Journal of Orthopaedic Translation (2014) 2, 26—34

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://ees.elsevier.com/jot

REVIEW ARTICLE

Role of nutritional supplementation in elderly patients with hip fractures

Megan Grigg [a,*], Manit Arora [b], Ashish D. Diwan [b]

[a] *Armidale Clinical School, School of Rural Medicine, University of New England, Armidale, Australia*
[b] *St George Hospital, Department of Orthopaedic Surgery, Sydney, Australia*

Received 16 August 2013; received in revised form 17 October 2013; accepted 22 November 2013
Available online 28 December 2013

KEYWORDS
Elderly;
Hip fracture;
Mortality;
Nutrition;
Supplement

Abstract Due to the ageing population there is an increasing incidence of hip fractures in the elderly. Oral nutritional supplements are being widely used to improve clinical outcomes and mortality post-hip fractures. The aim of this study was to review the available literature on the effects of oral nutritional supplements on elderly patients with hip fractures. A search of EMBASE (1988—present) and MEDLINE (1946—present) with the search terms: "nutritional supplement" AND "hip fracture"; "nutritional supplement" AND "femoral neck fracture"; "nutritional supplement" AND "intertrochanteric fracture"; "nutritional supplement" AND "subcapital fracture"; "hip fracture" AND "vitamin supplement"; "hip fracture" AND "protein supplement"; "hip fracture" AND "nutrient supplement" was carried out. Additionally, the reference lists of articles were searched for relevant areas of study. Few studies showed that oral nutritional supplementation led to a more positive clinical outcome amongst elderly patients suffering hip fractures. Most studies found little or nil positive results. Thus, the role of oral nutritional supplementation on post-hip fracture mortality, infection/complication rates, and hospitalisation/rehabilitation time amongst elderly patients is unclear. There is a need for a broader, randomised, placebo-controlled clinical trial on the effect of oral nutritional supplements and particularly on the supplements used commonly.

Introduction

With the ageing population expected to reach 25% of the total Australian population in 2056, there is an increasing demand on hospital services [1]. The incidence of hip fractures is also increasing, with one study projecting an increase by 15% every 5 years until 2036, and by 10% every 5 years after that until 2051 [2]. Morbidity and mortality

* Corresponding author. P.O. Box 327, Lutwyche QLD 4030, Australia. Tel.: +61 285667166.
E-mail addresses: megan.grigg@optusnet.com.au, mgrigg@myune.edu.au (M. Grigg).

http://dx.doi.org/10.1016/j.jot.2013.11.003

following hip fractures are high, with mortality rates of 24% being seen within the 1st year post-fracture. Protein energy malnutrition is seen more often in patients suffering from hip fractures than their age-matched control comparisons [3]. Theoretically, by providing the malnourished elderly patient with nutritional supplements, it is supposed that their clinical outcomes may be improved.

The benefit of oral nutritional supplements (ONSs) in this clinical scenario has been a topic of debate. Many trials have found that ONSs indeed reduce hospital length [4], pressure ulcers [5], economic cost [4], mortality [6,7], and rates of infections or complications [6,8—10]. Postoperative complications are described as a wide range of individual conditions including wound infections, other infections [e.g., pneumonia, urinary tract infection (UTI)], deep vein thrombosis (DVT), pulmonary embolism (PE), myocardial infarction, bedsores, delirium, severe anaemia, gastrointestinal (GI) ulcer, and cardiac failure. Others have found little or no benefit of oral supplements [11,12]. Despite their somewhat unclear benefit, a large variety of ONSs are available on the market.

The aim of this review is to analyse the available literature on the effects of nutritional supplements on the clinical outcomes (including mortality) of elderly patients suffering from a hip fracture.

