International Journal of Contemporary Pediatrics
Chinnappa GD et al. Int J Contemp Pediatr. 2020 Jun;7(6):1232-1236
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20202026

Original Research Article

Nutritional status and growth of children with hemophilia: a cross-sectional study

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Received: 03 April 2020
Accepted: 23 April 2020

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ABSTRACT

Background: Haemophilia A and B are the most common severe bleeding disorders and are inherited as X linked recessive pattern. The main clinical manifestations include bleeding into musculoskeletal sites or soft tissues mainly causing joint impairment and thus resulting in various morbidities. Prophylaxis therapy and inhibitor management have contributed a lot to the management of haemophilia cases. However in resource poor setting countries, like India, availability of factors, prophylactic therapy is farfetched leading to joint abnormalities, decreased physical activity and thus leading to different nutritional states. Studies from developed countries reveal obesity and overweight instances in children with Hemophilia. However not many studies have been undertaken to evaluate the nutritional status of such children in India.
Methods: This study was conducted in the Comprehensive hemophilia Care Centre, Victoria Hospital, attached to Bangalore Medical College. A total of 50 children were included in the study. Children aged between 4 and 18 years attending the hemophilia Clinic were included in the study. Observations and review of relevant documents were done.
Results: Among 50 children of haemophilia, 18(36%) children were aged less than 10 years and 32(64%) children were aged more than 10 years. The mean age of onset of disease in haemophilia A was 27.5 months (SD of 24.84; range 6-120) and in haemophilia B was 8 months (SD of 2.72; range 3-12). The mean BMI among children aged more than 10 years was more (21.35; SD= 4.02) compared to the children less than 10 years (16.87; SD= 3.41).
Conclusions: The prevalence of overweight and obesity among children with Haemophilia is more in adolescent age group compared to children in the first decade.

Keywords: Body mass index, Haemophilia, Malnutrition, Nutritional status, Obesity

INTRODUCTION

Haemophilias are hereditary bleeding disorders caused by absence or deficiency of plasma clotting factors, resulting in prolonged and uncontrolled bleeding either spontaneously or following trauma. Two types, Hemophilia A and B are present caused by the deficiency of clotting Factor VIII and IX, respectively. Both are inherited as X linked recessive pattern and are clinically indistinguishable.[1] The use of the term, Hemophilia was ascribed to Schonlein in 1820s. The clinical manifestations in both are identical, with musculoskeletal, soft tissue, and mucocutaneous bleeding.

The severity of bleeding is classified based on the activity level of the deficient clotting factor.[2] Haemophilia is traditionally classified as ‘mild’, ‘moderate’, or ‘severe’,

depending on the degree of clotting factor activity level, compared with that found in the general population. Mild hemophilia is defined as a factor activity level >5% and <40 %, Moderate hemophilia as a factor activity level ≥1 % and ≤5 % and Severe hemophilia as factor activity level <1 percent of normal population.

Recurrent joint bleeds may cause synovial proliferation and inflammation with end stage degeneration leading to hemophilic synovitis and hemophilic arthropathy, respectively and also with pain and limitation of motion severely affecting patients quality of life. Repeated bleeding into joints can result in abnormalities in both bone growth and limb length. Patients are also at increased risk of developing osteoporosis as a result of prolonged periods of immobility and reduced range of joint movement due to arthropathies.[3]

The management of patients with haemophilia is complex as their condition is associated with a large number of comorbidities. In recent decades, advances in hemophilia care**,** such as prophylaxis therapy and inhibitor management have improved the quality of life and prolonged the survival for patients with hemophilia.[4]

Replacement therapy uses intravenous infusions of the deficit clotting factor to reduce the risk of bleeding, and patients may receive this at regular intervals (prophylactic therapy) or in response to an acute bleeding episode (on-demand therapy).[5] However, the availability of replacement factor for prophylactic treatment still varies between regions, with continued restricted access in developing nations and poor long-term outcomes observed with episodic treatment.

Advances in treatment may allow greater scope to address the comorbidities, that impact haemophilia management, including overweight and obesity. In the context of haemophilia, overweight and obesity are expected to further add to the burden of disease; however, their prevalence in the global haemophilia population is currently unclear. There are significant challenges in managing haemophilia patients in developing countries. It should be mentioned that due to cost and lack of specialized care, access to replacement therapy is, to a large extent, limited to developed countries only.[6,7]

Joint problems resulting from recurrent haemarthrosis, such as chronic synovitis and degenerative arthritis, are a major cause of morbidity. Children with haemophilia experience a progressive deterioration of their functional health status. Regular clinical assessment of functional health status provides insight into their process of disablement.[8]

In severe haemophilia, particularly, the excess body adiposity accelerates the loss of joint mobility, especially in weight bearing joints. Also control of body weight, physiotherapy of the affected joints and effective treatment of bleeds should be implemented together, to achieve better range of joint movements as outcomes in children living with hemophilia.[9]

