

Original**Undernutrition in Older Adults Northern Thailand May Be Improved by Increasing Lipid Consumption**

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ABSTRACT Undernutrition is highly prevalent in older people. Understanding nutritional intake and dietary pattern of older people may help to design strategies to prevent malnutrition and improve dietary intake and nutrition status. However, there is lack of data on nutritional intake and dietary pattern of older people. Therefore, the purposes of present study was to determine the dietary intake and food pattern in older adults northern Thailand. The participants were interviewed using twenty four - hour dietary recall and assessed anthropometrically. Results showed that the mean age of the participants (n=50) was 59 ± 10 years, the prevalence of underweight was 18% in males and 9% in females. Estimated daily energy intake were accounting to 92% of the Thai recommended dietary allowances (RDA), mean lipid intake was 40% of the Thai RDA in males and 47.2 in females. Mean carbohydrates and protein intake were adequate, mean sodium intake was 151% of the Thai RDA in males and 152 in females. The food components largely consisted of vegetables, herbs, seasonings, with less meat and oils. In conclusion, the northern Thai older adults had inadequate energy and lipid consumption. Further studies may be suggested to promote the consumption of lipids by using vegetable oils for cooking dishes, if the older people do not have dyslipidemia.

Keywords: Undernutrition, older adults, northern Thailand, lipid consumption

INTRODUCTION

The aging population is increasing rapidly worldwide. In Thailand, there were approximately 11 million older adults (16.7%) aged 60 years and older in 2019, and this number is expected to increase 5 percent every year (1).

Malnutrition referred to as undernutrition is common in older people. The estimated proportion of older adults who are at risk of malnutrition is about 27% in community/outpatients and 50% in other healthcare settings (2). Causes of malnutrition in the elderly are related to several factors, including inadequate intake, due to deterioration of the senses of smell and taste, and decline in gastric emptying associated with satiation (3). Malnutrition is associated with frailty, sarcopenia, and decreased immunocompetence and leads to an increased rate of mobility and mortality (4).

In Phayao Province in the northern part of Thailand, the older adult proportion has increased from 15.3 percent in 2012 to 20 percent in 2017 (5). Most older adults in Phayao work in the agricultural field. Currently, there are limited data on nutrition intake in this population in northern Thailand. Understanding the nutritional intake and dietary pattern of older people may help to design strategies to prevent or improve dietary intake and nutrition status.

The purposes of present study was to determine the nutritional intake and dietary pattern in older adults who live in Chiang Kham district, Phayao Province, Thailand.

METHODS

This study was conducted with a cross-sectional study. The older adults (≥ 55 years old) who live in Chiang Kham district, Phayao Province, Thailand and having no dementia were enrolled in the study.

The participants were interviewed using twenty - four hour dietary recall and assessed anthropometrically. Trained interviewers determined participants' dietary intake; they were requested to describe precisely the foods and beverages consumed during the 24 hours prior to the interview. All data were calculated for energy and nutrient intake (carbohydrate, protein, lipids, dietary fibre and sodium) by the INMUCAL-N software version 3, Institute of Nutrition, Mahidol University, Thailand.

Height was measured using a portable, free-standing stadiometer, body weight and percent body fat were measured about 2 hours or more after breakfast, using Omron Karada scan (model HBF-375, Japan). The body mass index (BMI) calculation is the weight in kilograms, divided by the height in meters squared (kg/m²) and categorized into 4 groups according WHO cut off points: underweight: BMI <18.5 kg/m², normal: BMI 18.5-24.9 kg/m², overweight: BMI 25.0-29.5 kg/m² and obesity: BMI > 30 kg/m².

Ethical Considerations

This study was reviewed and approved by the Committee on Human Rights Related to Human Experimentation, University of Phayao, Phayao, Thailand. Project number 2/039/59.

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Statistical Analysis

All procedures of data analysis were performed using Microsoft Excel Software 2013. Descriptive statistics such as mean, standard deviation and percentage was used to quantify the characteristics of the participants, dietary intakes and compared with the Thai Recommended Dietary Allowance (RDA).

RESULTS

From our study, we found the mean age of the participants (n=50) was 59 ± 10 years. Their characteristics are shown in Table 1. Prevalence of underweight, normal, overweight and obesity of the males and females in this study are shown in Figure 1. Data on dietary intake could be obtained from 43 participants who were fully interviewed for dietary

recall. Energy and nutrient intake of the participants and Thai RDA are shown in Table 2. Comparison of energy and nutrient intakes with Thai RDA is shown in Figure 2.

The food components largely consisted of vegetables, herbs, seasonings, with less meat and oils. Common animal protein sources included chicken, fish such as Nile Tilapia (*Oreochromis niloticus*), snakehead fish (*Channa striatus*) and salt mackerel, pork belly, pork ribs, eggs and frog. Cooking oils included palm oil, soy bean oil, and lard. General seasonings used included salt, shrimp paste (Kapi), monosodium glutamate (MSG), fish sauce (Nampla), pickled fish (Plara), crab paste (Nampu) and soy sauce. A sample of daily foods (1 day) is shown in Figure 3.

