

## Prevalence and Common Risk Factors of Rickets among the Children below 15 Years

Talukder MNU<sup>1</sup>, Ali MM<sup>2</sup>, Sadullah M<sup>3</sup>, Haque M<sup>4</sup>, Ali SM<sup>5</sup>, Yousuf IA<sup>6</sup>

### Abstract

This cross sectional study was done in different upazillas of Sylhet district during July 2009 to June 2011 to find out the prevalence & common risk factors of rickets below 15 years in Sylhet district. The children under 15 years of age were selected from villages/slums by multistage random sampling. After recognition of at least one feature of rickets, the cases were sent to SOMCH or Upazilla Health Complex. They were examined by investigator and suspected cases were selected for further investigation. After radiological and biochemical examination the final cases were analyzed. In this study the prevalence of rickets in Sylhet district is 0.097%. Male children were more affected than female. In this study regarding feeding habit rice was the stable food which was eaten more than one time by all the rachitic children. Only twenty five percent of children drank milk once a day. The prevalence of rickets in Sylhet district was 0.097% which was almost similar to other parts of Bangladesh. Common risk factors for developing rickets are low socio-economic condition and carbohydrate rich dietary habit.

Keywords: Prevalence of rickets, Risk factors of rickets.

1. Corresponding Author:  
Dr. Md. Noor Uddin Talukder  
Jr Consultant  
Department of Paediatrics  
Kalihati UHC, Tangail.  
e-mail: nooruddin.nu33@gmail.com
2. Dr. Md. Manajir Ali  
Professor  
Department of Paediatrics  
North East Medical College, Sylhet.
3. Dr. Md. Sadullah  
Assistant Professor  
Department of Community Medicine  
Sylhet MAG Osmani Medical College
4. Dr. Mujibul Haque  
Assistant Professor  
Department of Paediatrics  
Sylhet MAG Osmani Medical College
5. Dr. Syed Mortaza Ali  
Medical Officer  
UHC, Beanibazar, Sylhet.
6. Dr. Ismat Ara Yousuf  
Consultant  
Department of Obs & Gynae  
Islami Bank Hospital, Motijheel Branch, Dhaka.

### Introduction

Rickets is a disease of growing bone of children occurs only before fusion of the epiphysis<sup>1</sup>. It was first reported in Europe in the mid 1600s and was recognized as an important health problem in Bangladesh in 1991 after a devastating cyclone<sup>2</sup>. A national Rickets survey was conducted in Bangladesh in 2008 to measure the overall national prevalence of rickets among Bangladeshi children aged 1-15 year<sup>3</sup>. Rickets was found in every division with the highest prevalence reported in Chittagong division<sup>3</sup>. Helen Keller International (HKI) conducted surveys in 28 upazillas of Bangladesh in 2000 and 2004. Rickets was identified in over half of these upazillas with the highest prevalence in Chittagong and Sylhet divisions respectively<sup>4</sup>. The aim of the present survey was to determine the reason of high prevalence of rickets in Sylhet district and to find out the factors responsible for rickets.

### Materials and Methods

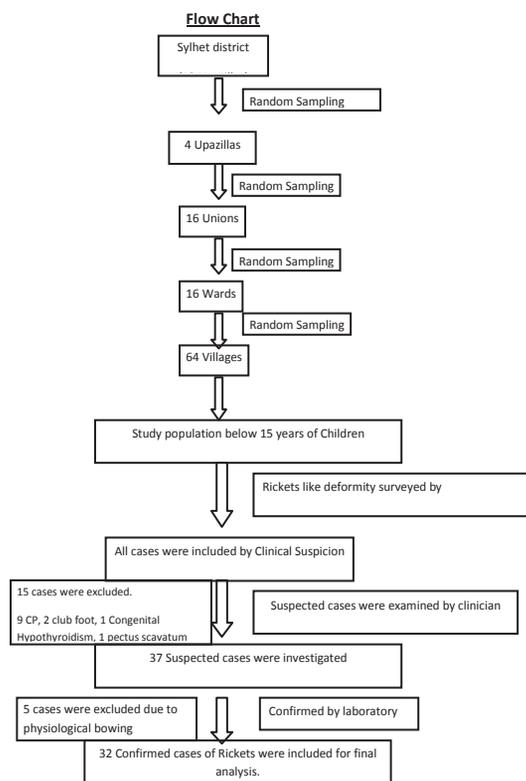
This is a cross sectional study. The children under 15 years of age were selected from villages/slums by multistage random sampling. These children were surveyed to find out any feature of rickets. The cases were seen by an expert and suspected cases were further investigated both radiologically and biochemically. Every 5<sup>th</sup> house hold was visited for identification of cases. The 1<sup>st</sup> one was selected randomly by lottery. The schools, madrasas and mosques of study areas were also visited for searching cases. For the study purpose 4 Health Inspectors (HI), one from each upazilla and 16 Health Assistants (HA), four from each upazilla of the study areas were selected and trained by workshop about the features of rickets and the use of questionnaires. After recognition of at least one feature of rickets, the cases were sent to SOMCH or Upazilla Health Complex. They were examined by investigator and suspected cases were selected for further investigations. 64 villages from four upazillas were randomly selected. A total of 52 cases presenting the features of rickets were primarily selected by the field workers. Bow legs, knock knee, windswept deformity, rachitic rosary, Harrison sulcus, swelling of the lower end of the long bones, box like head were the inclusion criteria for initial diagnosis. X-ray of both wrist joints was done and blood samples were collected for biochemical study.

