RESEARCH ARTICLE

Nutritional Status among Rural Community Elderly in the Risk Area of Liver Fluke, Surin Province, Thailand

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Abstract

Thailand is becoming an aging society, this presenting as a serious problem situation especially regarding health. Chronic diseases found frequently in the elderly may be related to dietary intake and life style. Surin province has been reported as a risk area for liver fluke with a high incidence of cholangiocarcinma especially in the elderly. Therefore, this study aimed to determine the nutritional status and associated factors among elderly in Surin province, northeast of Thailand. A community-based cross-sectional study was conducted among 405 people aged 60 years and above, between September 2012 and July 2014. The participants were selected through a randomized systematic sampling method and completed a pre-designed questionnaire with general information, food recorded, weight, height, waist circumference, and behavior regarding to food consume related to liver fluke infection. The data were analyzed using descriptive statistics and Spearman's rank correlation coefficients. The majority of participants was female (63.5%), age between 60-70 years old (75.6%), with elementary school education (96.6%), living with their (78.9%), and having underlying diseases (38.3%). Carbohydrate (95.3%) was need to improve the consumption. The participants demonstrated under-nutrition (24.4%), over-nutrition (16.4%), and obesity (15.4%). Elderly had a waist circumference as the higher than normal level (34.0%). Gender, female, age 71-80 years old, elementary school and underlying diseases were significantly associated with poor nutritional status. The majority of them had a high knowledge (43.0%), moderate attitude (44.4%), and moderate practice (46.2%) regarding food consumption related to liver fluke infection. In conclusion, these findings data indicated that elderly age group often have an under- or over-nutritional status. Carbohydrate consumption needs to be improved. Some elderly show behavior regarding food consumption that is related to liver fluke infection hat needs to be improved, so that health education pertaining good nutrition is required.

Keywords: Nutritional status - elderly - liver fluke - Surin province - Thailand

Introduction

Thailand is increasing the number older age and becoming the elderly society in which many problems has been reported. Thailand has been reported that the 65,400,000 populations in 2012 (National Statistical Office, Ministry of Information and Communication Technology, Thailand, 2012). Meanwhile, Thai elderly was prospected regarding the increasing number by the United Nation between 1990 to 2040 and found that the increasing number of populations were 185.1%, 326%, 526.3%, 696.6%, and 769.8% in 1990, 2000, 2010, 2020, and 2040 (Nation United, 1999). Health problems in elderly are mostly related to their previous nutrition status such as malnutrition, cholesterol, hypertension, diabetes,

obesity, myocardial infarction, gout, obesity, anemia, diabetes, and cancer (Mioche et al., 2004; Lennie et al., 2006; Mahon et al., 2007; Esser et al., 2014; McCartney et al., 2015).

Since then Surin province of Thailand, has been reported that are the epidemic areas of liver fluke and the high incident of cholangiocarcinoma; bile duct cancer that related to liver fluke infection (Kaewpitoon et al., 2008a; Kaewpitoon et al., 2008b; Sripa and Pairojkul, 2008; Sithithaworn et al., 2012). We previously reported that the *Opisthorchis viverrini* infection in elderly was found 9.91%, and followed by *Strongyloides stercoralis* (4.80%) and hookworm (1.50%), respectively (Kaewpitoon et al., 2012). In addition, *O. viverrini* infection was a cross-sectional survey in the rural communities of Surin

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province, during September 2013 to July 2014, and found that *O. viverrini* infection was 6.47%, the high frequently was found in the age group 61-70 (19.40%) and 71-80 year old (19.35%), respectively (Kaewpitoon et al., unpublished). Nutrition status and behavior are need required to concerned, especially in the risk areas of liver fluke infection. Therefore, this study aims to determine the nutritional status, behavior, and associated factors among elderly in Surin province, northeast of Thailand. These findings data may able useful for further planning of the health education campaign pertaining good nutrition in the risk group.

Materials and Methods

A community-based cross-sectional study was conducted among 405 elders aged 60 years old and above, between September 2012 and July 2014 in Surin province where is located in the northeastern region of Thailand. A total area about 8,124 kilometer2, approximately 450 kilometers away from Bangkok city (the capital of Thailand) by cars and 420 kilometers by train. The province is subdivided into 17 districts; Mueang Surin, Chumphon Buri, Tha Tum, Chom Phra, Prasat, Kap Choeng, Rattanaburi, Sanom, Sikhoraphum, Sangkha, Lamduan, Samrong Thap, Buachet, Phanom Dong Rak, Si Narong, Khwao Sinarin, and Non Narai district. All participants were randomized selected through systematic sampling method. Necessary permission from the concerned authorities was taken and a survey was conducted using pre-designed questionnaires. Prior informed consent was taken. For those not available in the first interview another visit was made to minimize nonresponse. All of participants was completed the pre-designed questionnaire with the general information, food recorded, and knowledge, attitude, and practice regarding to food consume related to liver fluke infection. Reliability and validity of questionnaire was analyzed, knowledge (Kruder-Richardon-20) = 0.89, attitude and practice (coefficient of Cronbach's alpha) = 0.80 and 0.78, respectively. Weight and height were computed and assessed for body mass index (BMI) following World Health Organization (WHO) reassesses appropriate body–mass index for Asia Population (Choo 2002). Briefly, BMI was classified to under-nutrition; <18.50 kg/m², normal; 18.50-24.99 kg/m², over-nutrition; >24.99 kg/m², and obesity; >29 kg/m². Waist circumference was computed and assessed by using the interpretation of anthropometry following WHO assessment (1995). Waist circumference was classified to normal and higher than normal level, (male; normal level ≤94 higher than normal level >94