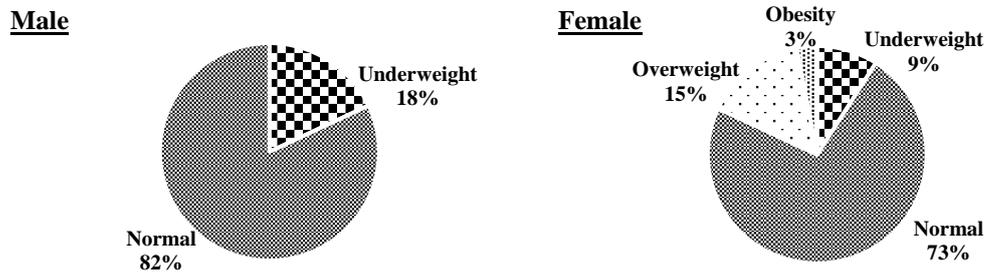


Figure 1. Prevalence of underweight, normal, and overweight in the males (n=17) and females (n=33)

Table 1. Characteristics of the participants (n=50)

Characteristics	Male	Female
Number (%)	17 (34)	33 (66)
Height (cm)	163.2 ± 6.7	151.6 ± 6.0
Weight (kg)	59.7 ± 12.8	52.9 ± 7.6
Body Mass Index (kg/m ²)	21.6 ± 2.58	23.06 ± 3.0
% Body fat	23.5 ± 3.9	32.4 ± 5.8

Data are mean ± SD

Table 2. Energy and nutrient intake of the participants and Thai RDAs (6) (n=43)

	Daily intake		RDA ^a	
	Male (n=15)	Female (n=28)	Male	Female
Dietary energy (kcal)	1,643 ± 387(91.8)	1,437 ± 440 (92.1)	1,790	1,560
Carbohydrate (g)	304 ± 98 (112.6)	246 ± 86 (102.5)	270	240
Protein (g)	53 ± 18 (89.8)	54 ± 27 (108)	59	50
Fat (g)	24 ± 16 (40.0)	25 ± 15 (47.2)	60	53
Dietary fibre (g)	6 ± 2 (24)	7 ± 4 (28)		25
Sodium (mg)	3,020 ± 1,481 (151)	3,035 ± 1,503 (152)		2,000
%Distribution of P:F:C ^b	74:13:13	69:15:16	45-65:10-15:20-35	

Data are mean ± SD; the number in blanket is %RDA; ^a Thai RDAs: Thai recommended dietary allowances, estimated energy requirement for Thai adult age 61 – 70 years (light activity). Distribution of energy: carbohydrate 45 – 65%, lipids 20-35% and protein is 1 kg/day (or 10-15%); ^b P: F: C is protein, fat and carbohydrates.

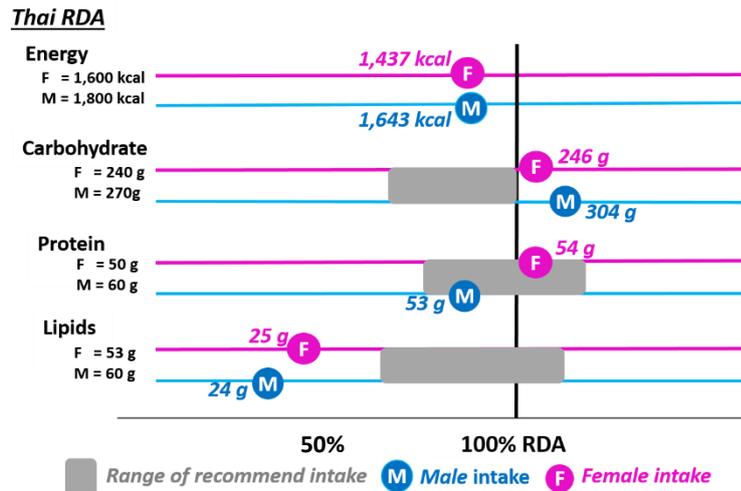


Figure 2. Comparison of energy and nutrient intakes with Thai RDAs



Figure 3. Examples of daily foods (1day)

DISCUSSION AND CONCLUSION

This study showed that older adults had lower energy, lipids and fibre intake than the Thai RDA. The percentage of carbohydrate, protein and fat to total calorie intake per day was 74:13:13 in males and 69:15:16 in females, respectively. This pattern seems to be similar to a previous study that determined dietary intake by 3-day dietary records in for Thai elderly in Bangkok (n=32) (7).