Already diagnosed cases of rickets by physician and under treatment of rickets were also included. 15 patients were excluded from the study after initial assessment by physician. Among them 9 patients were excluded for cerebral palsies, 2 patients for club foot, 2 patients for JRA, 1 patient for congenital hypothyroidism and 1 patient for pectus excavatum with no other features of rickets. Five patients were presenting with bow legs but no radiological and biochemical evidence of rickets. Finally 32 confirmed cases were analyzed. After radiological and biochemical examination the final cases were analyzed. Data were collected by using a preformed structured questionnaires. Data were processed and analysed by using SPSS-16.

**Results**

In this study the prevalence of rickets in Sylhet district is 0.097%. Male children were more affected than female. The educational statuses of most parents were primary or below primary level.

Regarding economical status 68.75% of parents had <5000 tk per month, 21.8% have 5000-10000 tk per month and 9.37% parents had monthly income above tk 10,000. Study revealed that 43.75% had 5 or more sibs and 21.8% had less than 3 sibs. Forty six percent of affected children lived in rural area and 38% in the slum. Exposure to sunlight for more than 60 minutes per day was more than 84% of affected children. In this study regarding feeding habit rice was the stable food which was eaten more than one time by all the rachitic children. Only twenty five percent of children drank milk once a day.



The prevalence in Sylhet Sadar, Beanibazar, Biswananth and Gowainghat are 0.10%, 0.07%, 0.08% & 0.13% respectively (table-I).

Table-I: Prevalence of rickets in four specified upazills of Sylhet district from July 2009-June 2011.

Upazilla	Total number of population	No of rickets (%)	Prevalence
Sylhet Sada	9280	9 (28.12)	0.10%
Beanibazar	7171	5 (15.6)	0.07%
Biswanath	8245	7 (21.87)	0.08%
Gowainghat	8180	11 (34.37)	0.13%
	32,876	32 (100)	0.097%

Among the study cases under 5 children was 87.5%. The next highest rate was 6-10 years. Regarding sex male were more affected (71.8%) than female child (table-II).

Table-II: Prevalence of rickets by age and sex of the children.

Indicators	Prevalence	Percentage
Age (years)		
0-5	28	87.5
6-10	4	12.5
11-15	0	0
Sex		
Male	23	71.8%
Female	9	28%

Rickets was more in rural area. Forty six percent of affected children lived in rural area and the second highest was in the slum area (figure-1).

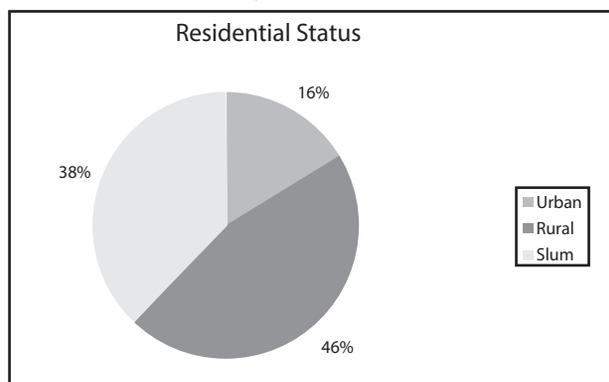


Figure -1: Residential Status.

Educational statuses of most parents were primary level (figure-2).

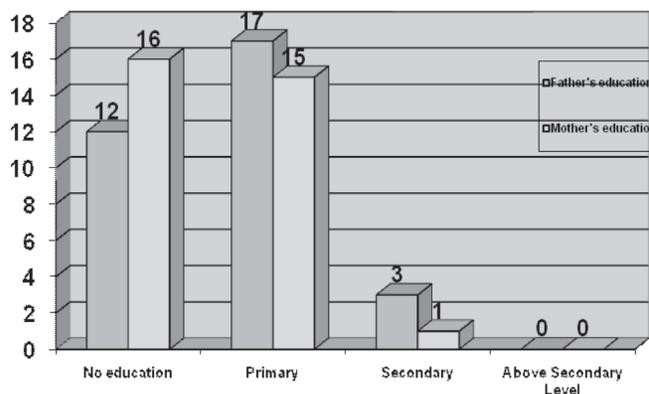


Figure -2: Parenteral education.

