Sports and Children with Hemophilia: Current Trends

Subjects: Orthopedics

Contributor: Davide Bizzoca

Hemophilia is a sex-linked recessive disorder characterized by a lack of blood factors necessary for clotting. Sports activities have benefits in children with hemophilia in terms of both physical and psychological wellness. Sports activity is necessary for children with hemophilia to preserve joints' range of motion, reduce joint bleeding, improve muscle mass and strength, enhance proprioception and prevent secondary chronic diseases.

hemophilia children sport physical activity

1. Introduction

Hemophilia is a sex-linked recessive disorder characterized by a lack of blood factors necessary for clotting [1].

This disease mainly occurs in males and the deficit may be in factor VIII (hemophilia type A or classic type) or factor IX (type B) [2]. Patients with severe plasma protein deficit can have recurrent muscular and especially joint bleeding episodes, which may lead to musculoskeletal pain and physical and functional ability reduction, thus finally compromising their quality of life [3].

Consequently, it is reported that hemophilic children tend to be more sedentary compared with non-hemophilic peers because of the difficulties they may experience during physical activity [4].

2. Hemophilia and Sports Participation

Sports activity is necessary for children with hemophilia to preserve joints' range of motion, reduce joint bleeding, improve muscle mass and strength, enhance proprioception and prevent secondary chronic diseases (i.e., cardiovascular disease, diabetes, cancer) [5]. To prevent joint and muscle bleeding, parents put their children with hemophilia through various exercise programs [6]. Muscle atrophy, instability and restriction of motion are the first visible signs of sedentarism [7], whereas early subclinical symptoms such as tender ligaments are found even in clinically healthy young people [1]. This leads to a lack of physical activity and exercise that results in a poor physical condition with diminished muscle strength, aerobic/anaerobic power, proprioception and flexibility [8]. Furthermore, sports activity can improve bone mineral density, which is lower in children with hemophilia than in healthy peers [9]. In the past, because of bleeding risk, sports activity was discouraged in children with chronic disease [10]. However, nowadays, due to new improvements in medical treatment, the participation of children with hemophilia in sport has improved [5].

However, even if an increase in participation in sports has been observed in children with hemophilia, aerobic activity is less practiced. This phenomenon may be explained considering that children with chronic diseases (such as cystic fibrosis or hemophilia) might have a decline in pulmonary function, which finally leads to less exercise tolerance [11]. Sports and exercise help to develop fundamental abilities, such as coordination, strength, endurance and flexibility. The muscle-to-fat ratio is improved, and, in the long term, joints are protected and bleeding episodes avoided [12].

Prophylaxis is effective to maintain a minimum level of clotting factor activity and to permit regular sports participation in children with hemophilia [13]. However, prophylaxis alone is insufficient to protect from bleeding and joint damage [14]. In fact, in children with hemophilia, it is important to maintain weight within a healthy range to prevent an overload of the joints, especially the knees and ankle [15]. Furthermore, sports exercise increases factor VIII levels and could modify coagulation parameters in mild/moderate hemophilia [16]. It is therefore reported that an increased plasmatic lactate concentration, secondary to anaerobic exercises, for instance, may affect FVIII clearance, thus improving the patient's coagulation [1].

In the past, high-impact sports were usually prohibited in children with hemophilia due to the high risk of bleeding injuries [17]. In the 1970s, it was a common practice to discourage any type of sports because of the risk of bleeding episodes, but today, the participation in sports activities by hemophilic patients has improved, and physical activity is considered healthy for this type of patient [18] even if high-impact sports are still not recommended. Nowadays, on the other hand, different guidelines are available to regulate hemophilic patients' sports participation; hemophilia type and severity play a key role in the correct sports activity choice [19][20]. According to some hemophilia centers, the choice of activities should reflect individual basis such as: preference/interest, ability, physical condition and resources [8]. Participation in non-contact sports (swimming, running and walking) should always be promoted, but high-impact sports (rugby, boxing, football and basketball) or sports such as motocross (endowed with a higher injury risk) are often discouraged even on good prophylactic therapy [8][12].

