Factors Influencing Low Muscle Strength among Community-Dwelling Older Adults with Non-Communicable Diseases

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Extended Abstract

Introduction The presence of low muscle strength serves as a major indicator of sarcopenia and health status in older adults with non-communicable diseases (NCDs), leading to increased morbidity and mortality among them.

Objective 1) To describe the prevalence of low muscle strength, and 2) To investigate personal and health factors predicting low muscle strength in community-dwelling older adults with NCDs

Design This study employed a correlational predictive design, guided by physiological theory and literature as its conceptual framework.

Methodology The participants consisted of 192 community-dwelling older adults diagnosed with non-communicable diseases in Samut Prakan province. Purposive sampling was employed according to the inclusion and exclusion criteria. Data were collected using the Global Physical Activity Questionnaire (GPAQ) version 2, the Thai Geriatric Depression Scale (TGDS-15), and nutritional and muscle strength assessments. Data were then analyzed using descriptive statistics and logistic regression analysis.

Results Most of the participants were female (65.1%), with a mean age of 69.60 years (SD = 7.60). The prevalence of low muscle strength among older adults with non-communicable diseases was 54.17%. Personal and health factors including age (OR= 3.47, 95% CI = 1.91-6.33), weight loss (OR= 4.05, 95% CI = 1.11-14.70), physical activity (OR= 0.37, 95% CI = .19-.73), and depression (OR= 3.06, 95% CI = 1.16-8.03) were significantly predicted low muscle strength. Multiple logistic regression analysis revealed that age (OR= 3.02, 95%CI = 1.63-5.59) and physical activity (OR= 0.48, 95%CI = 0.24-0.97) together could predict low muscle strength among older adults with NCDs, accounting for 14.3% of the variance.

Recommendation This study demonstrates that age and physical activity significantly predict low muscle strength among older adults with NCDs in the community. Therefore, health promotion programs addressing physical activity should be developed to reduce risk factors and to prevent and delay sarcopenia particularly in older adults of advanced age with NCDs.

Keywords: low muscle strength/ age/ physical activity/ older adults/ non-communicable diseases/ community

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ปัจจัยที่มีอิทธิพลต่อภาวะความแข็งแรงของกล้ามเนื้อต่ำในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรังในชุมชน

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บทคัดย่อขยาย

บทนำ ภาวะความแข็งแรงของกล้ามเนื้อต่ำเป็นตัวบ่งชี้ที่สำคัญของภาวะมวลกล้ามเนื้อน้อยและสุขภาพของผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรัง ทำให้เกิดความเจ็บป่วยและการเสียชีวิตที่เพิ่มขึ้นในผู้สูงอายุ

วัตถุประสงค์การวิจัย 1) เพื่อศึกษาความชุกของภาวะความแข็งแรงของกล้ามเนื้อต่ำ และ 2) เพื่อศึกษาความสามารถในการร่วมทำนายภาวะความแข็งแรงของกล้ามเนื้อต่ำ ของปัจจัยส่วนบุคคลและปัจจัยด้านสุขภาพในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรังในชุมชน

การออกแบบการวิจัย การวิจัยแบบบรรยายเพื่อวิเคราะห์ความสัมพันธ์เชิงทำนาย โดยใช้ทฤษฎีทางสรีรวิทยาและวรรณกรรมเป็นกรอบแนวคิด

วิธีดำเนินการวิจัย กลุ่มตัวอย่างเป็นผู้สูงอายุในชุมชนจังหวัดสมุทรปราการที่ได้รับการวินิจฉัยโรคไม่ติดต่อเรื้อรัง จำนวน 192 ราย เลือกตัวอย่างแบบเฉพาะเจาะจงตามเกณฑ์คัดเข้าและเกณฑ์คัดออก เก็บรวบรวมข้อมูลโดยใช้แบบสอบถามกิจกรรมทางกาย แบบวัดความเศร้าในผู้สูงอายุไทย และการประเมินภาวะโภชนาการและความแข็งแรงของกล้ามเนื้อ วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา และการวิเคราะห์ถดถอยลอจิสติก

