

Research Article

Vincer EMO Project: Physical Activity for Haemophilic Patients. How We Faced Up SARS COV2 Pandemic

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Abstract

The SARS COVID pandemic has negatively impacted health care activities in the entire world, both in emergency and ordinary inpatient and outpatient regimes. Rehabilitation has also suffered a heavy penalty which has not spared research projects in specific sectors. The VINCEREMO project stems from the need to objectively evaluate the benefits of a regular personalized physical activity program on musculoskeletal health in patients with severe haemophilia A and B. These patients present in a high percentage of important functional limitations and reduction of trophism and muscle strength due to the consequences of haemophilic arthropathy. Multi-district impairments in addition with the high risk of bleeding hinder the performance of common recreational and sports activities, resulting in social isolation of patients, especially in childhood and youth age. Even if the SARS COVID pandemic interrupted the various rehabilitation activities in the expected mode of the project, we were also able to continue the training course thanks to personalized tele-rehabilitation programs, who supported patients during the lockdown period, maintaining good adherence to therapeutic proposals. The preliminary results of the controls at the end of the reference period showed positive changes in the outcome indicators.

Keywords: SARS COVID Pandemic; Haemophilia; Sport; Adapted Physical Activity; Tele-Rehabilitation

Introduction

Haemophilia A is a rare hereditary bleeding disorders with an incidence approximately of 1 in 10,000 newborns, characterized by a deficiency of factor VIII (or F IX in the case of the even more rare haemophilia B) resulting in a defect in the haemostasis process and frequent bleeding episodes. Hemophilia is defined as serious when the circulating level of the factor is <1% of normal activity, moderate for activity between 1% and 5%, mild > 5%. Severe haemophilia is characterized by frequent spontaneous bleeding in joints and muscles, more typically in the elbows, knees and ankles, that arise from the first months of life. Intra articular bleeding, defined as haemarthrosis, is characterized by joint edema of varying degrees, rubor, positive thermotact, acute pain and functional impairment. In this phase, the treatment involves administration of coagulation replacement factors and functional rest. Subacute rehabilitation treatment promotes the recovery of joint mobility and muscular strength [1].

The onset of haemophilic arthropathy, that begin early after 1/2 intraarticular bleeding, recognizes a multifactorial pathogenetic mechanism that includes cartilage-mediated degenerative alterations and synovial-mediated inflammatory alterations. Intra-articular bleeding initially causes cartilage damage induced by metabolites (catalyzed iron) that stimulate the apoptosis of the chondrocytes. Iron stimulates the proliferation of the synovial membrane through the induction of proto-oncogenes (involved in cell proliferation) and inflammatory cytokines (synovial damage) [2]. These alterations are not the consequence but influence each other and this aspect reproduces what occurs in rheumatoid arthritis. Whenever the synovial

membrane is altered, both in an inflammatory and proliferative sense, an “erosive-wearing” type of damage occurs on the surrounding osteo-cartilaginous tissues, which in haemophilic arthropathy undergo a primitive biological insult and a traumatic insult from secondary contact [3]. The succession of joint haemorrhagic events leads to a progressive loss of joint function, chronic pain hardly controlled by drug therapy, severe functional limitations in the activities of daily living, with consequent important impairment of the quality of life. The main goal of hemophilia therapy is to reduce joint bleeding to a minimum to prevent arthropathy and the resulting disability and maintain a good quality of life as much as possible.

Primary prophylaxis (i.e. started before the onset of arthropathy) consists of intravenous infusion of replacement factor (FVIII or FIX depending on the type of haemophilia) which is carried out with variable frequency (from one infusion every other day to 1 infusion every 4-5 days for haemophilia A, from 2 infusions per week to one every 14 days in haemophilia B) based on the characteristics of the patient and the product used, from the first years of life and ideally continued throughout life. For younger patients prophylaxis treatment is aimed at preserving a good joint state together with a quality of life as much as possible like non-haemophilic subjects, while for adult patients prophylaxis often has the task of slowing down the evolution of a pre-existing and already disabling arthropathy [4,5].

The practice of sporting activity is extremely important in maintaining a healthy lifestyle and is essential for the correct development and maintenance of the integrity of the musculoskeletal system through the development of muscle strength and endurance,

Table 1: HEAD US score for joint health and NRS scale for pain evaluation (T0 basal value and T1 12 month's time points).

	HEAD US T0	HEAD US T1	NRS T0	NRS T1
Patient 1	29	26	3	3
Patient 2	24	23	7	7
Patient 3	22	22	2	2
Patient 4	14	13	4	1

proprioception and balance, as well as for the prevention of numerous diseases including heart disease, diabetes mellitus, hypertension and even some neoplasms. In patients suffering from haemophilia the approach to sport is conditioned by many difficulties; these subjects are in fact discouraged from practicing sports due to physical limitations and pain resulting from haemophilic arthropathy, due to the presence of muscle hypotrophy from non-use and postural instability, all conditions that make them more vulnerable to motor stress and easily bleeding. Haemophilia patients were previously discouraged from leading a physically active lifestyle due to the increased risk of bleeding and preexisting arthropathy [6-8]. However, nowadays, available therapy for haemophilia treatment has led to change in attitude towards physical activity that, anyway, must be carefully monitored by haematologist and physiatrician.

