Most Common Pattern Of Joint Involvement Among Hemophilic Arthropathy Patients

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ABSTRACT:
Background: Hemophilia is a rare inherited bleeding disorder characterized by the absence of one of the coagulation factors - factor VIII in hemophilia A and factor IX in hemophilia B. Recurrent bleeding into joints leads to extensive destruction of articular cartilage, synovial hyperplasia, and reactive changes, eventually leading to permanent joint damage- hemophiliac arthropathy[3] .Hemophilic arthropathy being a disabling condition characterized by joint impairment, chronic pain, and reduced quality of life. It can cause functional impairment thereby deterioration the quality of life of the hemophiliacs.
Objectives : To describe the most common pattern of joint involvement among hemophilic arthropathy patient.
Methodology: The study was conducted after obtaining necessary permission from institutional ethics committee. Total 146 patients were taken who have Hemophilia A or hemophilia B and attended HTC Government Medical College Kottayam during my study period. Informed written consent in vernacular was obtained from each patient before inclusion in the study. Detailed history was recorded as per structured proforma which is designed to include relevant patient information. Patients were divided according to the factor level as mild 5% to 40 %, moderate 1% to 5% and severe <1%. The patients were clinically examined using Hemophilia Joint Health Score, functionally using functional independence score. HJHS assess joint health mainly in the target joint. The Functional Independence Score in hemophilia (FISH) is a performance-based assessment tool to objectively measure an individual's functional ability.
Results: Out of the total 146 patients 63% had severe deficiency,26% moderate deficiency and 11% have mild deficiency. The most common pattern involved is knee and ankle. There is a statistically significant difference in the average bleed per year among patients in the different severity of disease. Most common joint involved is knee joint 40% followed by ankle joint 34% and elbow 25% with the least one being shoulder with 1%.
Conclusion: The most common pattern of joint involved was knee and ankle with knee joint being the most common joint involved followed by ankle and elbow, then comes shoulder, hip and wrist being the least.
Keywords: *hemophilia, arthropathy,target joint.*

I.   Introduction

Hemophilia is a X-linked recessive genetic disorder, which is divided into 3 types- hemophilia A if it is due to the factor 8 deficiency and hemophilia B, if it is due to the factor 9 deficiency and hemophilia C if it is due to the deficiency of factor 11[1]. Distinction between hemophilia A and B are crucial for the appropriate management. Hemophilia predominantly affects male individuals, and the most common symptom is an increased bleeding tendency. Repeated joint bleeding is a serious complication that can cause hemophilic arthropathy (HA) which is a major complication of severe hemophilia and joint disability. The pathological changes include effusion (hydrarthrosis or hemarthrosis), synovium hypertrophy and hyperemia, cartilage modification, bone erosion, osteophytes and bone remodeling[3]. This is secondary to the repetition of bleeding into the joint causing hemarthrosis. It can be divided according to the activity of factor level as mild ,moderate and severe. Severe hemophiliac patient will present with several episodes of hemarthrosis, spontaneously or after minor trauma. As it is a rare disease no much studies have been conducted in our population.

Hemophilic arthropathy being a disabling condition characterized by joint impairment, chronic pain, can reduced quality of life. It can cause functional impairment thereby deterioration the quality of life of the hemophiliacs. In our state, Kerala there are no studies available describing the pattern of joint involvement in hemophilia patients, hence this study can be extrapolated on to the general population to understand the burden of disease and its clinical profile. If not treated individual with hemophilia will develop hemophilic arthropathy by the age of 20. The primary goal of hemophilia care is to treat bleeding episodes as soon as possible.

II. Materials and methods

STUDY DESIGN: Observational- cross sectional study.

STUDY POPULATION: Hemophilia A or Hemophilia B patients in Hemophilia Treatment Centre (HTC), at Government Medical College, Kottayam.

INCLUSION CRITERIA: Patients with factor 8 or 9 deficiency.

EXCLUSION CRITERIA:

1. Patients with previous surgery, major accidents.
 2. Patients with acute joint bleed or hemodynamically unstable.
3. Any bleeding disorders other than Hemophilia.
 4. Not given consent for the study.

STUDY PROCEDURE.

