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Research Article

MAJOR DETERMINANTS OF SEVERE ACUTE MALNUTRITION IN UNDER FIVE CHILDREN IN JIMMA TOWN OF SOUTH WEST ETHIOPIA

Berhanu Andarge [1]., Abhay Kumar[2]., Javed Ahsan Quadri[3*].,A Shariff[3]., Melese Sinaga [1] and Tabarak Malik [1]

[1]Department of Biomedical Science, College of Health Science, Jimma University, Ethiopia
[2]Department of Microbiology, Indra Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India
[3]Department of Anatomy, All India Institute of Medical Sciences (AIIMS), New Delhi-110029

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ABSTRACT

Abstract: Under-nutrition during infancy and early childhood, when the developmental process are in very dynamic state, substantially increase vulnerability to different types of adverse health effects including infection, immune deficiency and other disease, leads to increased risk of premature death. In 2012, globally 162 million children were stunted, 99 million children were under weight, 51 million were wasted and 45% of 6.9 million child deaths occurred in 2011, which were related to under-nutrition.

Methodology: Major determinants of malnutrition in sick children fewer than five years of age were evaluated and compared with age matched well nourished children. The nutritional statuses of the subjects (80 malnourished and 80 well nourished) were determined by measuring MUAC. Different socio-economic indicators of the subjects were evaluated and correlated with malnutrition and disease severity to find out the determinants of malnutrition in children of Jimma town.

Results: Most of the severely malnourished were resident of rural area (88.8%). Out of 80 malnourished children, 51(63.75%) were belong to families having monthly income <500 birr, where as in well nourished group (80 children) only 22 (27.5%) were belong to families having monthly income <500 birr. In malnourished group 61.8% of children were having diarrheal episode during past 2 weeks. The prevalence of diarrhea in malnourished group was 21.3% which is higher than well-nourished group.

Conclusion: Place of residence, literacy status of mother, family size, family income, vaccination, presence TB, marital status of mother, diarrhea, timing of supplementary diet and water sources are the major determinants of SAM.

INTRODUCTION

Hunger and malnutrition are devastating problems, particularly for the poor and Unprivileged. According to the study by the Ethiopian Ministry of Economic Development and Cooperation, 50 percent of the Ethiopian population are living below the food poverty line and cannot meet their daily minimum nutritional requirement of 2200 calories (MOPED, 1999).[1] The goal of millennium development will remain be far reachable for many Ethiopian children because of malnutrition.[2] The 2000 National Demographic and Health Survey showed that in Ethiopia 58% of children fewer than five years of age are stunted, that is, chronically malnourished, as compared to 43% in Tanzania, 38% in Uganda or 33% in Kenya. This is very high and unacceptable by any standards. However the prevalence of stunted growth reduced to 51 and 44 according to EDHS 2005 and 2011 respectively.[3]

The enormous consequences of malnutrition are often not appreciated well before time because there effects are slow and have a latency period. Usually there are no early onset of signs & symptoms and the victims are silent and not aware of the slow progressing problems and usually ignored.[4,5] In Ethiopia, malnutrition starts in very early stages of life and up to 24 months, all the damages have already been accured and the chances of recovery is very poor.[5,6] The four main manifestations of malnutrition are protein energy malnutrition, vitamin-A deficiency, iron deficiency anemia and iodine

Corresponding author:* **Javed Ahsan Quadri
Department of Anatomy, All India Institute of Medical Sciences (AIIMS), New Delhi-110029

deficiency. Protein–energy malnutrition (PEM) commonly observed in 6 months to 5 years of age and is most common during weaning period and the rainy season. PEM manifested as Marasmus peak in the 1st year and Kwashiorkor in 1-3 years and stunting is most common between 2.5 to 3 years of ages. PEM is one of the most important global health problems affecting large number of children in developing countries. The influences of socio economic status on PEM in children have been documented and some indicators identified includes- level of education of parents (usually of the mother), occupation of parents, as well as family size and place of residence.[1] Ethiopia where the malnutrition is an enormous and deserves attention as it is the 11th leading cause of morbidity and 10th leading cause of hospitalization.[2] In addition more than half of children in the country are malnourished which take its parts in the explanation of the high infants and childhood mortality rates which were 155/1000 live birth and 12/1000 children aged 1-4 yrs, respectively.[2, 3] Reports indicated that the malnutrition is the common problem of under 5 years old children in Jimma zone and its surrounding areas.[5, 8] Over the past five decades the median case fatality from severe malnutrition remained unchanged and is typically 20-30% with the highest level (50-60%) being among those edematous malnutrition.[9] Therefore the present study was conducted to identify the major causes of severe acute malnutrition including age and sex, socio-demographic parameters of mothers/father/care takers, and correlated with health related variables.

