

# Exercise-Based Rehabilitation for Pre- and Post-Solid Organ Transplant Patients

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Short Editorial related to the article: *Clinical Implementation of Different Strategies for Exercise-Based Rehabilitation in Kidney and Liver Transplant Recipients: A Pilot Study*

In the last decades, numerous advances in solid organ transplantation (SOT) have resulted in greater patient survival, resulting in a considerable increase in the number of transplants performed in the world.<sup>1,2</sup> SOT is a life-saving intervention in patients with heart disease, pulmonary, renal or hepatic. Although the recipients improve both in functional capacity and quality of life (QoL), these are still not equivalent to the same levels of healthy individuals.<sup>3</sup>

The long waiting period, caused by the lack of organ donors, often makes patients unprepared for the transplant physically and mentally. In addition to the classic cardiovascular risk factors, we still have the patient's lack of adherence to the programs, knowledge deficits about the rules of conduct after transplantation, non-acceptance of the new organ, fear of rejection, lack of a physical exercise routine, strategies for coping and occupational health issues and social rights.<sup>4,5</sup>

Rehabilitation is an essential part of contemporary care for patients before and after transplantation. The aim is to improve graft survival and reduce deaths from infection/rejection. Rehabilitation programs have prophylactic and therapeutic objectives, meeting the recommendations of maintaining improvements in QOL, reducing morbidity from cardiovascular diseases and improving long-term survival in transplant recipients.<sup>6</sup> Therefore, greater attention should be given to postoperative interventions surgical procedures that help in the individualized management of these patients and that can result in a better prognosis.<sup>7</sup>

Physical training should be highlighted among non-pharmacological post-surgical interventions, as it is associated with significant improvement in exercise tolerance and functional capacity, reduced disability and decreased cardiovascular morbidity and mortality. This has also been shown to be beneficial in several groups of chronic diseases that can lead to SOT. It is known that there is a limitation in the ability to perform physical exercises in pre-SOT individuals, and most studies have

focused on candidates for heart and lung transplantation.<sup>8</sup> However, people with chronic kidney or liver disease also demonstrate limitations in pre-transplant exercise capacity, often due to secondary consequences of disuse, such as muscle weakness, rather than as a consequence of their primary disease process.<sup>9</sup> In these individuals, peak oxygen consumption limitation seems to be related to peripheral muscle dysfunction and not to central factors, such as cardiovascular or respiratory limitations.<sup>10</sup>

Despite the evidence showing the potential benefits of physical exercise for both pre and post-SOT patients, there is a great lack of places that offer this care globally. This worsened after the COVID-19 event that further restricted access to rehabilitation centers. A large proportion of TOS recipients engage in low levels of physical exercise and face barriers to being physically active.

The study by Ribeiro et al.<sup>11</sup> suggests a strategy where, after pre-participation assessment, in the absence of cardiovascular contraindication and according to the patient's preference, he can choose to perform his exercise program at the hospital gym, at the gym community or at home. This model allows more people to engage in an exercise program, receive guidance from a qualified professional, and have periodic face-to-face or teleconsultation consultations.<sup>12</sup> The results found by the authors reinforce the importance of the supervised program but emphasize that any type of treatment will be effective as long as the patient proposes to perform it.<sup>11</sup> In addition to the limitations described by the authors, the fact that, in the same study, recipients of different organs were approached have a pathophysiological inheritance that can directly influence rehabilitation outcomes.

Larger, well-controlled studies of physical exercise that specifically include transplant candidates are still needed to propose specific guidelines on exercise dose and program duration to achieve the best benefits.<sup>13</sup> Future studies on this topic should also focus on the effects of exercise during the waiting list period, preparing the patient for the transplant event and early post-transplant clinical outcomes.

For the world population, access to rehabilitation centers is still very limited, especially in places with a low structure and health resources and a low socioeconomic and cultural level. Our challenge is knowing how to use the knowledge of academia and scientists in conducting well-designed studies which can propose safe strategies, guidance and practice of PRBE in patients pre and post-SOT of great scope.