The study was conducted after obtaining necessary permission from institutional ethics committee. Total 146 patients were taken who have Hemophilia A or hemophilia B and attended HTC Government Medical College Kottayam during my study period. Informed written consent in vernacular was obtained from each patient before inclusion in the study. Detailed history was recorded as per structured proforma which is designed to include relevant patient information. Patients were divided according to the factor level as mild 5% to 40 %, moderate 1% to 5% and severe <1%. The patients were clinically examined using Hemophilia Joint Health Score, functionally using functional independence score. HJHS assess joint health mainly in the target joint. The Functional Independence Score in hemophilia (FISH) is a performance-based assessment tool to objectively measure an individual's functional ability. It can also be used to evaluate change in functional independence over time. The advantage is that it can be used with persons of different linguistic abilities, as it is an objective, performance-based instrument. It includes the assessment of 8 activities: eating, grooming, dressing, chair transfer, squatting, walking, step climbing, and running. Each activity is graded according to the amount of assistance required to perform it. During the study, pattern of arthropathy, the most common joint involved and the extent of arthropathy was identified by history, clinical examination.

SAMPLE SIZE

According to the study "Musculoskeletal complications of hemophilia" conducted by Sujeet Mishra, Deepak Maravi it was found that the least common target joint involved is ankle joint.

$p = 0.15$

N = 4pq /d2 Q = 0.85 D = 5 N = (15× 85× 4) ÷ 52 =204

 Sample size = 204.

DATA MANAGEMENT AND STATISTICAL ANALYSIS Data was coded and entered in Microsoft excel and analyzed using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.

III. Ethical issues

The proposal of the study was presented in front of the institutional review board and the approval for the study was obtained from institutional Ethics Committee on 02/08/2023 and informed consent was taken from all patients enrolled in the study.

IV. Analysis of data:

Data was coded and entered in Microsoft excel and analyzed using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Categorical variables were expressed as frequency (percentage) and continues variables were expressed in mean and standard deviation. For all these statistical interpretations p value of <0.05 was considered as statically significant .

V. Results:

Among the patients in HTC Kottayam patients with hemophilia A or Hemophilia B, those who met the inclusion criteria were enrolled in the study. The patients were categorized into 3 groups and the relation with each variable were studied. Data was entered in Microsoft excel and analyzed using IBM SPSS Statistics for Windows, Version 20.0

Table 1: Description of the study population

Characteristic	Levels	N (%)
Sex	Female	0 (0.0)
	Male	146 (100.0)
Deficient factor	Factor VII	116 (79)
	Factor IX	30 (21)
Occupation	Student	51 (34.9)
	Unemployed	22 (15.1)
	Manual labor	6 (4.1)

	Clerical	60 (41.1)
	Professional	7 (4.8)
Type of bleed	Joint only	65 (44.5)
	Joint and muscle	23 (15.8)
	Joint and mucosa	51 (34.9)
	Joint, muscle and mucosa	7 (4.8)
If bleed present in other than these sites	Yes	18 (12.3)
	No	128 (87.7)
Severity	Mild	16 (11.0)
	Moderate	38 (26.0)
	Severe	92 (63.0)
First joint	Elbow	37 (25.3)
	Knee	58 (39.7)
	Ankle	49 (33.6)
	Hip	2 (1.4)

Table 1: Among 146 patients selected all of the selected patients were males.

Table 2: Distribution according to age group.