Increasing prevalence of obesity in children living with Hemophilia has been reported which is an emerging challenge. From western countries, there have been some studies on prevalence of obesity and its impact on bleeding. Repeated joint bleeding and impaired joint function can lead to a reduction in physical activity in children living with Hemophilia and consequently increase their risk of obesity. Reports also suggest that increased BMI can lead to more joint bleeding and more consumption of clotting factor treatment for children living with Hemophilia. Prevalence of overweight and obesity in children living with Hemophilia vary among different countries and reports from Asian countries are very limited.[10]

METHODS

The study was an observational cross sectional study. The main aim of the study was to evaluate the weight, height and Body Mass Index (BMI) of children with Hemophilia.

Inclusion criteria

- All children registered under the Hemophilia Clinic.

Exclusion criteria

- Children below 4 years and above 18 years and Children with acute bleeds within 2 weeks prior to registration.

This study was approved by the ethics review board of this institution. Children were registered for the study after written informed consent from parents or Legally Authorized Representative (LAR). The study was conducted between November 2017 to May 2019.

Demographic data of all children with Haemophilia were collected like name, age, duration of illness, consanguinity, siblings or relatives with similar diseases etc. The examination data such as body weight, body height, Body Mass Index (BMI) and other clinical information including hemophilia type and severity, inhibitor status, hepatitis B virus (HBV) infection, hepatitis C virus (HCV) infection, and human immunodeficiency virus (HIV) infection were obtained and analyzed.

A detailed examination including anthropometric measurements, Head to toe examination, target joints and Joint Health Status (JHS) was recorded.

Statistical analysis

The collected data was analyzed using SSPS-Inc, Chicago v 18.5; Descriptive statistics and One Way ANOVA tests were used to test the hypothetical results.

RESULTS

Patient characteristics

The study comprised of 50 children and among them, there were 42(84%) children with Haemophilia A and 8(16%) children with Haemophilia B. The severity of Hemophilia was Mild in 2(4%) children, Moderate in 5(10%) and Severe in 43 children (86%). The Mean age of onset of disease in haemophilia A was 27.5 months (SD of 24.84; range 6-120) and in haemophilia B was 8 months (SD of 2.72; range 3-12) and the difference was statistically significant (P value <0.05). The mean ages of the children were10.9 years (SD of 4.03;range 4-17). Mean duration of illness was 8.7 years (SD of 4.06; range 2-16). Positive sibling/family history of Haemophilia was present in 19 children (38%).Serum inhibitors for factor was present in 8(16%) children. There were no associated Human Immunodeficiency Virus infections, Hepatitis B or Hepatitis C infections among any of the children under the study. There were 18(36%) children aged 10 years or less and 32(64%) children aged more than 10 years. The Mean BMI among children was 19.11(SD-3.71) (Table 1).

Table 1: Mean and standard deviation of children among two groups.

Age group	Numbers	BMI value (Mean±SD)
≤10 years	18(36%)	16.87±3.41
>10 years	32(64%)	21.35±4.02
Total	50	19.11±3.71

Table 2: Proportion of underweight, normal weight, overweight and obesity among children with haemophilia.

Age group	Underweight	Normal	Overweight	Obesity	Total
≤10 years	01(5%)	10(55%)	5(28%)	2(12%)	18
>10 years	02(6%)	19(60%)	5(16%)	6(18%)	32
Total	03(6%)	29(58%)	10(20%)	8(16%)	50

Table 3: One-Way ANOVA test for Mean BMI among children with haemophilia.

Age group	Numbers	Mean	SD	SE	F-Stat	p-value
≤10 years	18	16.8	3.41	0.80	16.36	0.0002 (<0.01)
>10 years	32	21.35	4.02	0.71		

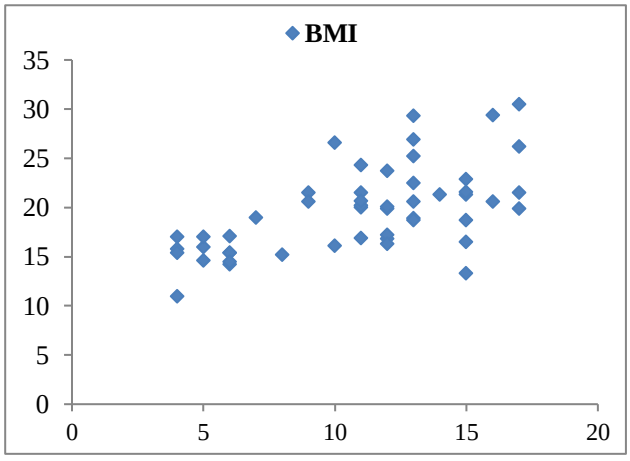

Figure 1: Distribution of BMI among various age group from 4 years to 18 years.

