National Consultative Workshop

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Divya Dhar is a final year medical student at the University of Auckland. She has been on the executive of The New Zealand Medical Students' Association for three years, currently in the role of Vice President, and was the convenor of NCW this year.

The National Consultative Workshop (NCW) was held this year on Friday 3rd of April at Auckland Medical School by The New Zealand Medical Students' Association (NZMSA) and brought together a group of thirty medical students. Registration was free and included flight travel and food for the day.

NCW came to fruition two years ago with the aim of increasing communication and collaboration between national medical student groups. We understand the important role these groups provide in supporting and advocating for medical students. Hence, this year was the first year where we desired to facilitate their growth and development. The groups included Medical Aid Abroad Programme (MAAP), Medical Students for Global Awareness (MSGA), Aotearoa Rural Health Apprentices (ARHA), Maori And Pacific Admission Scheme (MAPAS), Pacific Medical Association (PMA), Te Oranga and New Zealand Medical Students' Journal (NZMSJ).

NCW 2009 consisted of five workshop sessions on key training and development ideas. This consisted of time management by the CEO of Spark Sonali Nidarmaty, media engagement by the Editor of NZ Doctor Barbara Fountain, policy lobbying by New Zealand University Students' Association Co-president Jordan King, sponsorship raising by Faculty of Medical and Health Sciences External manager Tim Greene and event management by United Nations Youth Association of New Zealand's Auckland President Elizabeth Chan. The overwhelming response from the participants was that these speakers were amazing and enriched their professional and personal development.

Time was also allocated for three breakout sessions which consisted of medical student groups coming together in the areas of global health, rural health and Maori and Pacific health in order to discuss common issues of concern and collaborate on new ideas. The main outcomes of these groups were to establish a united overarching medical student global health group which will serve to improve sustainability, to provide avenues for ARHA to comment on NZMSA rural and distant placement policies and use NZMSA media ties for press releases and lastly to establish a joint Maori and Pacific student body.

Sonali Nidarmaty (CEO of Spark), Alistair Papali'i-Curtin (NZMSA), Divya Dhar (NZMSA)

NZMSA will be creating a NCW 2009 publication with relevant speaker presentations.

We look forward to expanding on NCW next year. If you have any comments or suggestion for the scope of NCW please feel free to contact us. Lastly, I'd like to thank Alistair Papali'i-Curtin for his role in assisting with NCW 2009.

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NZMSJ Academic Writing Prize
Issue 9
FIRST PLACE

Sarcopenic-Obesity with Polypharmacy is Associated with Gait and Balance Disturbances in Older Adults

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ABSTRACT

Objective: To investigate the relationship between gait and balance disturbances, body composition, polypharmacy, and falls in an elderly cohort.

Design: Baseline data obtained from a convenience sample within a larger randomized controlled trial (investigating Tai- Chi as a falls prevention intervention).

Setting: University setting.

Participants: 182 community-dwelling people over the age of 65 considered to have a risk of falling.

Main outcome measures: Body composition using dual energy X-ray absorptiometry (DXA), and gait and balance measures (timed up-and-go, single leg stand, step test, 30 second chair stand). Details of medications, physical activity and falls over the previous 12 months were obtained by interview-administered self report. The relationship between these factors was examined using multiple regression models.

Results: DXA scans revealed that 28.1% participants had a normal body composition, 9.3% were sarcopenic, 15.9% were sarcopenic-obese, and 46.7% were obese. The sarcopenic-obese group had poorer functional performance on the chair stand ($p=0.03$), step test ($p=0.03$) and timed up-and-go tests (trend $p=0.06$). This group also reported the lowest levels of physical activity compared to the other body composition groups ($p=0.01$). Regression analysis revealed that the total number of medications and a sarcopenic-obese phenotype was related to poor functional performance in the chair stand test ($p<0.01$) step test ($p=0.01$) and timed up-and-go test ($p<0.01$). Total number of medications known to alter body composition and a sarcopenic-obese phenotype were also related to slower timed up-and-go test ($p= 0.002$).

