DOI: 10.7860/JCDR/2014/9979.5274

Original Article

Orthopaedics Section

A Prospective Hospital Based Study of Childhood Orthopaedic Problems - A Case Series

SHARAT AGARWAL

ABSTRACT

Introduction: Children may present to an orthopaedic surgeon with congenital bone diseases, nutritional disorders like rickets, infective or traumatic due to fall etc of bones and joints.

Aim: To know the percentage, common orthopaedic problems and demographic profile of paediatric orthopaedic problem in patients attending the orthopaedic OPD of NEIGRIHMS.

Materials and Methods: The prospective study was conducted for the duration of one year from May'2012-May'2013 in the Department of Orthopaedics in North Eastern Indira Gandhi Regional Institute of Health & Medical Sciences (NEIGRIHMS), Shillong, India.

Results: In our study majority of the patients were in the age group of 11-15 y (37.4%), followed by the group of 0-5 y (25.6%). Majority of the paediatric orthopaedic patients came from the group of Rs.10,000/- to 30,000/- monthly income families (56.2%). The study showed that in majority (51.6%) of the cases trauma was the major cause for bringing the child to the medical center. Male children were most commonly affected, with playing as the most common mode of injury especially outdoor (60.3%) and fractures especially of upper limb were the most common form of presentation.

Conclusion: Our study here has given the bird's eye view of various pediatric orthopedic disorders as may be found in a tertiary health care setting. This may help in formulating training modules for the medical students in the subspecialty of pediatric orthopedics. However, more community based cross-sectional studies may be required to be undertaken to determine the prevalence & incidence of the various disorders found in our

Keywords: Bone & joint infections, North-east India, Paediatric orthopaedic problems, Paediatric trauma, Rickets

INTRODUCTION

A child is not a miniature adult & hence paediatric orthopaedics as orthopaedic subspecialty of orthopaedics is rapidly developing as it deals with children and with disorders which are common in children and may be different from adults. Children may present to an orthopaedic surgeon with congenital bone diseases, nutritional disorders like rickets, infective or traumatic due to fall etc. of bones and joints. It may be a useful endeavour to know the age, sex, demographic profile, racial, environmental, socio-economic factors in children with bone and joint disorders. The extent of orthopaedic problems in children may vary in different regions due to racial factors, environmental factors or geographical peculiarity of a terrain. It is imperative to know the extent of problem, before we can design and implement any preventive measures for any particular problem affecting the population in the given area. Childhood osteomyelitis, rickets and injuries in children have been found to have some correlation in geographically defined communities. In one of the studies, it was pointed out that children of younger and less educated parents have higher risk of injury [1]. In a study in New Zealand, it was found that acute haematogenous osteomyelitis is four times more common in Maori children than European children and has some correlation with skin and ear sepsis [2].

Lean M Ward et al., in a study of Vitamin D deficiency rickets amongst children in Canada found out that it is more common in children who reside in the north and among infants with darker skin who are breastfed without appropriate Vitamin D supplementation [3].

These studies highlight the importance of studying the regional distribution of different paediatric orthopaedic problem in a given geographical area as it may be related to certain predisposing factors prevalent in that population.

So, this study has been undertaken to find out the percentage, prevalence of various disorders like musculoskeletal trauma, congenital, metabolic or infective conditions and the demographic profile of paediatric orthopaedic patients attending the orthopaedic OPD of NEIGRIHMS, Shillong, India. This will help us to get an idea of the extent of bone and joint disease prevalent in children in the North-Eastern part of the country.

After studying the extent and nature of diseases it will help us to analyse the modifiable and non-modifiable predisposing factors. Strategies can then be formulated to prevent bone and joint disease in children so as to promote a healthy society with healthy adults by targeting the modifiable risk factors.

AIM

To know the extent of bone and joint disease prevalent in children in the North-Eastern part of the country.

MATERIALS AND METHODS

A prospective study was conducted in the Department of Orthopaedics at NEIGRIHMS, Shillong from May' 2102 to May' 2013.

All patients less than 18y of age attending the orthopaedic OPD were included in the study. Patients admitted into the ward through casualty were also included in the history. In each case a detailed history was under taken and thorough clinical examination was done. Relevant investigations pertinent to the case to establish the diagnosis were done.