cm, female; normal level ≤80 higher than normal level > 80 cm). Evaluation of knowledge, attitude, and practice level regarding to food consume related to liver fluke infection, was calculated and analyzed according to Bloom et al. (1971), answer correct=1, incorrect=0, and interpreted to high level; 19-21 point, fair level; 13-18 point, 0-12; low level. Evaluation of attitude and practice level were calculated and analyzed according to Best et al (1997), attitude with 3 choices (agree, moderate, disagree): positive question=3,2,1, negative question=1,2,3 and interpreted to good level; 2.67-3.00 point, moderate level; 1.33-2.66 point, 1.00-1.32 point; poor level. Practice with 3 choices (regular, irregular, and never): positive question=3,2,1, negative question=1,2,3 and interpreted to good level; 2.67-3.00 point, moderate level; 1.33-2.66 point, 1.00-1.32 point; poor level. Descriptive statistical and Spearman's rank correlation coefficients were analyzed with SPSS software. The protocol was approved by the ethical review committee of Suranaree University of Technology, 2012.

Results

The majority of participants was female (63.46%), age between 60-70 years old (75.56%), elementary school (96.6%), lives with thire child (78.86%), and had an

Table 1. Baseline characteristics of elderly in Surin province, Thailand

Characteristics	Number (n=405)	%
Gender		
Female	257	63.46
Male	148	36.54
Age		
60-70 years old	306	75.56
71-80 years old	81	20
80-90 years old	2	0.49
Not identified	16	3.95
Education		
Elementary school	375	96.6
Junior high school	14	2.09
Senior High school	9	0.79
Undergraduate	7	0.52
Caregiver		
Child	303	78.86
Relative	32	5.42
Others	70	15.72
Underlying disease		
Yes	155	38.27
No	250	61.73

Table 2. Food Consumption of Ederly in Surin Province, Thailand, by Food Group

Food group	Need to improve		Inappropriate		Appropriate	
	No.	%	No.	%	No.	%
Protein	10	2.47	98	24.20	297	73.33
Carbohydrate	386	95.31	11	2.72	8	1.98
Vitamin and mineral	15	3.70	91	22.47	299	73.83
Fat	73	18.02	163	40.25	169	41.73

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Table 3. Nutritional Status of Elderly in Surin Province, Thailand, by Waist Circumference and Body Mass Index

Characteristics	Number (n=405)	%
Waist Circumference		
Normal level	267	65.96
Higher than normal level	138	34.04
Body Mass Index (BMI)		
Under-nutrition (BMI <18.50 kg/m²)	99	24.43
Normal (BMI 18.50-24.99 kg/m²)	178	43.83
Over-nutrition (BMI >24.99 kg/m²)	66	16.37
Obesity (BMI >29 kg/m²)	62	15.37

underlying disease (38.27%) mainly diabetes mellitus, cardiovascular disease, hypertension, and anemia (Table 1). Food consumption of elderly was analyzed and found that food group of vitamine and mineral (73.83%), protein (73.33%) were appropriated consumed, while carbohydrate consumption was need to improve in this group (Table 2). Nutritional status of elderly was calculated by waist circumference and body mass index and found that The majority of participants had a normal nurtrition level (43.83%), followed by under-nurtition (24.43%), and over-nutrition (16.37%), respectively (Table 3). While, obesity was found 15.37% in this group. Elderly had a

Table 4. Factor Associated with Nutritional Status of Elderly in Surin province, Thailand, by Body Mass Index

