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PHYSIOTHERAPEUTIC INTERVENTIONS IN IMMUNOCOMPROMISED PATIENTS: WHAT DO WE NEED TO KNOW?

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Abstract: Immunocompromised patients, such as those undergoing cancer treatment, transplants or autoimmune diseases, are immunologically fragile and predisposed to infections and systemic complications. Immunocompromised patients are particularly vulnerable to complications and require special care, including physiotherapy interventions to improve their quality of life and promote rehabilitation. The aim of this study was to demonstrate, through a literature review, the role of physiotherapists in immunocompromised patients, analyzing the benefits and intervention strategies used. In this context, physiotherapy plays a crucial role, promoting functional rehabilitation, preventing complications and improving quality of life. The approach must be individualized, taking into account factors such as nutritional status, comorbidities, level of fatigue and associated risks. Close monitoring during sessions is essential to avoid overload and adverse events. Therefore, as pointed out in the studies, physiotherapy in immunocompromised patients is not limited to physical rehabilitation, but integrates multidisciplinary strategies, contributing to the maintenance of immunological and functional homeostasis. Future studies are needed to consolidate specific protocols and explore the effects of innovative interventions in this population.

Keywords: Immunocompromised, Physiotherapeutic intervention, Respiratory physiotherapy, Multidisciplinary treatment.

INTRODUCTION

Immunocompromised patients are individuals who have a weakened immune system and are therefore more susceptible to infections and other diseases (Griffiths; Reeves et al., 2021). This condition can be caused by various reasons, such as the use of immunosuppressive drugs, autoimmune diseases, chronic infections, among others. According to Mohammed (Mohammed et al., 2021), patients who are at increased risk of developing serious infections can have serious and even fatal complications. In addition, the immune response to vaccines and other medical treatments can be diminished in these individuals, which can make it difficult to prevent and treat diseases.

Immunocompromised patients can be divided into two main categories (Shields et al., 2021), those with a primary immunodeficiency and those with a secondary immunodeficiency. Patients with primary immunodeficiency have a congenital or inherited immune deficiency, while patients with secondary immunodeficiency acquire the condition throughout their lives. Among the main causes of secondary immunodeficiency are autoimmune diseases such as rheumatoid arthritis and systemic lupus erythematosus, cancer and treatment with immunosuppressive drugs such as chemotherapy and corticosteroids (Chinen; Shearer et al., 2010). Thus, as the immune systems of these patients are not effective in fighting infections, infectious agents, even the less virulent ones, become more dangerous.

The diagnosis and treatment of immunocompromised patients is a challenge for modern medicine, as it involves identifying the underlying causes of immunodeficiency and using specific treatments for each case (Chen et al., 2011; Habib et al., 2009). In addition, the prevention of infections is fundamental for these patients, through the use of vaccines and appropriate hygiene measures.

Physiotherapists play an important role in the care of immunocompromised patients, helping to treat and prevent complications arising from immunodeficiency. According to Rodrigues et al. (Rodrigues et al., 2020), physiotherapy can be especially important for patients with respiratory diseases, as these patients have an increased risk of serious lung infections. To this end, care must take into account the risks associated with immunodeficiency and be carried out in a safe and coordinated manner; and with this, physiotherapists must work closely with other healthcare professionals involved in the patient's treatment, such as doctors and nurses, to ensure that care is carried out safely and effectively.

Mohammed et al., 2021 (Mohammed et al., 2021) state that immunodeficiency is a condition that can compromise the health and quality of life of individuals of all ages, especially with regard to respiratory and musculoskeletal function. However, the role of the physiotherapist in the care of immunocompromised patients is still little explored in the scientific literature, despite the relevance of this professional in the prevention and treatment of complications arising from immunodeficiency. It is therefore necessary to investigate and evaluate the effects of physiotherapeutic care for immunocompromised patients in order to increase knowledge about best practices and strategies for preventing and treating respiratory and musculoskeletal complications in individuals with immunodeficiency.

Based on this information, the aim of this study was to review the existing literature on the care of physiotherapists in immunocompromised patients, evaluating the efficacy and safety of physiotherapeutic interventions in patients with different types of immunodeficiency. In addition, it sought to identify best practices and strategies to prevent complications and ensure the safety of physiotherapeutic care in immunocompromised patients.