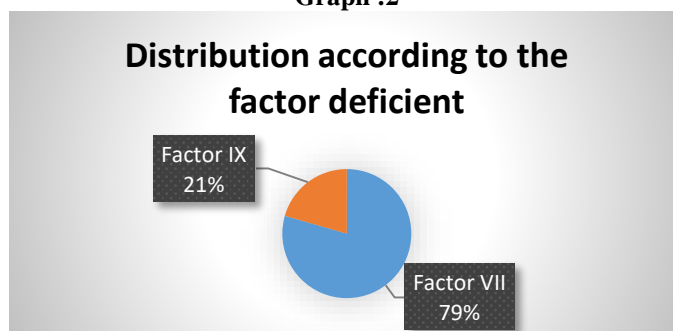| Age group	N	Percent
< 15 years	11	7.5%
15 - 30 years	57	39.0%
30 - 45 years	51	34.9%
> 45 years	27	18.5%
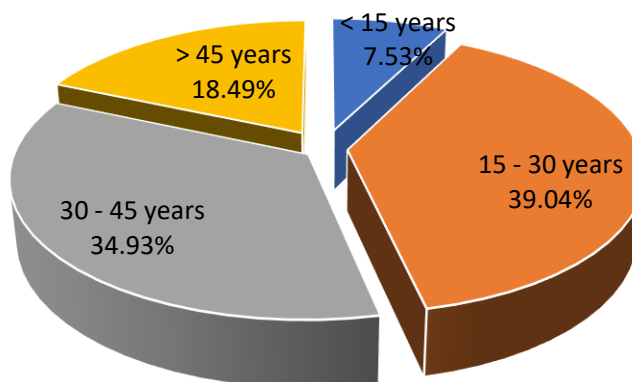
Graph :1

Graph 1: Most of our study population was in the age group of 15 to 45 about 74%.
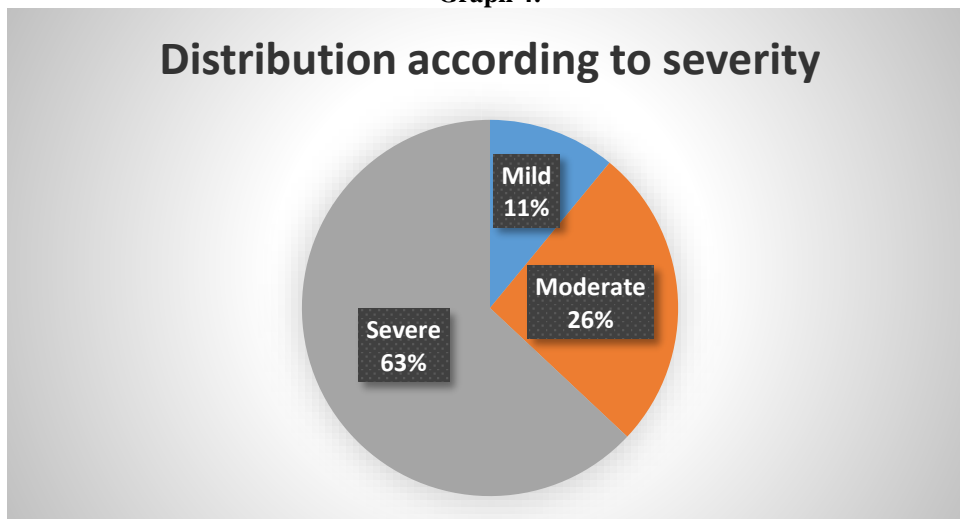
Graph :2

Graph 2: Out of the total 146 patients enrolled 76% have factor 8 deficiency and 21% have factor 9 deficient.

Graph 3:

Distribution according to occupation

Professional 5%

Student 35%

Clerical 41%

Unemployed 15%

Manual labor 4%
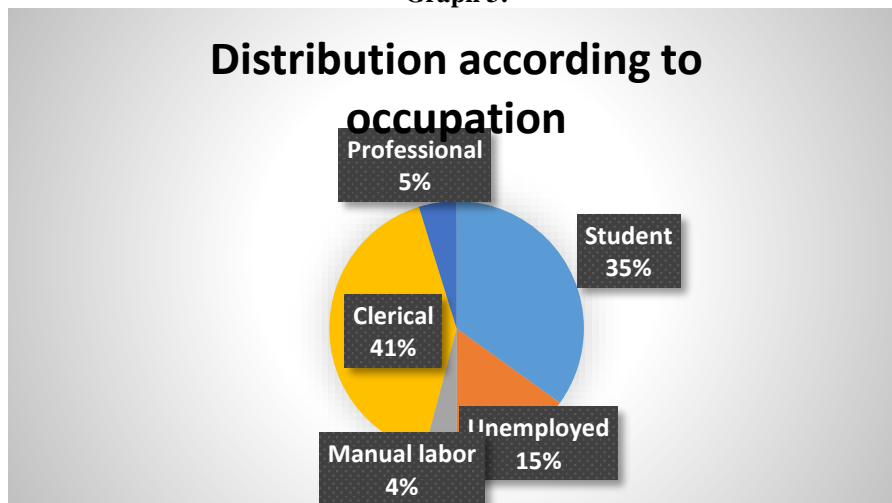
Graph 3: Occupation was chosen to know about the morbidity of the disease-causing restriction in activity, almost 95% of them where in low activity requiring group.

