Prevalence and Predictors of Sarcopenia Among Older Buddhist Monks in Thailand

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Abstract: Sarcopenia is a progressive loss of musculoskeletal condition, and the Asian Working Group for Sarcopenia has established the following diagnostic criteria for sarcopenia: (1) handgrip strength (< 26 kg) and/or (2) gait speed (≤ 0.8 meter/second) and (3) skeletal muscle mass index (< 7 kg/m^2). Sarcopenia is known to have a negative impact on quality of life, including falls and progressive disability. Older Buddhist monks may be at a higher risk for sarcopenia because of dietary problems, low levels of exercise, and chronic illnesses. This study used a descriptive correlational design aiming to investigate the prevalence of sarcopenia and the predictability of this and its three components in 324 older monks in Bangkok and a surrounding province. Measures for data collection were demographic and health questionnaires containing 13 questions, and measures of body composition, muscle strength, and physical performance. Data analysis included descriptive statistics, logistic regression, and multiple linear regression.

Results revealed that the prevalence of sarcopenia was zero. All participants had a normal skeletal muscle mass index; however, 31.2% had low handgrip strength; and 55.2% had low gait speed. Age and physical activity together predicted low handgrip strength. Age and chronic illness together predicted low gait speed. Body mass index, physical activity, and weight loss together predicted skeletal muscle mass index.

Age and physical activity are strongly predictability with the components of sarcopenia, and nurses should promote moderate to vigorous physical activity for maintaining muscle strength and gait ability.

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Introduction

Sarcopenia is a musculoskeletal condition in which individuals suffer progressive loss of muscle mass, function, and strength.[1] It is often associated with aging and older adults, although is not limited to this population. Its worldwide prevalence has been estimated to be 10%,[2] ranging between 8.1 and 15.7% in Asia[3,4] and 20.2% in Europe.[5] In Thailand, the prevalence rates of sarcopenia in community dwelling older adults range between 1.3% and 13.6%.[6-8] The

Asian Working Group for Sarcopenia (AWGS) has established the following diagnostic criteria for sarcopenia: (1) handgrip strength (< 26 kg) and/or (2) gait speed (≤ 0.8 meter/second) and (3) skeletal muscle mass index (< 7 kg/m^2) using bioelectrical impedance analysis.[9]

The physiological changes associated with lifestyle activity and eating behaviors contribute to the deterioration of muscle mass and bone density, especially in older adults 60 years of age and older, at a rate of about 3% per year.[10] A low education level can have an effect on the ability to take care of one's self and the quality of food intake, thus facilitating the decrease of muscle mass.[11] Chronic illnesses that are comorbid with sarcopenia include cancer, depression, diabetes mellitus, chronic obstructive pulmonary disease, chronic renal failure, heart disease, hypertension, and tuberculosis. These chronic conditions affect the inflammation process by further reducing blood flow and producing insulin resistance that cause the loss of muscle mass.[1, 9,12,13] Statins influence mitrichondria dysfuction that in turn can affect the loss of muscle mass and muscle strength by 10-15%.[14] Unintentional weight loss alters protein synthesis in muscles that can lead to the reduction of lean body mass.[15] A low body mass index may indicate low protein intake while a high body mass index and large waist circumference has been linked to increase inflammatory cytokines.[11,16]

Sarcopenia in older adults is known to have a negative impact on their quality of life, including falls and progressive disability.[9] Older adults with a history of falls often have low physical activity that reduces muscle mass.[17] Sedentary physical activity acts on mitochondrial production that decreases muscle strength and muscle mass.[18] More specifically, depression can cause an increase in inflammatory cytokines IL-6 and TNF- α and C-reactive protein production, and can produce loss of muscle mass[7,8,12]. Cigarette smoking impairs muscle protein synthesis and increases myostatin levels that consequently inhibit muscle growth development,[19] and nicotine suppresses appetite often leading to lower caloric intake and weight loss[15]

