

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Investigation of nutrition risk in
community living adults aged 75 years and
older: prevalence and associated physical
health factors**

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

Master of Science
in
Nutrition and Dietetics

Massey University
Albany
New Zealand

Vicki Jean Williams
2016

Copyright is owned by the Author of this thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Abstract

Background:

New Zealand's population is ageing. Given prevalence of functional disability and chronic disease increases with age, and older adults account for one third of health loss in New Zealand, supporting older adults to maintain independence is paramount to reducing future health care costs. A compromised nutritional status, and declining muscle mass, strength and function threatens independence. This study aims to investigate the prevalence of nutrition risk, and identify associated socio-demographic and physical health factors among community-living older adults aged 75 years and older.

Methods:

A total of 200 participants were recruited from eligible patients enrolled at the Henderson Medical Centre. Baseline sociodemographic, and health information was collected using an interview style questionnaire. Body composition, including muscle mass was estimated using Bioimpedance Analysis (BIA). Muscle strength was assessed using a hand held dynamometer to measure grip strength, and a Five Times Sit To Stand (5TSTS) test. Lower extremity function performance was assessed using 2.4 meter gait speed. Validated screening tools identified nutrition status (Mini Nutritional Assessment Short Form MNA-SF), swallowing status (10 item Eating Assessment Tool EAT-10), and cognitive status (Montreal Cognitive Assessment MoCA). Pearson's Coefficient Correlations were used to identify associations between nutrition risk and physical health nutrition risk factors.

Results:

The study sample (n= 200) included 89 (44.5%) men, and 111 (55.5%) women with a mean age of 80.5 years. The MNA-SF identified 2 (1%) malnourished participants, and 24 (12%) participants at risk of malnutrition. MNA-SF scores were positively correlated with a lower BMI ($r=0.257$, $p<0.001$), lower muscle mass, lower calf circumference ($r=0.333$, $p<0.001$), lower percentage of body fat ($r=0.287$, $p<0.001$), and weaker grip strength

($r=0.143$, $p=0.047$). MNA-SF scores had an inverse correlation with EAT-10 scores indicating dysphagia risk ($r=0.182$, $p<0.010$).

Conclusion:

A low prevalence of malnutrition was found in this study population. Those at risk of malnutrition or malnourished were more likely to use support services, be at risk of dysphagia, have a low BMI, low muscle mass, a lower calf circumference, lower percentage of body fat, and poor muscle strength. Routine nutrition risk screening is recommended to identify at risk individuals early to prevent escalation to malnutrition and poor health.

Key words: Malnutrition, MNA-SF, Older Adults, Community, Dysphagia, Muscle Mass

Acknowledgements

First and foremost, I would like to thank the participants who agreed to open your homes and allow me to gain valuable insight into your personal lives without which this study would not have been possible. I was inspired by the qualities of spirit, strength, and graciousness so prevalent in your generation. I can honestly say I thoroughly enjoyed meeting each and every one of you. Your generosity will help to serve those who follow you into their older years.

To my supervisor, Dr Carol Wham, I would like to thank you for your guidance, your support, and for sharing your passion for the nutritional wellbeing of older adults. Your extensive knowledge and experience was invaluable and greatly appreciated. I would also like to extend thanks to Dr Marilize Richter for your calming nature when statistical analysis of the results threatened to overwhelm me. To Dr Jacqui Allen and Teresa Stanbrook from the Waitemata District Health Board, thank you both for your support.

To all my fellow dietetic students, it was a pleasure to share this journey with you. A special thanks to Lisa and Sam who provided companionship and assistance when I needed it.

Last but by no means least I would like to thank my family. My partner Darren for your understanding, patience, and support through the ups and downs associated with the enormous task of completing a thesis while maintaining a role as a mother, business owner and partner. I would like also like to thank my mother, Jacqui, for always believing in me. And finally, to my sons, Alex and Thomas, who were forced to share their mother's attention for the past six years. I love you with all my heart, and thank you for your understanding and patience.

