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# **The Impact of Diet and Lifestyle on Bone Health in the Elderly**

A thesis presented in partial fulfillment of the  
requirements for the degree of

Master of Science

In

Nutritional Science

At Massey University, Turitea,  
Palmerston North  
New Zealand.

Caroline Morva Stanley

2001

## ABSTRACT

Osteoporosis is a multi-factorial disorder in which nutrition and lifestyle play an important role. There were two main reasons for doing this study. The purpose of the first part of the study was to determine the prevalence of nutritional and lifestyle factors related to bone health in a group of senior citizens from the Manawatu who were over the age of 70 years. This was followed by an intervention trial in which the purpose was to assess the impact of a single serve of a high-calcium milk on bone resorption using two ingestion strategies.

Calcium, magnesium and zinc intakes were below currently recommended levels in many of the study participants. Some of the participants and particularly those in rest homes received very little sunlight exposure and low dietary vitamin D. Participants spent an average of around 3.5 hours/day in physical activity. Weight-bearing activities such as walking, gardening and certain sports were common in this group.

Institutionalised women were most compromised by nutrition and lifestyle. Dietary supplementation may therefore benefit many in this group.

Of the 52 participants in the diet and lifestyle study, a group of 28 women and 14 men volunteered to take part in an intervention trial, which was approved by the Massey University Human Ethics Committee. The mean calcium intake of trial participants was only 70% of the current US recommended adequate intake (AI). Each person consumed a supplementary serve of 250mls of high calcium milk (640mg Ca), every evening for two weeks. Half consumed a whole dose one hour before bedtime (single serve group), whilst the rest consumed the milk in three divided doses of 80mls every hour before bedtime (divided dose group). Free deoxypyridinoline (Dpd), a biochemical marker of bone resorption, was measured in urine that was collected overnight on two consecutive days before and after two weeks of milk intervention. In the single serve group Dpd was  $4.15 \pm 1.99$  at the start and  $3.94 \pm 2.15$  mmol/mmol creatinine after two weeks (NS). In the divided dose group Dpd was  $4.25 \pm 2.21$  at the start and  $4.79 \pm 2.27$  mmol/mmol creatinine after two weeks (NS). In conclusion, a supplementary serve of milk in this group of elderly people did not produce significant changes in urinary Dpd, whether the milk was consumed as the whole amount or in divided doses.

# ACKNOWLEDGEMENTS

Throughout my thesis year I have been fortunate to have had a strong support system. Firstly, I would like to thank my supervisor, Dr Hilary Green, for her invaluable guidance and encouragement. I would also like to acknowledge the input of Jillian Richards, Richard Bunning and Dr Phil Pearce who assisted with the practical aspects of the trial.

I express my sincere gratitude to the NZ Dairy Board who funded this project and the Health Research Council who funded the preliminary study of my thesis. I also wish to express my appreciation to both the Milk and Health and Research Centre and Massey University from whom I received Masterate scholarships.

I would also like to thank the study participants without whom this thesis project would not have been possible. The warmth with which they invited Jillian Richards and myself into their homes and their earnest dedication to the trial was greatly appreciated.

Finally I would like to affectionately thank my fiancé, André, and my family, whose love, encouragement and support carried me through the most challenging times of my postgraduate years.

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## LIST OF ABBREVIATIONS

ADI	Average daily intake
AI	Adequate intake
AM	Morning
B-ALP	Bone Alkaline Phosphatase
BMD	Bone mineral density
B-SP	Bone sialoprotein
Ca <sup>2+</sup> or Ca	Calcium
CTx	C-telopeptide
d	Day
Dpd	Deoxypyridinoline
EAR	Estimated average requirement
FFQ	Food frequency questionnaire
Hr	Hour
HRT	Hormone Replacement Therapy
HYP	Hydroxyproline
IU	International units
M	Men
MoH	Ministry of Health
MP	Menopausal
mths	Months
NIH	National Institute of Health
NM	Not mentioned
NTx	N-telopeptide
Ocn	Osteocalcin
PM	Evening
PostM	Postmenopausal
PreM	Premenopausal
Pyd	Pyridinoline
R	Range
RDA	Recommended daily allowance

s.d.	Standard deviation
TI	Total intake
UK	United Kingdom
US	United States
VitD	Vitamin D
W	Women
Wks	Weeks
Y	Young
yrs	Years