Older Buddhist monks may be at greater risk for developing sarcopenia than older males in the Thai population. Their prevalence of morbidity is higher than males in the general population for diabetes (10.2% vs. 6%), hypertension (22.9% vs. 21.5%), and body mass index (45.1% vs. 37%).[20] Monks consume more sugary drinks and eat high fatty foods and less protein (41.69 grams/day or 0.62 grams/kg/day) compared to other males, and the standard criteria set by the Ministry of Public Health (1.0 gram/kg/day).[20] Moreover, it has been reported that 40.2% of Thai monks smoke.[21] They may also lead a sedentary lifestyle devoted to prayer and meditation. These factors suggest that Buddhist monks in Thailand may have health risks associated with unhealthy aging, including the development of sarcopenia.

A published study on sarcopenia in older monks in Thailand could not be found in the research databases. A baseline assessment for the presence of sarcopenia in older monks would be useful to clinicians and researchers for the development of appropriate behavioral modification guidelines for this unique population. Study findings might serve to identify healthcare needs for the prevention of sarcopenia among older monks and other health problems, such as falls, disability, and a poor quality of life.

Aims

This study aimed to (1) investigate the prevalence of sarcopenia among older Buddhist monks in Thailand and (2) determine the predictability of personal factors (age educational level) and health factors (chronic illness, use of statins, weight loss, body mass index (BMI), waist circumference (WC), history of falls, depression, and cigarette smoking) with each component of sarcopenia: handgrip strength, gait speed, and skeletal muscle mass index.

Methods

Design

This study was a descriptive correlational design.

Sample and Setting

After purposively selecting Bangkok because of its national importance and large population, a stratified random sampling was used to select one of the five provinces surrounding Bangkok. Subsequently,

eight of 50 districts of Bangkok and three of six districts in one province were randomly sampled, with 50 and 25 temples randomly sampled in the 11 districts.

Eligibility to participate in the study were the following criteria: (1) Buddhist monks aged ≥ 60 years old, (2) ability to care for self, (3) resident of their respective districts for at least six months, (4) ability to communicate in Thai, and (5) a total score ≥ 15 on the Chula Mental Test to indicate normal cognition. Exclusion criteria were having a (1) serious illness, (2) reported musculoskeletal problems, or (3) pacemaker implantation.

The sample size was determined by power analysis (power=0.85, significance level=.05)[22] using the G*Power Program. An effect size of 0.17 was based on three published studies.[7,8,23] Approximately 5% was added to the calculated 307 participants to compensate for incomplete data, bringing the final sample size to 324 older monks. They were a convenience sample, ranging from one to 13 monks from each temple.

Data Collection

Data was collected between January – March 2019 using the following instruments and equipment:

Demographic characteristics questionnaire. The primary investigator (PI) developed a demographic characteristics questionnaire to obtain following data: age, date of birth, educational level, Buddhist educational level, self-reported chronic illness (hypertension, diabetes mellitus, heart disease, chronic obstructive pulmonary disease, chronic renal failure, tuberculosis and cancer), use of statins (at least six months), weight loss (standard criteria[24] > 5% in 1 month, > 7.5% in 3 months, or > 10% in six months), history of falls (past year), cigarette smoking, and daily physical activity level. There were both response-choice items and fill-in-the-blank items.

The Chula Mental Test (CMT), developed by Jitapankul,[25] screens for cognitive function. There are 19 questions with binary responses (1=correct, 0=incorrect) with possible scores ranging from 0 to 19 points. Total scores ≤15 indicate abnormal cognitive function. Some words were slightly altered to be more appropriate for monks. A content validity index (CVI) submitted to three Thai experts in older adults and monkhood judged all word use to be 1.00.