In the United States, the National Hemophilia Foundation (NHF) proposes the stratification of activities into safe, safe-to-moderate, moderate, moderate-to-dangerous and dangerous risk groups. The safe through moderate categories can be routinely recommended with the proper preparation [21]. Another stratification in high-impact and low-impact sport was proposed by Ross and Goldenberg in 2009: high-impact sports include soccer, basketball, baseball, bowling, gymnastics, field hockey, running, skiing, snowboarding, soccer, softball, tennis and track and field, while low-impact activities include weight training, cycling, Frisbee, golf, swimming and walking/hiking [22].

However, is it right to forbid children with hemophilia to participate in high-impact sports even if they are on prophylactic treatment?

According to some authors, prophylactic therapy can allow a hemophilic child to engage in vigorous activities or high-impact sports [5]. An article by Ross et al. [22] showed that children with hemophilia on prophylaxis could participate without any increased risk of joint bleedings.

The American Academy of Pediatrics (AAP) Committee on Sports Medicine and Fitness has divided childhood activities according to risks and formulated guidelines for sports participation [23]. The AAP has recommended that children should engage in trampoline activities only in professionally supervised settings due to the high risk of fractures, hospitalization and risk of bruises and other injuries [24]. For the same reason, no children should participate in boxing because this activity encourages injuries especially to the head and neck [25]. Additionally, the dangers of concussion related to US football and soccer have recently received attention, with recommendations for carefully monitoring children after an event [26]. Nonetheless, the AAP recommends participation in sports activities for children with bleeding disorders [22].

In 2017, the National Hemophilia Foundation (NHF) proposed some guidelines for athletic participation by patients with a bleeding disorder [21]. Therefore, a minimum of 60 min of exercise per day, with appropriate supervision, is recommended for children after receiving prophylaxis.

References

1. Fijnvandraat, K.; Cnossen, M.H.; Leebeek, F.W.G.; Peters, M. Diagnosis and management of haemophilia. BMJ 2012, 344, e2707.
2. Knobe, K.; Berntorp, E. Haemophilia and Joint Disease: Pathophysiology, Evaluation, and Management. J. Comorbidity 2011, 1, 51–59.
3. Azab, A.R.; Elnaggar, R.K.; Diab, R.H.; Moawd, S.A. Therapeutic value of kinesio taping in reducing lower back pain and improving back muscle endurance in adolescents with hemophilia. J. Musculoskelet. Neuronal Interact. 2020, 20, 256–264.
4. Takken, T.; Stephens, S.; Balemans, A.; Tremblay, M.S.; Esliger, D.; Schneiderman, J.; Biggar, D.; Longmuir, P.; Wright, F.V.; McCrindle, B.; et al. Validation of the Actiheart activity monitor for measurement of activity energy expenditure in children and adolescents with chronic disease. Eur. J. Clin. Nutr. 2010, 64, 1494–1500.
5. Groen, W.G.; Takken, T.; Van Der Net, J.; Helders, P.J.M.; Fischer, K. Habitual physical activity in Dutch children and adolescents with haemophilia. Haemophilia 2011, 17, 906–912.
6. Collins, P.W.; Hamilton, M.; Dunstan, F.D.; Maguire, S.; Nuttall, D.E.; Liesner, R.; Thomas, A.E.; Hanley, J.; Chalmers, E.; Blanchette, V.; et al. Patterns of bruising in preschool children with inherited bleeding disorders: A longitudinal study. Arch. Dis. Child. 2017, 102, 1110–1117.
7. Stephensen, D.; Drechsler, W.I.; Scott, O.M. Outcome measures monitoring physical function in children with haemophilia: A systematic review. Haemophilia 2014, 20, 306–321.
8. Von Mackensen, S. Quality of life and sports activities in patients with haemophilia. Haemophilia 2007, 13, 38–43.