Characteristics	Number (n=405)	%	Normal nutrition	%	Under nutrition	%	Over nutrition	%	Obesity	%	rs	P
Gender												
Female	257	63.46	98	24.2	66	16.3	41	10.12	52**	12.84	0.21	0.01
Male	148	36.54	80	19.75	33	8.15	25	6.18	10	2.47		
Age												
60-70 years old	306	75.56	134	33.09	64	15.8	56	13.83	52	12.84		
71-80 years old	81	20	24	5.93	38**	9.38	12	2.96	7	1.73	0.25	0.01
80-90 years old	2	0.49	1	0.25	1	0.25		0	0	0		
Not identified	16	3.95	15	3.7	1	0.25	0	0	0	0		
Education												
Elementary school	375	96.6	164	40.49	97*	23.95	59	14.57	55	13.58	0.16	0.05
Junior high school	14	2.09	8	1.98	2	0.49	2	0.49	2	0.49		
High school	9	0.79	7	1.73	0	0	1	0.25	1	0.25		
Undergraduate	7	0.52	6	1.48	1	0.25	0	0	0	0		
Underlying disease												
Yes	155	38.27	75	18.52	41	10.12	27*	6.67	12*	2.96	0.11	0.05
No	250	61.73	150	37.04	60	14.81	34	8.4	6	1.48		
Caregiver											0.11	0.29
Child	303	78.86	143	35.31	60	14.81	52	12.84	48	11.85		
Relative	32	5.42	7	1.73	16	3.95	6	1.48	3	0.74		
Others	70	15.72	28	6.91	25	6.17	7	1.73	10	2.47		

Table 5. Factor Associated with Nutritional Status of Elderly in Surin Province, Thailand, by Weist Circumference

Characteristics	Number (n=405)	%	Normal level	%	Higher than normal level	%	rs	P-value
Gender								
Female	257	63.46	143	55.64	114**	44.36	0.33	0.01
Male	148	36.54	124	44.36	24	16.22		
Age								
60-70 years old	306	75.56	201	49.63	105*	25.93	0.03	0.05
71-80 years old	81	20	49	12.1	32	7.9		
80-90 years old	2	0.49	1	0.25	1	0.25		
Not identified	16	3.95	16	3.94	0	0		
Education								
Elementary school	375	96.6	246	60.75	129*	31.85	0.08	0.05
Junior high school	14	2.09	9	2.22	5	1.23		
High school	9	0.79	6	1.48	3	0.74		
Undergraduate	7	0.52	6	1.48	1	0.25		
Underlying disease								
Yes	155	38.27	88	21.73	67	16.55		
No	250	61.73	180	44.44	70**	17.28	0.16	0.01
Caregiver								
Child	303	78.86	202	49.88	24.94	14.81	0.05	0.66
Relative	32	5.42	22	5.43	2.47	3.95		
Others	70	15.72	42	10.37	29	6.42		

Table 6. Knowledge and Attitude of 405 Elderly, Surin Province, Thailand, Regarding to Food Consumed Related to Liver Fluke Infection

Behaviors	No. of participants (n=405)	%
Knowledge		
High	174	42.96
Fair	179	44.2
Low	52	12.84
Attitude		
Good	158	39.01
Moderate	180	44.44
Poor	67	16.54
Practice		
Good	175	43.21
Moderate	187	46.17
Poor	43	10.62

waist circumference as a normal level (65.96%), followed by the higher than normal level (34.04%) (Table 3). The relationship between domgraphic data and nutritional status was analyzed and found that gender, age group, edutcation, and underlying diseases were significant associated to nutritional status in which classified by body mass index. Gender, female and male were statistical significant associated to the over-nutritional status (rs=0.21, p-value=0.01). Age groups, 71-80 years old was statistical siginificant associated to under-nutritional status (rs=0.25, p-value=0.01). Education, elelmentary school was statistical siginificant associated to under-nutritional status (rs=0.16, p-value=0.05). Underlying diseases were statistical siginificant associated to over-nutritional status and obesity (rs=0.11, p-value=0.05). While, caregivers were not statistical siginificant associated to nutrition (Table 4). The relationship between domgraphic data and nutritional status was analyzed and found that gender, age group, edutcation, and underlying diseases were significant associated to nutrition nutritional status in which classified by weist circumference. Female (rs=0.33, p-value=0.01), age 60-70 years old, (rs=0.03, p-value=0.05), elelmentary school (rs=0.08, p-value=0.05), underlying diseases (rs=0.16, p-value=0.01) were statistical siginificant associated to nutrition (Table 5). The elderly behavior regarding to food consume that were related to liver fluke infection was analyzed and found that the majority of them had a high knowledge (42.96%), moderately attitude (44.44%), and moderately practice (46.17%) (Table 6).

