

# EVALUATION OF PULSED ELECTROMAGNETIC FIELD THERAPY FOR IMPROVING MUSCLE STRENGTH IN OLDER ADULTS

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## ABSTRACT

This open, single-center clinical trial aimed to evaluate the effects of pulsed electromagnetic field (PEMF) muscle stimulation technology. Sarcopenia is a condition characterized by a decrease in muscle mass and strength, as well as functional decline in older adults. The study included 30 older adults individuals who did not practice any type of physical activity, who underwent 12 PEMF sessions on the lower limbs (LL), in addition to resistance exercises for the upper limbs (UL). The PEMF protocol was performed for 30 minutes on the rectus-femoris and gastrocnemius muscles simultaneously. The volunteers underwent clinical evaluations and assessment tests, such as dynamometry, to measure lower limb muscle strength before and after the application of the PEMF protocol. The results showed that there was a strength gain of approximately 30%, which is quite significant considering the gradual loss of strength in the older adult population. This study reinforces the relevance and effectiveness of pulsed electromagnetic fields in generating contraction and, consequently, muscle strength in older adults with muscle strength loss and sarcopenic older adults.

**Keywords:** muscle strength; sarcopenia; elderly health.

## INTRODUCTION

Aging is linked to a group of developmental changes that occur in the last years of life and is associated with profound changes in body composition. These changes are determined by factors additional to chronological age and progress simultaneously with the aging process in different magnitudes, according to individual lifestyle habits, such as physical inactivity and diet. With age, there is an increase in body fat mass, especially with the accumulation of fat deposits in the abdominal cavity, and a decrease in lean body mass. This decrease occurs mainly as a result of skeletal muscle mass loss. This age-related loss has been termed "sarcopenia," whose symptoms occur mainly in physically inactive individuals (GADELHA *et al*, 2017).

This reduction in muscle mass contributes to the progressive loss of independence in this population, as it affects performance in activities of daily living (ADLs), increases the occurrence of falls, and also contributes to the onset of joint injuries. In addition,

loss of strength is associated with frailty syndrome in older adults and can be reversed with appropriate physical exercise (SILVA *et al*, 2012). Several authors have found that strength training can minimize or delay the process of sarcopenia to obtain significant neuromuscular responses (muscle hypertrophy and muscle strength) by increasing the contractile capacity of skeletal muscles (PÍCOLI *et al*, 2011). PEMF uses very low frequency electromagnetic waves that dissipate through tissue without being absorbed. Due to this form of propagation, the waves do not provide any heating by electromagnetic radiation, and an interaction occurs between the wave and human tissue according to the principles of electromagnetic induction. PEMF directly stimulates the motor neurons that innervate the muscle, without depending on the central and peripheral nervous systems, thus allowing complete muscle contraction (DUCAN; DINEV, 2020). Given this, it is appropriate to use health-related technology to improve the quality of life of these individuals. Highlighting this perspective, the electromagnetic field is one of the resources that is on the rise in the treatment of sarcopenia and, consequently, in the recovery of performance in activities of daily living.

