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## OBSTETRICS

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# Knowledge, Attitudes and Practices of Ramadan Fasting in Pregnant Thai-Muslim Women

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### ABSTRACT

**Objectives:** To assess the basic religious knowledge regarding the Islamic law, attitudes and practices of Ramadan fasting during pregnancy in Thai-Muslim women.

**Materials and Methods:** Multicenter, cross-sectional descriptive study was conducted between July 2016 and January 2017 on 619 pregnant Muslim women at antenatal care clinic from six hospitals in the three southernmost provinces of Thailand. Non-probability convenient sampling technique and a questionnaire were used to collect data from pregnant women who had experienced pregnancy during Ramadan at least once in their lives.

**Results:** Most participants (85.5%) reported to have knowledge regarding the Islamic law clear exemption from fasting for pregnant women, and the missed fasts must be completed later. Majority of pregnant women believed the fasting during pregnancy did no harm to maternal health. Overall, 87.1% observed fasting during pregnancy. Mean fasting days was  $24.56 \pm 5.66$  days and 63.0% observed fasting between 21-30 days. Logistic regression analysis demonstrated that their age  $\geq 35$  years and Islamic education increased the fasting during pregnancy (Adjusted OR 2.478, 95%CI 1.174–5.230,  $p = 0.017$  and 2.244, 95%CI 1.236–3.988,  $p = 0.006$ , respectively). The main adversities from Ramadan fasting during pregnancy were weakness and fatigue.

**Conclusion:** Most pregnant women knew Islamic law clear exemption from fasting during pregnancy, however many of pregnant women preferred fasting during Ramadan and they believed the fasting during pregnancy did no harm to maternal health. Healthcare providers are required to understand the religious beliefs of Muslim pregnant women, and design the standard guideline about managing lifestyle changes of Ramadan fasting during pregnancy.

**Keywords:** Knowledge, attitudes, practices, Ramadan, Fasting, pregnant Thai-Muslim women.

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# ความรู้ ทักษะ และการปฏิบัติตนของหญิงตั้งครรภ์ไทยมุสลิมกับการถือศีลอดในเดือนรอมฎอน

เสาวณีย์ สระอ, สมชาย ธนวัฒนาเจริญ

## บทคัดย่อ

**วัตถุประสงค์:** เพื่อประเมินความรู้เกี่ยวกับบทบัญญัติของศาสนาอิสลาม ทักษะ และการปฏิบัติตนของหญิงตั้งครรภ์ไทยมุสลิมกับการถือศีลอดในเดือนรอมฎอน

**วัสดุและวิธีการ:** เป็นการศึกษาเชิงพรรณนาแบบตัดขวางจากหลายสถาบัน ดำเนินการระหว่างเดือนกรกฎาคม 2016 ถึงเดือนมกราคม 2017 ทำการศึกษาวิจัยในหญิงตั้งครรภ์มุสลิม จำนวน 619 ราย ที่มารับบริการ ณ คลินิกฝากครรภ์ จาก 6 โรงพยาบาลในสามจังหวัดชายแดนภาคใต้ของประเทศไทย โดยใช้เทคนิคการสุ่มตัวอย่างแบบง่าย และใช้แบบสอบถามในการเก็บรวบรวมข้อมูล จากหญิงตั้งครรภ์ไทยมุสลิมที่มีประสบการณ์การตั้งครรภ์ในเดือนรอมฎอนอย่างน้อยหนึ่งครั้งในชีวิต

**ผลการศึกษา:** ผู้เข้าร่วมการศึกษาส่วนใหญ่ (85.5%) มีความรู้เกี่ยวกับบทบัญญัติของศาสนาอิสลามที่อนุญาตให้หญิงตั้งครรภ์ยกเว้นการถือศีลอดได้ โดยต้องถือศีลอดชดเชยในภายหลัง ส่วนใหญ่เชื่อว่าการถือศีลอดขณะตั้งครรภ์ไม่เป็นอันตรายต่อสุขภาพของมารดา จากการศึกษาพบว่าร้อยละ 87.1 ของผู้เข้าร่วมการศึกษาได้ทำการถือศีลอดขณะตั้งครรภ์ ซึ่งมีจำนวนวันถือศีลอดเฉลี่ย  $24.56 \pm 5.66$  วัน และร้อยละ 63 ทำการถือศีลอดเป็นจำนวน 21-30 วัน จากการวิเคราะห์การถดถอยโลจิสติก พบว่าหญิงตั้งครรภ์ที่มีอายุเท่ากับหรือมากกว่า 35 ปี และมีการศึกษาด้านศาสนาอิสลาม จะเพิ่มโอกาสการถือศีลอดขณะตั้งครรภ์ (Adjusted OR 2.478, 95%CI 1.174–5.230,  $p = 0.017$  and 2.244, 95%CI 1.236–3.988,  $p = 0.006$  ตามลำดับ) ส่วนผลข้างเคียงที่พบได้บ่อยจากการถือศีลอดขณะตั้งครรภ์ในเดือนรอมฎอน ได้แก่ ความอ่อนเพลียและความเหนื่อยล้า