The Global Physical Activity Questionnaire (GPAQ) version 2 was developed by the World Health Organization and translated into Thai by Aekplakorn.[26] It is composed of 16 items that assess three dimensions of physical activity: (1) six items measure vigorous intensity (activity at work), (2) three items measure moderate intensity, and (3) six items measure recreational activity and one item for sedentary intensity. Responses to each item assesses the duration (minute per day) and frequency (day per week) of physical activity. The results are then converted to metabolic equivalent tasks (METs) by calculating total time spent in each physical activity during a week, then multiplied by 4 for moderate intensity or 8 for vigorous intensity.

The total MET scores are categorized into three levels as follows; 1) Vigorous active lifestyles: (a) vigorous physical activities > 3 days/week and total MET > 1500 minutes/week, or (b) vigorous or moderate physical activities > 7 days/week and the total MET > 3,000 minutes/week. 2) Moderate active lifestyles: (a) vigorous activities > 3 days/week and > 20 minutes/day; (b) moderate activity or walking > 5 days/week and > 30 minutes/day; or (c) vigorous and moderate activities or walking > 5 days/week and total MET > 600 minutes/week. 3) Sedentary active lifestyles: lower physical activities with the total MET < 600 minutes/week.[26] The GPAQ's lifestyle language was modified to reflect typical monks' activity, such as, meditation, prayer, walking to receive alms. The CVI submitted to the three Thai experts mentioned earlier was 1.00.

Thai Geriatric Depression Scale (TGDS-15). This questionnaire was developed by Wongpakaran and Wongpakaran.[27] There are 15-items including 10 negative questions. The response is scored as 1 if the answer is "yes" and as 0 if the answer is "no". There are also 5 positive questions, the score is reversed with a maximum of 15 points and the scores reflect three levels of depression: Normal (0-4 points); Developing depression, needs counseling (5-10 points); and Depressive symptoms, needs medical treatment (11-15 points). The CVI was 1.00. The TGDS-15 was administered twice at a five-day interval to 20 older monks whose demographic characteristics were similar to those of the participants in the main study. Pearson's product moment correlation coefficient for test-retest reliability was 0.85.

Sarcopenia was assessed using the AWGS diagnostic criteria.[9] A digital dynamometer that was calibrated in accordance with ISO standards to measure *handgrip strength*. The participants used their dominant hand. After two attempts, their highest handgrip strength value was recorded in kilograms (kg). Handgrip strength <26 kg indicates a low level of muscle strength.[9]

Gait speed was measured by asking participants to walk on a designated six-meter path. Participants were timed from the beginning of the walk until they stopped. The recorded times were entered into the gait speed formula: length (six meters) divided by the time (seconds). The gait speed ≤ 0.8 meter/second is considered low.[9]

A *body composition analyzer* (TANITA-420, model) that had been standardized and calibrated assessed the skeletal muscle mass index. The skeletal muscle mass formula is [0.401x (height^2/resistance) + 3.825 x gender - 0.071 x age + 5.102]. The skeletal muscle mass index formula is skeletal muscle mass/height.^{2} A skeletal muscle mass index <7.0 kg/m^2 indicates low muscle mass.[28] If participants had a low skeletal muscle mass index plus low handgrip strength and/or low gait speed, this would indicate sarcopenia.[9]

Waist circumference was measured in centimeters (cm) and millimeters (mm) at the horizontal plane midway between lowest rib and the iliac crest[28] using a standardized tape measure. *Body weight* (kg) was measured using a body composition analyzer (TANITA-420 model). *Height* (cm, mm) was measured using a standardized scale and converted to meters-squared. The body mass index (BMI) formula is weight (kg)/height (meter^2). All equipment used to assess physical parameters was routinely examined and calibrated prior to collecting data.

Ethical Considerations

This study was approved by the Institutional Review Board on Research Involving Human Subjects of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University (ID 11-61-65), and the primary investigator (PI) submitted the letter issued by the Graduate School of Mahidol University to the Office of National Buddhism to introduce herself and to ask for cooperation in data collection. Potential volunteers were informed of the study's purpose and data collection procedure. They were told of their right to refuse or withdraw from the study at any time and were given assurances of privacy and confidentiality of information. Those who volunteered to participate signed an informed consent form.

