Research Article

# Experience in Pediatric Bleeding Disorders in Tertiary Care Health Services from Southern Region of Saudi Arabia: Single Center Retrospective Study

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**Abstract: Background:** Bleeding disorders are commonly encountered in clinical practice worldwide. In Saudi Arabia, such disorders are witnessed as a notable entity in clinical practice. They encompass a variable group of disorders – categorized into acquired and congenital. Notable among them are hemophilia, von Willebrand disease (vWD), platelet-function defects, clotting factor deficiencies and immune thrombocytopenia (ITP).

**Objective:** To describe the various bleeding disorders among Pediatric population and its related clinical features, diagnostics and management modalities adhered to.

**Materials and Methods:** Retrospective cross-sectional study was carried out in Pediatric Medicine Department, Armed Forces Hospital Southern Region (AFHSR), Khamis Mushait, Kingdom of Saudi Arabia. The data was gathered for last five years – 1st May 2020 to 30th April 2025, as pediatric patients were included who were diagnosed with a bleeding disorder while aged up till fourteen years. Pertinent details subject to relevant history, clinical course and laboratory investigations like blood indices, prothrombin time (PT), activated partial thromboplastin time (PTTK) and accordingly relevant investigations notably factor assay and platelet-function tests were recorded.

**Result:** During the last five years, 205 patients were evaluated by Pediatric Hematology team in regards to suspicion for a bleeding disorder. Out of these, 21% cases (44 patients) were confirmed with a definite bleeding disorder. Among these 44 patients, 24 (54%) patients being male and 20 (46%) female, all with Saudi ethnicity with their average age of 8 years 4 months. They were diagnosed with a bleeding disorder at average age of 4 years 10 months. 18 (41%) were having an acquired disorder while 26 (59%) were diagnosed with congenital disorder. Chronic ITP was observed in 9 cases while 5 cases were witnessed for each of acute ITP, vWD and factor VII deficiency. The most frequent presenting symptom was petechiae (25% patients) followed by epistaxis in 16% and ecchymosis in 11%, with no significant variation observed in congenital vs acquired disorders. Each patient had an average of one admission during the course of the disease. Thrombocytopenia was the most common laboratory abnormality identified (52% cases). This was followed by abnormal clotting factor levels (27% patients), raised PTTK in 25% and high INR in 14%. Furthermore, WES (whole exome sequencing) was performed in selected cases and genetic mutations were found in 41%. IVIG (intravenous immunoglobulin) was the most common intervention adopted.

**Conclusion:** We were able to identify a specific bleeding disorder in 21% of cases who were worked up for a suspected bleeding disorder. Among the pediatric population from southern region of Saudi Arabia, chronic ITP was most frequent (20%), followed by 11% cases each for acute ITP, vWD and factor VII deficiency. Awareness strategies aimed towards bleeding disorders accompanied by swift diagnosis, appropriate therapeutics and genetic counseling is indispensable in averting morbidity.

**Keywords:** Bleeding disorders, Clotting factor, Coagulation profile, Hemophilia, Platelets, von Willebrand disease.

## INTRODUCTION

Bleeding disorders are regarded as a global health concern which entail people of divergent ethnicities and ages. Around one in 2,000 adults as well as children in the UK have a diagnosed bleeding disease. Likewise, in Saudi Arabia, such disorders are witnessed as a notable entity in clinical practice. In the Kingdom of Saudi Arabia, no population-based study has examined the prevalence of bleeding disorders. Prevalence in Kingdom will be potentially higher in lieu to much higher rate of consanguinity in Arab ethnicity. These disorders present a complicated challenge in healthcare delivery as well as for research [1-6].

They exhibit a spectrum from familiar inherited conditions as von Willebrand disease (vWD) to acquired entities like immune

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thrombocytopenic purpura, the most common cause of severe thrombocytopenia in pediatric practice. Certain researchers from Saudi Arabia have mentioned the frequency of such medical ailments. Their efforts inferred platelet disorders, von Willebrand disease (vWD) and hemophilia stand amongst the most prevalent bleeding disorders. vWD has a prevalence of 1.5 to 3.9% in Saudi Arabia while 0.08% for Haemophilia A diagnostics and therapeutics adopted in bleeding disorders now follows a definite pathway in developed world. However, the knowledge and facilities for accurate diagnosis and sustained therapy bear various challenges in developing countries [7-12].

