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Determinants of overnutrition among elderly in Thailand: A Cross sectional study

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ABSTRACT

Background: As per the Global Nutrition Report 2017, malnutrition has been associated with weakened health conditions and can be distinguished as under and over nutrition respectively. Malnutrition distresses one in three people worldwide and is increasing in several countries making it public health challenge for all over the world.

Objectives: This study was aimed to identify the prevalence of overnutrition and the determinants of obesity among elderly in Thailand.

Methodology: 6,477 Thai elderlies were randomly selected from all the 77 provinces of Thailand which includes 13 zones and 4 regions. An analytical cross-sectional study was performed to identify the study outcome. Multilevel logistic regression was carried out and results were presented as Adjusted OR (Adj.OR) and 95% CI at the significance level of 0.05.

Results: Of the total 6,477, 39.40% (95% CI, 38.21-40.59) elderly were found to be obese. Multilevel logistic regression analysis between independent factors and obesity among elderly in Thailand observed those factors, statistically significant were, age group varying from 60-69 years (Adj.OR=2.53, 95% CI, 2.09-3.08), those who can read fluently (Adj.OR=1.33, 95% CI, 1.06-1.66, p-value 0.011), who can write fluently (Adj.OR=1.24,95% CI, 1.02-1.60, p-value 0.026), having cable TV (Adj.OR=1.22, 95%CI, 1.07-1.39, p-value 0.002), having mobile phones (Adj.OR=1.32, 95%CI, 1.17-1.49, p-value <0.001), residing in the municipality (Adj.OR=1.23, 95%CI, 1.10-1.38, p-value <0.001), having chronic disease (Adj.OR=1.73, 95%CI, 1.54-1.94, p-value <0.001) and, elderly who do not have universal health insurance (Adj. OR=1.21, 95% CI, 1.05-1.39, p-value 0.007) respectively while controlling other co-variates.

Conclusion: Overnutrition among the elderly was significantly raised and factors such as having age group 60-69 years, without current occupation, unable to read and write fluently, having cable TV and mobile phones, residing in the municipality, having chronic disease, without universal health insurance were observed to be associated with obesity. Therefore, to tackle dual-form of malnutrition, nutrition and health education are important strategies to promote and maintain good health of elderly.

Keywords: Overnutrition, Obesity, Elderly, Health status

1. Introduction

In 2050, it has been estimated that the world ageing population is increasing by 22% [1]. In addition, World Health Organization (WHO) estimates that by 2025 the number of people aged 60 years and above will reach 1.2 billion and approximately 840 million will live in low-income countries [2-4].

Decline in fertility rates and raise life expectancies are dramatically shifting the age structure of the population in Thailand toward and led to an aging society [5, 6]. Malnutrition is a significant problematic condition among the ageing population as well. As the nutrition status affects the process of aging and health in elderly people [7] body structure changes during the aging process, and this also effects nutritional status. So, aging can affect not only the physical and mental health by causing deteriorative changes but also can lead to the problem of malnutrition in elderly [1] as well. Almost 3 times higher risk of malnutrition were observed in elderly with underweight taste disorders [1, 8]. Moreover, few prospective studies have examined the relationship between health literacy and adverse health outcomes. People with inadequate health literacy have 29% to 52% higher hospitalization rates, even after adjustment for baseline socioeconomic status, health status, and health behaviours [9].

Nutrition literacy means the degree to which individuals have the capacities to receive, process, understand nutrition information and necessary skills to make decisions on nutrition properly [10].

Since, it is important that an evaluation anticipating the different dimensions of health conditions and lifestyle should be led to identify the factors that affect nutritional status and, possibly, to develop strategies to promote health and quality of life among the elderly [11, 12]. Therefore, proportion of underweight was 27.3% in men and 12.8% in women ($p < 0.01$), and was significantly likely to be associated with altered cognitive function (OR:3.52) and inversely related with maximum amount of medication use (OR:0.34). 25.5% of men and 53.8% of women were affected by overweight. Although, it was negatively connected with illiteracy (OR:0.12) and absolutely allied with female gender (OR:2.58)[11].

Furthermore, malnutrition and unplanned weight loss is also associated with progressive deterioration in health, it will also impair the muscle and cognitive functions. Similarly, it will reduced physical activities, decreased immune function and increased mortality rates [13-15]. A rapidly growing body of evidence is

accumulating of the effects of limited health literacy on health outcomes. In addition, a strong association between excessive body weight and age (OR=2.162, $p < 0.001$), with the prevalence of overweight and obesity increasing as age increased in both genders was found in Hu et al [16].

Therefore, attention is required to overcome malnutrition particularly in the aging population [1, 17]. However, data on the overnutrition and associated risk factors among elderly has not been well established in Thailand. Hence, this present study within the Thailand is necessary to assess the prevalence of overnutrition and associated factors of older person in this area. This study will influence the direction of nutritional education in older persons: reduce, change or improve the dietary pattern.

