Research Poster Awards 2023

Barwon Health

DEAKIN UNIVERSITY

A pilot feasibility randomised controlled trial of bone antiresorptive agents on bone turnover markers in critically ill women

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INTRODUCTION

Critical illness, with its associated immobilisation, inflammation, and endocrine dysfunction, is associated with an increased risk of osteoporosis due to increased bone turnover, loss of bone mineral density (BMD), and an increased risk of fragility fracture [1].

The impact of bone antiresorptive agents in this population is not established.

OBJECTIVES

The objectives of this trial was to examine the efficacy, feasibility, and safety of antiresorptive agents administered to critically ill women aged fifty years or greater.

METHOD

The trial was a prospective, randomised, controlled, clinical trial performed in a single centre tertiary regional Intensive Care Unit (ICU) in Geelong, Australia. Prior to commencement HREC approval was obtained. Written informed consent was obtained from patients or their authorised representative prior to enrolment. Patients underwent screening and randomisation between 15th March 2018 and 16th February 2021. Patients who met all inclusion and no exclusion criteria were randomised to receive an antiresorptive agent (zoledronic acid or denosumab) or placebo. Bone turnover markers and BMD were monitored for one year.

RESULTS

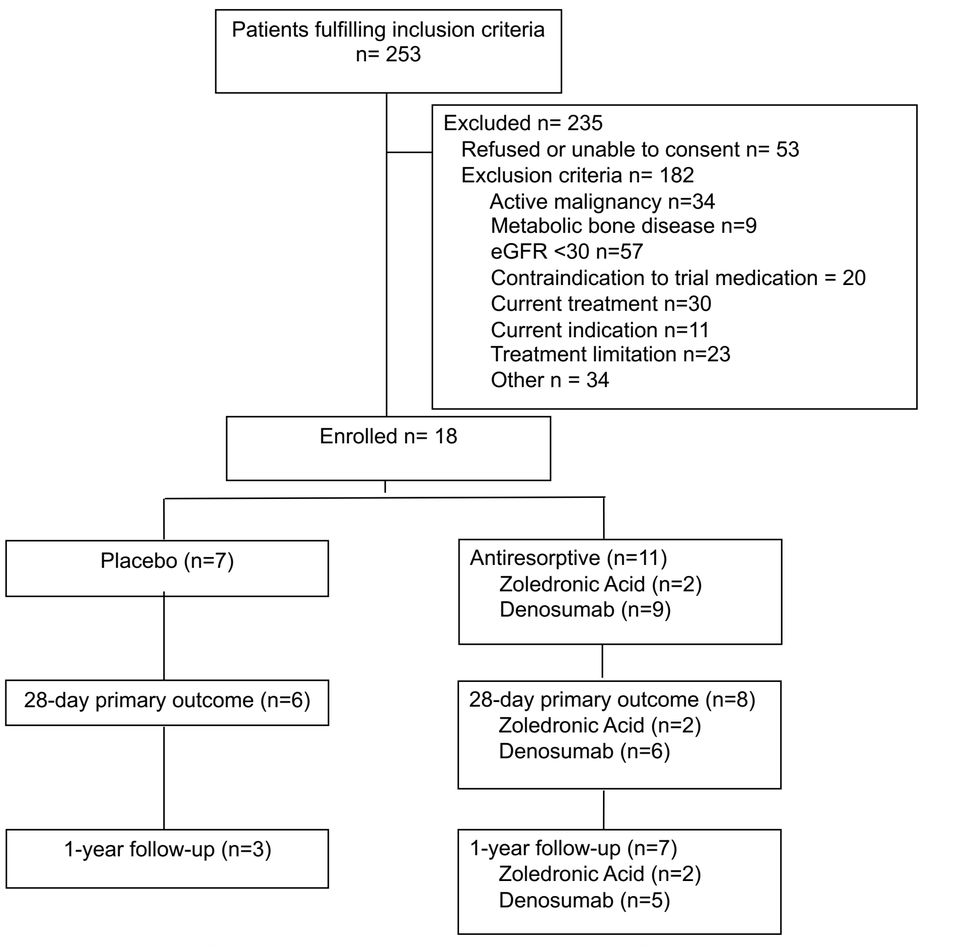

Figure 1. Summary of eligibility, enrolment, and long-term follow-up for trial procedures