Conclusions: These findings suggest that sarcopenic-obesity with polypharmacy has a relationship with gait and balance disturbances in older adults. Although cause and effect cannot be established from this study, physicians may need to consider both body composition and medication use in older patients when assessing falls risk.

INTRODUCTION

Gait and balance disturbances are a risk factor for falls[1] and also contribute to functional limitations[2] and instrumental activities of daily living (IADL) disability during aging.[2] Skeletal muscle mass gradually declines after the age of 45 years[3] and contributes to gait and balance disturbances, diminished muscular strength, functional limitations and increased rates of falls.[2, 4] The prevalence of obesity in the elderly is increasing in developing countries with fat mass generally peaking between the ages of 60- 70 years.[5] Sarcopenic-obesity (low lean body mass with high fat mass) has been reported to precede the onset of IADL disability[2] and functional limitations.[6, 4] However, the precise relationship between lean body mass and fat mass with gait and balance disturbances and increased risk of falling is controversial.[5] Some studies report obesity as the primary risk factor for gait and balance disturbances[4, 2, 7] whereas others report sarcopenia (low lean body mass with low fat mass) as a larger risk factor.[8] Polypharmacy also increases falls risk in older persons, adding to the complexity of the relationship between body composition, gait and balance disturbances and the risk for falls.[9, 1, 10] Polypharmacy refers to the administration of numerous medications, and 90% of people over the age of 65 currently take at least one medication daily, with many taking three or four different medications.[11, 12]

Psychotropic medications (hypnotics, anxiolytics and antidepressants) significantly increase rates of falls in the elderly.[13, 1] Commonly prescribed medications such as analgesics, cardiovascular, endocrine and respiratory drugs have also been associated with an increased incidence of falls.[13] Despite evidence that some psychotropic and metabolic drugs change body composition,[14] few studies have been conducted to investigate whether drugs altering body composition are also related to decreased physical functioning and increased gait and balance disturbances in elderly people.[13]

This study investigated the relationship between body composition, medication, gait and balance, and falls in healthy, community-dwelling older persons who had an increased falls risk.

METHODS

Design

This study was a cross- sectional secondary analysis funded by the Otago Medical Research Foundation. The primary study was a multi-centred randomised controlled trial (RCT) of Tai- Chi as a falls prevention intervention funded by the Accident Compensation Corporation of New Zealand (ACC). Ethical approval was obtained from the University of Otago Ethics Committee and the ACC Ethics Committee.

Participants

The University of Otago site enrolled 205 participants aged 65 years or older who were at an increased risk of falling as assessed by having at least one fall in the previous year, or as assessed by the Falls Risk Assessment Tool.[15] Of the original cohort, 182 participants agreed to one DXA scan (DPX-L scanner, Lunar Corporation, Madison, Wisconsin) for the purpose of sub- study.

Measures

Trained research assistants conducted gait and balance tests (30 second chair stand test,[16] step test,[17] single- limb support test,[18] timed get up-and-go test,[19]) and recorded detailed information on self- reported rates of falls in the previous 12 months, medical conditions, medications, and physical activity levels (NZPAQ)[20] at baseline.

Measurements of whole body and regional lean soft tissue mass and fat mass were obtained by DXA within one month of baseline testing.[21] Percentage fat and appendicular skeletal muscle mass (ASM) were used to determine body composition phenotype classifications based on normative data cut-points as described by Baumgartner et al.[2] Sarcopenia was defined as ASM (kg) divided by height (m2) of <7.23kg/m^2 for males and <5.70 kg/m^2 for females. Obesity was defined as percentage fat ≥30% in men and ≥40% in women.[7] Based on the combination of sarcopenia and obesity cut-points the participants were categorised into four body composition phenotypes; normal-lean, sarcopenic, sarcopenic-obese and obese.