The monthly income of 68.75% parents had <5000 Tk per month, 21.8% had 5000-10000 Tk per month and 9.37% parents had above Tk 10000 (table-III).

Table-III: Family income.

Family income/month	Prevalence	Percentage (%)
< 5000 Tk	22	68.75%
5000 -10,000 Tk	7	21.8%
>10,000 Tk	3	9.37%
Total	32	100%

Fourteen (43.75%) families had 5 or more sibs and 21.8% had less than 3 sibs (table-IV).

Table-IV: Total number of sibs in the family.

Number of sibs	Prevalence	Percentage (%)
1	4	12.5
2	3	9.3
3	7	21.8
4	4	12.5
5	8	25
>5	6	18.75

Twenty seven children (83.37%) out of 32 were exposed to sunlight for more than 60 minutes/day. Two (6.25%) patients were exposed to sunlight for less than 30 minutes/day (figure-3).

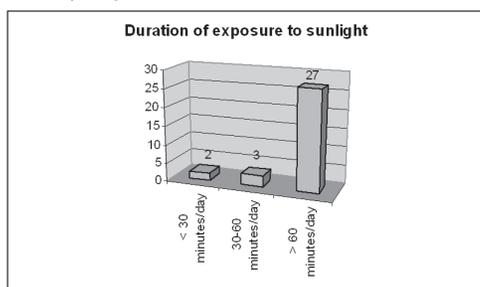


Figure-3: Prevalence of rickets in relation to sunlight exposure.

Food frequency for children in the last 24 hours showed that rice was the stable food of almost all of the rachitic children. Forty three percent of rachitic children ate leafy vegetables at least once a day and 28% children ate more than once a day. About half of the rachitic children ate small fish once a day and only nineteen percent of children ate small fish more than once a day. Only twenty five percent of children drank milk once a day and 15% of children drank milk more than once a day (figure-4).

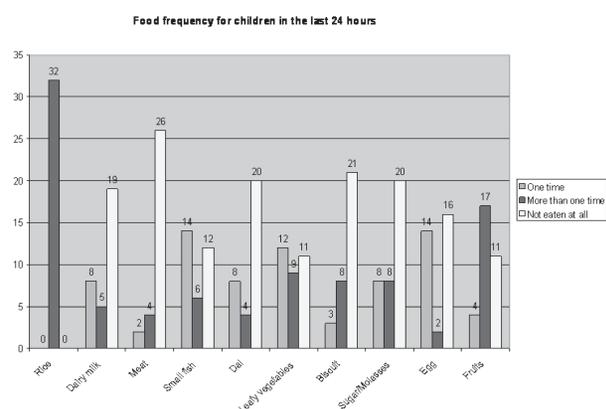


Figure-4: Food frequency for children in the last 24 hours.

## Discussion

Rickets is an emerging public health problem in Bangladesh. An International conference on rickets was jointly organized by Social Assistant and Rehabilitation for Vulnerable (SARPV) in January, 2006 claimed that there were 5 million rickets in Bangladesh<sup>5</sup>. According to that study 10.3% of under 14 years children were rachitic in Bangladesh. A national survey was conducted in 6 division of Bangladesh in 2008 where the prevalence of rickets was 0.99%. The highest prevalence was in Chittagong (2.19), then the second highest in Sylhet division (0.28%)<sup>3</sup>. This study was done to find out rickets among 32,876 children of 1-15 years from randomly selected 64 villages of four upazillas in Sylhet district. The prevalence of rickets is 0.097%. The result is lower than that of the national survey conducted in 2008. But it is still more than that of Khulna and Rajshahi where the prevalence is 0.07%<sup>3</sup>. A nation wide survey of lower limb rickets in Bangladesh was done by National Surveillance Project where the highest prevalence was reported in Cox's-Bazar upazilla (1.66%). In Sylhet division the highest prevalence was reported in Fenchuganj upazilla (0.66%). The causes of such high prevalence of rickets in those sunny areas might not be due to vitamin D deficiency, probably due to Calcium deficiency<sup>6</sup>. In this study sixty seven percent of the respondents had a monthly income less than Tk 5,000 followed by 21.8% had income between Tk 5000-10,000. This was similar to the national study of 2008. Rickets in low socioeconomic group was due to not promoting calcium rich food in children's diet<sup>3</sup>. Study revealed that 43.75% had 5 or more sibs and 21.8% had less than 3 sibs. This was similar to the Chakaria food system study where rickets were more prone to larger family size. Households with rachitic children in Chakaria had more children, more pregnant and lactating women which causes Calcium under nutrition<sup>7</sup>. In this study regarding feeding habit rice is the stable food which was eaten more than one time by all the rachitic children. Forty three percent of rachitic children ate leafy vegetables at least once a day and 28% children ate more than once a day. About half of the rachitic children ate small fish once a day and only nineteen percent of children ate small fish more than once a day. Only twenty five percent of children drank milk once a day and 15% of children drank milk more than once a day. The result is similar with that of the nation wide study by ICDDR, B where milk intake was very low by the rachitic children. In that study only 9% of children drank milk once a day and 5% of children drank milk more than once a day<sup>3</sup>. In this study educational statuses of the parents of rachitic children were either primary or below primary level. Illiteracy was a contributory factor of rickets due to lack of knowledge of the mothers of rachitic children as they had no idea about rickets and Calcium rich food<sup>3</sup>. Among the study cases under 5 children was 87.5% which