Graph 4:

Distribution according to severity

Mild 11%

Moderate 26%

Severe 63%

Graph 4: Out of the total 146 patients 63% had severe deficiency,26% moderate deficiency and 11% have mild deficiency.

Graph 5:Distribution according to the first joint affected
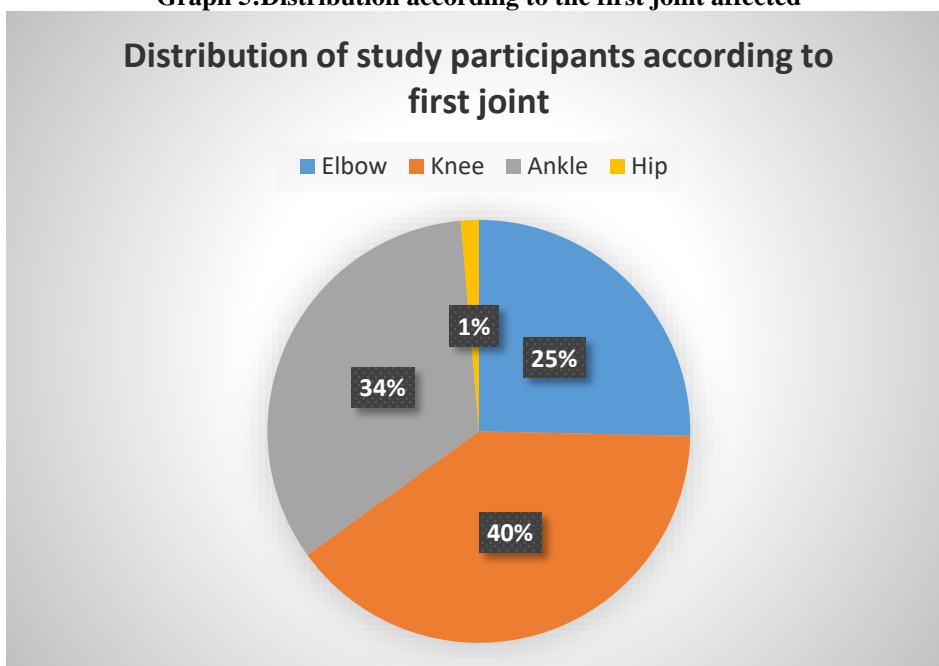
**Graph 5: Most common joint involved is knee joint 40% followed by ankle joint 34% and elbow 25%
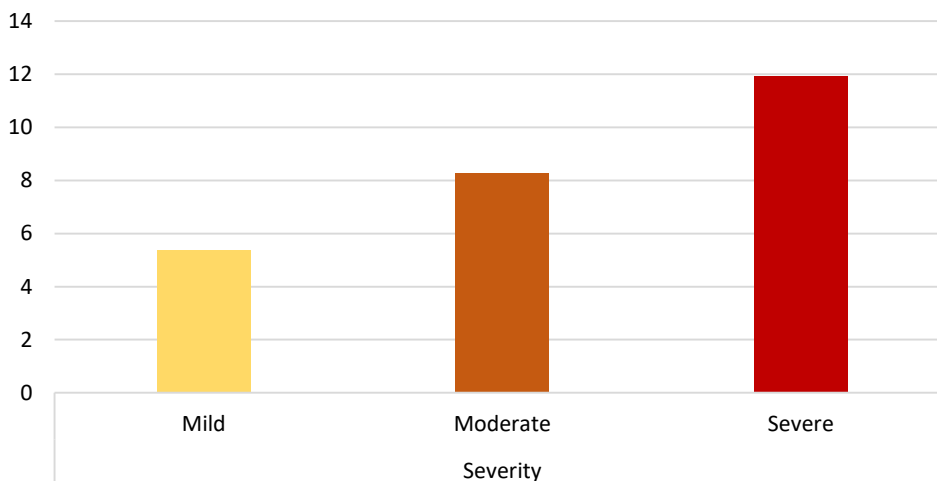with the least one being shoulder with 1%.**