Particulars of the patient in terms of place of incidence (urban/rural), family income, education status of patients etc. were taken. All this were studied as per the pre structured proforma. Data generated from the study was subjected to analysis subsequently.

In the study majority of the patients were in the group of 11-15y (37.4%), followed by the group of 0-5 y (25.6%) [Table/Fig-1]. In our study majority of the children came from the second group i.e. Rs.10, 000/- to 30,000/- monthly income families i.e. 56.2% [Table/Fig-2].

Age (y)	Nos.	Male	Female	Percentage (%)
0-5	65	41	24	25.6
6-10	45	29	16	17.7
11-15	95	67	18	37.4
16-18	49	38	11	19.2

[Table/Fig-1]: Distribution of the children in various age groups

Income group (Rs/per month)	Nos.	Percentage (%)
<10,000/-	74	29.1
10,000-30,000/-	143	56.2
>30,000/-	37	14.6

[Table/Fig-2]: Distribution of children on the basis of family income groups

Disease	Nos.	Percentage (%)
Congenital	25	9.8
Traumatic	131	51.6
Rickets	13	5.1
Infective	19	7.4
Others	66	26

[Table/Fig-3]: Distribution of children on the basis of diagnosis

Income group (Rs/month)	Trauma	Rickets
<10,000/-	28	8
10,000-30,000/-	81	5
>30,000/-	22	0

[Table/Fig-4]: Distribution of children suffering from two preventable causes (Rickets/ Traumatic) on the basis of income groups

Disease	Male		Female	
	Nos.	Percentage (%)	Nos.	Percentage (%)
Congenital	15	10.9	10	20
Traumatic	102	74	29	58
Rickets	7	5	6	12
Infections	14	10.1	5	10
Total	138		50	

[Table/Fig-5]: Sex based distribution of the children in 4 major groups

Modes of Trauma		Nos.	Percentage (%)
Accident (including pedestrian trauma, fall from >3ft. height and fall from bike		20	15.3
Playing	Outdoor	79	60.3
	Home	23	17.6
Others		9	6.9
Total		131	

[Table/Fig-6]: Distribution of children of trauma on the basis of the 'modes of injury'

Type of injury		Nos.	Percentage (%)
Soft tissue injury (STI)		63	48.1
Fracture	Upper limb	59	45
	Lower limb	9	6.9
Total		131	

[Table/Fig-7]: Distribution of the children suffering from trauma on the basis of the 'Type of injury'

Our study revealed Trauma as the major cause (51.6%) for bringing the child to the medical center [Table/Fig-3]. As regard to this category most of the children belonged to second (Rs.10, 000/- to 30, 000/-) monthly income group families (n=81).

In our study rickets was found in even second (Rs. 10,000/- to 30,000/-) income group families (n=5) indicating that this disease can affect children from all types of socio-economic backgrounds, and not just the poorer ones, and is primarily caused by low levels of vitamin D and certain foods. However, the factors responsible for the development of rickets in low & better income group may be different and require to be evaluated further [Table/Fig-4].

Male children were found most commonly injured (74%) as compared to female counterparts (58%). This gender difference is evident from other studies as well. This may be due to the fact that male children indulge more in outdoor sports than females [Table/Fig-5].

Playing was the most common mode of injury especially outdoor (60.3%). This probably needs emphasis on the supervision of the children by the adults during playing, looking into the safety concerns related to the playing environment including equipments [Table/Fig-6].

Fractures especially upper limb involvement was found in 45% cases of injury as compared to the lower limb involvement seen in 6.9% of the cases. In the study, the most common bone to fracture was the radius in 21 cases. Amongst these cases 16 cases were of fractures of the distal radius while in 5 cases both radius and ulna were fractured (Both bone forearm fractures) [Table/Fig-7].

DISCUSSION

Leanne M et al., [3] in a study of Vitamin D deficiency rickets amongst children in Canada found an overall incidence rate of 2.9 cases per 100,000 population. The mean age at diagnosis was 1-4 y. 65% children had lived in urban areas of their lives. 94% had been breast-fed and 2.9% had been fed on standard infant formula. Adolescent and young adults have greater Vitamin D demands and hence are more prone to Vitamin D deficiency in adolescents has been reported in cold and temperate countries, but a high prevalence has also been noted even in countries with adequate sunshine throughout the year.