The "VINCEREMO" project was developed with the intent to promote safe physical and sporting activity in the haemophilic patient. The primary endpoints of the study are the evaluation of the impact of physical activity correctly conducted, in association with adequate anti-haemorrhagic prophylaxis, on the osteoarticular and muscular health of the haemophilic patients and to evaluate any possible delaying or preventive effect of physical activity with respect to the onset of haemophilic arthropathy.

Materials and Methods

Desing and Setting

This is a single centre, prospectic and pilot study conducted by haematologists and physiatricians of the Hemophilia

Center and Rehabilitation Unit, Città della salute e della scienza University Hospital, in collaboration with SISPORT sport center, Turin, Italy.

After the ethical commetee approval, the study started on October 2019 and it is still ongoing. Recruitment and

development of the study has been slowing down due to SARS CoV2 pandemy.

Participants

Patients with severe haemophilia A or B (maximun 60 years of age) who are on regular FVIII/FIX prophylaxis with stable dose for at least 12 months and with knee, ankles and elbow range of motion of > 50% normal were eligible. 9 patients were enrolled.

Study Procedures

At enrollement haematology and physiatric evaluation was performed, toghether with psicologic evaluation. SISPORT's trainers developped 12 months Adapted Physical Activity (APA) program based on musculoskeletal characteristics of every patient including

aerobic training (free body workout, use of fitness equipment), muscular training (pilates, stretching) and waterfitness. 2 APA sessions/week were preview, together with a maintenance home program to perform under telematic monitoring weekly. Telematic monitoring was also available as needed, in order to detect any adverse event and to control patient wellness. Further haematologic and physiatric evaluation was preview after 6 months and after 12 months, at the end of the study.

Data Collection

The following parameters were preview at the beginning, after 6 and 12 months.

Haematology evaluation: age, weight and height, prophylaxis regimen review, articular ultrasound with HEAD US [9,10], annualized bleeding rate, NRS pain evaluation Physiatric evaluation : elbow, knee and ankles articular range of motion , HJHS [11], muscular strenght evaluation Psicologic evaluation: validated quality of life related questionnaires (Haem-a-QoL, SF-36, EQ-5D-5L) Trainer evaluation: EuroFIT battery test [12]: 6 minutes walking test, tapping test, hand grip, 5 reps sit to stand, sit and reach, flamingo balance test.

Appendix of the Main Study

Enrollement procedures started in autumn 2019 but they slow down in March 2020 because of the first lock down due to

SARS COV2 pandemy and they concluded in September 2020.

Adapted physical activity program started in October 2020 but it was suddenly stopped at the end of October 2020 following the recrudescence of the SARS COV2 pandemy, with a second lock down and closure of sport centres. At that moment, patients already exeperienced the first lock down with severe reduction in exercise and possible negative impact on musculoskeletal health.

In order to contrast the negative effect of movement limitations in these patients and to stimulate the interest in physical activity during the second lock down period, trainers developped a new physical activity program that could be carried out by the patient at home with their online monitoring. 4 patients accepted to participate to this appendix of the main study.

APA home training included full body, muscle activation and articular mobility exercises that were performed weekly under the supervision of SISPORT trainer (Wazzup video) for 12 months, since Novembre 2020 to Novembre 2021.

Results

At this moment we are able to present the descriptive results of the appendix (Table 1) Evaluation of ultrasound score HEAD US (validated to detect haemophilic artropathy) showed in two cases improving in score and in two patients no change in score, indicating that during this period no worsening or improving in joint health was detected. Pain evaluation showed that NRS scale did not change over 12 months except for patient 4 in which pain was improved. Any change in analgesic therapy use was reported. No bleeding event was reported in this period despite exercise, no FVIII except regular prophylaxis was needed. Every patient's participated at least at the 80% of the training online session during the entire period.

Discussion

We present in this paper descriptive results of an appendix of a pilot study on sports participation and physical activity in patients with haemophilia, developed to face the social restriction related to SARS COV2 pandemic. Despite big limitation, that include small number of patients enrolled and slightness of parameters evaluated related to isolation during lock down, we think that this work has some point of interest.

First, during telemonitored training program every patient was followed weekly by the trainer with a ratio of 1:1. Second, implementation of telemating training session in a very few time and AFA home training program development were easy to perform because in the main protocol we already included whatsapp meeting in order to support patients in sport. Compared to other chronic inflammatory/degenerative conditions that during lock down period worsening in arthropathy, as rheumatoid arthritis, these patients had the opportunity, using telemonitoring, to perform physical activity and to maintain a stable articular status. Furthermore, weekly contact with trainers during lock down allowed them to establish a confidential relationship with positive impact on reluctance that haemophilia patients have regarding physical activity.

Concerning these patients, no pain relievers increased consumption was registered and no further replacement therapy other than regular prophylaxis was administered, evidence that physical activity can be safely performed by haemophilia patients if well conducted. On this basis, on April 2022 the main project started and it is still ongoing. In parallel to clinic implications, with this project we would like to build a multidisciplinary team composed by trainees, physiatrists, haematologists that could remotely support haemophilic patients and to give to every patients, even far from hemophilia center, the possibility to safely practice sport and to improve musculoskeletal health and to maintain a healthy standard of life.

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