RESULTS

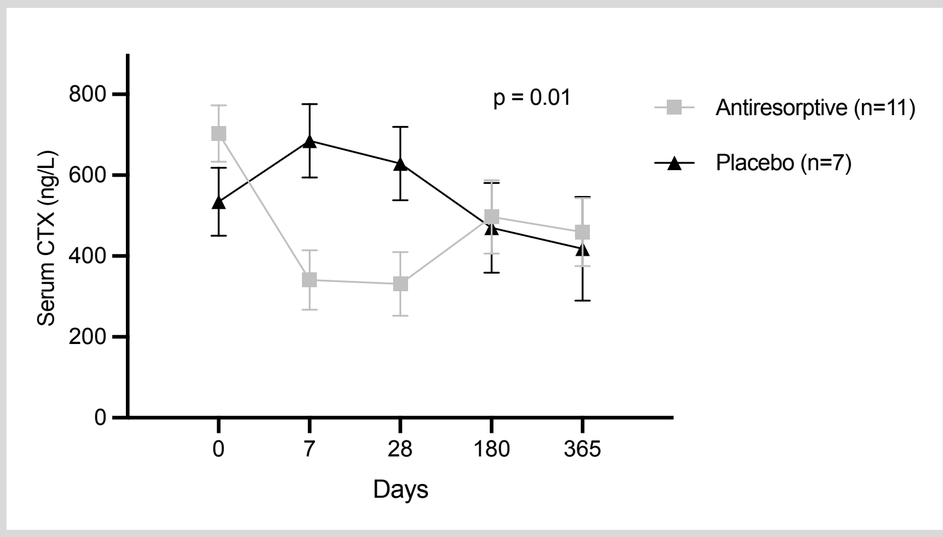

Figure 2. Bone resorption markers in year after critical illness

1. Data are shown as mean ±standard deviation 2. CTX = collagen type 1 cross-linked c-telopeptide
3. P-value relates to analysis of difference between treatment groups over time

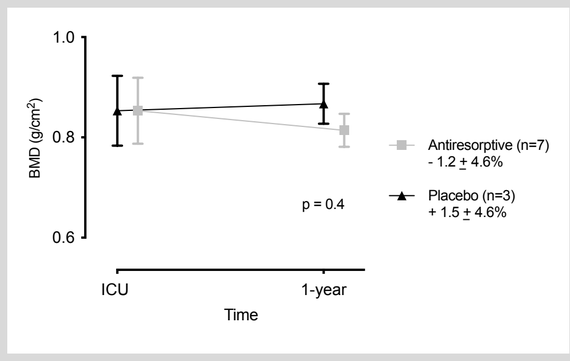

Figure 3a. Dual Femur Bone Mineral Density

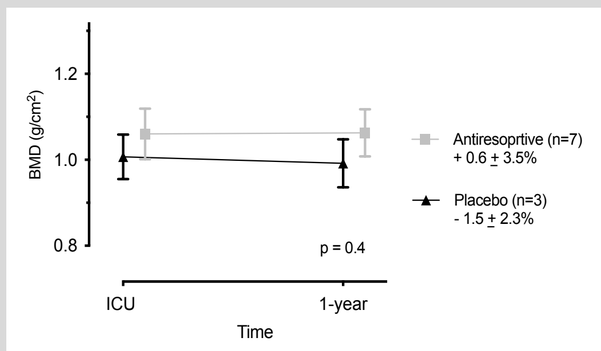

Figure 3b. PA Spine Bone Mineral Density

1. Data displayed as mean ±standard error 2. PA = posterior-anterior. BMD = bone mineral density

DISCUSSION

The administration of the two antiresorptive agents in this trial was associated with a pattern of suppression of bone resorption with no increase in bone formation and adds to two previous small single centre trials in similar populations.

Recruitment was slow, occurring at a rate of 1 participant every 2-months, an important feasibility issue for future studies.

This trial reported no adverse events related to trial medications. While the sample size is small, the absence of severe hypocalcaemia, infection or acute renal failure is reassuring.

A limitation of the trial was the inability to recruit the planned sample of 30 participants due to the COVID-19 pandemic, limiting statistical analysis and interpretation of results.

CONCLUSION

The administration of antiresorptive agents to older critically ill women was associated with favourable short-term changes in bone resorption markers and no adverse events. This supports the need for larger trials in the critical illness setting to define the efficacy, duration and degree of effect, safety of antiresorptive agents, and effect on BMD and fracture over at least one year follow-up. Barriers to enrolment should be identified and addressed

REFERENCES & ACKNOWLEDGEMENTS

1. Orford NR, Lane SE, Bailey M, etal. Changes in Bone Mineral Density in the Year after Critical Illness. *American Journal of Respiratory and Critical Care Medicine*. 2016;193(7):736-744. doi:10.1164/rccm.201508-15140c

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With thanks to the participants and their families for their participation and contribution to understanding the effect of critical illness on bone density.