Nutritional rickets is not rare among Indian children apparently due to inadequate exposure to sunlight and also due to malnutrition [4]. Anil Agarwal et al., [5] in his study on early adolescent nutritional rickets, studied 203 adolescents presenting to the orthopaedic OPD with clinical features of lower limb deformity, corpopedal spasm, joint swelling, a significant limp or non-traumatic joint pain. He screened them for nutritional rickets and found 51 to be suffering from nutritional rickets. Out of these 40 were females and 11 were males. A female preponderance in nutritional rickets may be due to discrimination against female gender in India [5].

The majority of the patients in our study fall in the income group of Rs.10,000/- to 30,000/- per month (middle group). This may be a bias perhaps due to very low income group patients may not be attending a tertiary level hospital. In a community based cross sectional survey the results may be bit different. The higher income group children may be getting a better care at home, so the incidence was found low in our study. Ricketic disorder in our study was seen in even families with income between 10,000/- to 30,000/ per month which precludes undernourishment as the potential cause of rickets. This may require community based cross sectional studies to find out the possible factors including food patterns responsible for the vitamin D and calcium deficiency. This may help in devising the preventive strategies to combat the problem at the community level. A more detailed analysis is required to ascertain whether such an observation of such large numbers of preventable disorder cases in these two subgroups of preventable causes (trauma & rickets) in such middle income group families is perhaps due to lack of children supervision due to parental working pressures or not in this region of the country.

The public health importance of childhood injuries and the need for the development of effective preventive strategies is widely recognized. However, there are only very few such studies on the incidence of childhood injuries in geographically defined communities.

A study was undertaken in a small town of Greece to monitor all children who sustained an injury aimed at identifying socio-

demographic, somatometric or health related injury risk factors [1]. They found an incidence rate of 28.2 injuries per 100 children over a period of one year. The incidence of total injuries were significantly higher among boys than among girls ($p<0.01$). About 50% of the injuries occurred in and around the home environment and the most frequent type of injury was the open wound. Brownall et al., [6] found in their study that injury is the leading cause of death among Canadian children between 1 and 19 y of age. They also highlighted that the motor vehicle crashes were the leading cause of injury related mortality, falls were the leading cause of injury related hospitalization and that higher injury rates were associated with lower income levels.

In a study in Germany on accidents in pre-school children, it was found that boys had 33% more accidents than girls, about 3/4th of all accidents took place in home or in its direct environment and the following accidents occurred particularly often- fall from stairs, fall from playground equipments, fall from bicycle and high bed [7]. Rehman R found in his study of childhood injuries seen at the emergency department in Pakistan that boys experienced significantly higher rates than girls at home and that the most common mechanism of injury was fall [8]. In a study done to evaluate childhood injuries in rural north India, it was found that children in the age group of 0-14 y accounted for 30% of all injury cases of which 42% were injured at home, 35% on roads, 8% in farms. The maximum number of injuries was due to fall (35%) [9].

In our study, which has studied 254 patients found trauma amongst the various other major categories studied namely infections, rickets and congenital causes as the major cause of patients attending the hospital. Trauma suffered was mainly during outdoor playing especially involving the upper limbs and was more common in boys than girls. It was found in all the income groups. The bone most commonly involved in the trauma was radius. During 16-18 y, fall from bike was found to be the most common cause of injury. This may be attributed to the child moving from the protected environment of travelling with parents or elder siblings to states of independent travel along with an urge to take risks, experiment with various devices like vehicles thus increasing their vulnerability to all types of injuries. This may be due to acuteness of the presentation and subsequent disability of the child with associated parental or guardian apprehension. The psychological characteristics of children like impulsiveness, curiosity, low levels of concentration, lack of supervision from the adults during the activity makes them really vulnerable to injuries [1]. Rickets was found to be least common (5.1%). This may be due to adequate sunshine available along with the non-polluted environment in this part of the country thus providing the vital source of vitamin D [4]. However, more cross sectional specific community based studies are required to establish such a presumption.

Haematogenous osteomyelitis is an inflammation of bone and bone marrow, usually caused by bacterial infection but occasionally caused by fungi, viruses and parasites. In a population based Norwegian study on childhood osteomyelitis, the annual incidence rate of osteomyelitis was 13 per 100,000 children under 16 y of age. The incidence of non-vertebral osteomyelitis was higher than the vertebral osteomyelitis. The incidence of osteomyelitis was higher in patients under the age of 3 y than in older children [10].