ผลการวิจัย กลุ่มตัวอย่างส่วนใหญ่เป็นเพศหญิง (ร้อยละ 65.1) อายุเฉลี่ย 69.60 ปี (SD = 7.60) พบความชุกของความแข็งแรงของกล้ามเนื้อน้อยในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรัง ร้อยละ 54.17 ปัจจัยส่วนบุคคลและปัจจัยด้านสุขภาพได้แก่ อายุ (OR= 3.47, 95%CI = 1.91-6.33) ภาวะน้ำหนักตัวลด (OR= 4.05, 95%CI = 1.11-14.70) ระดับของกิจกรรมทางกาย (OR= 0.37, 95%CI = .19-.73) และภาวะซึมเศร้า (OR= 3.06, 95%CI = 1.16-8.03) สามารถทำนายภาวะความแข็งแรงของกล้ามเนื้อต่ำอย่างมีนัยสำคัญทางสถิติ ผลการการวิเคราะห์ถดถอยลอจิสติกแบบพหุ พบว่า อายุ (OR= 3.02, 95% CI = 1.63-5.59) และระดับกิจกรรมทางกาย (OR= 0.48, 95%CI = 0.24-0.97) สามารถร่วมกันทำนายภาวะความแข็งแรงของกล้ามเนื้อต่ำในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรังในชุมชนได้ร้อยละ 14.3 อย่างมีนัยสำคัญทางสถิติ

ข้อเสนอแนะ การศึกษาครั้งนี้แสดงให้เห็นว่า อายุ และ ระดับกิจกรรมทางกาย เป็นปัจจัยสำคัญที่มีผลต่อภาวะความแข็งแรงของกล้ามเนื้อต่ำในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรังในชุมชน ควรมีการพัฒนาโปรแกรมสร้างเสริมสุขภาพโดยมุ่งเน้นกิจกรรมทางกายโดยเฉพาะในผู้สูงอายุกลุ่มที่มีอายุมากเพื่อลดปัจจัยเสี่ยงป้องกันและชะลอการเกิดภาวะมวลกล้ามเนื้อน้อย ในผู้สูงอายุที่เป็นโรคไม่ติดต่อเรื้อรังในชุมชน

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คำสำคัญ ภาวะความแข็งแรงของกล้ามเนื้อต่ำ อายุ กิจกรรมทางกาย ผู้สูงอายุ โรคไม่ติดต่อเรื้อรัง ชุมชน

วันที่ได้รับ 28 มี.ค. 67 วันที่แก้ไขบทความเสร็จ 20 พ.ค. 67 วันที่รับตีพิมพ์ 20 พ.ค. 67

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Introduction

Low muscle strength serves as a crucial indicator of physical performance and health status,[1] playing a significant role in diagnosing sarcopenia, a condition intricately associated with the aging process.[2] People aged 60 years and above experience a decline in muscle strength of about 0.11 kg per year.[3] Possible sarcopenia has therefore attracted attention and was defined according to the criteria established by the Asian Working Group on Sarcopenia (AWGS) in 2019;[2] that is a method of measuring muscle strength that involves handgrip squeezing.[2] This approach is widely adopted due to its simplicity, speed, and cost-effectiveness in identifying older adults at sarcopenia risk in the community.[2]

Low muscle strength is associated with illnesses[4] and an elevated risk of falls,[5] disability,[6] morbidity, hospitalization, and mortality particularly among older adults.[7] Consequently, older adults with low muscle strength are deemed a significant public health concern due to their increased risks. This is attributed to a decline in the body's functionality, which elevates the risk of developing various diseases. Addressing this issue is critical for improving their overall quality of life and reducing healthcare costs associated with these complications.

