	285	59.38%	0.134
	11-18	108	55.38%	87	44.62%	195	40.63%	
Gender	Boy	98	32.56%	203	67.44%	301	62.71%	0.000
	GIRL	148	82.68%	31	17.32%	179	37.29%	
Mother's Qualification	Illiterate	132	50.38%	130	49.62%	262	54.58%	0.680
	LITERATE	114	52.29%	104	47.71%	218	45.42%	
Monthly Per Capita Income	≤ Rs 866	211	51.21%	201	48.79%	412	85.83%	1.000
	> Rs 866	35	51.47%	33	48.53%	68	14.17%	
Breast Feed	≥ 6 Months	52	29.21%	126	70.79%	178	37.08%	0.000
	<6 MONTHS	194	64.24%	108	35.76%	302	62.92%	
Health Conciousness*	Yes	98	53.85%	84	46.15%	182	37.92%	0.374
	NO	148	49.66%	150	50.34%	298	62.08%	
Substance Abuse	Yes	87	51.79%	81	48.21%	168	35.00%	0.863
	NO	159	50.96%	153	49.04%	312	65.00%	
Fruits & Vegetables Intake	≥1 Serving Daily	43	24.43%	133	75.57%	176	36.67%	0.000
	< 1 SERVING DAILY	203	66.78%	101	33.22%	304	63.33%	
Protien Intake	Rda** For Age	48	20.60%	185	79.40%	233	48.54%	0.000
	<RDA FOR AGE	198	80.16%	49	19.84%	247	51.46%	
Bmi	18-23.5	54	47.37%	60	52.63%	114	23.75%	0.023
	<18	180	54.71%	149	45.29%	329	68.54%	
	>23.5	12	32.43%	25	67.57%	37	7.71%	

* Health consciousness includes taking meal at regular interval, eating leafy vegetables and not having tea just after taking a meal.

**RDA is Recommended Dietary Allowances.

gender, the percentage of anemic young female street children was higher (45.3%) than the male children (23.4%). Our result was higher than it. The present study revealed that the girl children were more anemic (82.68%) than boys (32.56%). This high percentage could be attributable to improper food habit, lack of iron absorption and deficiency of vitamin C intake. Beside this insufficient breast feeding during infancy was a contributing factor for anemic tendency of the street children. This is contrast to the result obtained by Njord L et al. [15] where 91% male and 16% female among the street children suffered from low hemoglobin level.

Conclusion

The present study reveals higher level of anemic tendency among the street children in Kolkata city. High percentage of pallor, koilonychias and low hemoglobin level was prevalent among them due to faulty food habit, skipping meal and lack of vitamin and protein in their diet. Female street children are the future mothers, their needs of adequate nutrients to avoid anemia is also important.

Street children deserve special attention in the area of anemia as reflected in this study. Anemia preventing nutrition education oriented programmes which aim to give information about anemia and to make positive changes in behavioral and environmental factors should be developed.

Acknowledgment

Thanks to department of Home Science, University of Calcutta and Department of Epidemiology, All India Institute of Hygiene & Public Health, Kolkata for helping me to carry out the research.

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