Data collection

Three registered nurses were trained by the PI to assist with data collection. The physical flow of data collection involved participants moving sequentially through five assessment stations. Station 1 was cognitive screening by using the Chula Mental Test. Two participants did not meet the inclusion criterion. The remaining participants were interviewed at Station 2 (~20 minutes) about demographic characteristics, physical activity, and administered the TGDS-15. At Station 3 (~5 minutes) participants removed their shoes to measure their height, stood on the TANITA-420, then measured for waist circumference. At Station 4 (~2 minutes), participants stood and squeezed the digital dynamometer two times, at their maximum strength. At Station 5 (~5 minutes), participants walked a distance of six meters.

Data analysis

Descriptive statistics were used to describe demographic characteristics, health variables, and the three measures of sarcopenia (handgrip strength, gait speed, and skeletal muscle mass index). Logistic regression was used to examine factors predictive of low handgrip strength and low gait speed while stepwise multiple linear regression was used to determine factors predicting skeletal muscle mass index. They were categorized as follows: age in years (0 = 60–79, 1= 80 or over), educational level (0 = secondary level or higher, 1= elementary level or lower), chronic illness (0= no, 1= yes), use of statins (0= no, 1= yes), weight loss (0= no, 1= yes), BMI (0= normal, 1= underweight or overweight/obesity), waist circumference (0= < 90, 1= ≥ 90 cm), history of falls (0= no, 1= yes), physical activity (0= moderate and vigorous, 1= sedentary), depression (0= normal ≤4, 1= abnormal ≥5), and cigarette smoking (0= no, 1= yes).

Results

The mean age of Buddhist monks was 69.8 ± 7.8 years old, ranging from 60–99 years. Almost two-thirds had an elementary education or lower (63.9%) and reported a chronic illness (65.7%). The most common problems were hypertension (39.5%) and diabetes mellitus (24.4%). Almost a third (32.7%) reported using statins. For their nutritional status, 3.1% experienced weight loss, 62.1% had an increased BMI, and 59.9% had waist circumference ≥90 cms. Although 14.8% had a history of falls, most monks (85.5%) reported a vigorous or moderate active lifestyle. Additionally, 12.7% had depressive symptoms and 71.6% had history of cigarette smoking (**Table 1**).

Table 1 Description of the study variables (n = 324)

Variables	**Mean** ± SD	**n (%)**
Age (years)	69.8 ± 7.8	
60–79		280 (86.4)
≥ 80		44 (13.6)
Education		
Elementary level or lower		207 (63.9)
Secondary level and higher		117 (36.1)
Chronic illness*		199 (61.5)
Hypertension		128 (39.5)
Diabetes mellitus		79 (24.4)
Heart disease		40 (12.3)
Other		21 (6.5)
Use of statins		
No		218 (67.3)
Yes		106 (32.7)
Weight loss		
No		314 (96.9)
Yes		10 (3.1)
BMI		
Low		26 (8.0)
Normal		97 (29.9)
Overweight and Obesity		201 (62.1)

Table 1 Description of the study variables (n = 324) (Cont.)

Variables	Mean ± SD	n (%)
Waist circumference (cm)		
< 90		130 (40.1)
≥ 90		194 (59.9)
History of falls		
No		276 (85.2)
Yes		48 (14.8)
Physical activity		
Sedentary		47 (14.5)
Vigorous and moderate		277 (85.5)
Depression		
No		283 (87.3)
Yes		41 (12.7)
Cigarette smoking		
No		92 (28.4)
Yes		232 (71.6)

* Answer more than 1 chronic illness

About two-thirds (68.8%) of the participants had normal handgrip strength (mean=29.4 ± 7.2 kgs) and 55.2% had a low level of gait speed (mean=0.6 ± 0.5 m/second). All participants had a normal skeletal muscle mass index (mean=10.7 ± 1.6 kg/m^2). Thus, the prevalence of sarcopenia in this study's sample was zero (**Table 2**).