Previous studies have identified a considerable prevalence of low muscle strength, 46.5% in South America,[8] and ranging from 23.7%[5] to 46.5%[9] in Asia. In Thailand, the prevalence of low muscle strength, ranges from 31.2%[10] to 44.7%.[11] Factors associated with low muscle strength among older adults include increasing age,[3,4] the presence of non-communicable diseases (NCDs) including cardiovascular disease,[12] type 2 diabetes mellitus (T2DM),[4,13] hypertension,[13] and dyslipidemia,[14] and an comorbidity.[15] Additionally, body mass index (BMI) (low BMI <18.5 kg/m^2 and high BMI >25 kg/m^2),[4] increased waist circumference (WC),[16] inadequate physical activity,[4] and depression[16] collectively contribute to the risk of low muscle strength among older adults.

Older adults with NCDs experience a heightened risk of developing low muscle strength, primarily due to the inflammatory processes, dietary constraints, and increased physical limitations associated with NCDs[17] compared to the general older population. Currently, the epidemiological data on low muscle strength in Thailand is limited, particularly in Samut Prakan province, an economic city within an industrial zone close to Bangkok. Therefore, this study aims to investigate the prevalence of low muscle strength and its predicting factors among community-dwelling older adults with NCDs in Samut Prakan province. Understanding the association of NCDs and low muscle strength is crucial for developing health promotion programs with effective approaches to modify risk factors for sarcopenia among these older adults.

Research objectives

1) To describe the prevalence of low muscle strength among community-dwelling older Thai adults with NCDs

2) To determine the predictive power of personal factors (age and gender) and health factors (number of comorbidities, weight loss, body mass index, waist circumference, physical activity, and depression) for low muscle strength

Research hypothesis

Personal factors (age and gender) and health factors (number of comorbidities, weight loss, body

mass index, waist circumference, physical activity, and depression) together predict low muscle strength among community-dwelling older adults with NCDs.

Conceptual framework

The physiological alteration in older adults guides the conceptual framework. With advancing age, physiological alterations occur, manifesting in various ways. These include a decline in mitochondrial function,[4] a reduction in muscle quality, and an increase in myostatin.[18] The development of low muscle strength has been linked to changes in testosterone levels in males[19] and estrogen levels in post-menopausal females.[20] Older adults with NCDs characterized by inflammatory processes, limitations in daily activities, physical activity, and dietary intake experience different challenges compared to the general aging population, impacting their susceptibility to low muscle strength.[4,12,13] Evidences indicate a significant association between the number of comorbidities and the likelihood of developing low muscle strength.[15] Both low body mass index (BMI <18.5 kg/m^2) and high BMI (>25 kg/m^2),[4] as well as excessive waist circumference (WC),[16] have been observed to correlate with reduced muscle strength. Diminished physical activity levels have been linked to decreased mitochondrial,[4] affecting muscle strength. In addition, depression associated with changes in the hypothalamic-pituitary-adrenal axis initiates inflammatory pathways in the body, consequently leading to reduced muscle strength.[3] These factors contribute to the pathogenesis of low muscle strength (Figure 1).

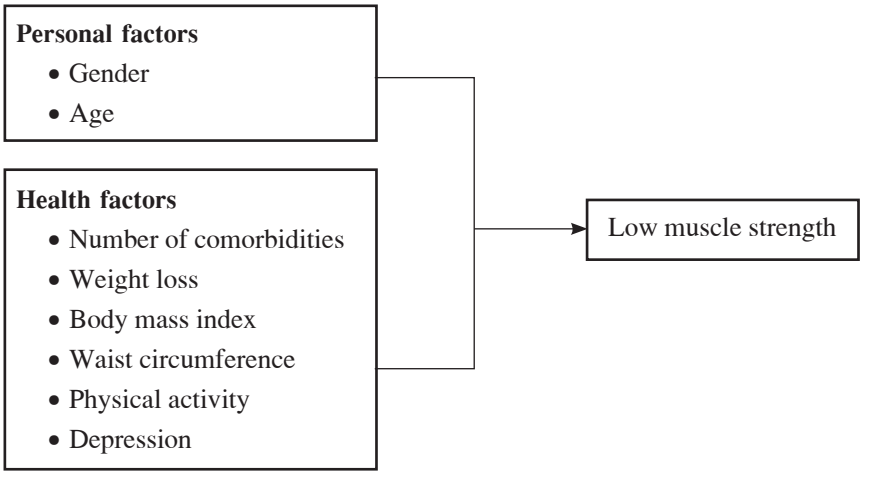

Figure 1 Conceptual Framework

Methods

The study employed a correlational predictive design.