IMMUNOCOMPROMISE

(Soares ., 2014) et alstate that being immunocompromised means having a weakened immune system, which reduces the body's ability to fight infections and other diseases, these patients can include, among others, transplant and implant recipients, burn victims, carriers of the human immunodeficiency virus (HIV) and individuals with cancer.

Immunocompromised patients can be divided into two categories, (Catalani Morata et al., 2010) those with a primary immunodeficiency and those with a secondary immunodeficiency. Patients with primary immunodeficiency have a congenital or inherited immune deficiency, while patients with secondary immunodeficiency acquire the condition throughout their lives.

Among the main causes of secondary immunodeficiency are autoimmune diseases such as rheumatoid arthritis and systemic lupus erythematosus, cancer and treatment with immunosuppressive drugs such as chemotherapy and corticosteroids (Errante et al., 2016).

Studies by the author Slavish (Susan, 2012) have shown that patients with the human immunodeficiency virus (HIV) and individuals with cancer may be more susceptible to infections because their immune systems are compromised. As the patient's immune system becomes more and more ineffective, less virulent organisms progressively become more dangerous, leaving patients with severe immune defects more susceptible to a greater number and variety of infectious diseases

The patient's overall immunosuppression determines their risk of infection and is affected by the interaction of many variables (HENRIQUE PAIM SANTOS, 2023) including: the patient's age and underlying disease; the dose and duration of immunosuppressive therapy; the state of the host's humoral and cellular defenses; the integrity of the body's skin and mucous membranes; metabolic factors, including malnutrition, uremia, hyperglycemia and liver dysfunction; abnormalities of the endothelial reticulum system (most notably the absence of splenic function); the presence or absence of immunomodulatory infections, such as HIV, cytomegalovirus, hepatitis virus and Epstein-Barr virus.

According to the WHO (GOV.BR, 2022) between 2% and 3% of the world's population suffer from diseases or are undergoing treatment that weaken the immune system:

- Those undergoing treatment for solid malignant tumors or immunosuppressive therapy.
- Those undergoing treatment after a solid organ transplant or immunosuppressive therapy.
- Who, in the last two years, has undergone a hematopoietic stem cell transplant.
- People with HIV, the AIDS virus, at an advanced stage or untreated.
- People with moderate or severe primary immunodeficiency, such as DiGeorge or Wiskott-Aldrich syndromes.

IMPACT OF IMMUNOCOMPROMISE ON CONDITIONS

As already commented in this work and well described in the literature, unlike healthy people, immunocompromised people mount a much weaker immune response and, consequently, the effectiveness of the vaccination process is largely affected. During the COVID-19 pandemic, when pharmaceutical companies began testing vaccines against the disease in 2020 and 2021, clinical trials excluded immunocompromised individuals (Oliveira, 2022). Even so, they received the same vaccination recommendations as the majority of the population. Only later were these recommendations adjusted (Runwal, 2022)

The University Hospital (HU) of the Federal University of Alagoas - Ufal, (Gonzaga, 2022), carried out studies using the context of

the COVID-19 pandemic and sought to assess adherence to drug treatment and analyze associations with characteristics related to the patient, disease, health professionals and service, as well as sociodemographic issues in individuals with Lupus.

(Tenório , 2012) et al.found an association between adherence to drug treatment and physical exercise. According to the same study, immunocompromised participants who did not practice physical exercise were 3.71 times more likely not to adhere to treatment. Individuals who cited difficulties were 3.43 times more likely not to follow the treatment. She "believes that the pandemic may have influenced this result".

In Brazil, according to the Brazilian Society of Rheumatology (Sociedade Brasileira de Reumatologia, 2022)estimates indicate that there are around 65,000 people with Systemic Lupus Erythematosus, the majority of whom are women. Systemic Lupus Erythematosus (SLE) is a chronic autoimmune disease characterized by an unregulated immune response, leading to inflammation and damage to the body's tissues. According to the same authors, this condition can affect several organs and systems, presenting a wide range of symptoms that can vary in severity and intensity from one patient to another. The disease creates a favorable environment for infections by opportunistic agents, including bacteria, viruses, fungi and parasites (GOV.BR, [n.d.]).

