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Case Report

Work adjustments for patients with hemophilia

Negin Kassiri[*1, 2], Samaneh Seydi Joughan [2], Hossein Shabani [2]

[1] *Occupational Medicine Research Center, Iran University of Medical Sciences, Tehran, Iran*
[2] *Department of Occupational Medicine, School of Medicine, Iran University of Medical Sciences, Tehran, Iran*

***Corresponding author:** Negin Kassiri, **Address**: Department of Occupational Medicine, school of Medicine, Iran University of Medical Sciences, **Email**: neginkassiri@gmail.com, **Tel**: +9891416634793

Abstract

***Background*:** Hemophilia is a bleeding disorder which is inherited in an X-linked recessive pattern. A person with hemophilia is unable to stop the bleeding process due to the low level or absence of coagulation factors. This may lead to spontaneous bleeding as well as bleeding following injuries or surgical procedures.

Case presentation: In this study, we investigated work adjustments in two cases of patients with hemophilia A.

Conclusion: Work adjustments depend on the severity of the disorder. Patients with mild hemophilia can work normally in any job, but those with a high risk of bleeding may have some restrictions.

***Keywords*:** Case report, Hemophilia, Work limitation, Work restriction

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Introduction

Hemophilia A (HA) and B (HB) are two common and serious blood disorders that can cause excessive bleeding (1). Both hemophilia A and B result from factor VIII and factor IX protein deficiency or dysfunction, respectively, and are characterized by prolonged and excessive bleeding after minor trauma or sometimes even spontaneously. HA and HB have different levels of severity based on the amount of coagulation factors in the plasma. If the level is greater than 5 IU/dL, it is considered mild. Plasma levels between 1 and 5 IU/dL are considered moderate. If the level is less than 1 IU/dL, it is considered severe hemophilia (2).

Since hemophilia is the most well-known inherited bleeding disorder (1), it may be thought that patients with hemophilia have limitations in performing social roles and job duties due to the high risk of bleeding. To clarify this issue, we are going to discuss two patients with hemophilia and determine their fitness for work.

Case reports

The first person was a 31-year-old man with the job title of construction painter who was examined by an occupational medicine specialist for pre-employment examinations. Job analysis revealed that he was exposed to chemicals (types of solvents and paints) and ergonomic hazards (prolonged standing, awkward body

posture, heavy lifting, and repetitive movements). His job involved a lot of intercity travel. In the patient's past medical history, it was revealed that he had known cases of hemophilia type A. About 10 years ago, following prolonged bleeding after molar tooth extraction, he was examined by an internist, and after performing coagulation tests and a factor assay, he was diagnosed with HA. He did not mention a family history of bleeding disorders. In the examinations conducted at the occupational medicine center, all organ systems were normal, and no traces of bruises, petechiae, or purpura were observed on the skin. Joint range of motion was normal, and there were no signs of swelling, tenderness, or heat in the facet examination. He had not suffered from hemophilia-related injuries in his work environment. He mentioned that the last time he received factor VIII was two months ago, and the last factor level report was 14%. Laboratory data are presented in Table 1.

Table 1. laboratory tests

	Case 1	Case 2
Prothrombin time (PT)	Normal	Normal
Activated partial thromboplastin time (aPTT)	Normal	Prolonged
Platelet count	Normal	Normal
Factor VIII level	14%	1%
Von willebrand factor antigen (VWF:Ag)	Normal	Normal

The second case was a 23-year-old man, a known case of HA, who had applied to be employed as a dentist assistant. Because of his job, there was a possibility of bacterial and viral infection. He was also exposed to ergonomic hazards (such as constant standing, and occasionally lifting and carrying heavy loads). He pointed out that, following circumcision, he experienced prolonged bleeding and hematoma formation for 10 days. After being admitted to the hospital and undergoing additional diagnostic tests, he was diagnosed with HA. In the 18 years since his diagnosis, he has frequently experienced abnormal bleeding and spontaneous bruising. In his previous job, due to a sharp injury, he experienced prolonged bleeding in his index finger. He also experienced hematoma formation at the age of 4 following an intramuscular injection and an intra-articular hemorrhage at the age of 11. His uncles (mother's brothers) were also known to have hemophilia. His brother died at the age of 19 days due to intracerebral hemorrhage. His latest blood tests are presented in Table 1.

Discussion

Hemophilia A (HA), is a rare X-linked genetic disorder characterized by a deficiency in clotting factor VIII. Untreated, HA can lead to recurrent and debilitating bleeding episodes, potentially causing severe joint damage and life-threatening hemorrhages (3, 4). Diagnosis involves blood tests and genetic testing to confirm specific gene mutations associated with hemophilia (5).

The primary treatment for hemophilia involves replacing the deficient clotting factor through clotting factor concentrates derived from human plasma or produced via recombinant DNA technology. Preventive (prophylactic) or periodic treatments are typically recommended to prevent or manage bleeding episodes effectively. Supportive therapies include desmopressin for mild to moderate hemophilia A, antifibrinolytic agents, and physiotherapy to enhance joint function (6, 7). Recent advancements include gene therapy, which has received FDA approval for HA, aiming to provide functional copies of the defective gene. Another innovative treatment is anti-tissue factor pathway inhibitor (Anti-TFPI), which helps regulate blood clotting by inhibiting a natural anticoagulant, thereby potentially reducing bleeding episodes (8, 9).