Our study, while defining the frequency and clinical aspects of hemostatic disorders, can prove to be pivotal in establishing the effective clinical interventions and instigating constructive public policies. This can steer towards surfacing a holistic approach towards such challenging Pediatric cases in Saudi Arabia. The aim is to define a holistic approach while approaching such disorders in Pediatric population.

## MATERIALS AND METHODS

We carried out a retrospective cross-sectional study at Armed Forces Hospital Southern Region (AFHSR), Khamis Mushait, a tertiary care referral center, located in the southern Saudi Arabia. AFHSR serves as a prominent healthcare facility within the Armed Forces Hospital system, catering to military personnel and their dependents residing in the surrounding area. The data was gathered for last five years – 1st May 2020 to 30th April 2025 after permission was sought from hospital ethics committee (REC certificate number AFHSRMREC/2025/DEPARTMENT OF PEDIATRICS/803). Target population was selected by convenience consecutive sampling for pediatric patients up till the age of 14 years, with a diagnosis of bleeding disorder and following with our Pediatric Hematology team.

As our study being a retrospective in design, the limitation to data collection was negotiated with thorough examination of medical archives. Confidentiality was cinched at all tiers. Detailed information from hospital electronic medical system of such children with bleeding disorder was gathered. The hospital possesses robust information and medical data management systems including archives system that aided in data collection needs for this study. A well-structured data collection pro-forma was devised for collecting information on demographic characteristics like age, gender and residential area along with clinical presentations including symptoms, diagnostic modalities utilized – like coagulation profile, platelets count, clotting factors levels. Moreover, treatment details such as interventions administered and hospital inpatient was documented. Confidentiality measures were held fast to ensure patient privacy and data was securely stored for subsequent assessment. The data was analytically evaluated for descriptive statistics, like frequency, mean and standard deviation to outline demographic data, clinical presentations, treatment and outcomes. P value ≤0.05 regarded as significant.

## RESULT

During the last five years, 205 patients were evaluated by Pediatric Hematology team in regards to suspicion for a bleeding disorder. Out of these, 21% cases (44 patients) were confirmed with a definite bleeding disorder (representing 0.006% of total 7220 admissions in Pediatric Ward). Among these 44 patients, 24 (54%) patients were male and 20 (46%) female. All were from Saudi ethnicity with their average age of 8 years 4 months. They were diagnosed with a bleeding disorder at average age of 4 years 10 months – with ranging from 1 month to 13 years 2 months. 18 (41%) were having an acquired disorder while 26 (59%) were diagnosed with congenital disorder (as demonstrated in Fig. **1**). Table **1** exhibits the types of bleeding disorders observed in our cases. Chronic ITP was observed in 9 cases while 5 cases were witnessed for each of acute ITP, vWD and factor VII deficiency. 7 patients of congenital disorder were having a family history of bleeding disorders.

