Original Article

Hepatitis in Thai Buddhist Monks in Urban Community

Sethasine S, MD[1], Kamsom A, MSc[2], Rojtangkom K, MPH[3]

[1] Division of Gastroenterology, Department of Medicine, Faculty of Medicine Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand
[2] Research Facilitation Division, Faculty of Medicine Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand
[3] Community Health Unit, Faculty of Medicine Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand

Objective: To evaluate the prevalence and predictive factors of non-alcoholic steatohepatitis (NASH) of the monks living in Bangkok particularly in Dusit and Nong Chok districts.

Materials and Methods: Medical illness was assessed by self-administered questionnaire, physical examination and biochemical blood test. The study was conducted from March 2017 to November 2017. Non-alcoholic steatohepatitis and was defined when there was abnormal transaminase, neither serology positive for viral hepatitis nor significant alcoholic consumption. The predictive factors of NASH were also determined.

Results: Among 190 monks who were included in the present study, 55 (28.9%) had hepatitis diagnosed from either an elevated AST and/or ALT level. The prevalence of hepatitis was significantly higher among the monks in Dusit compared to those in Nong Chok (43.2 vs. 14.7%; $p<0.001$). Comparing to normal individuals, the monks affected by NASH had significantly higher mean values of body mass index (27.9±5.3 vs. 24.5±4.9 kg/m^2, $p<0.001$), waist circumference (87.5±11.7 vs. 81.9±14.6 cm, $p<0.028$), body weight (77.9±18.2 vs. 67.4±16.8 kg, $p<0.001$) and uric acid (6.7±1.23 vs. 5.9±1.24, $p = 0.001$), respectively. The mean BMI >25 kg/m^2 was the only factor that increased the risk of NASH with the adjusted odds ratio of 2.84 (95% CI = 1.27 to 6.38; $p = 0.011$).

Conclusion: Approximately one-fourth of the Buddhist urban Thai monks had NASH. The significant independent predictive factor was obesity (BMI >25 kg/m^2). Lifestyle modification including having healthy diet and increasing physical activity, especially to reduce weight should be emphasized.

Keywords: Non-alcoholic steatohepatitis (NASH), Transaminase, Urban, Monk

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Monk is a distinct group of people who have different ways of living from general population. With their unique pattern of life, the monk may have limitations in obtaining and maintaining optimal healthcare because of their specific regulations and daily activities including food consumption.

Generally, the monks consume food offered by laymen. These foods are sometimes considered as unhealthy because they are mostly starch or high calories diet, such as, brisket, fried food, and sweet beverages. Aside from the food, unique daily activity of the monks involves sedentary or less physical activity and exercise than ordinary individuals contributing further to the unhealthy condition.

One report from a health screening program in 2016 among 5,989 monks and novices in Bangkok found that 15.9% of the monks were overweight (BMI 23 to 24.9 kg/m^2) and 41.6% were obese (BMI ≥25 kg/m^2)[1]. Moreover, 24.9% had waist circumference ≥90 cm. Previous study revealed higher prevalence of obesity in monks than that in the general population[2]. Another study also reported obesity was more common in male of urban than rural areas: 36.4% compared to 29.3%[3]. Aside from obesity, data from the Priest Hospital showed that other non-communicable diseases of dyslipidemia, hypertension, and diabetes as the 3 most common problems among the monks who sought for medical treatment in the hospital[4]. These diseases can consequently lead to non-alcoholic fatty liver disease (NAFLD) including hepatitis, liver fibrosis, and cirrhosis[5].

In realizing the need for health improvement, the 2017 Health Charter for Buddhist Monks was enacted as the framework and guidelines for monks' health promotion involving the awareness of the community and society on the care of monks. This consists of 4 basic needs to maintain or optimize the monks' health: a discipline of self-care by the monks themselves, general health surveillance, screening for health risks, and health promotion support for the monks by the government sectors.

In order to provide appropriate health care to the monks, basic health information of the monks in each specific area e.g. urban or rural settings are needed. This study focused on the prevalence of non-alcoholic steatohepatitis (NASH) and its predictive factors among the monks living in Bangkok which is the capital and urban area of the country.

Correspondence to:

Sethasine S.

Division of Gastroenterology and Hepatology, Department of Medicine, Faculty of Medicine, Navamindradhiraj University, Bangkok 10300, Thailand.