THE ROLE OF PHYSIOTHERAPY IN IMMUNOCOMPROMISED PATIENTS

According to Schujmann (Schujmann et al, 2020) et al. physiotherapy plays a fundamental role in immunocompromised patients, as it can favor early rehabilitation while still in the ICU, favoring a better return to functionality, fewer days of mechanical ventilation, a reduction in muscle weakness and hospitalization days.

In cases such as human immunodeficiency virus (HIV) where the immune system is suppressed, posing a risk for infections such as pneumonia, care must be redoubled, patients must protect themselves and other patients by using standard precautions (effective hand hygiene and appropriate PPE) when caring for HIV-positive patients and disposing of used needles (Susan, 2012).

In cancer patients, the side effects of therapies such as radiotherapy and chemotherapy can increase vulnerability to infections. A common example is the development of pneumonia due to the inhalation of microorganisms, especially in patients with head and neck cancer. Because of these risks, various Infection Prevention and Control (IPC) strategies are implemented to minimize the adverse effects of therapies. Precautions include strict hand hygiene practices, proper use of Personal Protective Equipment (PPE), and targeted antimicrobial therapies. These measures are aligned with the practices used for immunocompromised patients, aiming to protect the patient's health and prevent infectious complications during cancer treatment (Susan, 2012). Many people are unaware that Physiotherapy can play a significant preventative role and act as an effective ally in improving the immune system (Cunha, 2021).

According to Márcio Fernandes da Cunha, a specialist and professor on the Physiotherapy course at Cruzeiro do Sul University, Preventive Physiotherapy aims to promote health, even in individuals without comorbidities. This practice can be carried out in any age group, regardless of the presence of pathologies, with a focus on maintaining well-being and preventing musculoskeletal diseases or injuries. It is especially relevant for sedentary populations, who do not practice regular physical activities, such as exercise and stretching, and are more susceptible to health problems related to lack of movement (Cunha, 2021).

PHYSIOTHERAPEUTIC INTERVENTIONS

During the COVID-19 pandemic, breathing and lung expansion techniques were widely used, and around 80% of cases had mild symptoms and did not require hospitalization, receiving follow-up from primary health care services. However, the elderly and immunocompromised individuals, as well as obese people, often developed more severe clinical conditions. During treatment, the increased time patients spend sitting or lying down contributes significantly to loss of muscle strength, increased coughing and expectoration, as well as the risk of deep vein thrombosis. Physiotherapy played a fundamental role in this context, based on a comprehensive assessment of the patient's health conditions. It was often necessary to adapt the exercises according to the limitations and specific needs, ensuring greater effectiveness and safety during the recovery of these patients, especially for risk groups (Carolina Lustosa et al., 2020).

In patients with coughs and difficulty expectorating, secretion removal is recommended to relieve symptoms and improve respiratory function. Lung expansion therapy, which involves a sequence of deep inhalations and exhalations performed in a clean environment, is indicated for restoring and optimizing lung function. This practice helps renew residual air in the lungs, improves cerebral oxygenation and promotes holosomatic homeostasis. In addition, the increase in tidal volume generated by this technique facilitates expectoration of accumulated secretions (**Ériko** et al., 2012). During the application of these techniques, according to the same authors, it is essential that patients wear surgical masks or homemade fabric masks to prevent the spread of microorganisms. In addition, the proper use of Personal Protective Equipment (PPE) by healthcare professionals is crucial to ensure the safety of both the patient and the team, minimizing the risk of cross-contamination.

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease of unknown etiology that can affect various organs and systems due to the presence of autoantibodies and immune complexes. The disease has a pattern of recurrence, with abrupt or gradual onset, and varied clinical manifestations, from the most common to the least frequent. Among the complications associated with SLE is inflammation of the lung tissues, called pneumonitis, which can occur either as a result of infection or as a direct manifestation of the disease. Chronic interstitial lung disease, although rare in the context of SLE, represents an advanced form of lupus pneumonitis that can evolve into pulmonary fibrosis. The severe manifestations of SLE, especially those affecting the respiratory system, are potentially fatal and can result in significant disabilities. Given the multifunctional role of the respiratory system, pulmonary complications in SLE require special attention for early diagnosis and management, in order to minimize the impact on patients' quality of life (Vieira De Assis et al., 2004).