Sample and setting

The sample included 192 older adults with NCDs aged 60 years and above who lived in Samut Prakan province. Multistage sampling was employed, beginning with the selection of three out of six districts, followed by the selection of a subdistrict health promoting hospital from each of the three chosen districts. The sample was then purposively selected from older adults visiting the NCD clinics at the three health promoting hospitals

according to the following inclusion criteria: 1) aged 60 year and above, 2) residents of Samut Prakan province for at least six months, 3) diagnosed with at least one NCDs, and 4) able to understand and communicate in Thai language. Exclusion criteria were 1) having abnormal cognition, as determined by the Chula Mental Test (CMT), with a total score of ≤15, and 2) reporting shoulder and arm problems.

The three subdistrict health promoting hospitals included: 1) Khlong Dan subdistrict health promoting hospital in Bang Bo District, 2) Nong Prue subdistrict health promoting hospital in Bang Phli District, and 3) Sisa Chorakae Noi subdistrict health promoting hospital in Bang Sao Thong District.

The sample size was determined according to power analysis (power = .95, significance level = .05) using the G*Power version 3.1 program based on an effect size of 0.15[21] and eight predicting variables. Initially, the sample size was 160. To accommodate potential incomplete data, approximately 20% was added, resulting in a final sample size of 192 older adults.

Instruments

The research instruments were divided into three parts.

Part 1: The Chula Mental Test (CMT) questionnaire was developed by Jitapankul. It was used for the screening of participants. The questionnaire consisted of 13 items. Scoring varies across each item of the questionnaire. Total scores ranged from 0 to 19, with a total score < 15, indicating abnormal cognition.[22]

Part 2: The data collection questionnaires

2.1 The demographic characteristics questionnaire was developed based on a comprehensive literature review. It consisted of 12 items: gender, age, period of residence in Samut Prakan province, level of education, current occupation, past occupation, diagnosis of NCDs (hypertension, dyslipidemia, T2DM, cardiovascular disease, chronic kidney disease, and cancer), weight loss (> 5% within one month, > 7.5% within three months, > 10% within six months), smoking, alcohol consumption, frequency of alcohol consumption, and history of falls.

2.2 The Global Physical Activity Questionnaire (GPAQ) version 2 was developed by the World Health Organization and translated into Thai by Ekpalakorn.[23] It included 16 items Scores were interpreted by calculating Metabolic Equivalent (MET), which were then categorized into three levels: 1) vigorous or vigorously active lifestyles involve activities occurring > 3 days/week, with a total MET > 1,500 minutes/week, or vigorous or moderate physical activity undertaken 7 days with a total MET > 3,000 minutes/week.[23]

2.3 The 15-item Thai Geriatric Depression Scale (TGDS-15) was translated from Sheikh and Yesavage[24] into Thai by Wongpakaran and Wongpakaran.[25] It included ten negative and five positive questions with responses of either "yes" or "no". Total scores ranged from 0 to 15. Interpretation was divided into three levels: 1) normal (0-4), 2) developing depression, indicating a need to receive counseling (5-10), and 3) depressive symptom, requiring medical treatment (11- 15). The instrument's reliability was tested, with a KR-20 of .94 obtained in this study.

2.4 The health record forms created by the researchers included weight, height, waist circumference, and handgrip strength.

Part 3: Anthropometric assessment

3.1 A digital handgrip dynamometer, verified as an ISO standard instrument, was used to determine low muscle strength. In the assessment process, older adults assumed a seated position with

elbow flexion of 90 degrees and squeezed as hard as possible using the dominant hand with the handle of the handgrip dynamometer. The test was conducted twice, and the kilograms recorded during each trial were assessed, with the highest value chosen for interpretation. The interpretation was based on the criteria established by the Asian Working Group for Sarcopenia (AWGS), which defined low muscle strength as handgrip strength less than 28 kilograms in males and less than 18 kilograms in females.[2] In this study, the handgrip dynamometer was calibrated prior to data collection.