Phone: +66-2-2443480

E-mail: supatsri9@hotmail.com, supatsri@nmu.ac.th

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Materials and Methods

This cross sectional study was part of a large institutional project of health survey of the monks in urban temples. The study was conducted from March 2017 until November 2017. Approximately total number of 250 monks living in temples in Bangkok was planned. The temples in Dusit and Nong Chok districts were arbitrarily selected. Dusit and Nong Chok districts are 2 major districts in Bangkok Metropolitan with overall 27 temples in the areas. An approval from the Ethics Committees for Human Research of the institution was obtained. Inclusion criteria were Thai monks aged 20 years old and above, having minimum of 1 year in the monkhood, being literate in Thai and voluntary to participate. Exclusion criteria were the monks who were not present in the temple on the day of survey.

A self-administered questionnaire was used to collect data before physical examination and blood test.

The survey comprised of 3 parts: 1) questions about demographic data and history of health conditions, 2) general physical examination included weight, height, waist circumference, vital signs including blood pressure assessment, and examination of skin and eye, and 3) basic laboratory tests. Consumption behavior questions included the regular type of food, decision on consuming or not consuming something, how to eat, and number of meals. Waist circumference measured with a tape measure between the 12th rib and the upper edge of the front hip bone in a standing position with normal breathing. Laboratory tests included complete blood count and blood chemistry of fasting plasma glucose (FPG), lipid profiles including, liver and renal function tests, and uric acid. Liver function test included aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP). Other relevant tests to assess liver diseases were anti-HCV, HBs Ag, and anti-HBs. Details of the research conduct were described in the main report[6].

The main outcomes of interest were the prevalence of NASH and their predictive factors. The NASH was diagnosed when there was transaminase enzyme (either the AST or ALT) elevation without history of significant alcohol consumption for at least 6 months and after the exclusion of chronic viral hepatitis. The factors studied were age, body weight, waist circumference, body mass index (BMI), blood pressure, FPG, lipids profile, and uric acid level. In studying the association with NASH, some of these factors were bundled up as metabolic syndrome.

Metabolic syndrome (MS) in this study was defined by either the International Diabetes Federation (IDF) or the American Heart Association (AHA). Criteria by the IDF included central obesity (abdominal obesity; waist circumference was >90 cm) plus any 2 of the following 4 factors: triglyceride ≥150 mg/dl, high-density cholesterol (HDL) <40 mg/dl, systolic blood pressure (SBP) ≥130 mmHg or diastolic pressure (DBP) ≥85 mmHg or those who had received treatment of previously diagnosed hypertension, FPG >100 mg/dl. or those who had previously diagnosed type 2 diabetes. On the other hand, criteria by the AHA were any 3 of the 5 factors of waist circumference ≥102 cm triglyceride ≥150 mg/dl, HDL <40 mg/dl, SBP ≥130 mmHg or DBP ≥85 mmHg.

Data analysis was performed using the IBM SPSS software (IBM SPSS Statistics for Windows, version 22.0. Armonk, NY, USA: IBM Corp). The participants' personal information and health condition were analyzed by calculating the number and percentage for categorical variables and mean and standard deviation for continuous variables. Baseline physical measurement and laboratory parameters were compared using Student's t-test for continuous variables while categorical variables were compared using a Chi-square test or Fisher's exact test. Continuous variables are presented as mean ± standard deviation (SD) while categorical variables are presented as percent and frequency over total available. Significance was established at a *p*-value of <0.05. Multiple logistic regression analysis was utilized to analyze the prediction power of the factors relating to NASH. Odds ratios are presented with 95% confidence intervals (CIs).

Results

Out of 224 monks who agreed to participate from 16 temples in Dusit and Nong Chok districts, 190 (84.8%) completed the questionnaire about liver disease and had blood test. The mean age was 44±18.6 years. Slightly over half (52.6%) aged over 40 years old and being in the monkhood for less than 5 years (57.9%). Liver disease was the fourth common illness after diabetes, hypertension and dyslipidemia found from the self-report questionnaire. Liver diseases which were reported from the 8 monks (4.3%) were chronic hepatitis in 6 (3.2%) and fatty liver in the other 2 (1.1%). General data and history of illness of the monks and findings from physical examination including body weight, waist circumference, and blood pressure are shown in Table 1. The mean body mass index (BMI) was 25.48±5.2 kg/m^2; 98 of the monks (52%) were obese (BMI ≥25 kg/m^2).