METHODOLOGY

The chosen area of study Jimma town is located 354 km away from Addis Ababa in south western Ethiopia and has population of 207,573 (2012 Gc). The residents of the city comprise of different ethnic groups Oromo being most common followed by Amara, SNNPR and others. The climate condition of the area is woinadega and coffee is the main cash crop of the people surrounding the city. The city has two hospitals JUSH and Shenen Gibe hospital. The data collection was done in February 2015 to December 2016, (after getting ethical Clarence from JUSH, Jimma, vide certificate reference No. was RPGC/18/2012, dated 05/03/2012) from pediatric OPD, JUSH, an super-specialty centre serving the Jimma town and its surroundings. Guardians (Mother and fathers) of children were explained about the purpose of the study and written consent was obtained prior to the data collection. Study subjects sampled from all under 5 sick children who are visiting JUSH, Pediatrics OPD. All sick children under five years of age, visited JUSH Pediatrics OPD were included in the study. The children over five years of age, history of any congenital defects, history of genetic disorder, malignancies etc were excluded from the study. The nutritional statuses of the subjects were evaluated by the measuring Mid-Upper Arm Circumference (MUAC). MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow. MUAC is used for the assessment of nutritional status.

SAMPLING METHOD

Non probability sampling method ``QUOTA`` technique were used. Sample size were determined using the following formula: Taking estimated prevalence of (p) 13%(17) and allowing 5% marginal error (d) and 95% confidence level, the sample size were calculated as follows using single population proportion formula:

$$n = \frac{(Z\ \alpha/2)^2\ p(1-p)}{d^2}$$

n= calculated sample size, Z α/2 = 1.96 = confidence interval, P= estimated prevalence=0.5, D = 0.05 = margin of error.

Using this formula the calculated sample size should be 85 (n=85) in each group, however due to stringent inclusion and exclusion criteria only 80 subjects were included in each group. Data was collected using interview methods from the parents/caretakers and anthropometric measurements were taken to evaluate the nutritional status of the subjects. A designed questioners which includes different dependent and independent variables were recorded. The dependent variable included SAM and independent variables included, family income, family size, age, staple diet, immunization status, literacy status of parents/care takers, weaning food start time, cough in past 3 weeks, diarrhea in the past 2 weeks, Prelacteal feeding, bottle feeding, duration of breast feeding, sanitary condition, source of income, single parent, widowed, divorced or dead mother. All the included patients were divided into two groups. Subjects with severe malnutrition were kept in group-1 (study group) and well nourished subjects were placed in group-2 (control group).

***Data analysis and interpretation*:** The collected data was analyzed with great care; summarization and comparison of data were done excluding all the possible bias factors. Questionnaires were checked for competence and consistence and were pretested on 5% of the study population that were not included in the main survey, to ensure clarity of questions and required amendment was done. Therefore, the personal variations on interpretation of the questions were minimized. Statistical analysis was done by non parametric test of significance, and significance was calculated by two-way ANOVA.

Table 1 parameters evaluated to assess the nutritional status.

Groups	Group-1 (n=80)	Group-2 (n=80)
Nutritional status	Severe Acute Malnutrition (SAM)	Well Nourished (WN)
MUAC (Mid-upper arm circumference)	< 11.5cm	>13.5 cm
Weight for height/ length	< 70%	>70%
Bilateral pitting edema	Yes	No

RESULTS

In this study in both the groups male children (58.1%) were more as compared to female (41.9%). In group-1 number of malnourished male children (64/80 = 80%) were significantly high ($p<0.05$), as compared to female (16/80 = 20%). The most of the children included in the study were in the age of 48 to 59 months and majority of malnourished children were also in the age between 48 to 59 months (Table-1). The majority of the parents of children in both the groups were from Oromo ethnic group (78.8%) followed by Amhara and were follower of Islam religion (70.6%). The children (group-1 & group-2) visited OPD during the study period 103(64.4%) were from rural area.

In group-1 a significant number of malnourished children were from rural area (88.8%), (Table 2).

