

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.

Assessment of nutrition risk using the Mini-Nutritional Assessment Short-Form and biomarkers (prealbumin) in community-living older adults within Auckland

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

Master of Science

In

Nutrition and Dietetics

At Massey University, Albany,
New Zealand.

Emily Louise Sycamore

2016

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.

Abstract

Background: The global population is ageing with New Zealand currently experiencing a large growth in those aged 65 years and older. Increasing age is associated with increasing use of health and disability support services. Vulnerable older adults are at high risk of malnutrition and may be high users of these services. With global ageing creating more economic and social pressures on countries, it is important that nutritional well-being, a key determinant of good health and healthy ageing, is maintained throughout life to sustain functional health and quality-of-life in older adults. Assessing nutrition status will help determine those at nutrition risk.

Aim: To determine the prevalence of nutrition risk in community-living older adults enrolled with The Henderson Medical Centre, a general practice in West Auckland; to determine the prevalence of dysphagia risk; and to assess the potential of prealbumin (PAB) in conjunction with C-reactive protein (CRP) as biomarkers of nutrition risk.

Method: Patients enrolled with Henderson Medical Centre were recruited into this cross-sectional study over a three-month period. Nutrition risk was determined by the Mini Nutritional Assessment Short-Form (MNA-SF), dysphagia risk by the 10-Item Eating Assessment Tool (EAT-10), and cognitive function by the Montreal Cognitive Assessment tool (MoCA). Demographic, living situation, co-morbidities, number of medications, and support services information was collected through a face-to-face interview. Serum PAB and CRP were measured and their relationship with the MNA-SF analysed.

Results: Two hundred participants, mean age 80.9 ± 4.5 years, were recruited. Women comprised 55.5%. Two participants were categorised by the MNA-SF as malnourished and 12% categorised as at risk of malnutrition. Dysphagia risk was observed in 7.5%. 131 participants received a blood test, with a mean PAB value of 0.27 ± 0.06 g/L and mean CRP value 4.66 ± 11.81 mg/L. 85% of participants had a normal PAB and CRP value. No significant association was found between serum PAB values and nutrition risk status when compared.

Conclusion: One in seven community-living older adults were categorised as at risk of malnutrition. Our study found a low prevalence of nutrition and dysphagia risk indicating a generally 'well' study population. PAB and CRP did not significantly correlate with the MNA-

SF scores in this population. The results highlight the need for further studies investigating the use of PAB and CRP as nutrition biomarkers in community-living older adults.

Key words: older adults, community-living, nutrition risk, dysphagia, prealbumin, C-reactive protein

Acknowledgements

I would like to thank all those involved with this research project and my studies throughout the two years of this course. Without your guidance and support, this thesis would not have been possible.

Firstly, thank you to my supervisors, Dr Carol Wham and Dr Marilize Richter, for your wealth of knowledge and experience in nutrition and older adults, and your encouragement to strive for the best results.

I would like to thank Dr Jacqueline Allen for the opportunity to be a part of this research, assistance with the data and expertise in dysphagia.

I am grateful to Henderson Medical Centre and all staff involved – your assistance and accommodation with this research has been invaluable.

I would also like to acknowledge all the participants involved for inviting us into their homes, willingness and time to assist with this research.

To my classmates – thank you for sharing the last two years and making it such an enjoyable experience.

Lastly, to my family. Mum, Dad and Nathan - thank you for putting up with the late nights, stress, and excessive caffeine intake. I know that combination can be disastrous! And (soon to be) Dr Hannah Sycamore, thank you for the late night international video calls and medical chat. You have all been my rock and support - thank you for your love.

Contents

Abstract.....	i
Acknowledgements.....	iii
List of Tables	vii
List of Figures	viii
Abbreviations	ix
Chapter 1: Introduction	1
1.1 Overview	1
1.2 Significance of Research.....	2
1.3 Aims and Objectives.....	3
1.3.1 Aims	3
1.3.2 Objectives	3
1.4 Structure of the Thesis	3
Chapter 2: Literature Review	4
2.1 The Ageing Population	4
2.1.1 Ethnic Diversity.....	4
2.1.2 Life Expectancy	4
2.1.3 Positive Ageing in Place	5
2.2 Physical Health and Function of Older Adults.....	6
2.2.1 Healthcare Costs and Ageing.....	6
2.2.2 Chronic Diseases and Health Loss in Older Adults	8
2.2.3 Functional Health and Ageing	11
2.3 Nutrition and Ageing	12
2.3.1 The Importance of Nutritional Well-Being.....	12
2.3.2 Dietary Advice for Older Adults.....	12
2.3.3 Dietary Trends in Older Adults	15
2.4 Malnutrition	15
2.4.1 Over-Nutrition in Older Adults	15
2.4.2 Under-Nutrition in Older Adults.....	16
2.4.3 Factors Affecting Nutritional Status	17
2.4.4 Nutrition Risk in Community-Living Older Adults.....	23
2.5 Malnutrition assessment.....	27