Focusing on liver function tests, 55 monks (28.9%) were found to have transaminitis defined by one or more of abnormal aminotransferase elevation. Among these 55 monks, 13 (23.6%) had elevated levels of both AST and ALT. Of note, 40 of them (72%) were obese. Data of aminotransferase were presented in relation to the upper normal limit (UNL) value. Most of the elevated ALT patients were 1 to 2 times higher than UNL. The prevalence of transaminitis was significantly higher in the monks of Dusit compared to those of Nong Chok districts (43.2% vs. 14.7%; p<0.001). The abnormal AST and ALT levels in Dusit and Nong Chok districts were: 15.8% vs. 9.5% and 38% vs. 11.6%, respectively (Table 2).

From the viral hepatitis serologic test, eight monks had abnormal findings: positive for hepatitis B surface antigen in five patients (2.6%) and chronic hepatitis C in the other three (1.6%). Four of the eight patients also had elevated aminotransferase enzyme. The researchers then presumed that the other 51 monks who had transaminitis without evidence of viral hepatitis had non-viral etiology. All of them had no history of alcohol consumption; hence, they were

Table 1. General information of the populations (n = 190)

Personal Information	n (%)
General data	
Age, (mean ± SD)	44±18.6
20 to 40 years	90 (47.4)
41 to 60 years	64 (33.7)
>60 years	36 (18.9)
Buddhist year (median±; range)	5 (2 to 15)
1 to 5 Buddhist year	110 (57.9)
>5 Buddhist year	80 (42.1)
History of illness	
Underlying disease	50 (26.3)
Diabetes	20 (10.5)
Hypertension	26 (13.7)
Dyslipidemias	17 (8.9)
Liver disease	8 (4.3)
Fatty liver disease	2 (1.1)
Chronic viral hepatitis B or C	6 (3.2)
Physical examination (mean ± SD)	
Body weight (kg)	70.5±17.7
BMI (kg/m^2)	25.48±5.2
Waist circumference (cm)	83.8±14
Systolic blood pressure (mmHg)	132.5±20
Diastolic blood pressure (mmHg)	80.7±13.6
Laboratory test (mean±SD)	
FPG (mg/dL)	106.5±51
Cholesterol (mg/dL)	209±49
HDL (mg/dL)	52.43±12.3
LDL (mg/dL)	143.8±41
Triglyceride (mg/dL)	163.8±138
Uric (mg/dL)	6.1±1.3

BMI = body mass index, FPG = fasting plasma glucose, HDL = high-density lipoprotein, LDL = low-density lipoprotein

diagnosed as having NASH. Of note, 38 of 51 monks (74.5%) who had NASH were obese.

The authors compared demographic features, findings from physical examination and laboratory investigation according to the presence of NASH (Table 3). Significantly higher abnormal values of the followings were found in the NASH group than the others: mean BMI (27.9±5.3 kg/m^2 vs. 24.5±4.9 kg/m^2; p<0.001); mean waist circumference (87.5±11.7 cm vs. 81.9±14.6 cm; p<0.028); mean body weight (77.9±18.2 kg vs. 67.4±16.8 kg; p<0.001), mean uric acid (6.7±1.2 mg/dl vs. 5.9±1.2 mg/dl; p = 0.001), and lower HDL (48.9±10.8 mg/dl vs. 53.6±12.6 mg/dl; p = 0.02) (Table 3).

The relationship of NASH and each component of metabolic syndrome were assessed. The monks who had NASH had higher frequency of abnormal findings than the other monks: BMI ≥25 kg/m^2 (74.5 vs. 43.7%; p<0.001), abdominal waist circumference ≥90 cm (33.3 vs. 15.6%; p = 0.007), and triglyceride ≥150 mg/dl (54.9 vs. 34.8%, p = 0.013), respectively. Although impaired FPG, SBP ≥130 mmHg, DBP ≥85 mmHg, and HDL <40 mg/dl were found more frequently in NASH than the other individuals, the differences were not statistically significant. Taken these features altogether into consideration, the monks with NASH had higher frequency of metabolic syndrome by both AHA criteria (45.1% vs. 21.5%; p = 0.001) and IDF criteria (25.5% vs. 12.6%; p = 0.033) than the other individuals (Table 3).