Dedication

This thesis is dedicated to my grandmother, Jean Alexandra Fitzjohn who was born into a generation of women where continued education was often not an option. Her lifelong desire for learning inspired me to begin this journey of self-discovery and personal achievement. Her final 18 months, spent unable to eat food orally directed me to the field of dietetics. This achievement is for you Grandma.

11 July 1925 - 18 July 2011

Table of Contents

Abstract.....	iii
Acknowledgements.....	v
Dedication.....	vi
Table of Contents.....	vii
List of Tables.....	xi
List of Figures.....	xii
Abbreviations.....	xiii
Chapter 1: Introduction.....	14
1.1 Background.....	14
1.2 The Aim and Objectives.....	18
1.2.1 The Aim.....	18
1.2.2 The Objectives.....	18
1.3 The Thesis Structure.....	18
1.4 Research Support.....	19
Chapter 2: Literature Review.....	20
2.1 New Zealand’s Population is ageing.....	20
2.1.1 Active Ageing.....	21
2.1.2 Healthcare Impact of New Zealand’s ageing population.....	22
2.2 Health Loss in Older Adults.....	23
2.2.1 Frailty.....	24
2.2.2 Chronic Disease.....	24
2.2.3 Disability.....	25
2.3 Malnutrition.....	26
2.4 Body Composition Changes in Older Adults.....	34
2.4.1 Body Mass Index (BMI).....	35
2.4.2 Weight Loss.....	37
2.4.3 Muscle Mass, Muscle Strength, and Physical Function.....	38

2.4.4 Muscle Mass	39
2.4.5 Muscle Strength.....	40
2.4.6 Physical Function	43
2.5 Nutritional Health of Older Adults.....	45
2.5.1 Key Nutrients for Muscle Health	46
2.6 Nutrition Risk Factors	49
2.6.1 Living Arrangement	49
2.6.2 Income and Education	51
2.6.3 Support Services	51
2.6.4 Polypharmacy	52
2.6.5 Sensory and Appetite Changes.....	52
2.6.6 Oral Health.....	52
2.6.7 Dysphagia	53
2.6.8 Depression.....	54
2.6.9 Cognitive Impairment.....	55
Chapter 3: Methods.....	57
3.1 Study Design	57
3.2 Ethics Approval	57
3.3 Information and Consent Forms.....	57
3.4 Setting.....	58
3.5 Participants.....	59
3.5.1 Participant Recruitment	60
3.6 Data Collection	60
3.6.1 Participant Interview	60
3.6.2 Questionnaire	61
3.6.3 Body Composition Measures.....	63
3.6.4 Physical Function	65

3.7 Statistical Analysis	67
Chapter 4: Results	68
4.1 Participant Recruitment	68
4.2 Sociodemographic Characteristics	69
4.3 Body Composition Characteristics	70
4.4 Health Characteristics	73
4.4.1 Co-morbidities	73
4.4.2 Medications	73
4.4.3 Nutritional Supplements	73
4.4.4 Dentition	74
4.4.5 Social Support	74
4.5 Nutrition Risk Assessment (MNA-SF)	74
4.6 Dysphagia Risk Assessment (EAT-10)	76
4.7 Cognition Assessment (MoCA)	76
4.8 Grip Strength	77
4.9 Gait Speed Test (2.4m)	78
4.10 Five Times Sit To Stand (5TSTS)	78
4.11 Nutrition Risk Factors	79
4.11.1 Sociodemographic, Health, Dysphagia, and Cognition	79
4.11.2 Body Composition, Grip Strength, 2.4m Gait Speed, and 5TSTS	80
4.12 Correlations between Nutrition Risk and Anthropometric, Health, and Physical Function Risk Factors	81
Chapter 5: Discussion	84
5.1 Study Strengths	93
5.2 Study Limitations	94
Chapter 6: Conclusion and Recommendations	97
6.1 Study Summary	97
6.2 Recommendations for Further Research	98
6.3 Conclusion	100
References:	101