The adverse side effects of each listed medication was researched through both a MIMS and Medsafe database search to determine which medications were potentially linked to changes in body composition.[22] Side-effects potentially altering body composition included weight gain, weight loss, anorexia, and fluid retention. The data were collated with the number of medical conditions, medications and medications altering body composition tallied.

Analysis

Statistical analysis was undertaken using a statistical software package for the social sciences (SPSS for Windows, v 14.0; Chicago, Illinois.). Analysis included non-parametric independent t-tests (Kruskal-Wallis test) and multiple regression. Covariates included age and sex. As there was a significant sex imbalance within the sample the decision was made to combine the sexes for the statistical analysis. The normal-lean body composition group was set as a referent category in all statistical tests and significance was set at $p<0.05$.

Table 1. Descriptive characteristics of the sample

Female	Normal (N = 35)	Sarcopenic (N = 16)	Sarcopenic-Obese (N = 21)	Obese (N = 62)
Age (Yr)	73.5 ± 5.7	73 ± 8.2	73.7 ± 5.4	70.7 ± 5.4
Weight (kg)	63.6 + 8.0	54.6 + 8.2	67.6 + 6.6	80.9 + 12.5
% Fat	35.1 ± 3.5	32.8 ± 7.1	45.3 ± 3.4	47.1 ± 4.5
* ASM index (kg/m)	6.32 ± 0.4	5.29 ± 0.3	5.42 ± 0.2	6.45 ± 0.5
Average number of medications	3.9 ± 2.7	4.2 ± 3.4	4.6 ± 3.1	3.3 ± 2.3
Average number of medications changing body composition	1.3 ± 1.1	0.9 ± 1.3	1.5 ± 1.3	1.3 ± 1.3
Male	**Normal (N = 16)**	**Sarcopenic (N = 1)**	**Sarcopenic-Obese (N = 8)**	**Obese (N = 23)**
Age (Yr)	70.7 ± 6.5	86 ± 0	79.5 ± 7.9	74.4 ± 5.4
Weight (kg)	79.5 + 6.7	67.9 + 0	79.5 + 6.9	91.1 + 13.7
% Fat	24.3 ± 3.7	25.8 ± 0	35.3 ± 3.9	35.1 ± 3.5
* ASM index (kg/m)	8.41 ± 0.7	7.1 ± 0	6.89 ± 0.31	8.23 ± 0.7
Average number of medications	3.3 ± 2.8	1 ± 0	3.8 ± 2.2	5.3 ± 3.3
Average number of medications changing body composition	1 ± 1.3	0 ± 0	1.4 ± 0.7	1.6 ± 1.7

*ASM index = Appendicular Skeletal Muscle Mass

Table 2. Top Four Medications by Body Composition Phenotype

Phenotype	1 (%)	2 (%)	3 (%)	4 (%)
Normal (N = 51)	Aspirin (45.1%)	Simvastatin (29.4%)	Cilazapril (17.6%)	Calcitriol, Metoprolol, Omeprazole (11.8%)
Sarcopenic (N = 17)	Simvastatin (41.2%)	Calcitriol (29.4%)	Aspirin (29.4%)	Warfarin (23.5%)
Sarcopenic-Obese (N = 29)	Aspirin (34.5%)	Metoprolol (27.6%)	Omeprazole (20.7%)	Calcitriol (20.7%)
Obese (N = 85)	Aspirin (35.3%)	Metoprolol (24.7%)	Cilazapril (24.7%)	Simvastatin (17.6%)
Overall (N = 182)	Aspirin (37.4%)	Simvastatin (22.5%)	Metoprolol (20.3%)	Cilazapril (19.8%)

* 1- 4, where 1= the most frequently reported medication
(%) = percentage of people reporting use of medication

Table 3. Top Four Medications with Potential to Change Body Composition by Body Composition Phenotype