In the present study it was observed that 78.75% of mother/caretaker was illiterate in group-1 as compared to group-2 (33.75%), ($p<0.05$). The most of the SAM (G-1) subjects (87.5%) were from rural background, as compared to (G-2) well-nourished (41.25%). The family income was one the factors and group-1 subjects were from lower socio-economic strata as compared to group-2 and per-month family income was significantly low (63.75% families monthly income was <500 Birr) as compared to group-2 (only 27.5% families monthly income was <500 Birr), ($p<0.05$). It was also observed that the prevalence of recurrent infection including diarrhea, tuberculosis and measles etc. were significantly high in group-1 ($p<0.05$) as compared to group-2 (table-4). The duration of breast feeding, supplementary feeding, Pre-lacteal feeding were other determinants of the SAM as summarized in table-4. The sickness as well as SAM showed a sex bias, where malnutrition was more prevalent in male child (80%) as compared to female children (20%) ($p<0.05$). The MUAC were less than 11 cm in group-1 as compared to group-2 (MUAC greater than 13.5 cm) and the differences were statistically significant ($p<0.05$). The source of drinking water were also correlated with SAM as in group-1 most of the subject's family dependent upon unsafe drinking water sources, like river (38.75%), spring (12.5%), wells (25%) and pipe (23.75%). While in group-2 majority of the subject's families water source was pipe (67.5%), (table-4)

Table 2 MUAC, Age and Sex distribution among two groups.

Variable		Group-1 (G-1)		Group-2 (G-2)		P .value
MUAC		<11cm		>13.5 cm		p=0.001
Sex	M	64	80 %	29	36.25%	G-1M v/s G-1F P=0.034
	F	16	20%	51	63.75%	G-1M v/s G-2M p=0.001 G-1F v/s G2F p=0.001
Age (in months)	6-11	18	22.5 %	16	20%	Df=4 P=0.776
	12-23	16	20%	19	23.75%	
	24-35	13	16.25%	18	22.5%	
	36-47	6	7.5%	5	6.25%	
	48-59	27	33.75%	22	27.5%	

DISCUSSION

Findings of this study revealed that parental illiteracy is associated with a higher risk of SAM. The similar observations reported from North African regions [8-11], Southeast Asian [13-15] and Latin American countries (14). In a case-control study in Bangladesh, the maternal illiteracy was associated with a fourfold increase in the risk of severe acute malnutrition in their children [14]; which is higher than the findings of the present study. Out of 80 malnourished children`s mothers/caretakers 63(78.75%) were illiterate. In the well nourished group only 27(33.75%) mothers/caretakers were illiterate which clearly indicated inverse association. In this study most of malnourished children were permanent resident of rural area 70/80 (87.5%) and only 33(41.2%) well nourished were residing in rural area, which suggests that rural population is more vulnerable for SAM (Table 3). The effect of a large family size with overcrowding and inadequate spacing has been implicated as a risk factor for severe malnutrition in different studies as well [6, 3, 15 and 17] and our finding are in agreement with previous findings. This supports the notion that non-nutritional factors are essential components in the effort to reduce severe acute malnutrition in Ethiopia. In addition to it the risk of SAM were found to be inversely proportional to monthly incomes ($p<0.05$) table-3&4. Similarly poor family income has been found as a risk factor for severe acute malnutrition in studies done in Nigeria[15], Sudan[18], Zimbabwe[19], India[13] and Bangladesh.[14] A community based study done in Jimma, Ethiopia showed that children with malnutrition lived in a household with low monthly income.[4] On the cross sectional study conducted on rural are of Jimma in 1996 to determine nutritional status and determinant factors revealed that malnutrition was significantly associated with family income ($p<0.05$).[8]

In the present study it is seen that maternal marital status is remarkably important, as in SAM (G-1) 12/80 mothers were divorced, while in well-nourished group (G-2) only 1 were divorced and a statistically significant difference were observed between two groups ($p <0.05$) table-3&4. Breastfeeding is a norm in Ethiopia and the national survey indicated that 96% of children under the age of 5 are breastfed.[5] In this study 45/80 (27%) sick children feed breast for less than 6-months, and were malnourished. The association between duration of breast feeding and nutritional status was statistically significant ($p <0.05$) in the present study. In about half of severely malnourished children were given prelacteal feeding where as in well nourished group only 10/80 (12.5%). Prelacteal feeds are given to newborns before breastfeeding is established usually on the first day of life and it includes honey, jiggery, ghee (clarified butter), ghutti (herbal paste) etc. It has been reported that prelacteal feeds interferes with breastfeeding.[20] It is well established fact that as child grows provision of supplementary diet with respect to the age is essential for the infant or child physical growth and mental development. The diet other than mother milk before the age of six months increased the prevalence of pneumonia and diarrheal disease.[21, 22] In this study it was found that in malnourished group 73.75% started earlier, but in well nourished only 25% started at the age < 6 months ($p <0.05$).