Appendices:	115
Appendix A: Participant Information Sheet.....	115
Appendix B: Participant Consent Form.....	118
Appendix C: Questionnaire.....	119
Appendix D: Mini Nutritional Assessment-Short Form (MNA-SF).....	122
Appendix E: 10 Item Eating Assessment Tool (EAT-10).....	123
Appendix F: Physical Assessment Form.....	124
Appendix G: Montreal Cognitive Assessment (MoCA).....	125
Appendix H: Instructions for Administering and Scoring the MoCA	126
Appendix I: Co-morbidities, Prescribed Medications and Supplements	130
Appendix J: Mini Nutrition Assessment Short Form (MNA-SF) Results.....	131
Appendix K: Socio- demographic, and health factors stratified by nutrition risk	132

List of Tables

Table 1.1 The research team and contribution.....	19
Table 2.1 New Zealand nutrition risk prevalence community based studies using SCREEN/II and ANSI screening tools	28
Table 2.2 International nutrition risk prevalence community based studies using the MNA/MNA-SF screening tools	30
Table 2.3 Validated nutrition status screening tools.....	33
Table 2.4 BMI international classifications	36
Table 2.5 BMI Classifications according to the MNA-SF.....	37
Table 3.1 Predictive calculations and healthy reference values to estimate body composition.....	64
Table 4.1 Sociodemographic characteristics	70
Table 4.2 Differences between men and women (stratified by age) for body composition measures (BIA)	72
Table 4.3 BMI classification of men and women stratified by age, according to cut-off values set by the WHO and MNA-SF.....	72
Table 4.4 Cognitive impairment status (MoCA)	77
Table 4.5 Significant nutrition risk factors (Sociodemographic, health, dysphagia, and cognition)	80
Table 4.6 Differences in body composition and physical function measures between men and women's and MNA-SF nutrition risk categories	81
Table 4.7 Associations between nutrition risk (MNA-SF score) and physical health factors	83

List of Figures

Figure 2.1 Population growth and projections within New Zealand’s older cohorts.....	20
Figure 2.1 Historical and projected distribution of health expenditure.....	23
Figure 2.3 Top five health loss contributors for people 75 years and older cohorts.....	25
Figure 3.1 Correct positioning of the Dynamometer	65
Figure 4.1 Participant recruitment process	68
Figure 4.2 Nutrition risk prevalence (MNA-SF)	75
Figure 4.3 Participants at risk/malnourished (MNA-SF) stratified by age.....	75
Figure 4.4 Grip strength using recommended gender cut-offs (men 32kg and women 22kg).....	77
Figure 4.5 Fastest gait speed (over 2.4m) stratified by a cut-off of 1m/s	78
Figure 4.6 5TSTS test results stratified by age specific cut offs for those aged 75-79y (>12.6s), and ≥ 80y (> 4.8s).....	79

Abbreviations

AD	Alzheimer's disease
ADL	Activity of daily living
ANSI	Australian Nutrition Screening Initiative
ANOVA	Analysis of Variance
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
CC	Calf Circumference
CHD	Coronary heart disease
cm	Centimeter
COPD	Chronic obstructive pulmonary disorder
DALY	Disability adjusted life year
DHB	District Health Board
DXA	Dual-Energy X-Ray Absorptiometry
EAT-10	10-Item Eating Assessment Tool
GI	Gastrointestinal
GP	General Practitioner
HDEC	Health and Disability Ethics Committee
ICD-10	International Classification of Diseases 10 th revision
IHD	Ischaemic heart disease
kg	Kilogram
m	Meter
MCI	Mild cognitive impairment
MNA	Mini Nutritional Assessment
MNA-SF	Mini Nutritional Assessment-Short Form
MoCA	Montreal Cognitive Assessment
MRI	Magnetic Resonance Imaging
MST	Malnutrition Screening Tool
MUST	Malnutrition Universal Screening Tool
NRV	Nutrient Reference Value
OTC	Over the counter
PEM	Protein energy malnutrition
QOL	Quality of Life
RDI	Recommended Daily Intake
SCREEN II	Seniors in the Community: Risk Evaluation for Eating and Nutrition, Version II
SD	Standard Deviation
SMM	Smooth muscle mass
WDHB	Waitemata District Health Board
WHO	World Health Organization
Y	years