Table 3 :Comparison of average bleed per year across severity

Variables	Severity	N	Mean (S.D)	Mean rank	P value
Average bleed / year	Mild	16	5.38 (0.89)	15.94	<0.001*
	Moderate	38	8.29(2.7)	49.88	
	Severe	92	11.93 (3.06)	93.27	

P value <0.05 is considered statistically significant
Kruskal –Wallis ANOVA test

Graph 6:

Inference (Table 3/graph 6)
There is a statistically significant difference in the average bleed per year among patients in the different severity of disease.

Table 4: Distribution of population according to target joint

Target Joint	N (%)
Elbow	1 (0.7)
Elbow and Knee	17 (11.6)
Elbow and Ankle	14 (9.6)
Elbow, Ankle and Knee	13 (8.9)
Knee	20 (13.7)
Knee and Ankle	54 (37.0)
Ankle	20 (13.7)
Knee, Ankle and Hip	2 (1.4)
Elbow, Knee and Shoulder	2 (1.4)
Elbow, Ankle and Wrist	1 (0.7)
Shoulder	1 (0.7)
Elbow, Knee and Wrist	1 (0.7)

Table 4: The most common pattern involved is knee and ankle. The most common joint involved being knee joint followed by ankle and elbow. The least being shoulder, hip and wrist.

VI. Discussion

In our study, 146 patients who attended HTC of Government medical college Kottayam were enrolled. History, examination, and radiological investigations were taken. Data was entered in Microsoft excel and analyzed using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Out on 146 patients, all of them were males aged between 3years and 75 years. Of which, about 116 (79%) had factor 8 deficiency and 30(21%) had factor 9 deficiency. The study conducted by Biss and colleagues[6] in Canada in 2008 reported 2663 cases of hemophiliacs, 81% hemophilia A (n = 2161) and 18% hemophilia B (n = 502). So, in our study also hemophilia A was the most common. Patients were categorized according to their job to know about the morbidity of the disease. But most of unemployed were aged above 45 years. Almost, all patients were in low activity group, with severe activity amounting to only 4%. In our study, almost all patients have joint bleed in their life. According to the study conducted by Rodrigurez et al[5] about 80-85% of bleed was musculoskeletal. In our study joint bleed is followed by mucosal bleed which is followed by muscle bleed -psoas muscle bleed being the most common. The study conducted by Mishra at al from Gandhi Medical College, Madhya Pradesh most common muscle hematoma was psoas muscle hematoma in six (31.58%) patients followed by calf muscle hematoma in four (21.05%) patients. In our study, patients with combined bleed amounted to 4.8%. Of the total, 18% had bleed in other sites like intracranial hemorrhage, peritoneal bleeding. In our study, according to the severity 63% had severe disease, 26% had moderate and 11% had mild disease. It does not correlate fully with the study conducted by Hayam et al in which Fifteen (50%) had severe hemophilia, seven (23.3%) patients had moderate, and eight (26.7%) patients had mild hemophilia.Majority of the patients had severe hemophilia in our study followed by moderate and mild. In our study, the most common target joint involved was knee joint (40%) followed by ankle (34%) then comes elbow (25.3%), least involved joint was shoulder joint (1%). The knee and ankle have a weightbearing function, as a result they bleed more often. Shoulders and hips are better supported and thus bleed less. It also correlates with the study conducted by Hayam et al[7] in which knee was the most affected joint in 22 (73.3%) patients, followed by ankle in five (16.7%) patients, only two (6.7%) patients had elbow affection, and one (3.3%) patient had shoulder affection. This finding agrees with that of Jansen et al [9], who found that the three large joints (ankle, knee, and elbow) were the most affected joints.

VII. Conclusion

The most common pattern of joint involved is knee and ankle. The most common joint involved is knee followed by ankle then comes elbow, followed by shoulder, hip and wrist being the least.

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