Different studies showed that mothers who have awareness of vaccination have better nourished children than those mothers who are not aware of immunization. This was seen in the base line survey report on community nutrition by Ethiopian nutrition institute, 1993 in 3 sites of Arsi, Easter Gojam and Wollega.[23-25] In the present study, in malnourished group 36.25% children are not vaccinated ,but in well nourished group only 15% are not vaccinated .This makes the association statistically significant ($P <0.05$). In the malnourished group 13 (16.25%) had history of tuberculosis, 4 (5%) having measles but from well-nourished only 1(1.25%) with TB none of them infected with measles ($P <0.05$) In Ethiopia the association between diarrhea and malnutrition seem to be rarely studied, however, it is equally true that proportion of mortality rate associated with diarrhea in different region of our country ranged from 22.6% to 62.6 % with median of 45%. According to MOH report in primary health care review 1985, it showed that diarrhea is the major contributing factor in mortality under 5 children. We found that the incidence of diarrhea over past 2 weeks was 62 (77.5%) in malnourished group was significantly high as compared to well-nourished group 37(46.25%), ($P <0.05$). Although over all the high prevalence of diarrhea in

Demographic characteristics and malnutrition

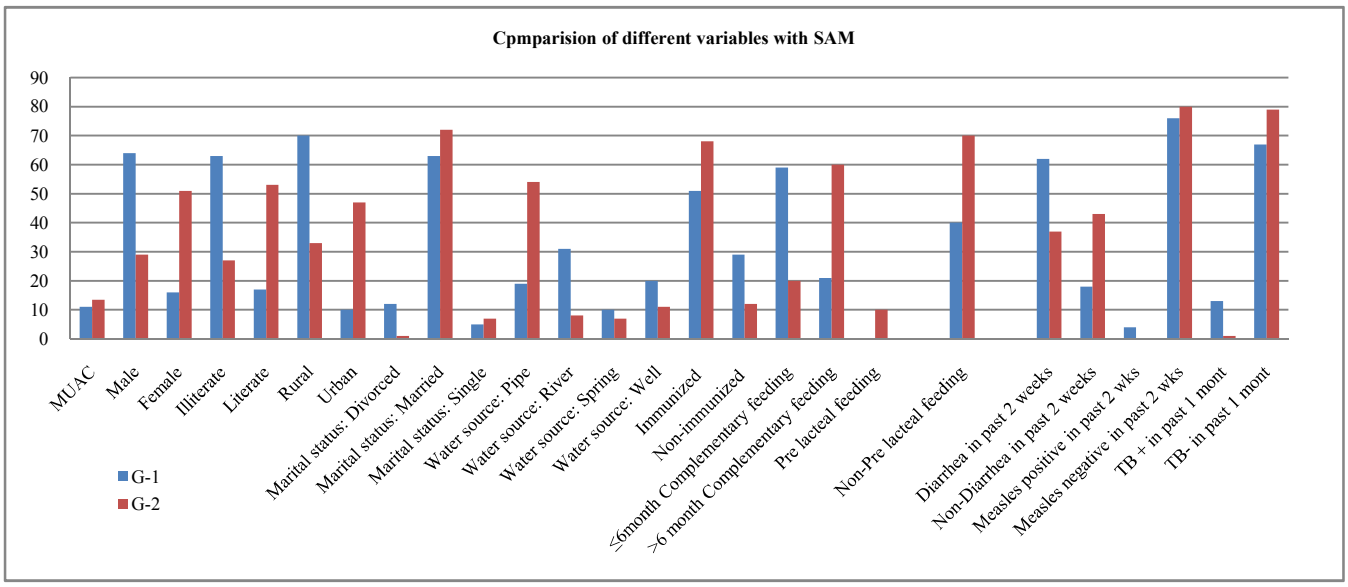
Table 3 Nutritional status of sick under 5 children by selected socio demographic characteristics