By univariate analyses which found that BMI ≥25 kg/m^2, abdominal obesity, triglyceride ≥150 mg/dl and both criteria of metabolic syndrome were significant factors to predict NASH, multiple logistic regression analysis was performed to assess independent factors (Table 4). Only BMI ≥25 kg/m^2 was the independent factor that increased the risk of NASH. The odds ratio was 2.65, 95% CI = 1.16 to 6.04 (p = 0.02) after adjusted for the metabolic syndrome by AHA criteria, BMI, waist circumference and triglyceride, and was 2.84, CI = 1.27 to 6.38; p = 0.011) adjusted for metabolic syndrome by IDF criteria, BMI, waist circumference and triglyceride.

Discussion

Previous studies reported varied prevalence of non-alcoholic fatty liver disease (NAFLD) in Asian population ranging from 2% to 35% depending on the obesity status, age interval and gender[5]. Most patients with NASH, which is a stage of liver inflammation in NAFLD, are generally asymptomatic and are incidentally found during a routine health check-up from biochemical test. The rising prevalence of these liver disorders is along with an increased prevalence of metabolic syndrome[5]. The present study showed the prevalence of hepatitis in 28.9% of urban monks, and most of them (92.7%) had non-viral etiology. Due to our inclusion criteria that the participating monk must be at least 1 year in the monkhood and the prohibition of alcoholic consumption of Thai Buddhist monks, the authors assumed that the most likely diagnosis of non-viral transaminitis was NASH.

Overweight/obesity is an important global health problem. The health survey in Thailand in 2014 found 37.5% prevalence of obesity (BMI >25 kg/m^2) among 20,000 general population[3]. The rate was found slightly higher in provincial areas and central district of the country than the other regions: 40.4% and 39.7%, respectively[3]. The high BMI, which ranged from being overweight to obese and morbid obesity, was strongly associated with several non-communicable disease and NAFLD. The Thai National Health Examination Survey showed a high prevalence of hypertension (31.1%), increased triglyceride (49.6%) and diabetes (11%) among obese individuals[7]. Hence, any means to reduce weight should be the primary objective to decrease these morbidities.

The present study showed that slightly more than half (52%) of the total number of urban monks or 74.5% among those who had NASH were obese. The corresponding percentages of truncal obesity were 21.1% of total and 34.5% among urban monks who had NASH which was higher than 29.3% reported among general male urban living population from the national health survey report[3]. Although the 40% prevalence of hyperlipidemia in the present study was similar to 42% of hyperlipidemia reported by Angkatavanich et al in 2018 wherein nearly half of the monks who live in urban area

Table 2. Prevalence of hepatitis of monks of urban areas

Variables	Total (n = 190)		Dusit district (n = 95)		Nong Chok district (n = 95)	
	n	%	n	%	n	%
Aspartate aminotransferase						
UNL*	166	87.4	80	84.2	86	90.5
1 to 2 times of UNL	22	11.6	15	15.8	7	7.4
>2 to 3 times of UNL	2	1.1	0	0	2	2.1
Alanine aminotransferase						
UNL	143	75.3	59	62.1	84	88.4
1 to 2 times of UNL	36	18.9	30	31.6	6	6.3
>2 to 3 times of UNL	7	3.7	3	3.2	4	4.2
>3 times of UNL	4	2.1	3	3.2	1	1.1
Alkaline phosphatase						
UNL	178	93.7	94	98.9	84	88.4
1 to 2 times of UNL	8	4.2	1	1.1	7	7.4
>2 to 3 times of UNL	4	2.1	0	0	4	4.2
Hepatitis**						
No	135	71.1	54	56.8	81	85.3
Yes	55	28.9	41	43.2	14	14.7

* UNL upper normal limit
** Hepatitis referred to an elevation of aminotransferase above upper normal limit

Table 3. Physical examination and laboratory data of total and non-alcoholic steatohepatitis monks

