Joint Health Status of Hemophilia Patients in Jodhpur Region

Vikas Payal · Pramod Sharma · N. P. Chhangani ·
Yojana Janu · Yudhavir Singh · Akash Sharma

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Abstract Hemophilia refers to a group of bleeding disorders in which there is a deficiency of one of the factors necessary for coagulation of the blood. Susceptibility to joint hemorrhage in persons with Hemophilia suggests that the routine assessment of joint health is an important aspect of clinical management and outcome studies assessing the efficacy of treatment. This prospective study was conducted to study joint health status in Hemophilia patients and draw their joint disability score by using Hemophilia Joint Health Score (HJHS). Out of total 56 cases 51 (91.07 %) cases were diagnosed as hemophilia A while 5 cases (8.92 %) were diagnosed as hemophilia B. According to their factor level 44 % cases had severe 36 % had moderate and 20 % had mild disease. Knee joint was the predominant joint affected by hemarthrosis in 67.85 % cases followed by ankle joint (51.7 %) elbow joint (35.7 %), hip joint (12.5 %), shoulder joint (5.3 %) and proximal metacarpophalangeal joint (1.78 %). Out of total 37.5 % patients of hemophilia had developed target joint. Knee joint was the predominant target joint in 28.57 % cases and ankle joint was the target joint in 8.92 % cases. Maximum number of patients (40.47 %) had HJHS score of zero. The mean HJHS score was 6.78 ± 9.04 . HJHS score showing significant positive correlation with age of patient ($p < 0.0001$). Most risky period and most aggravating development of hemophilic joint damage starts from 7 years of age. Therefore, treatment decisions, such as starting

prophylaxis, should be tailored according to bleeding pattern and age of patients rather than based on the clotting factor activity levels.

Keywords Hemophilia joint health score · Hemarthrosis · Target joint

Introduction

Hemophilia refers to a group of bleeding disorders in which there is a deficiency of one of the factors necessary for coagulation of the blood. The two most common forms of the disorder are factor VIII deficiency (Hemophilia A or Classic Hemophilia) and factor IX deficiency (Hemophilia B, or Christmas disease) [1, 2].

Hemophilia A accounts for around 80 % of cases [3]. The incidence of Hemophilia A is around 1 in 5,000 male births [3]. Hemophilia B (also known as Christmas disease) accounts for the remaining 20 % of cases. The incidence of Hemophilia B is around 1 in 25,000 male births [3].

Hemophilia is not a disease of public health relevance in India. It, being a rare condition, which is non-communicable, chronic and extremely expensive to treat. Thus, this condition does not attract any government resources. Under such circumstances, data collection for Hemophilia acquires very low priority. Consequently there is very little information on the disorder and its trends in the population.

Recurrent and spontaneous joint bleeding or hemarthrosis is the most frequent manifestation of hemophilia. The most affected joints, in decreasing order of frequency, are the knees (accounting for one half of all hemarthroses), elbows and ankles [4]. Therefore, these joints are often called 'index joint'. Repeated hemarthrosis leads to the development of target joints, which are more prone to continuous bleeding and the

V. Payal (✉) · P. Sharma · N. P. Chhangani · Y. Singh ·
A. Sharma
Department of Pediatrics, Umaid Hospital, Dr S. N. Medical
College, Jodhpur, Rajasthan, India
e-mail: drvikaspayal@gmail.com

Y. Janu
Defence Research and Development Organisation (DRDO),
Jodhpur, India

development of chronic arthropathy. Target joint is defined as a single joint that has experienced three or more bleeds in a consecutive three-month period [5]. Susceptibility to joint hemorrhage in persons with Hemophilia suggests that the routine assessment of joint health is an important aspect of clinical management and outcome studies assessing the efficacy of treatment.

The current standard for diagnosis and assessment of arthropathy is the World Federation of Hemophilia (WFH) Physical Evaluation Scale, which has served as an important measure of joint outcome [6]. However, over the past two decades; limitations of the WFH Physical Evaluation Scale have become apparent. The International Prophylaxis Study Group developed the Hemophilia Joint Health Score (HJHS) in 2002 based on expert review of previously existing measures and consensus of the most relevant items. The HJHS is an 11-item scoring tool for assessing joint impairments of the six index joints in boys with Hemophilia aged 4–18 years. It was developed to be sensitive to minor changes in joint health.

The Indian scenario is also characterized by chronic shortage of treatment products, incomplete treatment due to poor purchasing power of patients and extreme physical, economic and emotional trauma for patient and his family members. Furthermore, due to economic reasons patients repeatedly use blood and blood products as a cheaper alternative to factor concentrates, thus exposing themselves to the risk of transfusion related infections. Poor use of factor concentrates manifests as progressive crippling disability, the extent and associated social costs of which are unknown. So Government of Rajasthan declared to provide all hemophilia patients free medical facility under “Mukhya Mantri BPI Jeevan Raksha Kosh Yojana”. This study has been designed to study joint health status in Hemophilia patients in Jodhpur region and draw their joint disability score by using HJHS score.