Table 2 Prevalence and components of sarcopenia in older monks based on AWGS (n = 324)

Prevalence and components of sarcopenia	Number	Percentage
Handgrip strength (HG) Min-Max = 10.0-48.5; Mean, SD = 29.4±7.2		
Normal	223	68.8
Low*	101	31.2
Gait speed (GS) Min-Max = 0.2-2.6; Mean±SD = 0.6±0.5		
Normal	145	44.8
Low**	179	55.2
Skeletal muscle mass index (SMI) Min-Max = 7.1-18.7; Mean±SD = 10.7±1.6		
Normal	324	100.0
Low***	-	-
Sarcopenia		
No	324	100.0
Yes	-	-

* HG < 26 kg **GS of 6 meters ≤ 0.8 meter per second *** SMI < 7 kg/m^2 (AWGS)

Univariate logistic regression analysis revealed that age and physical activity were associated with handgrip strength. Monks who were ≥80 years old were 4.42 times more likely to have low handgrip strength compared to those who were between 60 and 79 years old. Moreover, older monks who were sedentary (MET <600 minutes/week) were 3.33 times more likely to have low handgrip strength compared to those who had a moderate and vigorous of physical activity (MET ≥600 minutes/week) (**Table 3**).

Table 3 Univariate logistic regression examining factors associated with handgrip strength in older monks (n= 324)

Factors	Normal HG n (%)	Low HG n (%)	B	OR	95%CI	P
Age (years)						
60-79*	206(73.6)	74(26.4)				
≥ 80	17(38.6)	27(61.4)	1.486	4.421	2.280-8.575	<.001
Education						
Elementary level or lower	138(66.7)	69(33.3)	.284	1.328	.807-2.187	.265[ns]
Secondary level or higher*	85(72.7)	32(27.3)				
Chronic illness						
No*	91(72.8)	34(27.2)				
Yes	132(66.3)	67(33.7)	.306	1.359	.831-2.221	.222[ns]
Use of statins						
No*	150(68.8)	68(31.2)				
Yes	73(68.9)	33(31.1)	-.003	.997	.604-1.646	.991[ns]
Weight loss						
No*	219(69.7)	95(29.3)				
Yes	4(40.0)	6(60.0)	1.241	3.458	.954-12.535	.059[ns]
BMI						
Normal*	66 (68.0)	31(32.0)				
Low, overweight or obese	157(69.2)	70(30.8)	-.007	.993	.594-1.659	.977[ns]
Waist circumference						
< 90*	84(64.6)	46(35.4)				
≥ 90 cm	139(71.7)	55(28.3)	-3.25	.723	.449-1.163	.181[ns]
History of falls						
No*	194(70.3)	82(29.7)				
Yes	29(60.4)	19(39.6)	4.38	1.550	.823-2.921	.175[ns]
Physical activity						
Sedentary	21(44.7)	26(55.3)	1.204	3.335	1.770-6.281	<.001
Vigorous and moderate *	202(72.9)	75(27.1)				
Depression						
No*	199(70.3)	84(29.7)				
Yes	24(58.5)	17(41.5)	.518	1.678	.857-3.285	.131[ns]
Cigarette smoking						
No*	63(68.5)	29(31.5)				
Yes	160(69.0)	72(31.0)	-.023	.978	.581-1.645	.932[ns]

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

*Reference group

Age, chronic illness, and level of physical activity were associated with gait speed. Older monks who were ≥80 years old were 4.31 times more likely to have low gait speed compared to those who were between 60 and 79 years old. Older monks who had at least one chronic illness were 1.6 times more likely to have low handgrip strength compared to those who did not have any chronic illness. Finally, older monks who were sedentary were 2.38 times more likely to have low gait speed compared to those who had a moderate and vigorous of physical activity (MET ≥600 minutes/week) (**Table 4**).