2. Methods

2.1: Study Design

The study was carried out to identify the prevalence of overnutrition and its associated factors among the elderly in Thailand by conducting a cross-sectional study with the data set from the National Health Literacy Survey of Thailand. All citizen aged 60 years and older of the all 13 zone of Thailand were selected as study population which consist of the people from 77 province of 4 regions respectively.

2.2: Sample size and sampling Procedures

The stratified three-stage sampling method was used for the sampling of 6477 elderly Thai citizen which has been sampled by calculating the power of test sample size calculating formula for logistic regression [18]. Firstly, 13 health zone including Bangkok Metropolitan were included. After that 3 provinces had been selected by using systematic random sampling from each zone made the total of 36 provinces. Secondly, systematic random sampling has been applied to select study units as per proportion to the size of provinces. Finally, a systematic random sampling method was used to select 15 household from each unit. Then, study population from each household were identified and recruited for this present study.

2.3: Data Collection

A semi-structured questionnaire was designed to conduct personal interview followed by a physical examination to measure blood pressure and anthropometric characteristics. In addition, the anthropometric measurements, including weight, height, and waist circumference (WC), were obtained by trained interviewers using standardized techniques and equipment. Body weight was measured to the nearest 0.1 kg using a calibrated electronic scale with the subject bare-foot and dressed in

lightweight clothing. Height was measured barefoot to the nearest 0.1 cm using a portable wall-mounted stadiometer. WC was obtained using a nonelastic flexible plastic tape with a buckle on one end and was made with the person wearing lightweight clothing. These anthropometric measurements were validated by the investigators in a random sample of 240 persons. The intraclass correlation coefficients were 0.97 for weight, 0.92 for height, and 0.89 for WC. Furthermore, BMI was calculated as the weight (in kilograms) divided by height (in meters) squared.

2.4: Statistical Analysis

STATA 10 Texas USA 2007 statistics analysis (Copyright of Khon Kaen University) was used to perform statistical analysis. Simple logistic regression has been performed for bivariate analysis including one dependent and one independent variable and reported as Crude Odds Ratio (Crude OR or OR) and 95% CI. The prevalence of overweight (BMI, 23 to 24.9 kg/m^2) and obesity (BMI, ≥25kg/m^2). In addition, BMI ≥25kg/m^2 has been considered as overnutrition among the elderly. The multivariable analysis was performed using a multilevel logistic regression by including all independent variables into the model by assigning p-value for entry (Pe) 0.25, p-value for remove (Pr)> Pe, and eliminating variables that do not relate to the model by backward elimination method [19] and Adjusted OR (Adj. OR) and 95% CI has been presented at the 0.05 significance level ($\alpha = 0.05$).

2.5: Ethical Approval

The study was approved by Khon Kaen University Centre for Research Ethics in Humans under ethical exemption (HE652126). In addition, Each and every study participant was assured that their information would be kept confidential.

3. Results

Out of 6,477 respondents, a total of 2,552 (39.40%) were obese (BMI ≥ 25 kg/m2) with 95% CI, 38.21-40.59 (Table 1).

Table 1: Prevalence of the obesity among elderly in Thailand (n = 6,477)

Body Mass Index (BMI)	Number	Percentage	95% CI
Underweight (BMI <18.5 kg/m^2)	609	9.40	8.71 – 10.13
Normal (BMI = 18.5-22.9 kg/m^2)	2,230	34.43	33.28 – 35.59
Overweight (BMI=23-24.9 kg/m^2)	1,086	16.77	15.87 - 17.69
Obese (BMI ≥ 25 kg/m^2)	2,552	39.40	38.21 - 40.59

Female gender was observed with significant association with obesity with OR 1.48 (95% CI, 1.33-1.64, p-value<0.001), the age group between 60-69 years was also found to be significantly associated with obesity with OR 2.40, (95% CI, 2.02-2.86, p-value<0.001),

those who earnt vocational certificate or higher were also found to be associated with obesity with OR 1.62, (95% CI, 1.18-2.21, p-value <0.001). However, those who had current occupation of being unemployed with OR1.15, 95% CI, 1.02-1.31, p-value <0.001, being labour worker with OR1.25, 95% CI, 1.04-1.51, p-value <0.001 and having personal business with OR1.46, 95% CI, 1.28-1.68, p-value <0.001 were likely to be obese respectively.