There are many studies demonstrating a decline in food intake with aging (8). A poor appetite is shown to be an important determinant of poor dietary intake in older adults and of incidence of undernutrition. Older persons often have a poor appetite due to various reasons including chewing problems, olfactory losses and poorer health. About one-fifth of the males and one-tenth of the females were found to be underweight, as determined by BMI less than 18.5 kg/m². This was two times as high as underweight in the survey of the Thai National Health Examination, NHES V 2014 that is shown in Figure 4. Undernutrition may start in the young old (age 60 – 69 years old) and increase at advanced ages. However,

the dietary patterns of older people may not change much compared to those of adulthood. Therefore, in order to have appropriate nutritional status in the later stages of life, healthy eating behaviors should be promoted at a young age.

The northern indigenous foods generally used little oil in cooking. Cooking with less oil may be appropriate for individuals who are overweight/ obese, but some older people take in too few calories and are also underweight; low fat/oil choices may make it difficult for them to consume enough food to maintain a positive energy balance (9). Adequate energy intake is necessary for optimizing protein utilization and allows the body to utilize protein for non – energy yielding functions such as the maintenance of lean body mass (10).

In addition, we found carbohydrates were the main energy source (72% of total calories). Related to the data of the Thai National Health Examination Survey IV, of adults aged 30 - 59, reported that a carbohydrate-rich dietary pattern was popular in northern region of Thailand and rural areas (11).

BMI (kg/m ²)	60 - 69 years		70 - 79 years		80+ years	
	Male n=1,894	Female n=2,447	Male n=985	Female n=1,250	Male n=337	Female n=370
< 18.5	9.4	4.3	14.0	10.0	23.9	23.6
18.5 - 24.9	59.7	45.1	61.9	51.6	64.8	54.8
25 - 29.9	25.7	38.9	21.2	31.2	10.1	17.7
≥ 30	8.0	11.8	2.9	7.2	1.2	3.9

Adapted data from Thai National Health Examination Survey, NHES V

Figure 4. Percentage of Thai older adults according to BMI in 2014

In conclusion, the northern Thai older adults had inadequate energy and oils consumption. Although the amount of protein intake was sufficient, it may be necessary to consider whether the quality of the protein is good enough. Further studies may be suggested to promote the consumption of lipids by using vegetable oils for cooking dishes such as stir fried vegetables or rice and coconut milk in curry dishes, if the older people do not have dyslipidemia. And to increase high biological value proteins, soy bean milk may be recommended.

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REFERENCES

- 1) Department of Older Persons. Statistics, Number Separated by Province, and Age: 2018. Bangkok, Thailand: Ministry of Social Development and Human Security. Available from:<http://www.dop.go.th/th/know/side/1/1/275>. Accessed July 28, 2020.
- 2) Cereda E., Pedrolli C., Klersy C., Bonardi C., Quarleri L., Cappello S., Turri A., Rondanelli M., Caccialanza R. Nutritional status in older persons according to healthcare setting: A systematic review and meta-analysis of prevalence data using MNA. *Clin. Nutr.* 2016, 35, 1282–1290.
- 3) Nagaratnam N. Malnutrition and Malabsorption in the Elderly. *Advanced Age Geriatric Care*. Springer, Cham, 2019. 225-233.

- 4) Nieuwenhuizen WF, Weenen H, Rigby P, Hetherington MM. Older adults and patients in need of nutritional support: review of current treatment options and factors influencing nutritional intake. *Clin Nutr.* 2010; 29(2):160-169. doi:10.1016/j.clnu.2009.09.003
- 5) Phayao Provincial Statistical Office. Central data set of adult age 60 year and over. 2017. Phayao, Thailand. Available from:http://phayao.nso.go.th/index.php?option=com_content&view=article&id=382:2019-09-05-07-17-40&catid=84&Itemid=558. Accessed July 28, 2020.
- 6) Bureau of Nutrition, Department of Health, Ministry of Public Health. Dietary reference intake for Thais 2020. Bangkok.
- 7) Pongpaew P, Tungtrongchitr R, Phonrat B, et al. Activity, dietary intake, and anthropometry of an informal social group of Thai elderly in Bangkok. *Arch Gerontol Geriatr.* 2000 Jun; 30(3):245-260. DOI: 10.1016/s0167-4943(00)00051-0.
- 8) Morley JE. Decreased food intake with aging. *J Gerontol A Biol Sci Med Sci.* 2001; 56 Spec No 2:81-88. doi:10.1093/Gerona/56.suppl_2.81
- 9) Rolls BJ. Do chemosensory changes influence food intake in the elderly?. *Physiol Behav.* 1999;66(2):193-197. doi:10.1016/s0031-9384(98)00264-9.
- 10) Pasiakos SM, Margolis LM, McClung JP, et al. Whole-body protein turnover response to short-term high-protein diets during weight loss: a randomized controlled trial. *Int J Obes (Lond).* 2014;38(7):1015-1018. doi:10.1038/ijo.2013.197
- 11) Aekplakorn W, Satheannoppakao W, Putwatana P, Taneepanichskul S, Kessomboon P, Chongsuvivatwong V, Chariyalertsak S. Dietary pattern and metabolic syndrome in Thai adults. *J Nutr Metab.* 2015; 2015:468759. doi:10.1155/2015/468759