Variables	Non-alcoholic steatohepatitis		*p*-value*
	Yes (n = 51)	No (n = 135)	
Physical examination n(%)			
Body weight, mean ± SD, (kg)	77.98±18.2	67.45±16.8	<0.001
BMI ≥25 kg/m^2	38 (74.5)	59 (43.7)	<0.001
Waist circumference ≥90 cm	17 (33.3)	21 (15.6)	0.007
Systolic blood pressure (SBP) ≥130 mmHg	25 (49.0)	62 (45.9)	0.706
Diastolic blood pressure (DBP) ≥85 mmHg	20 (39.2)	46 (34.1)	0.513
Laboratory (mean SD)			
FPG (mg/dL)	109.84±49.2	104.98±52.4	0.57
Cholesterol (mg/dL)	205.14±40.5	210.30±51.8	0.52
HDL (mg/dL)	48.98±10.8	53.68±12.6	0.02
LDL (mg/dL)	143.27±37	143.29±41.9	0.99
Triglyceride (mg/dL)	195.29±122.2	153.60±144.8	0.07
Uric acid (mg/dL)	6.74±1.2	5.99±1.2	<0.001
Abnormal laboratory, n (%)			
FPG ≥100 mg/dL	19 (37.3)	37 (27.4)	0.192
HDL <40 mg/dL	9 (17.6)	15 (11.1)	0.236
Triglyceride (≥150 mg/dL)	28 (54.9)	47 (34.8)	0.013
Metabolic Syndrome, n (%)			
AHA Metabolic Syndrome criteria	23 (45.1)	29 (21.5)	0.001
IDF Metabolic Syndrome criteria	13 (25.5)	17 (12.6)	0.033

* Significant *p*-value <0.05
BMI = body mass index, FPG = fasting plasma glucose, LDL = low-density lipoprotein, HDL = high-density lipoprotein, AHA = American Heart Association, IDF = International Diabetes Federation

were obese, higher prevalence by 2 fold (54.2% compared to 25%) of hypertension and 3 fold of impaired fasting plasma glucose (31% compared to 10%) were found in the present study than those in their study[8]. The difference may lie on

Table 4. Multiple logistic regression analysis for factors associated with nonalcoholic steatohepatitis (n = 186)

Factors	Univariable analysis			Multivariable analysis			Multivariable Analysis		
	OR [1]	95% CI	*p*-value	OR_{adj} [2]	95% CI	*p*-value	OR_{adj} [3]	95% CI	*p*-value
Metabolic syndrome									
AHA criteria	3.00	(1.51 to 5.97)	0.002	1.56	(0.63 to 3.85)	0.340			
IDF criteria	2.38	(1.06 to 5.34)	0.036				0.59	(0.12 to 2.93)	0.515
BMI ≥25 kg/m^2	3.77	(1.84 to 7.70)	<0.001	2.65	(1.16 to 6.04)	0.021	2.84	(1.27 to 6.38)	0.011
Abdominal obesity (Waist circumference ≥90 cm)	2.71	(1.29 to 5.72)	0.009	1.17	(0.45 to 3.04)	0.741	2.22	(0.49 to 10.01)	0.298
Abnormal FPG ≥100 mg/dL	1.57	(0.80 to 3.11)	0.193						
SBP ≥130 mmHg	1.13	(0.59 to 2.16)	0.706						
DBP ≥85 mmHg	1.25	(0.64 to 2.43)	0.514						
Abnormal triglyceride ≥150 mg/dL	2.28	(1.18 to 4.39)	0.014	1.43	(0.68 to 3.00)	0.341	1.63	(0.80 to 3.32)	0.177
Abnormal HDL <40 mg/dL	1.71	(0.70 to 4.21)	0.239						

OR, Odds Ratio; OR_{adj}, Adjusted Odds Ratio; CI, confident interval.
[1] Crude odds ratio estimated by binary logistic regression.
[2] Adjusted odds ratio estimated by multiple logistic regression adjusted for the AHA metabolic syndrome, BMI, circumference and triglyceride.
[3] Adjusted odds ratio estimated by multiple logistic regression adjusted for the IDF metabolic syndrome, BMI, circumference and triglyceride.
The variable was included in the multivariable model as a result of having a *p*-value <0.050 in the univariable analysis.
AHA = American Heart Association, IDF = International Diabetes Federation, BMI = body mass index, FPG = fasting plasma glucose, SBP = systolic blood pressure, DBP = diastolic blood pressure, LDL = low-density lipoprotein, HDL = high-density lipoprotein,

different habitation (urban, suburban, or rural) and period of each study (past or current) which reflected a trend of higher prevalence.