Furthermore, elderly having personal business were also significantly associated with obesity (OR=1.61,95% CI, 1.37-1.91, p-value <0.001). Similarly, other factors statistically significant were, fluent reading skill (OR=1.34, 95% CI, 1.21-1.48, p-value <0.001), writing fluently (OR=1.24, 95% CI, 1.12-1.37, with p-value <0.001), financial adequacy with saving (OR=1.61, 95% CI, 1.25-2.07, with p-value <0.001), having cable TV (OR=1.31, 95% CI, 1.17-1.48, p-value <0.001), having computer (OR, 1.56, 95% CI, 1.37-1.79, p-value <0.001), having mobile phones (OR=1.75, 95% CI, 1.57-1.94, p-value <0.001). Likewise, there were other factors those were significantly associated with obesity were, having participated in the community (OR=1.33, 95% CI, 1.18-1.51,p-value <0.001), residing in the municipality (OR=1.37, 95% CI, 1.24-1.51, p-value <0.001), having chronic disease (OR=1.69, 95% CI, 1.52-1.88, p-value <0.001) and those who have government insurance, social security insurance, and other insurance (OR=1.34, 95% CI, 1.18-1.52, p-value <0.001) (Table 2).

Table 2: Bivariate analysis between independent factors and Obesity among elderly in Thailand (n = 6,477)

Factors	Number	% of Obesity	Crude OR.	95%CI	p-value
Characteristics and socio-economic status					
Gender					< 0.001
Male	2,484	33.66			
Female	3,993	42.98	1.48	1.33 - 1.64	
Age (years)					< 0.001
≥ 80	790	25.32			
70 - 79	2,053	35.02	1.58	1.32 - 1.91	
60 - 69	3,634	44.94	2.40	2.02 - 2.86	
Education					0.005
No formal education	514	37.74			
Elementary school	5,002	38.80	1.04	0.86 - 1.26	
High school	723	41.36	1.16	0.92 - 1.46	
Vocational certificate or higher	238	49.58	1.62	1.18 - 2.21	
Current Occupation					< 0.001
Farmer/ Gardener	1,972	35.45	1		
Unemployed/Housewife (no income)	2,362	38.91	1.15	1.02 - 1.31	
Laborers, workers (such as general contractors Housekeepers, cleaning workers, security guards)	598	40.80	1.255	1.04 - 1.51	

Factors	Number	% of Obesity	Crude OR.	95%CI	p-value
Personal Business and Other	1,545	44.66	1.46	1.28 - 1.68	
Reading skills					< 0.001
Can't read / not fluent read	3,300	35.94			
Fluent read	3,177	43.00	1.34	1.21 - 1.48	
Writing skills					< 0.001
Can't read / not fluent read	3,574	37.05			
Fluently write	2,903	42.30	1.24	1.12 - 1.37	
Financial status of family					< 0.001
Inadequate with debt	972	36.11			
Inadequate	3,044	37.12	1.04	0.89 - 1.21	
Adequacy without saving	2,130	42.86	1.32	1.13 - 1.55	
Adequacy with saving	331	47.73	1.61	1.25 - 2.07	
Household facilities					
AM/FM radio					0.032
Not Available	3,005	38.00			
Available	3,472	40.61	1.11	1.00 - 1.23	
Cable TV					< 0.001
Not Available	1,635	34.56			
Available	4,842	41.04	1.31	1.17 - 1.48	
Computers					< 0.001
Not Available	5,447	37.65			
Available	1,030	48.64	1.56	1.37 - 1.79	
Mobile phones					< 0.001
Absent	2,434	31.22			
Present	4,043	44.32	1.75	1.57 - 1.94	
Participated in the community					< 0.001
Not participated	5,128	37.93			
Participated	1,349	45.00	1.33	1.18 - 1.51	
Residence					< 0.001
Outside the Municipality	3,362	35.75			
Municipality	3,115	43.34	1.37	1.24 - 1.51	
Health status					
Chronic disease					< 0.001
Do not have chronic disease and never checked	2,494	31.80			
Having chronic disease	3,983	44.16	1.69	1.52 - 1.88	
Health insurance					< 0.001
Universal health insurance	5,251	38.03			
Government Insurance, Social Security insurance, and Other	1,226	45.27	1.34	1.18 - 1.52	

Our multilevel logistic regression analysis between independent factors and obesity among elderly in Thailand describes those factors, statistically significant with obesity among the elderly were, age group varying from 60-69 years (Adj.OR=2.53, 95% CI, 2.09-3.08), those who can read fluently (Adj.OR=1.33, 95% CI, 1.06-1.66, p-value 0.011), who can write fluently (Adj.OR=1.24,95% CI, 1.02-1.60, p-value 0.026), having cable TV (Adj.OR=1.22, 95% CI, 1.07-1.39, p-value 0.002), having mobile

phones (Adj.OR=1.32, 95% CI, 1.17-1.49, p-value <0.001), residing in the municipality (Adj.OR=1.23, 95% CI, 1.10-1.38, p-value <0.001), having chronic disease (Adj.OR=1.73, 95% CI, 1.54-1.94, p-value <0.001), similarly, elderly who do not have universal health insurance were observed to be associated with obesity (Adj.OR=1.21, 95% CI, 1.05-1.39, p-value 0.007) respectively (Table 3).