## Keywords

Organ Transplantation/rehabilitation; Transplantation Immunology; Physical Activity; Kidney Transplantation; Liver Transplantation.

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## References

1. Mathur S, Janaudis-Ferreira T, Wickerson L, Singer LG, Pacai J, Rozenberg D, et al. Meeting report: consensus recommendations for a research agenda in exercise in solid organ transplantation. *Am J Transplant*. 2014;14(10):2235–45. doi: 10.1111/ajt.12874
2. Associação Brasileira de Transplantes de Órgãos (ABTO). Registro Brasileiro de Transplantes. São Paulo; 2019.
3. Salles AF, Oliveira JA. Adaptation to exercise following cardiac transplantation. *Arq Bras Cardiol*. 2000;75(1):70-90. doi: 10.1590/s0066-782x2000000700010.
4. Santos DC, Limongi V, Da Silva AM, Ataíde EC, Mei MF, Udo EY, et al. Correlation between functional capacity and respiratory assessment of end-stage liver disease patients waiting for transplant. *Transplant Proc*. 2014 Nov;46(9):3043-6. doi: 10.1016/j.transproceed.2014.07.014.
5. Kılıç L, Pehlivan E, Balcı A, Bakan ND. Effect of 8-week Pulmonary Rehabilitation Program on Dyspnea and Functional Capacity of Patients on Waiting List for Lung Transplantation. *Turk Thorac J*. 2020 Mar 1;21(2):110-5. doi: 10.5152/TurkThoracJ.2019.18202
6. Zelle DM, Corpeleijn E, Stolk RP, Greef MHG, Gans ROB, der Heide JJH, et al. Low physical activity and risk of cardiovascular and all-cause mortality in renal transplant recipients. *Clin J Am Soc Nephrol*. 2011;6(4):898-905. DOI: 10.2215/CJN.03340410
7. Gerbig D. Rehabilitation after kidney transplantation. *Nephrologie*. 2021;16(3):160-8. DOI: 10.2215/CJN.03340410
8. Perrier-Melo RJ, Figueira F, Guimaraes GV, Costa MDC. High-intensity interval training in heart transplant recipients: a systematic review with meta-analysis. *Arq Bras Cardiol*. 2018;110(2):188-94. doi: 10.5935/abc.20180017. 9-9. Pérez-Sáez MJ, Morgado-Pérez A, Faura A, Muñoz-Redondo E, Gárriz M, Muns MD, et al. The FRAILMar Study Protocol: Frailty in patients with advanced chronic kidney disease awaiting kidney transplantation. A randomized clinical trial of multimodal prehabilitation. *Front Med (Lausanne)*. 2021;8:675049. doi: 10.3389/fmed.2021.675049
10. Williams TJ, McKenna MJ. Exercise limitation following transplantation. *Compr Physiol*. 2012;2(3):1937-79. doi: 10.1002/cphy.c110021.
11. Ribeiro PAB, Gradassi M, Sarah-Maude M, Leenknecht J, Baudet M, Le V, et al. Implementação Clínica de Diferentes Estratégias para Reabilitação Baseada em Exercícios em Receptores de Transplante de Rim e de Fígado: Um Estudo Piloto. *Arq Bras Cardiol*. 2022;119(2):246-254.
12. Tian M, Wang B, Xue Z, Dong D, Liu X, Wu R, Yu L, Xiang J, Zhang X, Zhang X, Lv Y. Telemedicine for Follow-up Management of Patients After Liver Transplantation: Cohort Study. *JMIR Med Inform* 2021;9(5):e27175. doi: 10.2196/27175.
13. Pesce de Souza F, Massierer D, Anand Raje U, Tansey CM, Boruff J, Janaudis-Ferreira T. Exercise interventions in solid organ transplant candidates: A systematic review. *Clin Transplant*. 2020 Sep;34(9):e13900. doi: 10.1111/ctr.13900.