2.5.1 Malnutrition Screening Tools	27
2.5.2 Laboratory Measures of Malnutrition Risk	32
2.6 Summary	38
3.0 Methodology.....	39
3.1 Study Design.....	39
3.2 Participants and Setting	39
3.3 Participant Recruitment and Consent.....	39
3.3.1 Inclusion Criteria:.....	40
3.3.2 Exclusion Criteria:	40
3.4 Ethical Approval	40
3.5 Study Questionnaire.....	41
3.5.1 Sociodemographic Characteristics	41
3.5.2 Health Characteristics.....	42
3.5.3 Mini Nutritional Assessment®-Short Form (MNA®-SF)	42
3.5.4 10-Item Eating Assessment Tool (EAT-10)	43
3.5.5 Montreal Cognitive Assessment (MoCA)	43
3.5.6 Anthropometric	43
3.6 Blood sampling procedures.....	45
3.7 Statistical Analysis	46
Chapter 4: Results	48
4.1 Participant Recruitment	48
4.2 Participant Characteristics	49
4.3 Health Characteristics	51
4.3.1 Key Co-morbidities	51
4.3.2 Medications	52
4.3.3 Nutritional Supplements	53
4.3.4 Dental Status	54
4.3.5 Support Services	55
4.4 Dysphagia Risk.....	56
4.5 Cognitive Status.....	56
4.6 Nutrition Risk Status.....	57
4.6.1 Nutrition Risk by Participant Characteristics.....	57

4.7 Nutrition Biomarkers.....	60
4.7.1 Prealbumin	60
4.7.2 C-reactive Protein	60
4.7.3 Nutrition Risk and Biomarkers.....	61
5.0 Discussion.....	64
5.1 Strengths of the Study.....	70
5.2 Limitations of the Study	71
6.0 Conclusion and Recommendations	73
6.1 Study Findings	73
6.2 Recommendations for Future Research	73
References	75
Appendices.....	85

List of Tables

Table 1: Advice on servings and nutrients of the four food groups for health older people..	13
Table 2: Prevalence of nutrition risk in studies investigating New Zealand community-living older adults.	26
Table 3: Nutrition screening tools available for community-living older adults	30
Table 4: WHO International Classification of adult BMI	45
Table 5: Participant characteristics.....	50
Table 6: Participant key co-morbidities	51
Table 7: Key co-morbidities experienced by participants	52
Table 8: Prescribed medications.....	52
Table 9: Prescribed nutritional supplements.....	54
Table 10: Participant dental status	54
Table 11: Support services received by participants	55
Table 12: Participant EAT-10 scores to assess dysphagia risk	56
Table 13: Participant MoCA scores	56
Table 14: MNA-SF participant scores by gender	57
Table 15: Associations between participant nutrition risk status, sociodemographic, health and social support factors.....	58
Table 16: Participant PAB values	60
Table 17: Categorised PAB values by gender.....	60
Table 18: Participant CRP protein values.....	61
Table 19: Categorised CRP values by gender.....	61
Table 20: Prevalence of normal and abnormal CRP values, of those with normal and abnormal PAB values, within both 'normal nutrition' risk status and those with 'at-risk of malnutrition' status categories according to MNA-SF score	61
Table 21: Correlation between PAB, CRP and MNA-SF nutrition risk group.....	62
Table 22: Binomial logistic regression predicting likelihood of nutrition status assessed by the MNA-SF based on PAB and CRP values	63

List of Figures

Figure 1: DALYs, by leading condition group and age group for 2006 (Ministry of Health, 2013b)	8
Figure 2: Study design detailing participant recruitment and final participant number.	48

Abbreviations

ADE	Adverse Drug Event
ANSI	Australian Nutrition Screening Initiative
AT&R	Assessment, Treatment & Rehabilitation
BMI	Body Mass Index
BMR	Basal Metabolic Rate
BRIGHT	Brief Risk Identification Geriatric Health Tool
CC	Calf circumference
CHD	Coronary Heart Disease
cm	Centimetres
CRP	C-Reactive Protein
CVD	Cardiovascular Disease
DALY	Disability-adjusted life year
DHB	District Health Board
EAT-10	10 Item Eating Assessment Tool
HDEC	Health and Disability Ethics Committee
HOPS	Health of Older People Strategy
IADL	Instrumental Activities of Daily Living
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10 th revision
kg	Kilograms
LiLACS NZ	Life and Living in Advanced Age, a Cohort Study in New Zealand
m	Metres
MCI	Mild Cognitive Impairment
MDADI	MD Anderson Dysphagia Inventory
MMSE	Mini-Mental State Examination
MNA	Mini Nutritional Assessment
MNA-SF	Mini Nutritional Assessment Short Form

MoCA	Montreal Cognitive Assessment
MoH	Ministry of Health
MUST	Malnutrition Universal Screening Tool
NHMRC	Nation Health and Medical Research Council
NRV	Nutrient Reference Values
NZ	New Zealand
NZANS	New Zealand Adult Nutrition Survey
NZBD	New Zealand Burden of Diseases, Injuries and Risk Factors Study
NZHS	New Zealand Health Survey
OECD	Organisation for Economic Co-operation and Development
PAB	Prealbumin
PEM	Protein-Energy Malnutrition
RBP	Retinol Binding Protein
RD	Registered Dietitian
SCREEN II	Seniors in the community: risk evaluation for eating and nutrition, Version II
SNAQ	Short Nutritional Assessment Questionnaire
SWAL-QOL	Swallowing Quality of Life
VFS	Videofluoroscopy
WDHB	Waitemata District Health Board
WHO	World Health Organisation