Prevalence of infection was found to be low (7.4%) as also the congenital orthopedic problems (9.8%) which were mainly idiopathic CTEV, CDH, lobster claw hand, congenital trigger thumb, arthrogryposis multiplex congenital, Stuve Weidman's syndrome with scoliosis, Hyper laxity syndrome, muscular dystrophy, idiopathic dorsal scoliosis and hemophilic arthropathy. However, this may not reflect the actual magnitude of the problem as ours is a tertiary health care center and many such problems may be attended to at other primary and secondary health care levels. So, cumulative data involving all such centers in the region may be of help in giving the actual picture about the prevalence and distribution of the bone, joint & soft tissue infections and various congenital orthopedic disorders.

Other disorders which were seen in our study includes Osgood Schlatter's disease, tumors like osteochondroma, osteogenic sarcoma of tibia, femur and pelvis, postural neck and back pains, growing pains, cerebral palsy, transient synovitis hip, chondromalacia patellae, recurrent non reactive non-inflammatory arthralgia, dorsal ganglion wrist, myalgia legs, non-specific sacroilitis, Juvenile Rheumatoid arthritis (JRA), neuroma ankle, Raynaud's phenomenon, corn foot and coccydynia.

On search of the literature, we could not find any Indian study on childhood osteomyelitis or congenital bone diseases. Hence the relevance of this study, to find the various types of paediatric orthopaedic problems, in Indian scenario, especially the northeast.

CONCLUSION

Our study here has given the bird's eye view of various pediatric orthopedic disorders as may be found in a tertiary health care setting. This may help in formulating training modules for the medical students in the subspecialty of pediatric orthopedics. However, more community based cross-sectional studies may be required to be undertaken to determine the prevalence & incidence of the various disorders found in our patients.

REFERENCES

[1] Petridou E, Anastasiou A, Katsiardanis K, et al. A prospective population based study of childhood injuries: the Velestino town study. *Eur J Public Health.* 2005;15(1):9-14.
[2] Gillespie WJ. Racial and environmental factors in acute haematogenous osteomyelitis in New Zealand. *N Z Med J.* 1979;90(641):93-95.
[3] Leanne M, Ward, Isabella Gaboury, et al. Vitamin D-deficiency rickets among children in Canada. *CMAJ*. 2007;177(2):161-16.
[4] Raghuramulu N. Aetiology of rickets in India. *Indian Journal of Paediatrics.* 54; (4):521-27.
[5] Anil Agarwal, Divesh Gulati. Early adolescent nutritional rickets. *Journal of Orthopaedic Surgery.* 2009;17(3):340-45.
[6] Brownell M, Friesen D, Mayer T. Childhood injury rates in Manitoba: socioeconomic influences. *Can J Public Health.* 2002;93(suppl 2):550-56.
[7] Kersting-Durrwachter G, Mielck A. Accidents in preschool children in the Boblingen district-accident causes and risk group. *Gesundheitswesen.* 2001;63(5):335-42.
[8] Rehmani R. Childhood injuries seen at an emergency department. *J Pak Med Assoc.* 2008; 58(3):114-18.
[9] *Mohan* D, Kumar A, Varghese M. Childhood injuries in rural north India. *Int J Inj Cntr Saf Promot.* 2010;17(1):45-52.
[10] Riise OR, Kirkhus E, Handeland KS, et al. Childhood osteomyelitis-incidence and differentiation from other acute onset musculoskeletal features in a population based study. *BMC Pediatr.* 2008;8:45.

PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Orthopaedics & Trauma, North Eastern Indira Gandhi Regional Institute of Health & Medical Sciences (NEIGRIHMS), Shillong, Meghalaya, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Sharat Agarwal,
Associate Professor, Department of Orthopaedics & Trauma, North Eastern Indira Gandhi Regional Institute of Health & Medical Sciences (NEIGRIHMS), Shillong, Meghalaya, India.
Phone : +91-9436336213, E-mail : drsharat88@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **May 13, 2014**
Date of Peer Review: **Jul 22, 2014**
Date of Acceptance: **Sep 17, 2014**
Date of Publishing: **Dec 05, 2014**