3.2 A digital weighing scale was used for measuring body weight, with participants instructed to stand barefoot on the scale, keeping their arms relaxed at their sides and eyes forward to ensure even weight distribution on both feet. Upon stabilization of the scale and display of body weight, the researcher recorded the measurement to the nearest kilogram. The digital weighing scale used in this study was calibrated before data collection.

3.3 A height meter was utilized to measure height, with participants instructed to stand barefoot against a vertical surface. They were asked to place their heels together, keep their back straight, relax their shoulders. extend their neck, look straight ahead, and take a deep breath in. The measurement was recorded to the nearest centimeter. The height meter used in this study was calibrated before data collection.

3.4 A measuring tape was used for measuring waist circumference. It was measured at the midpoint between the lower ribs and the iliac crest. Participants were instructed to stand comfortably with feet shoulder-width apart and to relax the abdomen. Subsequently, the measurement was recorded in centimeters.

Ethical Consideration

This study received approval from the Institutional Review Board (IRB) committee of Huachiew Chalermprakiet University, with reference number 958/2563. Data collection was conducted in accordance with ethical considerations. Participants were provided with a detailed explanation of the study's aims and procedures. Furthermore, they willingly consented and were informed that they could withdraw at any time. Throughout the study, the data were kept confidentially.

Data Collection

The researchers contacted the three sub-district health-promoting hospitals. Appointments were then scheduled for data collection between July 2020 and January 2021. Prior to data collection, the researchers provided training to research assistants, which included three nurses, and offered detailed explanations of the data collection process.

The potential participants who met the inclusion criteria were screened using the CMT questionnaire. Two participants were excluded from the study, with their information forwarded to sub-district health-promoting hospitals. Later, the assessment of low muscle strength was conducted, divided into three stations: 1) collection of demographic characteristics questionnaire, GPAQ, and TGDS-15, 2) measurement of height, weight, and waist circumference, and 3) assessment of handgrip strength using a handgrip dynamometer.

Data analysis

Demographic characteristics, personal and health factors, and muscle strength were analyzed using descriptive statistics, including frequency,

percentage, mean, standard deviation (SD), minimum, and maximum. Factors predicting low muscle strength, including personal factors (age and gender), and health factors (number of comorbidities, weight loss, BMI, waist circumference, physical activity, and depression) were analyzed using univariate and multivariate logistic regression analysis due to non-normal distribution. The results were presented with adjusted odds ratios and 95% confidence intervals (CI).

Results

The participants in this study comprised 192 older individuals with NCDs residing in Samut Prakan Province. The majority were female (65.1%), aged between 60 and 94, with a mean age of 69.60 years (SD = 7.6). Most older adults with NCDs were diagnosed with hypertension (82.8%), dyslipidemia (56.3%), and T2DM (36.5%), respectively. Moreover, more than half of them had two or more comorbidities (68.7%). Additionally, the majority reported no weight loss (93.2%), no history of smoking (70.3%), no alcohol consumption (53.1%), being overweight or obese (67.3%), having excessive waist circumference (70.8%), engaging in moderate to vigorous physical activity (67.7%), no history of falls (75.5%), and not experiencing depression (87.0%) (Table 1).

Low muscle strength was determined by the AWGS criteria. It was found that males had low muscle strength more than females (Table 2).

Table 1 Characteristics of participants (n = 192)

Characteristics	n	%
Age (years) (Min-Max= 60-94; M= 69.60, SD = 7.6)		
60-69	102	53.1
70-79	71	37.0
≥ 80	19	9.9
Gender		
male	67	34.9
female	125	65.1
Chronic illness*		
hypertension	159	82.8
dyslipidemia	108	56.3
T2DM	70	36.5
cardiovascular disease	16	8.3
chronic kidney disease	4	2.1
cancer	4	2.1
Number of comorbidities		
1	60	31.3
≥ 2	132	68.7
Weight loss**		
no	179	93.2
yes	13	6.8
Cigarette smoking		
no	135	70.3
yes	57	29.7

Table 1 Characteristics of participants (n = 192) (Cont.)