Materials and Methods

The present study was a prospective study conducted in the Department of Pediatrics, Umaid Hospital, Dr. S.N. Medical College Jodhpur for a period of 12 months from October 2012 to September 2013. Total 56 diagnosed cases of Hemophilia (diagnosed by Factor Assay) aged less than 18 years and resident of Jodhpur region were included in this study through newspaper advertisements, pamphlets and notices placed in the hospital campus patients known or suspected to be hemophiliacs were asked to get themselves enrolled in the hemophilia registry created as per the directives of Government of Rajasthan.

A detailed history was taken regarding age of first joint bleed, average number of joint bleeding episodes in last

1 year, most affected joints in decreasing order of frequency and target joints (if developed). All patients were subjected to factor VIII & IX assay, if not previously done.

Out of 56 cases, 42 cases were between 4 and 18 years of age were assessed for joint impairment by HJHS score 2.1 version. This is an eight item scoring tool for assessing joint impairments of the six index joints in boys with Hemophilia aged 4–18 years. Each of the six index joints were evaluated individually by trained physiotherapist. Each joint was then scored using all eight items, with a joint score ranging from 0 to 20. Global gait was assessed separately for a score of 0–4. The total joint scores and global gait score were then combined for a total score ranging from 0 to 124.

Statistical Method

Statistical analysis was performed by using Chi square test to find out the significance of difference in Mean between two variables and Spearman's correlation coefficient (ρ) to find out correlation between two variables.

Results

A total of 56 diagnosed cases of hemophilia aged less than 18 years attending the hemophilia clinic and those admitted to the hospital were enrolled in the present study. Out of them 51 (91.07 %) cases were diagnosed as hemophilia A while five cases (8.92 %) were diagnosed as hemophilia B. According to their factor level **25 (44 %)** cases had severe disease while **20 (36 %)** had moderate disease and 11 (20 %) had mild disease (Fig. 1).

Knee joint was the predominant joint affected by hemarthrosis in 67.85 % cases. Ankle joint was involved in 51.78 % cases and elbow joint was involved in 35.71 % cases. Hip joint and shoulder joint involvement was seen in 12.5 % and 5.35 % cases respectively. Only one case (1.78 %) had proximal metacarpophalangeal joint involvement (Table 1). 37.5 % patients of hemophilia had developed target joint. Knee joint was the predominant

Fig. 1 Distribution of severity

Table 1 The frequency and distribution of joint involvement in cases of hemophilia

Joints involved	Total	
	No.	%
Knee	38	67.85
Ankle	29	51.78
Elbow	20	35.71
Hip	7	12.50
Shoulder	3	5.35
Proximal metacarpophalangeal	1	1.78

Table 2 The distribution of target joint in cases of hemophilia

Target joints	Total	
	No.	%
Knee	16	28.57
Ankle	5	8.92
Elbow	0	0
Total	21	37.50

Table 3 HJHS score in hemophilia

No.	Total (42)	
	No.	%
0	17	40.47
1–10	14	33.33
11–20	9	21.42
21–30	0	0
31–40	2	4.76

target joint in 28.57 % cases and ankle joint was the target joint in 8.92 % cases (Table 2).

Out of total 56 enrolled patients, 42 patients (age >4 yr) HJHS score drawn. Out of 42 cases 21 cases (50 %) had severe, 13 cases (31 %) had moderate and 8 cases (19 %) had mild hemophilia. Maximum number of patients (40.47 %) had HJHS score of zero which means that there was no joint complication. 33 % of cases had HJHS score 1–10 followed by 21 % of hemophilia patients who had scores of 11–20 (Table 3). The mean HJHS score of severe, moderate and mild hemophilia was 7.61 ± 9.34 , 5.69 ± 9.96 and 6.37 ± 7.38 respectively and difference was non significant ($p > 0.05$). The mean HJHS score was 6.78 ± 9.04 . No correlation was found between HJHS score and factor level. Spearman correlation coefficient was 0.07 and p value was ($p = 0.64$) which is statistically non significant (Fig. 2). HJHS score showing significant

Fig. 2 Scatter statistical graph showing correlation of HJHS score with factor level

positive correlation with age of patient. Spearman corre-

Fig. 3 Correlation of HJHS score with age **Fig. 4** Liner diagram of HJHS score with age

lation coefficient was 0.54 and p value was ($p < 0.0001$) which is statistically highly significant. So with increasing age HJHS score increase (Fig. 3).

In present study when HJHS score was plotted against age of patient. Moving average trend line indicated that a worsening of the HJHS score was noticed with increasing age and most risky period and most aggravating development of hemophilic joint damage starts from 7 years of age (Fig. 4).

Discussion

In our study knee joint was the predominant joint affected by hemarthrosis in 67.85 % cases, ankle joint was involved in 51.78 % cases and elbow joint was involved in 35.71 % cases. Hip joint and shoulder joint involvement was seen in 12.5 % and 5.35 % cases respectively.