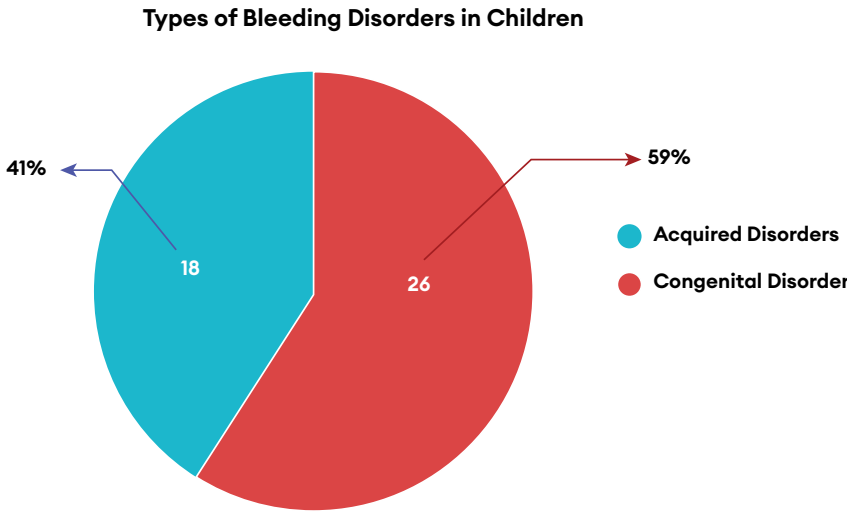


**Fig. (1).** Types of Bleeding Disorders among our Pediatric Patients (Congenital vs Acquired) (n=44).

**Table 1.** Type of Bleeding Disorders among our Pediatric Patients (n=44).

| Diagnosis | Number of Patients n (%) |
|---|---|
| **Acquired Disorders** | |
| Chronic ITP | 9 (20%) |
| Acute ITP | 5 (11%) |
| Chronic thrombocytopenia unexplained | 3 (7%) |
| Non-Alloimmune thrombocytopenia (NAIT) | 1 (2%) |
| **Congenital Disorders** | |
| vWD (von Willebrand disease) | 5 (11%) |
| Factor VII deficiency | 5 (11%) |
| Haemophilia A | 4 (9%) |
| Haemophilia B | 1 (2%) |
| Gray platelet syndrome | 1 (2%) |
| THAMY (Thrombocytopenia, Anemia, and Myelofibrosis) disease | 1 (2%) |
| Congenital amegakaryocytic thrombocytopenia | 1 (2%) |
| Chronic genetic thrombocytopenia | 1 (2%) |
| Bernard-Soulier syndrome | 1 (2%) |
| Fanconi Anaemia | 1 (2%) |
| Afibrogenimia | 1 (2%) |
| Factor XII (Hageman factor) deficiency | 1 (2%) |
| Combined Factor V and VIII deficiency | 1 (2%) |
| Combined Factor VII and X deficiency | 1 (2%) |
| Combined Factor X and XII deficiency | 1 (2%) |

5 out of 44 patients were noted to have a syndrome (Table **2**). Four cases were having a comorbid disease (two with Type 1 diabetes mellitus and one each for sickle cell disease and G-6-PD deficiency).

**Table 2.** Type of Syndromes Identified with Bleeding Disorders (n=5).

| Syndrome | Bleeding Disorder | Number of Cases n (%) |
|---|---|---|
| VATERAL anomaly | Gray platelets syndrome | 1 (20%) |
| Digeorge syndrome | Acute ITP | 1 (20%) |
| Down syndrome | Chronic ITP | 1 (20%) |
| Cornelia de Lange syndrome | Chronic genetic thrombocytopenia | 1 (20%) |
| Arnold Chiari malformation | Chronic ITP | 1 (20%) |

The presenting symptoms documented in these disorders are depicted in Table **3**, with petechiae being most frequent (25% patients) followed by epistaxis in 16% and ecchymosis in 11%, with no statistical significance among congenital and acquired disorders. Each patient had an average of one admission during the course of the disease with quite variation observed among individual patients (maximum four admissions vs nil admission in certain cases). PICU admission was required once in lieu to intra-cerebral hemorrhage. No other significant complication was observed.

**Table 3.** Presenting Symptoms in Bleeding Disorders (n=44).

| Presenting Symptoms in Bleeding Disorders | Number of Patients n (%) | | p-value |
|---|---|---|---|
| | Acquired Disorder | Congenital Disorder | |
| Petechiae | 6 (14%) | 5 (11%) | 0.238 |
| Istaxis | 2 (4%) | 5 (11%) | 0.388 |
| Skin bruising / ecchymosis | 1 (2%) | 4 (9%) | 0.308 |
| Status post circumcision | 0 | 3 (7%) | 0.196 |
| Incidental (pre-operative workup) | 0 | 3 (7%) | 0.196 |
| Asymptomatic | 1 (2%) | 2 (4%) | 0.638 |
| Incidental | 0 | 3 (7%) | 0.196 |
| Intra-cerebral hemorrhage | 0 | 2 (4%) | 0.344 |
| Per rectal bleed | 0 | 2 (4%) | 0.344 |
| Gingival bleed | 0 | 2 (4%) | 0.344 |
| Hematoma (gluteal) | 0 | 1 (2%) | 0.591 |
| Hematuria | 0 | 1 (2%) | 0.591 |
| Bleeding per vaginal | 0 | 1 (2%) | 0.591 |

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|---|---|---|---|
| Menorrhagia | 0 | 1 (2%) | 0.591 |
| Umblical bleed | 0 | 1 (2%) | 0.591 |
| Spontaneous conjunctival bleed | 0 | 1 (2%) | 0.591 |

During the laboratory workup in order to strike a definitive diagnosis for bleeding disorder, thrombocytopenia was the most common abnormality identified (52% cases). This was followed by abnormal clotting factor levels (27% patients), raised PTTK in 25% and high INR in 14% (Table **4**). Furthermore, WES (whole exome sequencing) was performed in selected cases and genetic mutations were found in 41%.