Phenotype	1 (%)	2 (%)	3 (%)	4 (%)
Normal (N = 51)	Metoprolol (11.8%)	Thyroxine (11.8%)	Calcitriol (11.8%)	Bendrofluazide (9.8%)
Sarcopenic (N = 17)	Calcitriol (29.4%)	Celecoxib (17.6%)	Metoprolol (11.8%)	Digoxin (11.8%)
Sarcopenic-Obese (N = 29)	Metoprolol (27.6%)	Calcitriol (20.7%)	Bendrofluazide (17.2%)	Thyroxine, Cholecalciferol (10.3%)
Obese (N = 85)	Metoprolol (24.7%)	Thyroxine (16.5%)	Bendrofluazide (11.8%)	Atrovastatin, Frusemide (10.6%)
Overall (N = 182)	Metoprolol (20.3%)	Thyroxine (12.6%)	Bendrofluazide (11.5%)	Calcitriol (11.5%)

* 1- 4, where 1= the most frequently reported medication
(%) = percentage of people reporting use of medication

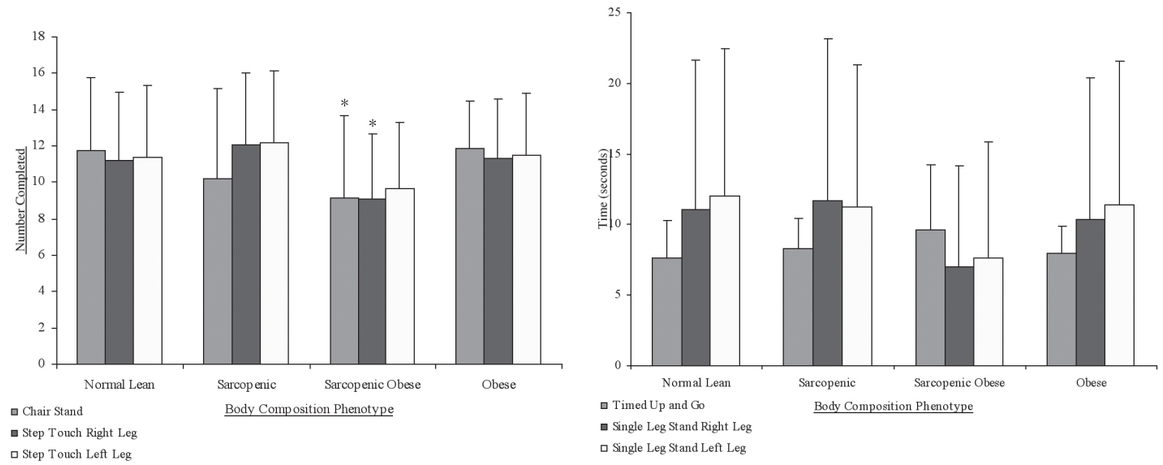

Figure 1. Gait and Balance Functional Tests by Body Composition Classification. Data presented as mean (+ SD).
* denotes a statistically significant result $p<0.05$

RESULTS

Participants

Of the 182 participants, 73.6% were female and 26.4% were male (mean age 72.7 + 6.3 yrs). Descriptive characteristics by sex and body composition classification are presented in Table 1.

Overall 28.1% of the participants had a normal-lean body composition, 9.3% were sarcopenic, 15.9% were sarcopenic-obese, and 46.7% were obese.

Medications

The participants reported a total of 126 different medications. Fifty-five of these medications had links to side-effects with potential to change body composition. Of these, 21 (38.2%) had the effect of anorexia, 2 (3.6%) were linked to weight loss, and 11 (20%) to weight gain. Four (7.3%) were associated with fluid imbalances, and 17 (30.9%) were linked to a combination of anorexia, weight gain, weight loss and fluid imbalances. The most commonly reported prescription and body composition altering medications are listed in Tables 2 and 3.