was similar to the study done by Bangladesh Rural Advancement Committee (BRAC) in 2003. Regarding sex, male children (71.8%) were prone to suffer from rickets. This was similar to the national study where 61% were male child<sup>3</sup>. A study in Pakistan suggested that there was an association between rickets and pneumonia where males were more affected than females with 1.9:1 male to female ratio<sup>8</sup>. A study in India suggested that female children were more prone to develop rickets as the male children receive precedence in the diet and female children were less exposed to outside environment<sup>9</sup>. Regarding the residential status 84% of rachitic children lived in rural and slum area where only 16% lived in urban area. The result was similar as the national study. Illiteracy, ignorance and poor socioeconomic condition were responsible for rickets<sup>3</sup>. In this study eighty four percent of children were exposed to sunlight more than 60 minutes/day where nine percent children were exposed to sunlight between 30-60 minutes/day. A study suggested that approximately thirty minutes of skin exposure to sunlight could provide all the needs of vitamin D to the human body<sup>10</sup>. A study in Karachi found that children living in high rise building were more vulnerable to rickets due to inadequate exposure to sunlight<sup>1</sup>. In this study regarding feeding habit rice is the staple food which was eaten more than one time by all the rachitic children. Forty three percent of rachitic children ate leafy vegetables at least once a day and 28% children ate more than once a day. About half of the rachitic children ate small fish once a day and only nineteen percent of children ate small fish more than once a day. Only twenty five percent of children drank milk once a day and 15% of children drank milk more than once a day. The result is similar with that of the nation wide study by ICDDR, B where milk intake was very low by the rachitic children. In that study only 9% of children drank milk once a day and 5% of children drank milk more than once a day<sup>3</sup>.

#### Conclusion

The prevalence of rickets in Sylhet district is 0.097% which is almost similar to other parts of Bangladesh. Common risk factors for developing rickets are low socioeconomic condition and carbohydrate rich dietary habit.

#### References

1. Larry, Greenbaum. Rickets and Hypervitaminosis D. In: Kliegman RM, Jenson HB, Behrman RE, Stanton BF. Nelson Text Book of Pediatrics. 18<sup>th</sup> ed. W.B. Saunders Company; 2007:253.
2. Rajakumar K. Vitamin D, cod-liver oil, sunlight and rickets: a historical perspective. *Pediatrics*. 2003; 112:132-5.
3. International Centre for Diarrhoeal Disease Research, Bangladesh. National Rickets Survey in Bangladesh. The Institutes; 2008.
4. Helen Keller International. Prevalence of lower limb rickets Bangladeshi children in 2004: a follow-up to the 2000 survey.
5. International Conference on rickets, Dhaka. Five million children affected by rickets. *The Daily Star*. 2006 Jan 21.
6. Karim F, Chowdhury A M, Gani M S. Bangladesh Rural Advancement Committee (BRAC), Public Health. 2003; 117:367-79.
7. Combs GF, Hassan N. The Chakaria food system study: household-level, case-control study to identify risk factors for rickets in Bangladesh. *Eur J Clin Nutr*. 2005; 59:1291-301.
8. Haider N, Nagi AG, Khan KM. Frequency of nutritional rickets in Children admitted with severe pneumonia. *Pak Med Assoc*. 2010;60:729-3.
9. Ghai OP, Pulin BK. Rickets in India, Rickets, edited by Francis H. Glorieux. Nestle Nutrition Workshop Series. Vol.21. Nestec Ltd. New York; 1991.
10. Holick MF. Vitamin D deficiency. *N Engl J Med*. 2007; 357:266-8.
11. Javed M, Mehnaj MA, Fatema GS. The Emerging Burden of Rickets: Impact of High Rise Building in Karachi; *A.P.M.C*. 2009;3:32-5.