Table 4 Univariate logistic regression examining factors associated with gait speed in older monks (n= 324)

Factors	Normal GS n (%)	Low GS n (%)	B	OR	95%CI	P
Age (year)						
60-79*	137(48.9)	143(51.1)				
≥ 80	8(18.2)	36(81.8)	1.461	4.311	1.935-9.605	<.001
Education						
Elementary level	91(44.0)	116(56.0)	.089	1.093	.693-1.723	.703 ns
Higher than elementary level*	54(46.2)	63(53.8)				
Chronic illness						
No*	65(52.0)	60(48.0)				
Yes	80(40.2)	119(59.8)	.477	1.611	1.026-2.530	.038
Use of statins						
No*	105(48.2)	113(51.8)				
Yes	40(37.7)	66(62.3)	.427	1.533	.954-2.463	.077 ns
Weight loss						
No*	143(45.5)	171(54.5)				
Yes	2(20.0)	8(80.0)	1.207	3.345	.699-16.003	.131 ns
BMI						
Normal*	47(48.5)	50(51.5)				
Low, overweight or obese	98(43.2)	129(56.8)	.151	1.163	.720-1.879	.538 ns
Waist circumference						
< 90*	57(43.8)	73(56.2)				
≥ 90 cm	88(45.4)	106(54.6)	-.061	.941	.601-1.471	.788 ns
History of falls						
No*	124(44.9)	152(55.1)				
Yes	21(43.8)	27(56.2)	.048	1.049	.566-1.945	.880 ns
Physical activity						
Sedentary	13(27.7)	34(72.3)	.867	2.381	1.205-4.705	.013
Vigorous	132(47.7)	145(52.3)				
Moderate *						
Depression						
No*	130(45.9)	153(54.1)				
Yes	15(36.6)	26(63.4)	.387	1.473	.748-2.899	.262 ns
Cigarette smoking						
No*	37(40.2)	55(59.8)				
Yes	108(46.6)	124(53.4)	-.258	.772	.793-2.114	.302 ns

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

*Reference group

Multivariate logistic regression analysis indicated that age and physical activity together explained 11.3% of model's prediction of handgrip strength (**Table 5**). Similarly, age and chronic illness together explained 8% of the model's prediction of low gait speed (**Table 6**). Results of stepwise multiple linear regression, the first model showed that BMI was included and could account for 27.2 %. The second model included BMI and physical activity account for 29.1% of skeletal muscle mass index. In the third model, BMI, physical activity, and weight loss could account for 30.3 % of skeletal muscle mass index (**Table 7**).

Table 5 Multivariate logistic regression examining factors associated with handgrip strength in older monks (n= 324)

Factors	B	OR	95% CI	P
Age (year)				
60-79*				
≥ 80	1.271	3.565	1.792-7.091	<.001
Physical activity				
Sedentary	.924	2.519	1.290-4.918	.007
Vigorous and Moderate *				

Nagelkerke R^2 =.113; -2LL=374.914; χ^2 =27.155; df=2; p<.001

OR=Odds ratio, CI=Confidence interval

*Reference group

Table 6 Multivariate logistic regression examining factors associated with gait speed in older monks (n= 324)

Factors	B	OR	95%CI	P
Age (year)				
60-79*				
≥ 80	1.466	4.332	1.937-9.690	<.001
Chronic illness				
No*				
Yes	.483	1.621	1.021-2.574	.040

Nagelkerke R^2 =.080; -2LL=425.531; χ^2 =20.054; df=2; p<.001

OR=Odds ratio, CI=Confidence interval

*Reference group

Table 7 Stepwise regression analysis summary for predicting skeletal muscle mass index in older monks (n = 314)