Characteristics	n	%
Alcohol consumption		
no	102	53.1
yes	90	46.9
Body mass index (Min-Max = 15.27-48.44; M = 25.54, SD = 5.51)		
< 18.5 (underweight)	12	6.2
18.5 – 22.9 (healthy weight)	51	26.5
23.0 - 24.9 (overweight)	37	19.3
25.0 – 29.9 (obese class I)	56	29.2
> 30.0 (obese class II)	36	18.8
Waist circumference (cm) (Min-Max = 61-135; M = 91.52, SD = 12.95)		
< 90	56	29.2
≥ 90	136	70.8
Physical activity level		
vigorous	55	28.6
moderate	75	39.1
sedentary	62	32.3
History of falls		
no	145	75.5
yes	47	24.5
Depression		
0-4 (normal)	167	87.0
5-10 (developing depression)	25	13.0
11-15 (depressive symptom)	0	0.00

* Selecting more than one answer

Table 2 Classification of muscle strength (n= 192)

	Male n (%)	Female n (%)
Handgrip strength		
normal	27 (40.3)	61 (48.8)
low*	40 (59.7)	64 (51.2)
Min-Max=5.0-50.0; M = 21.96, SD = 8.23		

* <28 kg for males and <18 kg for females

The univariate logistic regression analysis showed that age, weight loss, physical activity, and depression were significant predictors of low muscle strength. Participants aged 70 years and over were 3.47 times more likely to have low muscle strength than those aged 60-69 years. Participants experiencing weight loss were 4.05 times more likely to have low muscle strength than those without weight loss.

Participants with sedentary behavior (MET < 600 minutes/week) were 0.37 times more likely to have low muscle strength than those with moderate to vigorous activity (MET ≥ 600 minutes/week). Participants with depression were 3.06 times more likely to have low muscle strength than those without depression (Table 3).

Table 3 Factors predicting low muscle strength using univariate logistic regression (n=192)

Variables	n	Normal muscle strength (n%)	Low muscle strength (n%)	B	OR	95%CI	p-value
Age (years)							
60-69*	102	61(59.8%)	41(40.2%)				
≥70	90	27(30.0%)	63(70.0%)	1.245	3.472	1.905-6.325	<.001
Gender							
male*	67	27(40.3)	40(59.7)				
female	125	61(48.8)	64(51.2)	-.345	.708	.388-1.292	.261
Number of comorbidities							
1*	60	30(50.0%)	30(50.0%)				
≥ 2	132	58(43.9%)	74(56.1%)	.244	1.276	.692- 2.352	.435
Weight loss							
no*	179	85(48.3%)	91(51.7%)				
yes	13	3(18.8%)	13(81.2%)	1.398	4.048	1.114- 14.700	.034
Body mass index							
18.5 – 22.9*	51	19(37.3%)	32(62.7%)				
< 18.5 and ≥ 23.0	141	69(48.9%)	72(51.1%)	-.479	.620	.321-1.195	.153
Waist circumference (cm)							
< 90*	56	24(42.9%)	32(57.1%)				
≥ 90	136	64(47.1%)	72(52.9%)	-.273	.761	.406- 1.429	.396
Physical activity							
sedentary	55	16(29.1%)	39(70.9%)				
moderate and vigorous*	137	72(52.6%)	65(47.4%)	-.993	.370	.189 - .725	.004
Depression							
no*	167	82(49.1%)	85(50.9%)				
yes	25	6(24.0%)	19(76.0%)	1.117	3.055	1.162 - 8.032	.024
Alcohol consumption							
no*	102	43(42.2%)	59(57.8%)				
yes	90	45(50.0%)	45(50.0%)	-.316	.729	.412- 1.289	.277

OR=Odds ratio; CI=Confidence interval; ns= No statistical significance

Multivariate logistic regression analysis was conducted by entering variables that predicted low muscle strength. It was found that age and physical activity together predicted low muscle strength, accounting for 14.3% of variance (Table 4).