Socio demographic variable	Indicators	Group-1 (G-1)		Group-2 (G-2)		p-value
Literacy status of mother or care taker	Illiterate	63	78.75%	27	33.75%	p=0.001
	Literate	17	21.25%	53	66.25%	Df=1
Family size (members in each family)	>3	41	51.24%	29	36.25%	p=0.045 Df=3
	4-5	19	23.75%	36	45%	
	6-8	16	20%	12	15%	
	>9	4	5%	3	3.75%	
Family income per month (in birr)	<500	51	63.74%	22	27.5%	p=0.001 Df=4
	501-1000	16	20%	29	36.25%	
	1001-1500	7	8.75%	14	17.5%	
	1501-2000	3	3.75%	6	7.5%	
	>2000	3	3.75%	9	11.25%	
Resident of rural/urban area	Rural	70	87.5%	33	41.25%	p=0.001
	Urban	10	12.5%	47	58.75%	Df=1
Mother marital status	Divorced	12	15%	1	1.25%	p=0.003 Df=2
	Married	63	78.75%	72	90%	
	Single	5	6.25%	7	8.75%	

Nutritional status and related variables

Table 4 Nutritional status of sick under 5 children and its comparisons with different variable among the groups.

Health related variables	MUAC	<11 cm (malnourished)		>13.5cm(well nourished)		P –value
Duration of breast feeding in months	≤6month	29	36.25%	15	18.75%	P=0.364
	6-12month	26	32.5%	36	45%	Df=2
	1-2 year	25	73.75%	29	36.25%	
Complementary feeding started	≤6month Complementary feeding	59	26.25%	20	25%	P=0.001 Df=1
	>6 month Complementary feeding	21	50%	60	75%	
Pre lacteal feeding	Yes	40 ≤	50%	10	12.5%	P=0.001
	No	40	36.25%	70	87.5%	Df=1
Immunization status	Yes	51	63.75%	68	85%	P=0.002
	No	29	83.75%	12	15%	Df=1
History of tuberculosis in past 01 month	Yes	13	5%	1	1.25%	P=0.001
	No	67	95%	79	98.75%	Df=1
Measles in past 2 weeks	Yes	4	77.5%	0	00%	P=0.043
	No	76	22.5%	80	100%	Df=1
Diarrhea in past 2 weeks	Yes	62	23.75%	37	46.25%	P=0.001
	No	18	38.75%	43	53.75%	Df=1
Water supply	Pipe	19	23.75%	54	67.5%	P=0.001
	River	31	38.75%	8	10%	Df=1
	Spring	10	12.5%	7	8.75%	
	Well	20	25%	11	13.75%	
Latrine	Present	68	85%	65	81.25%	P=0.527
	Absent	12	15%	15	18.75%	Df=1



Graph 1 Graphical representation of variable distribution among group-1 and group-2.

both groups can be explained by the season at which the study conducted. It is well known fact that the provision of unsafe water supply significantly increases the prevalence of diarrheal disease thereby increase the prevalence of malnutrition. In this study, 38.75% malnourished subjects were dependent on river water, while most of well-nourished children used pipe water (67.5%), ($p < 0.05$). It has been reported that environmental toxins put its effects on many organs including kidney[26] and induces adverse pregnancy outcomes.[27]

Figure1 Schematic representation of factors responsible alone and in combinations for SAM in the town of Jimma.

CONCLUSION

Various factors are responsible for severe acute malnutrition and these include rural residence, literacy status of mother/caretaker, family size, family income, vaccination status of child, timing of start of supplementary diet and water source in Jimma town and its periphery. By addressing these concerns by the public, health setups, administration and Government the prevalence of SAM may be reduced. Therefore SAM can be tackled in accordance with the national health policy through primary health care (PHC) by: Strengthening integrated nutritional activities with services of EPI, MCH and Family planning by screening of malnourished children during vaccination campaign and outreach activities to take early intervention measures. Emphasis should be given to community health education with respect to health and nutrition. Growth monitoring and screening of children at the community level has to be under taken so as to detect the problem at early stage.