Discussion

Surin province is located in the northeastern Thailand where has been reported the mortality rate of liver cancer and cholangiocarcinoma in 2004 was 30.14-44.31 per 100,000 population (Sripa and Pairojkul, 2008). Cholangiocarcinoma is the bile duct cancer that related to liver fluke infection (Kaewpitoon et al., 2008a; Sripa and Pairojkul, 2008). *O. viverrini* infection in Surin province has been reported in 2012, and indicates that its a serious problem in the elderly group. Moreover, *S. stercolaris*

and hookworm, was found frequently in this province (Kaewpitoon et al., 2012). Recent study found that the most of elderly had a normal nutrition level, however, moore than half of elderly age were the under-nurtition, over-nutrition and obesity. Morover, 34.04% of elderly had a waist circumference as the higher than normal level. In addition, elderly had an underlying disease mainly diabetes melletus, cardiovascular disease, hypertention, anemia. Basicly, anemia indicates the malnutritonal status of human. Previously studies have been reported that S. stercolaris and hookworm were the one caused of anemia in rural child and elderly. Anaemia was independently associated with infections including heavy hookworm infection (OR 3.45, 1.73-6.91) in a rural Ugandan population (Mugisha et al., 2013). In addition, a meta-analysis show that soil-transmitted intestinal helminth co-infection mainly S. stercolaris and hookworm, effect on anemia (Naing et al., 2013). Association of body mass index and mortality in Japanese diabetic men and women based on self-reports has been reported and found that mortality from cardiovascular disease, cancer, and renal disease showed L-shaped associations with body mass index. Compared to diabetics with body mass index of 20.0-22.9 kg/m^2, those with body mass index of 23.0-24.9 kg/m^2 and ≥25.0 kg/m^2 had lower risks of mortality from infectious disease (Kubota et al., 2015). These figures may concern for infectious disease prevention and control in Thai elderly age who had an underlying disease with diabetic myelitis, cardiovascular disease, cancer, and renal disease.

Meanwhile, diabetes melletus, cardiovascular disease, hypertension are found frequently in human who are over-weight or obesity. An android pattern of obesity is associated with a more deleterious plasma lipoprotein profile as well as hypertension and insulin resistance, resulting in an even greater increase in cardiovascular disease risk. Weight loss through caloric restriction improves the plasma lipoprotein profile (Hecker et al 1999). The most frequent risk factors to ischemic heart disease appear to be low physical activity, excess cigarette consumption, and body overweight (Geizerova et al., 1975). Food consumption of elderly was appropriated regarding vitamine, mineral, and protein, however, carbohydrate consumption was inappropriated consume and need to improve in this group. The relationship between the parameters of metabolic control and quality of carbohydrates of the diet in individuals with type 2 diabetes has been reported. The study showed that the quality of carbohydrates were strongly associated with metabolic control of type 2 diabetes (Pincheira et al., 2014). In addition, plasma glucose, insulin, and ghrelin responses were least favorable when patients with type 2 diabetes consumed a breakfast with a high glycemic index and low fiber, which suggests that reducing the glycemic index or increasing the fiber content or both of breakfasts may be a useful strategy to improve the postprandial metabolic profile of these patients (Silva et al., 2015).

Domgraphic data; gender, age group (60-70 and 71-80 years old), edutcation (elelmentary school level), and underlying diseases were significant associated to poor nutritional status in which classified by body mass

index and weist circumference. These results are similar to previous study, the elderly' studying and nutritional behavior are the most important factors associated with poor nutrition among elderly residents of Nursing Homes in Tehran, Iran (Nazemi et al., 2015). In Taiwan, older in rural areas are need required concerned because they had significantly lower educational level, less adequate income, higher medication use, and lower self-rated healthy eating status. Moreover, rural participants had significantly lower nutritional self-efficacy, higher chance health locus of control and poorer nutritional status (Chen et al 2015). Malnutrition was significantly more frequent in elderly subjects aged more than 85 years, in females, widowed and illiterate people. Regarding health status, poor nutritional status was more common among those reporting more than three chronic diseases, taking more than three drugs daily, suffering from chronic pain and those who had worse oral health status. These results highlighted the close relationship between health status and malnutrition. The identification of potential predictive factors may allow better prevention and management of malnutrition in elderly people (Boulos et al., 2014). Socio-economic determinants of micronutrient intake and status in Europe have been reported that there is a positive association between indicators of socio-economic status and micronutrient intake and/or status (Novaković et al 2014). Meanwhile, the elderly behavior regarding to food consumed that were related to liver fluke infection was found that the majority of them had a high knowledge, moderately attitude, and moderately practice, however, many of them is found the risk factor to liver fluke infection in this group. Previous study indicates that knowledge, attitude and practice related to liver fluke infection in northeastern Thailand (Kaewpitoon et al., 2007). Rujirakul et al., (2015) has been reported that rural community people' attitude associated to liver fluke infection in Surin province. Therefore, health education pertaining good cook before consumption is need required in this risk group.

These findings data indicated that elderly age group had under-and over-nutritional status. Carbohydrate consumption was needed to improve. Meanwhile, behavior of some elderly group regarding to food consumed that related to liver fluke infection is poor, therefore, health education pertaining good nutrition is need required.

Acknowledgements

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