Similar results were observed by Karim MA et al. in a study in Bangladesh. In their study, knee joint swelling was present in 68 % cases of Hemophilia followed by ankle joint (22 %), elbow joint (14 %), shoulder joint (8 %), and hip joint involvement (6 %) [7]. In a study by Shahida Mohsin et al. on Hemophilia B patients, most commonly involved joint was found to be knee in 15 cases (33.3 %), followed by elbow in 17.7 %, ankle in 13.3 %, and hip joint in 4.5 % [8].

In our study most commonly involved joint was knee joint which is similar to observation of Shahida Mohsin et al. In our study next to knee joint in order of frequency was ankle and elbow joint contrary to Shahida Mohsin et al. who reported more involvement of elbow joint. Our results may be due to more involvement of knee joint with abnormal gait which predispose to repetitive ankle hemarthrosis or may be due to higher physical activity level.

In the present study 37.5 % patients of Hemophilia developed target joint. Knee joint was the predominant target joint in 28.57 % cases and ankle joint was the target joint in 8.92 %.

In our study in a total of 42 patients HJHS score was calculated. Mean HJHS score was 6.78 ± 9.04 . Majority of patients i.e. 40 % cases had HJHS score 0 which means normal joints. No significant correlation was found between HJHS score and factor level.

Contrasting results to our study were observed by Christoforidis et al. This study involved 26 patients with Hemophilia A with a mean age of 12.08 years (standard deviation [SD] 4.44). Seventeen patients had severe Hemophilia A (residual factor activity <1 %) and nine had moderate Hemophilia A. The mean HJHS for moderate Hemophilia was 4.83 (SD 5.27, range 0–15), and for severe Hemophilia was 8.27 (SD 6.11, range 0–23; $p = 0.24$) [9].

This may be due to the fact that age is a major confounding factor in our study. Therefore, HJHS score not only depends on factor level but also on other factors like age of patients, number of joint bleeding, age of first joint bleeding, physical activity limit, Body mass index and presence of target joint.

These results may also be due to the low number of patients. In our study 70 % patients were from rural areas. Severe hemophilics have significant arthropathy so they respond well to our call but in mild hemophilics only patient with severe joint involvement comes in our center from remote areas. This is reflected by small sample size of

mild hemophilics (8 cases 19 %) in our study with relatively high proportion of joint involvement (mean HJHS score 6.37 ± 7.38).

HJHS score showed significant positive correlation with age of patient indicating that a worsening of the HJHS score was noticed with increasing age and most risky period and most aggravating development of hemophilic joint damage starts from 7 years of age.

Similar results are reported by Trakymiene et al. (2010), who reported that the mean total HJHS in the study cohort ($n = 20$) was 24.5, with a range from 5 to 50. Furthermore, the study indicated that a worsening of the HJHS score was noticed with increasing age and that >50 % (8 of 13) of the patients ≥ 10 years of age presented with values higher than 30 ($p = 0.0002$). The comparison of the mean total HJHS between the two age groups resulted in the detection of significant differences between patients under 10 years of age and older patients, showing that the most risky period and most aggravating development of haemophilic joint damage starts from 10 years of age [10].

In our study the early age of development of joint damage may be due to low factor transfusion rates because of poor economic status of the patients who could not afford factor replacement therapy.

The above results were also supported by Bladen et al. (2010) researchers from the UK. In 39 boys with severe Hemophilia (mean age 10 years, range 4 to 18) who were receiving primary prophylaxis the HJHS ranged between 0 and 22, with a tendency to increase progressively with age. Mean values ranged from one in boys four to six years of age to four in boys 14–18 years of age ($p = 0.08$) [11].

The utility of the HJHS in assessing the health status of the joints was also tested on 20 Chinese children with Hemophilia (age 5–17 years, Hemophilia A/B: 18/2; severe/moderate/unknown: 5/13/2). The HJHS score ranged from 1 to 35 (mean 13.1, median 12, SD 9.03). The investigators stated that the score was significantly higher in older than in younger children, but it was not specified exactly from which age the score was noticed to be higher [12].

Conclusion

Hemophilia is still not a disease of public health relevance in India like other developed countries. There is very little information on the disorder and its trends in our population. In this study an attempt has been made to enlist hemophilia cases, grade their severity and to find out the joint complications in Jodhpur region.

The most affected joints in order of frequency were Knee, ankle and elbow joints. In the present setting 37.5 % patients developed target joint. Knee joint was the predominant target joint followed by ankle joint.

Mean HJHS score was 6.78 ± 9.04 . There was no significant correlation between HJHS score and factor level but significant correlation between ages of patient with HJHS score was observed. So with increasing age HJHS score increase. In present study we observed that most risky period and most aggravating development of hemophilic joint damage starts from 7 years of age. Therefore, treatment decisions, such as starting prophylaxis, should be tailored according to bleeding pattern and age of patients rather than based on the clotting factor activity levels.

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