Autoimmune diseases, such as systemic lupus erythematosus (SLE), often lead to the need for hospitalization, life support and specialized medical care. In many cases, physiotherapy plays a crucial role in patient management, contributing to the prevention and reduction of complications arising from pathophysiological processes (Errante et al., 2016). In the case of SLE, which can affect the lungs and pleurae, physiotherapy uses a variety of techniques and equipment to promote pulmonary rehabilitation, improve functional capacity and prevent secondary complications such as loss of mobility and respiratory deterioration. These interventions are fundamental to optimizing quality of life and helping patients recover, as part of the multidisciplinary treatment of autoimmune diseases.

According to Errante et al. (Errante et al., 2016) , physiotherapy has proven effective in treating pulmonary complications through specific breathing exercise techniques. Among these techniques are diaphragmatic breathing, chest expansion, inspiratory sighs and inspiration in times, which aim to prevent the accumulation of bronchial secretions and reduce the risk of infections. These approaches contribute significantly to relieving symptoms such as breathing difficulties and muscle overload, favoring improved lung function and the patient's recovery. In addition, physiotherapy helps to improve the prognosis of diseases that compromise the respiratory system, promoting a better quality of life and the patient's functional reintegration

COMPLEMENTARY TREATMENTS FOR IMMUNOCOMPROMISED PATIENTS: AQUATIC AND MOTOR PHYSIOTHERAPY

Patients with Down Syndrome have a compromised respiratory system and usually weakness in the muscles responsible for the process of inhalation and exhalation due to generalized hypotonia, favoring a decrease in respiratory muscle strength, which can increase the chances of these individuals having repeated infections, weak cough, accumulation of secretions, pneumonia and recurrent hospitalizations, so physiotherapeutic intervention is necessary (Silva et al., 2019). Among the various existing physiotherapy techniques, aquatic physiotherapy stands out, in which physical, physiological and kinesiological principles are used on the body when immersed in heated pool water.

Physiotherapy in the aquatic environment offers significant benefits for children and adolescents with Down Syndrome, including strengthening the inspiratory and expiratory muscles. Techniques such as Bad Ragaz, Halliwick and conventional hydrokinesiotherapy are applied, taking advantage of the pressures exerted by the water on the rib cage when the body is immersed (Braga et al., 2019). In addition to the physical benefits, according to the same authors, practicing in an aquatic environment promotes social interaction in a pleasant setting rich in playful stimuli, facilitating the application of techniques and strengthening the bond between therapist and patient. This approach combines motor and respiratory therapies with psychosocial aspects, contributing to the quality of life and overall development of individuals with Down's Syndrome.

According to researcher Quezia Cavalcanti and colleagues (Nobre et al., 2008), motor physiotherapy plays an important role in the rehabilitation of these patients, promoting muscle strengthening, improved motor coordination and increased physical endurance. Among the strategies used are therapeutic exercises, neuromuscular electrical stimulation and aquatic therapy, which provide functional and psychological benefits to patients.

Another important point discussed in the literature is the importance of guidance and education offered by physiotherapists to immunocompromised patients and their caregivers (Cavalcanti et al., 2008). These guidelines aim to promote adherence to care and prevent complications such as ventilator-associated pneumonia. To this end, it is essential to understand the importance of multi-professional care, overcoming the traditional biomedical model, which focuses only on the disease. The focus should be on comprehensive patient care, recognizing the benefits of physiotherapy in this context, which contributes to improving quality of life and preventing further complications.

CONCLUSION

In summary, this review highlighted the importance of physiotherapists in caring for immunocompromised patients, emphasizing the need for an integrated and continuous approach with the multi-professional team throughout the disease cycle, as exemplified in the case of HIV. Physiotherapeutic intervention, by helping to improve the patient's quality of life, has the effect of reducing the length of hospitalization. In this context, respiratory and motor physiotherapy plays a crucial role in preventing complications and promoting rehabilitation, optimizing quality of life, reducing hospitalization time, reducing the incidence of hospital infections and, consequently, the costs associated with treatment. Likewise, the guidance and education provided by the physiotherapist promotes greater autonomy and safety for patients, making physiotherapy an essential and complementary component in multidisciplinary treatment. The research carried out demonstrates the importance of advancing knowledge about physiotherapy in the care of immunocompromised patients, an area that needs further exploration by the scientific community. The results obtained, in turn, offer important guidelines for the clinical practice of physiotherapy professionals in the care of this population.

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