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References

1. WHO, guideline update on management on sever acute malnutrition on infants and children, 2013; 8-12
2. Ethiopia Demographic and health Survey. Central Statistical Agency Addis Ababa, Ethiopia. 2011, March 2012; 163-5
3. **Ne**pal. National Planning Commission, Nepal Millennium Development Goal: progress report 2005. Kathmandu: National Planning Commission, Government of Nepal, 2005:15-6.
4. Protocol For The Management Of Sever Acute Malnutrition, Ethiopian Federal Ministry of Health, March 007; 71-4.
5. Pediatric and child health lecture note for health science student, Jimma university, 2010; 74
6. Nepal. Ministry of Health and Population. Department of Health Services. Annual report, 2006/2007. Kathmandu: Department of Health Services, Ministry of Health and Population, Government of Nepal, 2007:43
7. Marasmus: a case-control study of Bangladesh children. *Int J Epidemiology*. 1993;22(2):278283
8. World Health Assembly Resolution. Infant and young child nutrition. WHA 54.2, May 2001;44-5
9. WHO. Global strategy for infant and young child feeding. WHA 55/15, April 2013;55
10. Yimer G. Malnutrition among children in Southern Ethiopia: levels and risk factors. *Ethiop. J. Health Dev*. 2000; 14(3):283-292.
11. Appoh LY, Krekling S. Maternal nutritional knowledge and child nutritional status in the Volta region of Ghana. *Maternal child Nutrias* 2005;1(2):100-110.
12. Bloss E, Wainaina F, Bailey RC. Prevalence and predictors of underweight, stunting, and wasting among children aged 5 and under in western Kenya trop Pediatric. 2004;50(50):260- 270.
13. Coulter JB, Omer MI, Suliman GI, Moody JB, Macfarlane SB, Hendrickse RG. Protein- energy malnutrition in Northern Sudan: prevalence, socioeconomic factors and family background. *AnnTrop Pediatric*. 1988;8(2):96-102.
14. F. Savage King. Helping Mothers to Breastfeed. Revised Edition. Nairobi AMREF, 1992;77-9
15. Haider J, Abate G Kogi-Makau W, Sorensen P.risk factors child under nutrition with a human right sedge in rural villages of North Wollo, Ethiopia. *East Afr Med J* 1992;69(10):566-571
16. Henry FJ, Briend A, Fauveau V, Huttly SR, YunusM, Chakraborty *J. Risk factors for clinical*, 2001: 39-43
17. Islam MA, Rahman MM, Mahalanabis D. Maternal and socioeconomic factors and risk of severe malnutrition in a child: a case-control study. *EurJClinNutr*. 1994;48(6):416-24.
18. Jeyaseelan L, Lakshman M. Risk factors for malnutrition in south Indian children. *J BiosocSci*.1997;29(1):93-100
19. Kikafunda JK, Walker AF, Collett D, TumwineJK. Risk factors for early childhood malnutrition inUganda. *Pediatrics* 1998;102(4):E45.
20. Odunayo SI, Oyewole AO. Risk factors formal nutrition among rural Nigerian children. *AsiaPac J ClinNutr*. 2006;15(4):491-495.

21. Paget Stanfield, Martin Brueton, Michael Chan, Michael parkin, Tony Waterston, Disease of Children in the Subtropics and tropics,2008; 88-92.
22. Rikimaru T, Yartey JE, Taniguchi K, KennedyDO, Nkrumah FK. Risk factors for the prevalence of malnutrition among urban children in Ghana. *J NutriSciVitamin (Tokyo).* 1998;44(3):391-407.
23. Schuftan C, Ramalingaswami V, Levinson FJ. Micronutrient deficiencies and protein-energy malnutrition. *Lancet* 1998; 351:1812.
24. Wang X, Wang Y, Kang C. Feeding practices in105 counties of rural China. *Child Care Health Dev*2005;31(4):417-23.
25. Yimer G. Malnutrition among children in Southern Ethiopia: levels and risk factors. *Ethiop. J. Health Dev.* 2000; 14(3):283-292.
26. Quadri JA, Alam MM, Sarwar S, Singh S, Shariff A, Das TK. (2016) Inorganic Contaminants of Drinking Water: Impact on Pregnancy Outcome and Related Congenital Defects. *International Journal of Medical and Clinical Research.*7(2):341-349.
27. Quadri JA, Alam MM, Sarwar S, Singh S, Shariff A, Das TK.(2016) Fluoride Induced Nephrotoxicity: Apoptosis, Ultrastructural Changes and Renal Tubular Injury in Experimental Animals. *International Journal of Ayurveda and Pharma Research.* 4(8):91-95.

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