Table 3: Multilevel logistic regression analysis between independent factors and Obesity among elderly in Thailand (n = 6,477)

Factors	Number	% of Obesity	Crude OR.	Adj. OR.	95%CI	p-value
Age (years)						< 0.001
≥ 80	790	25.32	1	1		
70 - 79	2,053	35.02	1.58	1.57	1.28 - 1.92	
60 - 69	3,634	44.94	2.40	2.53	2.09 - 3.08	
Reading skills						0.011
Can't read/not fluent read	3,300	35.94	1			
Fluent read	3,177	43.00	1.34	1.33	1.06 - 1.66	
Writing skills						0.026
Can't read/not fluent read	3,574	37.05	1			
Fluently write	2,903	42.30	1.24	1.28	1.02 - 1.60	
Household facilities						
Cable TV						0.002
Available	1,635	34.56	1			
Not Available	4,842	41.04	1.31	1.22	1.07 - 1.39	
Mobile phones						< 0.001
Absent	2,434	31.22	1			
Present	4,043	44.32	1.75	1.32	1.17 - 1.49	
Residence						< 0.001
Outside the Municipality	3,362	35.75	1			
Municipality	3,115	43.34	1.37	1.23	1.10 - 1.38	
Health status						
Chronic disease						< 0.001
Don't have any chronic disease and never checked	2,494	31.80	1		1	
Having chronic disease	3,983	44.16	1.69	1.73	1.55 - 1.94	
Health insurance						0.007
Universal health insurance	5,251	38.03	1		1	
Government Insurance, Social Security insurance, and Other	1,226	45.27	1.34	1.21	1.05 - 1.39	

4. Discussion

In our present study, we have intended to measure the prevalence as well as factors associated with overnutrition among the elderly Thai people. The prevalence of overnutrition among the elderly was 39.40%, 95% CI: 38.21%-40.59%. The previous study in Thailand observed that the overall prevalence of obesity among is 61.2% [1] it was mostly observed in the female age 60-69. So, the ageing population overweight are significantly vital issues to be measured. A

study revealed that there is strong association between excessive body weight and age with the prevalence of overweight and obesity increasing as age increased in both genders was found in Hu et al [16]. This might be due to the decrease work efficiency and low exercise rate. In our settings, we observed that age of elderly between 6o-79 years is more prone to develop obesity than that of age ≥ 80 years. Study suggested that the obesity has lethal effects on the brain and cognitive function in the elderly population. However, the specific mechanisms through which aging and obesity interact to promote cognitive decline however it is still remain unclear [20]. Similarly, it has been identified that the people have personal business were more likely to be obese. This might be due to the good income source lead to the dietary consumption. An increasing inactivity and illness in elderly people commonly result in substantial loss of muscle mass while body fat is relatively preserved or increased [15, 21, 22]. So, health conditions and lifestyle should be led to identify the factors that affect nutritional status and possibly to develop strategies to promote health and quality of life among the elderly [11].

Moreover, elderly who were fluent reader, writer and had facilities of the cable TV and mobile phones as well as residing in the municipality observed to be associated with obesity. Furthermore, it has been identified that those who were obese had chronic diseases. Study has been published that direct connection on health literacy to the health status of individuals [23]. For older adults, health literacy is considered important in preventing disability and the need for long-term care. In addition, our study also observed that the elderly who didn't have universal health insurance were significantly likely to be obese. Therefore, health literacy and nutritional status of the people is public health concern. Nutritional status of the elderly will reduced physical activities, decreased immune function and increased mortality rates [13, 14, 24, 25]. So, in the ageing population, underweight and overweight are significantly vital issues to be measured.

As this study covers all Thai citizen aged 60 years and older to identify the status of overnutrition, it is one of the greatest strengths for the generalization of the study findings. However, secondary analysis is one of the limitations of this study. We might have more variables while conducted primary data collection. Therefore, there is need of the further longitudinal study to identify the nutritional status and an associated factor among elderly.

5. Conclusion

Nearly 40% elderly were found to be obese. Factors such as having age group 60-69 years, without current occupation, unable to read and write fluently, having cable TV and mobile phones, residing in the municipality, having chronic disease, without universal health insurance were observed to be associated with obesity. Therefore, health literacy has the potential to improve health outcomes and may prove to be decisive in the development of resilience and empowerment in the world's older population. Furthermore, the overweight status among elderly was associated with the different chronic diseases. Therefore, to tackle dual-form of malnutrition, nutrition and health education are important strategies to promote and maintain good health and well-being of the elderly and this can be achieved by health care personnel in the community.

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Conflict of interest

No Conflict of Interest

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