Managing hemophilia requires a multidisciplinary approach involving hematologists, physical therapists,

and genetic counselors. Regular follow-up, education on bleeding control, and genetic counseling for patients and families are crucial (5).

Complications of hemophilia include joint deformities, chronic pain from recurrent joint bleeding, and the development of antibodies against administered clotting factors. People with hemophilia are also at increased risk of viral infections due to clotting factor concentrates derived from human plasma, though advances have made blood products safer (10,11). Overall, comprehensive care and ongoing advancements in treatment have significantly improved outcomes for individuals with hemophilia, focusing on enhancing quality of life and minimizing complications associated with the condition (12).

Work adjustments depend on the severity of the disorder. Patients with mild hemophilia can work normally in any job. Even in severe cases, some patients may have rare bleeds and will not need to make any changes to their work. Certain jobs and occupations can pose significant risks due to the potential for injury and bleeding. Here are some key considerations:

1. Physical Labor and Manual Work: Patients who have frequent large joint bleeds should avoid physically demanding or risky jobs like mining, heavy construction, manufacturing, agriculture, the armed forces, firefighting, or the police service. In these environments, accidents like cuts, bruises, or muscle strains are common, all of which can trigger bleeding in individuals with hemophilia (13).
2. High-Risk Environments: It is not recommended to work in environments with the possibility of repeated trauma or work with sharp and dangerous tools such as woodworking, metalworking, or culinary professions without observing safety principles, due to the risk of superficial and internal bleeding. Additionally, jobs involving heights or confined spaces may increase the risk of falls or accidents, potentially leading to internal bleeding if trauma occurs (14).
3. Non-observance of Safety Practices: Failure to adhere to safety protocols and guidelines, including not using protective gear (such as gloves, helmets, or goggles), improper handling of equipment, and inadequate training in emergency response procedures significantly heightens the risk for individuals with hemophilia (14).
4. Blood-Borne Infections: Healthcare workers who perform invasive procedures should get tested for blood-borne viruses (12).
5. Working in Remote Areas: Extra attention is necessary if someone has to travel for their job or work in isolation. Arrangements for the safe storage of factors and access to sterile equipment for administration are important. Working in remote areas with poor hygiene or medical facilities is not recommended unless the cases are very mild and do not need extensive treatment. Patients with severe hemophilia would not be allowed to become commercial aircrew (12).
6. Insurance Support: It is important to have appropriate insurance that covers hemophilia-related complications (12).
7. Psychological Impact: The psychological stress of working in environments where injury is a possibility can affect individuals with hemophilia. Fear of injury, anxiety about bleeding episodes, and concerns about disclosing their condition to employers or coworkers can contribute to overall stress levels and impact mental health (15, 16).

In the first case, the construction painter, due to not mentioning a history of spontaneous bleeding and intra-articular bleeding, as well as the last factor VIII level (14%), no special occupational restriction was applied. It was recommended to avoid heavy lifting and observe the principles of personal protection when working with sharp and cutting tools. It was also explained to the employer that business trips to areas with poor hygiene are not suitable for him.

In the second case, the dental assistant, due to the history of frequent bleeding in different parts of the body and the last factor VIII level of 1%, performing physically demanding jobs with the risk of trauma is

not favorable. Periodic testing for blood-borne viruses is recommended as well. Also, working with sharp tools inside the oral cavity requires proper personal protection and observing safety principles.

Conclusions

In conclusion, hemophilia is a genetic bleeding disorder characterized by a deficiency or dysfunction of specific clotting proteins. It manifests with symptoms such as prolonged bleeding, easy bruising, and joint bleeding. Diagnosis involves blood tests and genetic testing, while treatment primarily revolves around replacing the deficient clotting factor. Work adjustments depend on the severity of the disorder. Patients with mild hemophilia can work normally in any job, but those with a high risk of bleeding should avoid physically demanding work due to joint bleeding risk. Also, working with dangerous and sharp instruments due to the risk of trauma and bleeding should be accompanied by safety principles. In patients requiring clotting factor injection, working in remote areas with poor hygiene or medical facilities is not recommended. Healthcare workers who perform invasive procedures should be tested periodically for blood-borne viruses. Proper management of hemophilia requires a collaborative effort by healthcare professionals and ongoing support for individuals and their families.

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Authors' Contributions

Kassiri N has given substantial contributions to the conception or the design of the manuscript. Seydi Joughan S and Shabani H performed the experiments. Kassiri N supervised the experiments and determined the title. Seydi Joughan S and Shabani H wrote the article. Kassiri N wrote and submitted the article. All authors read and approved the final manuscript.

Data Availability

All the data obtained from this study are included in the text of the article.

Conflict of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

Ethical Statement

Informed consent was obtained from all human adult participants.

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