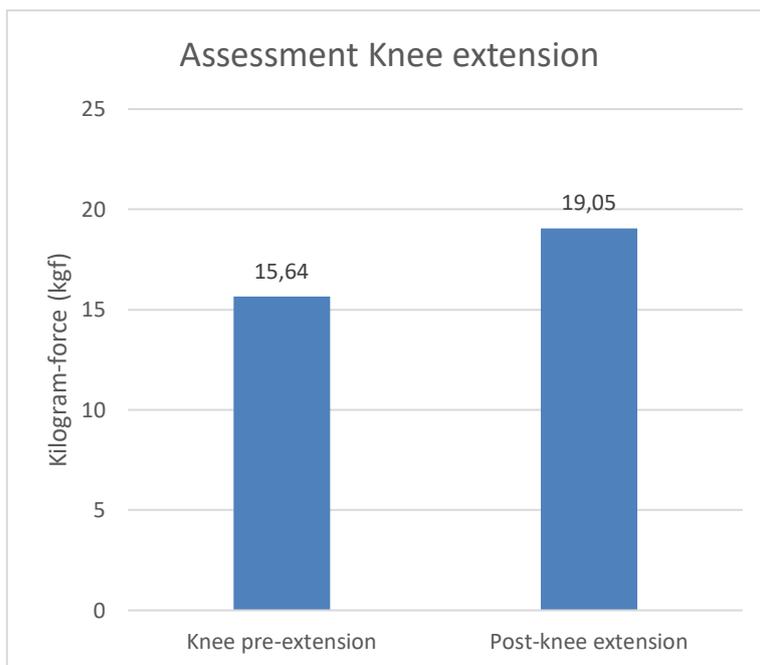
## **METHODOLOGY**

This is an open, single-center study with 30 volunteers of both sexes, aged between 65 and 80 years, who had intact cognitive function and no comorbidities that could interfere with the research, such as the use of a pacemaker or metal prosthesis in the region to be treated, with a diagnosis of sarcopenia or muscle weakness that affected basic activities of daily living (ADL), and who did not engage in physical activity. Participants performed a strength test using lower limb dynamometry (E-lastic force dynamometer). Twelve PEMF sessions were performed using mittens positioned on the lower limbs (LIM), more precisely on the rectus femoris and gastrocnemius muscles, in addition to resistance exercises for the upper limbs, twice a week, with a 48-hour rest period between sessions. The PEMF protocol was performed for 30 minutes per session, according to the manufacturer's instructions (ADOXY®, Brazil). Participants with significant cardiovascular impairment and/or severe cerebrovascular disease, severe cognitive impairment, and those who did not meet the values established in the clinical criteria and functional tests were excluded from the study.

## **RESULTS**

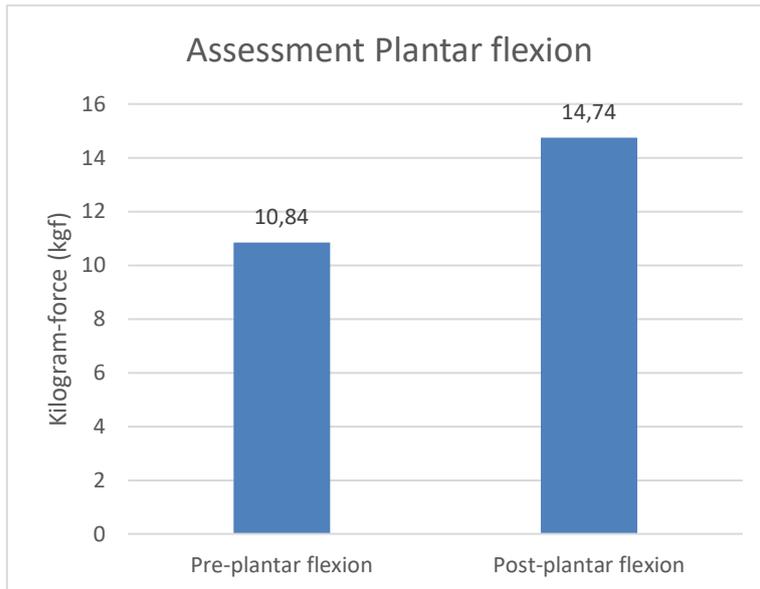
The study participants underwent muscle strength quantification before and after the 12 sessions of the PEMF protocol. The assessment was performed using a dynamometer (E-lastick brand), which measured the extension strength of the right and left knees, as well as plantar flexion on both sides. Based on the pre- and post-protocol assessments, a significant gain in strength was observed in the study participants, with an average gain of approximately 21% (graph 1) in knee extension and 35% (graph 2) in plantar flexion.

**Graph 1. Pre- and post-evaluation of knee extension.**



Source: author's production.

**Graph 2. Assessment before and after plantar flexion.**



Source: author's production

## CONCLUSION

Therefore, it can be concluded that the use of Pulsed Electromagnetic Field Therapy (PEMF) promoted significant muscle strength gains in sedentary older adults, suggesting the use of PEMF in participants with muscle strength loss and sarcopenic individuals. Furthermore, in light of this study, it is worth highlighting the importance of new research using health-related technology to contribute to improving the physical and functional capacity, as well as the quality of life and autonomy of the older adult.

## ACKNOWLEDGEMENTS

I would like to thank the Evangelical University of Goiás for the institutional research grant, which encouraged scientific production. In addition, I am immensely grateful to my advisor, Professor Patrícia Sardinha, and the entire team at the Health Technologies Laboratory (Lates) for the magnificent learning opportunity throughout this research.

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