These non-communicable diseases certainly resulted from diet and physical activity including exercise. Previous study reported that food consumption of the monks was composed of high carbohydrate, low protein, enriched in saturated fat, cholesterol and less polyunsaturated fatty acids (PUFAs) diet[9]. The food the monks have are generally given by laymen. These foods are frequently ready-cooked from the vendors and are not so healthy e.g. curry rich in coconut milk, fried chicken, having sweet taste from refined sugars. Furthermore, the afternoon beverages or "Nam Pana" are mostly sugary. A sucrose- or fructose-rich soft drink increases the synthesis of intrahepatic triglycerides, induces intestinal dysbiosis and permeability and increases uric acid level. Previous studies reported that regular fructose consumption increased risk of insulin resistance, hypertriglyceridemia, hyperuricemia and increase fibrosis progression of NAFLD from unhealthy diet[10,11]. Previous studies from Thailand that although the monks consumed fewer or similar calories to the general population[8], they consumed more soft drinks, sugary drinks or boxed juices leading to obesity[8,12]. Higher soft drink consumption was reported to increase the risk of NAFLD independent of metabolic syndrome[13].

Because the reduction of caloric intake could result in the improvement of insulin resistance[14], guidelines for total calories intake and type of diet should be established. A prolonged (6 month) period intake of hypocaloric diet of reduced carbohydrates or fat could also reduce ALT and intrahepatic lipid and visceral fat in non-diabetic, overweight or obese subjects[14]. Mediterranean diet which is low in carbohydrate and enriched with omega-3 fatty acids[9] is recommended in NAFLD because it can improve plasma lipid profile and reduce liver steatosis and insulin resistance[15]. Laymen should consider natural and healthy diets, such as, increased vegetables, fiber, fish, brown rice, and decreased saturated fat, including palm oil and coconut oil[3] in giving alms to the monks.

Another means to reduce weight and its consequences of metabolic morbidities and NAFLD is by increasing energy expenditure by physical activity or exercise. The monks generally tend to have limited physical activity or sedentary lifestyle such as regular meditation and/or sitting for several hours[16]. The present study found that the sitting time of urban monks was 5 to 8 hours/day. One different activity of the monks from 2 districts was the walking distance for alms in the morning and other temple chores: 1 kilometer of Dusit district monks compared to 2 to 3 kilometers and additional of cleaning the surrounding area outside the temple for 1 to 1.5 hours of the monks in Nong Chok district. This might result in a higher proportion of BMI and more prevalence of hepatitis among the monks in Dusit district observation than the monks in Nong Chok district. Previous studies showed that moderate intensity of regular exercise e.g. aerobic exercise at moderate intensity or resistance exercise for 16 weeks in sedentary NAFLD patients improved glycemic control and reduced intrahepatic fat[17-19], irrespective of weight loss[18,19]. Resistance exercise by either daily walking, or any work activity displayed benefits even in monks who had poor physical performance due to comorbidity. Other studies demonstrated lifestyle modification (having healthy diet/caloric restrictions and increased physical activity or exercise) is the most important factor associated with the improvement of liver inflammation, steatosis and fibrosis[9,20,21] and highly recommended it in the treatment of NAFLD. Previous studies supported that step of 5, 7 to 10% of weight reduction from initial body weight either from diet and/or exercise were associated with the improvement of liver inflammation, steatosis and fibrosis respectively[9,20,21].

Several limitations of the study were recognized. The present study used biochemical testing from 2 laboratory machines where in the actual transaminase level could not be calibrated for the same reference value, so the enzyme elevation was presented as folds above the upper normal limit. Nevertheless, each machine was regularly calibrated and its intra-assay coefficient variation for transaminase level was less than 3%. Second, a diagnosis of NASH may require an additional ultrasonography to confirm by the evidence of increased liver echogenicity. Finally, the limitation of the data collected from a small population may have bias from the questionnaire design and estimated data from the participants.

Conclusion

This study found 26.8% of the monks in urban areas had NASH. 74.5% of them were also obese and more than 25% also had metabolic syndrome. Modification of their lifestyle should be encouraged by emphasizing on healthy diet and increasing physical activity by either daily walking, or any activity at work for at least 40 to 45 minutes at least 3 times/week for the purpose of weight reduction. Education or public relation should be conducted to devotees to offer healthy alms to monks. A balanced meal with regular exercise would thus result in healthy urban monks.

What is already known on this topic?

Monk is a special group which have a limitation in food consumption and have a unique way of life, hypertension obesity and hyperlipidemia are common medical illness.

What this study adds?

Non-alcoholic steatohepatitis is another important medical disease in urban monk aside from obesity and metabolic disorders. Lifestyle modification including having healthy diet and adequate physical activity should be solicited among the monks. Health promotion for hepatitis B vaccination should be encouraged in all monks to prevent chronic liver disease.

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Potential conflicts of interest

The authors declare no conflict of interest.

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