**Table 4.** Abnormal Laboratory Investigations Witnessed in Bleeding Disorders (n=44).

| Abnormal Laboratory Investigation | Number of Patients n (%) |
|---|---|
| Thrombocytopenia (<150 x 109) | 23 (52%) |
| Low clotting factor levels | 12 (ɔ7%) |
| Raised PTTK | 11 (25%) |
| High INR (Raised PT) | 6 (14%) |
| Abnormal vWF profile | 3 (7%) |
| Abnormal platelet morphology (Giant platelets) | 2 (4%) |
| Abnormal PFA (Platelet function assay) | 1 (2%) |
| Abnormal WES (Whole exome sequencing) | 18 (41%) |

The role of investigations like platelets count, PT, PTTK, PFA, clotting factor levels and WES in reaching a final diagnosis is portrayed in Table **5**, which exhibited that basic screening coagulation tools can direct in almost all cases towards a definitive diagnosis.

**Table 5.** Mandatory Requirement of WES (Whole Exome Sequencing) in Diagnosis of Acquired vs Congenital Bleeding Disorders (n=44).

| Type of Bleeding Disorder | Types of Laboratory Investigations required in Confirmation of Diagnosis (n=44) | | p-value |
|---|---|---|---|
| | Platelets Count, PT, PTTK, PFA, Clotting Factor Levels | WES (whole Exome Sequencing) | |
| Acquired | 17 (39%) | 0 (0%) | 0.074 |
| Congenital | 22 (50%) | 5 (11%) | |

Table **6** describes the therapeutic intervention done in various cases of bleeding disorders.

**Table 6.** Therapeutics Administered in Bleeding Disorders (n=44).

| Therapeutic Modality Administered | No. of Patients with Diagnosis | | | | |
|---|---|---|---|---|---|
| | Acute ITP | Chronic ITP | NAIT | Haemophila A | vWD |
| IVIG* | 2 | 6 | 1 | | |
| Low dose steroids | | 3 | | | |
| Methylprednisolone pulse therapy | | 3 | 1 | | |
| Platelets transfusion | 1 | 1 | 1 | | |
| Sirolimus | | 1 | | | |
| Emicizumab | | | | 1 | |
| Recombinant Factor VIII | | | | 2 | |
| Haemate P | | | | | 2 |
| Eltrombopag | | 1 | | | |

*Intravenous Immunoglobulins.

## DISCUSSION

Bleeding disorders embody a variety of causes as well as discrete symptoms. Certain studies have explored the genetic perspective of such diseases and specific genetic mutations have been implied in coagulation factor defects. The incessant transformation in molecular tools has provided refined diagnostic techniques as well as early detections – inferring in improved therapeutic outcomes. Having a certain diagnosis is crucial for opting right therapeutics as well as for genetic counseling. These disorders have worldwide presence and region of Saudi Arabia stands as no exception [13-18]. Our current study strived to uncover the clinical presentations and involved diagnostics as well as therapeutics employed in our Kingdom specifically in terms of Pediatric bleeding disorders.

While investigating the children with a suspected bleeding disorder, we were able to arrive at a specific bleeding disorder in 21%

cases (44 patients). Among these 44 patients, 24 (54%) patients were male and 20 (46%) female. Yildiz *et al.* while studying bleeding disorders had reported similar observation as 52.5% being male. However, Revel-Vilk *et al.* has published 46% as male gender [19, 20].

Our all cases were from Saudi ethnicity with their average age of 8 years 4 months. They were diagnosed with a bleeding disorder at average age of 4 years 10 months – with ranging from 1 month to 13 years 2 months. Revel-Vilk *et al.* found the median age of 6.4 years at the time of presentation for bleeding disorders [20].

In general, early presentation especially during infancy points towards congenital cause [21]. In our observation, 18 (41%) were having an acquired disorder while 26 (59%) were diagnosed with congenital disorder. Family history can definitely provide a clue in favor of congenital bleeding disorders [22]. 7 (25%) patients of our congenital disorder were having a family history of bleeding disorders. Yildiz *et al.* found family history of bleeding disorder in 19% patients [19]. As the genetic factor is one of the established cause of bleeding diseases, high rate of consanguinity magnifies the prevalence of congenital bleeding disorders among the Saudi people. Awareness by incorporating premarital screening and counseling services can extend comprehensive understanding among the general public [23].