Methods

A search of EMBASE (1988—present) and MEDLINE (1946—present) with the search terms: "nutritional supplement" AND "hip fracture"; "nutritional supplement" AND "femoral neck fracture"; "nutritional supplement" AND "intertrochanteric fracture"; "nutritional supplement" AND "subcapital fracture"; "hip fracture" AND "vitamin supplement"; "hip fracture" AND "protein supplement"; "hip fracture" AND "nutrient supplement" was carried out. Additionally, reference lists of articles were searched for relevant areas of study. The exclusion criterion included studies that did not use nutritional supplements, studies that did not focus on hip fractures, and studies that did not examine complications/outcomes that were affected by the use of nutritional supplements. The inclusion criterion was studies that focused on the effect of nutritional supplements on the clinical outcome of patients with hip fractures. The searches resulted in 94 EMBASE and 92 MEDLINE results. The authors manually sorted through the available literature to identify 12 studies that fit the inclusion criteria.

Results

Study participant profiles

All studies had set inclusion and exclusion criteria to determine the eligibility of the patient to participate in the identified study. Patient age varied from >60 years [13—17], >65 years [18], and >70 years [19]. Fabian et al. [20] included female patients >65 years and Sullivan et al. [21] included all patients >64 years, whereas Bastow et al. [3] included all "elderly" female patients with ages ranging from 68 years to 92 years. Most studies had time constraints in which the patient had to receive the surgical invention by, ranging from within 48 h [14,19], within 3 days [21], up to within 2 weeks [17], 3 weeks [16], and 4 weeks [15]. Exclusion criteria were very strict within all studies with pathological fractures [13—17,19—21,23,24], organ failure or severe trauma to multiple organs [3,13,16,18—21,23,24], mental incapacity (including dementia) [3,13—15,17,19] and contraindication to ONSs [13—15,18—21,23,24] being the most consistent exclusion criteria. Other exclusion criteria included concurrent malignancy [14,15,21,23], body mass index >25 [15], 30 [16], and 40 [23] as well as patients that were in an unstable condition [15,16], being treated with phenytoin, steroids, barbiturates, fluoride, or calcitonin [13], unable to be contacted by telephone for follow-up [16] or in need of dialysis [23]. Eneroth et al. [14] also excluded patients who had pain or functional impairment, alcohol or substance abuse, or multiple fractures as well as patients with acute psychosis or epilepsy. Botella-Carretero et al. [18] excluded patients with moderate to severe malnutrition (weight loss of >5% in the previous month or >10% in the previous 6 months, and/or serum albumin <27 g/L) because these patients automatically received supplementation according to the guidelines of their institution. Pregnant patients were excluded from Houwing et al.'s [23] study. Lastly, Schürch et al. [17] excluded those with a history of contralateral hip fracture, fractures caused by severe trauma, and patients with active metabolic bone disease, severe malnutrition, taking drugs such as calcitonin, fluoride, sex hormones, corticosteroids, or bisphosphonates, or had a life expectancy of <1 year. These exclusion criteria have clear reasoning behind them; however, studies may have excluded patients who would benefit from ONSs. Although including dementia patients poses an ethical dilemma, research has shown that they are more likely to be malnourished and thus may benefit more from such an intervention [25].

Nature of intervention

All studies compared an ONS group (the intervention group) to a control group. Most studies used hospital food as the control group [3,13—15,18,20,21,24]; however, Neumann et al. [16] compared a high protein ONS (Boost HP, Mead Johnson, Evansville, IN, USA) to the "control" group, Ensure (Ross Laboratories, Columbus, OH, USA) [16], and Espaulella et al. [19] compared an ONS, which provided 149 cal including 20 g of protein to a "control" group, an ONS containing 155 cal mainly derived from carbohydrates. Although this provided better blinding and the consequential "placebo effect", it can be argued that this was why both papers lacked significant results as caloric intake by both patient groups was increased, suggesting that increased protein intake may not necessarily improve clinical outcomes. Botella-Carretero et al. [18] compared two types of ONSs, the first a protein supplement (Vegenat-med Proteina, Vegenat SA, Badajoz, Spain) and the second an energy and protein supplement (Resource, Hiperproteico, Novartis Medical Nutrition, Barcelona, Spain) versus a control. Lastly, Houwing et al. [23] compared an intervention group to a control group that received a noncaloric-