9. Iorio, A.; Fabbriciani, G.; Marcucci, M.; Brozzetti, M.; Filipponi, P. Bone mineral density in haemophilia patients: A meta-analysis. Thromb. Haemost. 2010, 103, 596–603.
10. Khair, K.; Littley, A.; Will, A.; von Mackensen, S. The impact of sport on children with haemophilia. Haemophilia 2012, 18, 898–905.
11. Nixon, P.A.; Orenstein, D.M.; Kelsey, S.F. Habitual physical activity in children and adolescents with cystic fibrosis. Med. Sci. Sports Exerc. 2001, 33, 30–35.
12. Gomis, M.; Querol, F.; Gallach, J.E.; González, L.M.; Aznar, J.A. Exercise and sport in the treatment of haemophilic patients: A systematic review. Haemophilia 2009, 15, 43–54.
13. Hoefnagels, J.W.; Versloot, O.; Schrijvers, L.H.; van der Net, J.; Leebeek, F.W.G.; Gouw, S.C.; Fischer, K. Sports participation is not associated with adherence to prophylaxis in Dutch patients with haemophilia. Haemophilia 2021.
14. Cuesta-Barriuso, R.; Torres-Ortuño, A.; Pérez-Alenda, S.; Carrasco, J.J.; Querol, F.; Nieto-Munuera, J. Sporting activities and quality of life in children with hemophilia: An observational study. Pediatr. Phys. Ther. 2016, 28, 453–459.
15. Soucie, J.M.; Cianfrini, C.; Janco, R.L.; Kulkarni, R.; Hambleton, J.; Evatt, B.; Forsyth, A.; Geraghty, S.; Hoots, K.; Abshire, T.; et al. Joint range-of-motion limitations among young males with hemophilia: Prevalence and risk factors. Blood 2004, 103, 2467–2473.
16. Philpott, J.; Houghton, K.; Luke, A. Physical activity recommendations for children with specific chronic health conditions: Juvenile idiopathic arthritis, hemophilia, asthma and cystic fibrosis Society, Canadian Paediatric Living, Healthy Active Committee, Medicine Sport, Paediatric. Paediatr. Child Health 2010, 15, 213–218.
17. Longmuir, P.E.; Yap, L.A.; Bravo, C.; Lee, S.L.; Brandão, L.R. Childhood physical activity body contact risk: Feasibility of a novel technique for objective measurements of impact speed, frequency, and intentionality. Haemophilia 2016, 22, 126–133.
18. Buzzard, B.M. Sports and Hemophilia-Antagonist or Protagonist. Clin. Orthop. Relat. Res. 1996, 328, 25–30.
19. Wang, M.; Alvarez-Román, M.T.; Chowdary, P.; Quon, D.V.; Schafer, K. Physical activity in individuals with haemophilia and experience with recombinant factor VIII Fc fusion protein and recombinant factor IX Fc fusion protein for the treatment of active patients: A literature review and case reports. Blood Coagul. Fibrinolysis 2016, 27, 737–744.
20. McLain, L.G.; Heldrich, F.T. Hemophilia and Sports. Phys. Sportsmed. 1990, 18, 73–80.
21. Howell, C.; Scott, K.; Patel, D.R. Sports participation recommendations for patients with bleeding disorders. Transl. Pediatr. 2017, 6, 174–180.

22. Ross, C.; Goldenberg, N.A.; Hund, D.; Manco-Johnson, M.J. Athletic participation in severe hemophilia: Bleeding and joint outcomes in children on prophylaxis. Pediatrics 2009, 124, 1267–1272.
23. Manco-Johnson, M.J. Collision sports and risk of bleeding in children with hemophilia. JAMA 2012, 308, 1480–1481.
24. Keller, K. American Academy of Pediatrics. Trampolines at Home, School, and Recreational Centers. Encycl. Obes. 2014, 2021.
25. LeBlanc, C.M.A.; Purcell, L. Policy statement—Boxing participation by children and adolescents. Pediatrics 2011, 128, 617–623.
26. Halstead, M.E.; Walter, K.D.; Moffatt, K. Sport-related concussion in children and adolescents. Pediatrics 2018, 142.

Retrieved from https://encyclopedia.pub/entry/history/show/39585