Aspirin was the most commonly reported medication across all groups followed by Simvastatin, Metoprolol, and Cilazapril. Of the medications that had potential side effects of body composition changes, Metoprolol was the most commonly reported, followed by Thyroxine, Bendrofluazide and Calcitriol. Overall, the sarcopenic-obese group had the highest average number of total medications (4.3 medications), including the highest average number of potential body composition changing medications (1.5 medications), compared to all other body composition groups.

Functional Measures of Gait and Balance

The sarcopenic-obese group had lower function on all tests compared to the other body composition groups (Figure 1). The normal and obese groups showed the highest functional ability for the 30 second chair stand test compared to the other groups, whereas the sarcopenic-obese group produced the lowest score in the 30 second chair stand test ($p= 0.03$ Kruskal-Wallis test.). The sarcopenic-obese group also performed the lowest number of step touches for the right leg ($p=0.03$ Kruskal-Wallis test) and the slowest timed up-and-go test (trend $p=0.06$ Kruskal-Wallis test). The sarcopenic-obese group also had the lowest time for the single leg stand test on both the right and left leg although this was not statistically significant.

Figure 1. Gait and Balance Functional Tests by Body Composition Classification. Data presented as mean (+ SD). * denotes a statistically significant result $p<0.05$

The sarcopenic-obese group reported the lowest levels of walking and moderate intensity physical activity, as well as overall physical activity, in both frequency per week and duration per session. The sarcopenic group reported the lowest level of vigorous physical activity.

Table 4 shows the regression model used to investigate total number of medications and body composition phenotype for predicting functional test performance. Greater number of total medications and a sarcopenic-obese phenotype was predictive of poorer performance on the 30 second chair stand, step test and timed up-and-go tests. Total number of medications was an independent predictor of poorer performance on the single leg stand. Neither body composition phenotype nor medication was predictive of falls (data not shown).

Table 4. Regression Models for Total Number of Medications

Variable: Chair Stand				Variable: Step Touch Right Leg			
	B	SE B	*B*		B	SE B	*B*
Step 1				Step 1			
Constant	12.60	0.46		Constant	11.883	0.452	
Total RX	-0.35	-0.10	-0.26	Total RX	-0.229	0.095	-0.178
Step 2				Step 2			
Constant	12.96	0.60		Constant	11.996	0.597	
Total RX	-0.327	0.094	-0.245*	Total RX	-0.211	0.093	-0.163*
Normal Lean vs Sarcopenic Obese	-2.398	0.819	-0.236*	Normal Lean vs Sarcopenic Obese	-2.012	0.813	-0.205*
Normal Lean vs Sarcopenic	-1.473	0.984	-0.115	Normal Lean vs Sarcopenic	0.905	0.977	0.073
Normal Lean vs Obese	0.144	0.622	0.019	Normal Lean vs Obese	0.110	0.618	0.015
* sig. p< 0.05				* sig. p< 0.05			

Variable: Timed Up-and-Go				Variable: Single Leg Stand			
	B	SE B	*B*		B	SE B	*B*
Step 1				Step 1			
Constant	7.181	0.339		Constant	12.772	1.243	
Total RX	0.258	0.071	0.261	Total RX	-0.674	0.260	-0.190
Step 2				Step 2			
Constant	6.752	0.449		Constant	13.486	1.676	
Total RX	0.241	0.070	0.244*	Total RX	-0.643	0.261	-0.181*
Normal Lean vs Sarcopenic Obese	1.868	0.611	0.248*	Normal Lean vs Sarcopenic Obese	-3.691	2.280	-0.136
Normal Lean vs Sarcopenic	0.550	0.734	0.058	Normal Lean vs Sarcopenic	0.821	2.739	0.024
Normal Lean vs Obese	0.313	0.464	0.057	Normal Lean vs Obese	-0.688	1.732	-0.035
* sig. p< 0.05				* sig. p< 0.05			

Table 5. Regression Models for Total Potential Body Composition Changing Medications