Table 4 Factors predicting low muscle strength using multivariate logistic regression analysis (n=192)

Variables	B	OR	95%CI	P
Age (years)				
60-69*				
≥70	1.104	3.018	1.630-5.588	<.001
Physical activity level				
sedentary				
moderate and Vigorous*	-7.31	.481	.238-.974	.042

Nagelkerke R Square = .143; -2 Log likelihood = 264.834, x^2 = 21.675; df = 2 ; p<.001

OR=Odds ratio, CI=Confidence interval

*Reference group

Discussion

The results revealed that 54.17% of older adults diagnosed with NCDs had low muscle strength. Personal and health factors, including age, weight loss, physical activity, and depression, significantly predicted low muscle strength. Notably, age and physical activity among older adults with NCDs together predicted low muscle strength at 14.3%.

Age was a significant predictor of low muscle strength. Participants aged 70 years or older had a 3.47 times higher probability of experiencing low muscle strength than those aged 60-69. This is consistent with previous research indicating a decline in muscle strength with advancing age. Older adults generally experience a decrease in muscle strength of approximately by 0.11 kg per year.[3] The most significant decrease in muscle strength occurred between 70 and 74 years, with older females decreasing by 3.75 kg and older males by 3.37 kg.[26] Our finding may be linked to aging process, which entails a decline in myosin, mitochondrial function, and hormonal alterations. Notably, older adults with NCDs characterized by inflammatory pathways and metabolic dysregulation, experience reduced protein synthesis, resulting in a decline in muscle strength.[4]

Participants with weight loss demonstrated a 4.05 times higher likelihood of developing low muscle strength compared to those without weight loss. This finding aligns with a previous study indicating that weight loss correlates with fat and muscle mass reductions, ultimately reducing muscle strength.[27] Weight loss is associated with malnutrition, and previous findings have identified a link between malnutrition and low muscle strength among older adults.[28] Inadequate protein intake relative to the body's metabolic demands may cause low muscle strength.[29] Furthermore, reduced energy intake has been observed to adversely affect muscle strength.[29] This is consistent with previous studies, which state that low muscle strength is associated with energy consumption and albumin, indicators of nutritional status that influence the protein synthesis process, contributing to the development of low muscle strength.[30]

Physical activity has been identified as a predictor of low muscle strength. Older adults with NCDs who engage in sedentary activity (MET < 600 minutes per week) were 0.37 times more likely to develop low muscle strength compared to moderate to vigorous physical activity (MET ≥ 600 minutes per week). Sedentary behavior has been associated

with low muscle strength, whereas increased physical activity enhances muscle strength.[31] Consistent with previous studies, research on physical activity and resistance exercise has demonstrated their effectiveness in enhancing muscle strength among older adults.[32] However, in this study, the difference was less than one-fold in sedentary older people with NCDs than those in moderate to vigorous physical activity. This observation may be attributed to the fact that all participants in this study had NCDs associated with inflammatory processes known to contribute to the development of low muscle strength.

Participants with depression were 3.06 times more likely to have low muscle strength compared to those without depression. This finding aligns with previous literature and meta-analyses, indicating a relationship between reduced muscle strength in older individuals with depression.[33] Previous studies have identified that older adults with depressive symptoms exhibit elevated levels of interleukin-6 (IL-6), Tumor Necrosis Factor-alpha (TNF-α), and C-reactive protein (CRP), which play significant roles in the muscle breakdown process leading to low muscle strength.[3]

Nevertheless, gender, number of comorbidities, body mass index, waist circumference, and alcohol consumption could not predict low muscle strength in this study. These may vary due to different lifestyle, culture, and healthcare practices in different settings. This study is limited in terms of generalizability due to non-probability sampling.

Recommendation

Handgrip strength assessment can be useful for screening older adults with NCDs in communities to identify those at risk for low muscle strength. Healthcare providers should promote physical activity and healthy lifestyle aiming to prevent weight loss and depression in older adults. Additionally, it is recommended that further research be conducted on developing health promotion programs that encourage moderate and vigorous physical activity among older adults with NCDs, and specifically tailored to these conditions.

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