Factors	B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	p-value
Model 1					
(Constant)	9.593	.109		88.251	<0.001
1 BMI	1.500	.139	.521	10.793	<0.001
Model 2					
(Constant)	9.858	.142		69.666	<0.001
1 BMI	1.496	.137	.520	10.889	<0.001
2 GPAQ	-.400	.140	-.137	-2.878	.004
Model 3					
(Constant)	9.849	.141		70.061	<0.001
1 BMI	1.486	.137	.516	10.881	<0.001
2 GPAQ	-0.423	.140	-.144	-3.027	.003
3 weight loss	0.883	.380	.111	2.326	.021
Model 1: R = .521; R^2 = .272; Adjusted R^2 = .270; F = p<0.001					
Model 2: R = .539; R^2 = .291; Adjusted R^2 = .286; F = p=.004					
Model 3: R = .550; R^2 = .303; Adjusted R^2 = .296; F =p=.021					

Note: Sample size reduced after assessing for normality of data; 10 outliers were deleted.

Discussion

Our finding is consistent with the previous study that showed the overall prevalence of sarcopenia was 1.3% and zero in older males.[8] It was lower than the prevalence in worldwide (10%)[2] and Asia (8.1% to 15.7%).[3,4] This may be explained as being due to the older monks engaging in moderate to vigorous physical activity and having a normal skeletal muscle mass index. The majority of their physical activity comes from daily religious activities that include morning walks to receive alms and walking during some meditation exercises that can take approximately 40–120 minutes. However, almost a third of the older monks had low muscle strength and more than half had low gait speed. Prior research conducted on type 2 diabetes found that 34% of older males had low handgrip strength and 50.5% had low gait speed.[8] This means that many of the monks did not have optimal physical performance, reflecting the results of at least one other group in the Thai male population.

Age and sedentary physical activity together predicted low handgrip strength. This finding is consistent with previous studies.[2,7,8,10] Physiological changes in older adults that include changes in the body's production of enzymes result in the continuous loss of bone mass and a reduction in muscle strength.[10,28] One study conducted with older Thai adults corroborates this finding.[6]

The age of the older monks, the presence of at least one chronic illness, and sedentary physical activity were factors that were associated with low gait speed. Their age and chronic illness together predicted a low gait speed, also similar to other reported studies.[2,7,8,10] Physiological changes in aging adults can bring a gradual loss of bone density, loss of flexibility in cartilage, and the constriction of muscles. As a result, older adults can have slower body movements.[29] Individuals with chronic illnesses and metabolic problems have been reported to have problems with lower limbs and experience slower gait speed,[30] and that sedentary physical activity is related to gait speed.[31] When older adults do not have sufficient physical activity, muscle strength and muscle mass are reduced, walking mechanisms are adversely affected, hence slower gait speed.[1,31]

The first predictor of skeletal muscle mass index was BMI. The increased BMI was associated with skeletal muscle mass index. It is a well-known phenomenon that a large girth is not necessarily fat, but can be related to high skeletal muscle mass index.[11,16] The second predictor was physical activity. This study revealed that the level of physical activity associated with the skeletal muscle mass index. A low level of physical activity results in a reduction of muscle mass.[32] On the other hand, older adults who exercise regularly have a higher level of mitochondria similar to that found in middle aged adults, producing adequate levels of muscle mass.[18] The last predictor was weight loss. This is counterintuitive and not supported in the literature.[33] However, weight loss for most of the older monks was only one to two kilograms. The small loss may have insufficient to significantly affect loss of muscle mass.[34]

There was no association between educational level, use of statins, history of falls, depression, or cigarette smoking with components of sarcopenia (handgrip strength, gait speed, and skeletal muscle mass index). No association between educational level and components of sarcopenia has been reported elsewhere in Thailand.[7]

The older monks had been prescribed a low dose of statins, ranging from 10 to 20 mg. This level of dosage may not contribute to the loss of muscle strength or muscle mass, unlike higher dosages of statins.[15] Because most older monks had activity levels at a moderate to vigorous level and all had a normal skeletal muscle mass index, the absence of a statistical association between history of falls, depression, and cigarette smoking and components of sarcopenia may not be surprising. As the findings show, only age and physical activity are the important factors associated with sarcopenia.