Variable: Chair Stand				Variable: Step Touch			
	B	SE B	*B*		B	SE B	*B*
Step 1				Step 1			
Constant	11.551	0.401		Constant	11.298	0.387	
Total BCRx	-0.233	0.214	-0.081	Total BCRx	-0.225	0.207	-0.081
Step 2				Step 2			
Constant	12.035	0.566		Constant	11.436	0.552	
Total BCRx	-0.243	0.210	-0.084	Total BCRx	-0.184	0.204	-0.066
Normal Lean vs Sarcopenic Obese	-2.538	0.846	-0.249*	Normal Lean vs Sarcopenic Obese	-2.094	0.825	-0.213*
Normal Lean vs Sarcopenic	-1.683	1.041	-0.128	Normal Lean vs Sarcopenic	0.862	1.015	0.068
Normal Lean vs Obese	0.180	0.645	0.024	Normal Lean vs Obese	0.141	0.629	0.020
* sig. p< 0.05				* sig. p< 0.05			

Variable: Timed Up-and-Go				Variable: Single Leg Stand			
	B	SE B	*B*		B	SE B	*B*
Step 1				Step 1			
Constant	7.793	0.295		Constant	11.091	1.054	
Total BCRx	0.293	0.157	0.138	Total BCRx	-0.774	0.563	-0.102
Step 2				Step 2			
Constant	7.316	0.420		Constant	11.964	1.535	
Total BCRx	0.276	0.156	0.130*	Total BCRx	-0.720	0.568	-0.095
Normal Lean vs Sarcopenic Obese	1.943	0.627	0.258*	Normal Lean vs Sarcopenic Obese	-3.896	2.291	-0.145
Normal Lean vs Sarcopenic	0.755	0.772	0.078	Normal Lean vs Sarcopenic	-0.696	2.820	-0.020
Normal Lean vs Obese	0.260	0.478	0.047	Normal Lean vs Obese	-0.551	1.748	-0.028
* sig. p< 0.05				* sig. p< 0.05			

Table 5 demonstrates that sarcopenic-obesity was predictive of lower chair stand and step test independently of the number of potential body composition changing medications reported. The number of body composition changing medications in sarcopenic-obese participants was predictive of poorer performance on the timed up-and-go test. Neither number of potential body composition changing medications or body composition phenotype was predictive for single leg stand performance or falls (not shown).

DISCUSSION

This investigation revealed a relationship between sarcopenic-obesity and medication use, with gait and balance disturbances in community-dwelling elderly persons. The results corroborate previous reports that sarcopenic-obesity is significantly associated with lower scores in performance-based tests of gait and balance.[23] Our data also supports studies reporting polypharmacy as a risk factor for gait and balance disturbances in older persons.[13, 1, 24] Medications changing body composition were only related to poorer performance on the timed up-and-go test in the sarcopenic-obese group. We were unable to determine any relationship between medications and falls due to the small sample size.

These findings add to a growing body of evidence that polypharmacy is a risk factor for gait and balance disturbances and highlights the risk that may be exacerbated by a sarcopenic-obese phenotype. These results suggest that body composition should be considered alongside polypharmacy when identifying risk factors for gait and balance disturbances.

We found that physical activity scores were significantly lower in the sarcopenic-obese group in comparison to all other body composition groups. It has been postulated that an individual with excess adiposity and low lean muscle mass would perceive physical activity to be more difficult than an obese individual with adequate muscle mass.[2] Although causality cannot be established in the current study design, if sarcopenic-obese individuals have inadequate muscle strength to support their body weight, this may well lead to decreased levels of habitual physical activity, and consequently gait and balance deficiencies.

Strengths

Strengths of this study were the inclusion of community-dwelling, relatively healthy older adults, all of whom had an increased falls risk. Fat mass and lean mass were determined by DXA which is considered the gold standard of body composition measurement. Other studies have utilised bioelectrical-impedance, body mass index (BMI), anthropometric and predictive equations to estimate body composition, but none of these measures are as accurate as DXA, nor can they assess individual components of appendicular skeletal muscle mass (ASM).[3, 25, 26] The gait and balance tests were administered by trained assessors who were blinded to the true body composition of the participants. Recruitment of the entire cohort for the main study did not advertise the DXA scan in order to control for a potential selection bias toward people seeking this information.

