

Meeting Abstract

Exercise and quality of life in patients undergoing bone marrow transplantation

Ejercicio y calidad de vida en pacientes sometidos a trasplantes de médula ósea

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According to the World Health Organization cancer is the leading cause of death worldwide. It is responsible for 7.6 million annual deaths, 13% of the total annual deaths (1). The highest cancer incidence is observed in industrialized countries followed by developing nations. It is estimated that in 2030 about 70% of total deaths will be attributed to cancer. In Chile, a country of 17 million people, there are approximately 240 new cases of cancer each year per 100,000 inhabitants for a total of 36,500 new cases yearly.

Bone Marrow Transplantation (BMT) is a form of therapy used for many patients with hematologic malignancies. It has demonstrated a survival benefit for many patients. It involves the use of high doses of chemotherapy and radiation therapy to eradicate malignant cells followed by the administration of stem cells from a third party donor in order to restore bone marrow function.

A common side effect observed after BMT is increase muscle wasting, and secondary functional disability. These changes result in detriment in the quality of life, increased fatigue, and worsening physical function. Multiple studies have showed that 35% of patients with cancer will develop cancer-related fatigue by different assessment methods: the EORTC questionnaire for research and treatment of cancer (EORTC QLQ-C30), the global survey on quality of life related to the health for patients with prostate cancer (CAVIPRES-30) and the instrument of quality of life related to health (SF -36). In Chile demonstrated that 75% of patients with different types of leukemia treated with chemotherapy (CT) developed cancer related fatigue (2).

Different biological factors contribute to muscle atrophy and fatigue observed during BMT. Anemia and decreased oxygen delivery observed prior to engraftment limits exercise tolerance. In addition, there is an increased metabolism due to infections and chemotherapy administration leading to a negative nitrogen balance. A further factor is poor protein intake associated to severe gastrointestinal mucositis, malabsorption, chemotherapy-induced anorexia and vomiting all leading to cachexia. Different cytokines released during infections or engraftments have a direct effect in the musculoskeletal and nervous system leading to fatigue.

Studies that measure exercise capacity using oxygen delivery ($VO_2\text{max}$) and 6-min-walking test have showed that there is decreased oxygen delivery and decreased exercise tolerance in patients undergoing BMT.

Exercise training during treatment with chemotherapy can improve quality of life, improve strength and decrease fatigue. The START study (Study of Supervised Versus Aerobic Training Resistance) compared the effects of aerobic or resistance-exercise on quality of life, fatigue, psychosocial function, physical performance and body composition in patients undergoing chemotherapy. Exercise training overall improved the scores in all the above aspects compared to controls but it was unable to detect a difference between aerobic or anaerobic exercise. According to the meta-analysis by exercise training during chemotherapy can improve quality of life, help to manage emotions, improve sleep and general physical well-being.

Concluded that exercise reduces fatigue and pain during and after chemotherapy (3) evaluated the effect of an exercise program in patients undergoing BMT concluding that an exercise program is efficient in improving muscle strength after transplantation (4). Courneya et al. (5) in 2000 established the effect of an inpatient physical exercise program on quality of life in 25 hospitalized patients undergoing BMT. Their results indicated a statistically significant positive correlation between exercise and improvement in physical and psychological well-being, decreased depression and anxiety showed that after a strength training program perception of health status and quality of life improved in BMT patients. Patients evaluated even after six weeks of hospital discharge continued to have less fatigue compared to patients not involved in a strength-training program.

We hypothesize that an individualized exercise program that involves aerobic and strength training can increase physical activity and improve quality of life. Increase in VO₂max will be used as a surrogate for increase physical function and EORTC QLQ-30 as an assessment of quality of life.

We propose a planned, individualized and supervised physical intervention program for patients undergoing Bone Marrow Transplantation that will involve cycle ergometer, dumbbells, TRX, Wii Fit for the duration of 5 time/week (6) that should be included during the multidisciplinary management of BMT patients in order to prevent or mitigate the loss of functional capacity thereby contributing to the maintenance of the quality of life after BMT.

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