Limitations

The use of self-report to collect data on important measures is a limitation to the study. Older monks may have overestimated their abilities on the Global Physical Activity Questionnaire. The use of pedometers would have been better but would have required extensive time and resources. Moreover, the self-report of chronic illnesses may need to be reinforced with diagnostic assessment, such as hypertension and diabetes. The participants of the present study comprised older monks living in two urban areas. It is not known if results would be the same had temples in more rural areas beyond central Thailand been included.

Conclusions and recommendations for nursing practice and further research

Age and physical activity are strongly associated with the components of sarcopenia. However, nurses and health personnel need to wisely consider the religious sensitivities of recommending exercise and other physical activity to this population. This includes monks who are in the oldest-old age group and those who have a chronic illness that significantly impairs their mobility. Nevertheless, suggestions may be offered to younger monks, especially to those in monastic colleges, about how to develop lifelong activities that will strengthen their physical abilities to best serve the monkhood.

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ความชุกและปัจจัยทำนายภาวะมวลกล้ามเนื้อน้อยของพระภิกษุสูงอายุในประเทศไทย

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บทคัดย่อ: ภาวะมวลกล้ามเนื้อน้อย ส่งผลกระทบด้านลบต่อคุณภาพชีวิต การพลัดตกหกล้ม และภาวะทุพพลภาพ พระภิกษุสูงอายุมีความเสี่ยงต่อการเกิดภาวะมวลกล้ามเนื้อน้อย เนื่องจากข้อจำกัดด้านการรับประทานอาหาร การออกกำลังกาย และการเจ็บป่วยเรื้อรัง การศึกษาครั้งนี้ มีจุดมุ่งหมายเพื่อศึกษาความชุกของภาวะมวลกล้ามเนื้อน้อย และหาปัจจัยทำนายภาวะมวลกล้ามเนื้อน้อย และ สามองค์ประกอบของภาวะมวลกล้ามเนื้อน้อย เก็บรวบรวมข้อมูลพระภิกษุสูงอายุ จำนวน 324 ราย ในจังหวัดกรุงเทพมหานคร และจังหวัดใกล้เคียงแห่งหนึ่ง โดยใช้แบบสอบถามข้อมูลส่วนบุคคลและภาวะสุขภาพ ประเมินองค์ประกอบของร่างกาย ความแข็งแรงของกล้ามเนื้อมือ สมรรถภาพทางกาย วิเคราะห์ข้อมูลโดยใช้สถิติบรรยาย สถิติการวิเคราะห์การถดถอยโลจิสติก และสถิติการวิเคราะห์การถดถอยเชิงเส้นพหุคูณ

ผลการศึกษา พบว่า ไม่พบความชุกของภาวะมวลกล้ามเนื้อน้อย พระภิกษุสูงอายุทุกรูปมีดัชนีมวลกล้ามเนื้อปกติ อย่างไรก็ตามร้อยละ 31.2 มีความแข็งแรงของกล้ามเนื้อน้อย และ ร้อยละ 55.2 มีความเร็วในการเดินต่ำ อายุ และระดับกิจกรรมทางกาย สามารถร่วมกันทำนายการมีความแข็งแรงของกล้ามเนื้อต่ำ อายุ และการมีโรคเรื้อรังสามารถร่วมกันทำนายการมีความเร็วในการเดินต่ำ และ ดัชนีมวลกาย ระดับกิจกรรมทางกาย และภาวะน้ำหนักลด สามารถร่วมกันทำนายดัชนีมวลกล้ามเนื้อ

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คำสำคัญ: ความเร็วในการเดิน ความแข็งแรงของกล้ามเนื้อ พระภิกษุ สูงอายุ ระดับกิจกรรมทางกาย ภาวะมวลกล้ามเนื้อน้อย ดัชนีมวลกล้ามเนื้อ

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