Limitations

Although we included falls data in this study it was clear that we did not have sufficient statistical power to investigate falls and their relationship to medication and gait and balance disturbances. However, the main longitudinal study, which has a 12 month follow up, was designed to have adequate power to assess this outcome. The convenience sample in this study had a notable sex imbalance, which did not allow for sub-analyses by sex. Further study is needed to clarify the roles of sex on gait and balance disturbances and body composition changes with aging. There is no consensus for any standardised definition of sarcopenia or sarcopenic-obesity and one might argue that using categories rather than continuous measures of lean and fat mass may increase the risk of a type I error. However, this study and several other studies have utilised the Baumgartner et al2 definition for determining cut- off points for sarcopenia and obesity in both men and women.[27, 28, 29, 30] Self-report of medication use and physical activity can be prone to recall and social desirability bias, however we attempted to control for this by using trained assessors and face-to-face interview techniques. Possible adverse side-effects of medications on body composition were 'potential changes' and may not have affected all study participants. In addition, duration of medication use was not queried. Generalisability of this study's findings to the wider New Zealand population is not possible due to the predominantly New Zealand European sample. The study's cross-sectional design did allow for determining cause and effect associations between body composition, medications, and gait and balance.

IMPLICATIONS

The findings of this study add to the body of evidence that sarcopenic-obese older adults may have more gait and balance disturbances, higher rates of medication use and lower levels of physical activity when compared to other body composition groups, especially those older persons who maintain a normal-lean body composition. The physiological mechanisms underlying body composition changes during aging are poorly understood but this study reinforces the importance of minimising age-related alterations in body composition, particularly increases in fat and decreases in lean muscle, in an effort to reduce the risk of functional limitations, gait and balance disturbances, and the risk of falls. Sarcopenic-obesity cannot currently be identified by weight, BMI, or waist to hip ratio.[21] Thus general practitioners should make general recommendations for regular physical activity as recommended by the New Zealand Ministry of Health and Sport and Recreation New Zealand to help maintain physical function and normal body composition.[31] Future studies should focus on developing other measures to identify people with sarcopenic-obese phenotypes and if identified, general practitioners could then tailor the treatment and medication of these persons to mitigate the risk of gait and balance disturbances and functional limitations. Longitudinal study designs will also be needed to discern the temporal relationship between body composition changes, medication, and the development of gait and balance disturbances in older adults and whether these are predictive of an increase in falls risk.

ACKNOWLEDGEMENTS

I would like to thank the Otago Medical Research Foundation for their generous funding of this research scholarship. I would also like to express my gratitude to my co-authors Dr Debra Waters, Dr Lynnette Jones, Dr Leigh Hale and Prof Alisa Goulding. Their guidance and support has made this research both possible and enjoyable. I also wish to thank Robin Janata for his pharmaceutical expertise. In addition, I would like to acknowledge the Tai-Chi Dunedin-based study participants and the support of Age Concern Dunedin.

WHAT IS ALREADY KNOWN ON THIS TOPIC

Polypharmacy and body composition are reported risk factors for gait and balance disturbances in older persons. These gait and balance deficiencies may increase the risk of IADL disability and falling.

WHAT THIS STUDY ADDS

- Sarcopenic-obesity was predictive of gait and balance disturbances.
- Polypharmacy and use of medications with side-effects that can alter body composition in a sarcopenic-obese phenotype is related to reduced gait and balance performance.
- Sarcopenic-obesity may be associated with lower levels of physical activity.
- Polypharmacy and body composition are reported risk factors for gait and balance disturbances in older persons. These gait and balance deficiencies may increase the risk of IADL disability and falling.

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