Our research demonstrated chronic ITP in 9 cases while 5 cases were witnessed for each of acute ITP, vWD and factor VII deficiency. While studying the hereditary bleeding disorders, Kannan *et al.* had mentioned hemophilia A to be the commonest congenital hemostatic defect (56% cases) [24]. Yildiz *et al.* found von Willebrand disease to be most frequent (12.1%), followed by hemophilia (9.1%) [19].

Among our studied subjects, petechiae was the most frequent presenting symptoms (25% patients), followed by epistaxis in 16% and ecchymosis in 11%. In contrary, Yildiz *et al.* while documenting the considerable bleeding symptoms, reported epistaxis in 36.4% cases, easy bruising in 32.3% and menorrhagia in 6.1% [19]. Kannan *et al.* reported that the commonest clinical manifestation was subcutaneous hematoma.24 Revel-Vilk *et al.* reported spontaneous bruising as most common symptom (18% patients) [20]. We did not experience any long term complication particularly, anemia, joint deformity and hemiplegia. It is explainable by early diagnosis and the proper handling of specialists in Hematology team.

These diseases are a key mechanism of both morbidity and mortality. It was quite evident that laboratory assessment was a key factor in the diagnosis and management of the disease [25]. 52% cases were spotted to have thrombocytopenia. An elevated level of clotting factor was seen in 27% patients, elevated level of PTTK in 25% and high level of INR in 14%. Yildiz *et al.* discovered that screening tests (platelets, PFA-100, PT, PTTK) were useful in the diagnosis of the bleeding disorder in 36.4 percent patients [19].

## STRENGHT AND LIMITATION

Our study has received a validity and strength by the fact that our hospital is a tertiary referral center in the south of Saudi Arabia. Our research is distinguished in regards to its eccentric emphasis on pediatric cases. These findings disclosed valuable insights into factors underlying Pediatric bleeding disorders. This can help in extending efficacious therapeutic interventions and devising the blueprints of public health. The apparent limitation of our study is its retrospective design and relatively smaller number of study participants.

## CONCLUSION

We were able to identify a specific bleeding disorder in 21% of cases who were worked up for a suspected bleeding disorder – making 0.006% of total 7220 admissions in Pediatric Ward. Our study surfaced chronic ITP as most frequent (20%), followed by 11% cases each for acute ITP, vWD and factor VII deficiency. This endeavor towards the diverse bleeding disorders in Kingdom of Saudi Arabia provides valued insights into their prevalence, clinical features and adopted therapeutic strategies. Awareness campaigns targeting masses and physicians can serve in prompt diagnosis and timely provision of multiple unanswered queries of families. Further pursuits will definitely aide in achieving the desired goal of advance yet personalized medicine, especially in the emerging framework of carrier detection and gene therapy in varied genetic bleeding disorders.

## ABBREVIATIONS

**ITP**: Immune Thrombocytopenia.

**IVIG**: Intravenous Immunoglobulin.

**PT**: Prothrombin Time.

**PTTK**: Partial Thromboplastin Time.

**vWD**: von Willebrand Disease.

**WES**: Whole Exome Sequencing.

## AUTHORS' CONTRIBUTION

**Badriah Gharamah Al Asmari** and **Manea Abdullah Alqarni**: Conceptualization.

**Ali Mujtaba Tahir**: Writing draft, Critical review and revision the manuscript, Methodology, Data analysis and interpretation.

**Mohammed Alpakra** and **Sara Saeed Mahamoud Hassanien**: Study design.

**Mohaned Mustafa Ahmed Mohammad** and **Sami Saleh Alamri**: Methodology, Data analysis and interpretation.

**Mahnoor Saeed**: Final approval, final proof to be published.

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## ETHICAL DECLARATIONS

### Data Availability Statement

Data are available upon reasonable request. The data used to support the findings of this study are available from the corresponding author upon request.

### Ethical Approval

The study was permitted by the Research Ethics Committee of Armed Forces Hospital Southern Region (AFHSR), Khamis Mushait, Saudi Arabia (REC certificate number AFHSRM-REC/2025/DEPARTMENT OF PEDIATRICS/803).

### Consent to Participate

Informed consented.

### Consent to Publication

Consented.

### Conflict of Interest

Declared none.

### Competing Interest/Funding

Declared none.

### Use of AI-Assisted Technologies

The authors declare that no generative artificial intelligence (AI) or AI-assisted technologies were utilized in the writing of this manuscript, in the creation of images/graphics/tables/captions, or in any other aspect of its preparation.

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