The proportion of underweight, normal, overweight and obesity among children with hemophilia aged less than 10 years were 1(5%), 10(55%), 5(29%) and 2(11%) and in children above 10 years were 2(6%), 19(59%), 5(16%), and 6(19%), respectively (Table 2).

There were 2(12%) children who were under 10-years of age with obesity. The prevalence of underweight and normal weight was almost similar among both the groups. Proportion of overweight was more among children ≤10 years (5, 28%) and that of obesity (6, 18%) was more among children >10 years.

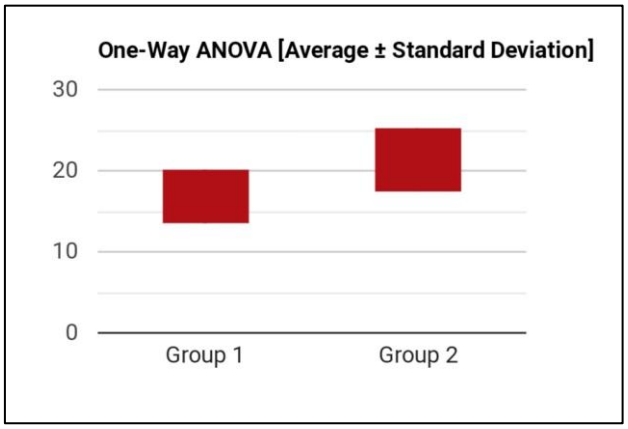

Figure 2: One-Way ANOVA test for Mean BMI among Group 1 (aged ≤10 years) and Group 2 (aged >10years).

Mean BMI among children aged more than 10 years was more (21.35 with SD of 4.02) compared to other group (16.8with SD of 3.41) Table 3.

DISCUSSION

The prevalence of obesity varies in different ethnicities, different countries with conflicting comparison to the general population. According to the data of Center for Disease Control (CDC) in 2005, prevalence of overweight and obesity was more in children with Hemophilia (58%) than normal population (54.9%). In 2005, CDC reported rate of overweight in children with hemophilia was 20% to 21% which was true in this study also (20%).[10] Prevalence of overweight and obesity among Hemophilia adolescent children in this study (36%) was higher than the normal adolescents of this country as observed by Mohan et al, (19.3%).[13] The proportion of haemophilia A was more in this study (84%) similar to Majamdar et al, study(81%) and Chia-Yau Chang et al, study(90%).[13,14] Proportion of Severe haemophilia among the severity of disease was more in this study(94%) similar to Chia-Yau Chang et al, study (77.8%).[12,4]

Proportion of inhibitors for clotting factors was more in this study (16%) compared to Soucie et al, study (7.6%) probably because number of children included in the later study was more.[9] The Mean age of the children in this study (10.9 years) was almost similar to Soucie et al, study (9.2 years).[9] The mean BMI of children of haemophilia in this study (19.11) was less when compared to Chia-Yau Chang et al, study (20.4) probably because proportion of children aged less than 10 years were more (36%) compared to Chia-Yau Chang et al, study(32%).[4]

The difference between Mean BMI among children aged less than 10 years and more than 10 years was statistically significant($p < 0.01$) in this study similar to Majamdar et al, study probably due to the fact that longer duration of the disease, more number of joint bleeds, high prevalence of arthropathy leading to reduced physical activity among adolescents.[12]

The prevalence of obesity among children aged less than 10 years in this study, was 12% compared to 18% among children aged more than 10 years which was similar to Chia-Yau Chang et al, study (0% and 27.6%) and Majamdar et al, study(16% and 30%).[11,12,4] The prevalence of overweight and obesity combined among children of Haemophilia in this study (36%) was similar to Majamdar et al, study (37%) but was more compared to Soucie et al, study (32%) probably because the mean age of children (10.4 years) was more in this study compared to Soucie et al, study(9.2).[12,9]

Limitation of this study is sample size included in the study was less. Physical activity among children with Hemophilia was not evaluated. Association of risk for developing overweight and obesity with severity of the disease, presence of inhibitors, number of joint bleeds and development of arthropathy was not assessed.

CONCLUSION

Among the children included in the study majority were Hemophilia A and had severe form of the disease. The manifestation of joint bleed was earlier in Hemophilia B. Proportion of obesity was more in children aged more than 10 years compared to children of first decade. The difference between Mean BMI among children aged less than 10 years and more than 10 years was statistically significant implicating that risk for developing overweight and obesity increased with age among Hemophilia children.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Chinnappa GD, Venugopal S, Varadarajan M, Kariyappa M, Smitha R. Nutritional status and growth of children with Hemophilia: a cross-sectional study. Int J Contemp Pediatr 2020;7:1232-6.