**สรุป:** หญิงตั้งครรภ์ส่วนใหญ่มีความรู้เกี่ยวกับบทบัญญัติของศาสนาอิสลามที่อนุญาตให้หญิงตั้งครรภ์ยกเว้นการถือศีลอดได้ อย่างไรก็ตามหญิงตั้งครรภ์จำนวนมากยังคงต้องการถือศีลอดขณะตั้งครรภ์ในช่วงเดือนรอมฎอน โดยพวกเขาเชื่อว่าการถือศีลอดระหว่างตั้งครรภ์ไม่เป็นอันตรายต่อสุขภาพของมารดา ดังนั้นผู้ให้บริการด้านสาธารณสุขควรมีความรู้ความเข้าใจเกี่ยวกับความเชื่อด้านศาสนาของหญิงตั้งครรภ์มุสลิม และจัดทำแนวทางเกี่ยวกับการปรับเปลี่ยนพฤติกรรมให้เหมาะสมในการถือศีลอดระหว่างตั้งครรภ์ในเดือนรอมฎอน

**คำสำคัญ:** ความรู้, ทักษะ, การปฏิบัติตน, รอมฎอน, การถือศีลอด, การตั้งครรภ์, ไทยมุสลิม, ผู้หญิง

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## Introduction

Ramadan, the name of the ninth lunar month of the Islamic calendar. During this month Muslims across the world are required to complete abstinence from foods, drinks, smoking, and sexual activity at daytime hour from sunrise to sunset 1-4 for a period of 29 or 30 days<sup>(2-6)</sup>. The duration of fasting time depends on geographic area and season. It may vary from 12 to 19 hours per day<sup>(5,7)</sup>.

Ramadan fasting is one of the five pillars of Muslim's faith which means that it is compulsory for all healthy Muslim adults<sup>(1-4)</sup>. However, Islamic law clear exemption from fasting is permitted for pregnant women who are worried or believes that fasting may cause harm to their health and/or fetal health<sup>(3,4,6)</sup>. Then she must make up the missed days by fasting or feeding a poor person for each day missed a later time<sup>(2,4,5)</sup>.

Although pregnant Muslim women can be exempted from fasting, but evidence from researches around the world showed that 50-90% of the pregnant Muslim women preferred fasting during Ramadan<sup>(2,3,5-9)</sup>. While, 93.3% of pregnant Thai-Muslim women chose to fast during pregnancy<sup>(8)</sup>.

Several studies have shown the reasons why most Muslim women chose to fast during pregnancy; because of faith in God, a sense of religious duty, positive attitude on fasting, cultural reasons, familial support, perceiving no harm, and difficulty to fast alone at another time<sup>(1-3)</sup>.

The characteristic behaviors of Ramadan fasting, compared to the remaining months of the year, are not similar. These modifications are accompanied by changes of meal frequency and eating pattern, daily activity, the rhythm of life and disturbances of the sleep cycle, which may affect different aspects of human health<sup>(10)</sup>.

Many studies have examined the health effects of fasting in healthy pregnant women, there were little or no effects of fasting on pregnancy outcomes, fetal well-being parameter, fetal health and development, mean birth weight, preterm birth, APGAR score, or intellectual development in children of fasting pregnant women<sup>(11-15)</sup>.

However, some studies reported contrasting results. Fasting increased risk of hypoglycemia, ketosis and ketonuria, vomiting, diarrhea, dizziness<sup>(16)</sup>, urinary tract infection, hyperemesis gravidarum, relative risk of lower birth weight<sup>(6,17-19)</sup>, reduced fetal biophysical profile and reduced breathing movements<sup>(6,20)</sup>.

Several studies have shown the fasting during pregnancy may be associated with poor weight gain, increased frequencies of gestational diabetes mellitus, hypertension, pre-eclampsia, preterm labor, cesarean delivery, and neonatal admission to the intensive care unit<sup>(6,21)</sup>.

Exposure to fasting during fetal period was associated with slow placental growth. Changes in placental growth during Ramadan could be associated with altered fetal programming, and might increase the later risk of adult chronic diseases, such as coronary heart disease, hypertension and type 2 diabetes mellitus<sup>(4,6,10,22)</sup>.

Pregnant women can make decision about fasting during Ramadan. However, many of the pregnant Muslim women fast due to the family and social pressures or lack of proper information. Although the health effects of Ramadan fasting on pregnancy outcomes are still unclear, it is important for healthcare providers to be aware of potential risks that may be associated with Ramadan fasting during pregnancy.

This study aimed to assess the basic religious knowledge regarding the Islamic law of Ramadan fasting during pregnancy, attitudes concerning Ramadan fasting during pregnancy and practice of Ramadan fasting among pregnant Thai-Muslim women, based on the prevalence in relation to factors such as maternal age, education, occupation, economic circumstances, gravida, parity and gestational age at Ramadan. It also analysed the characteristic fasting behaviors, factors that influence the decision to fasting, and adversities of fasting on maternal health.

## Materials and Methods

This study was a multicenter, cross-sectional descriptive study conducted between July 2016 and January 2017. The target population was pregnant

Thai-Muslim women in the three southernmost provinces of Thailand, who visited antenatal care clinic in six hospitals. The hospitals covered in this multicenter study were Pattani Hospital, Yala Hospital, Narathiwat Hospital, Crown Prince Saiburi Hospital, Crown Prince Yaha Hospital and Chanae Hospital. This region is one of the largest Muslim populations in Thailand, making it an ideal location to study religion influenced knowledge, attitudes and practices. The study protocol has been approved by Institutional Review Board of the Faculty of Medicine, Chulalongkorn University.

The inclusion criteria were: 1) Pregnant Thai-Muslim women who had experienced pregnancy during Ramadan at least once; 2) Healthy pregnant women; 3) Can write and read Thai language and/or Yawi language. The exclusion criteria were: 1) Pregnant Thai-Muslim women who had history of any illnesses or medical problems or drug consumption during their pregnancies.

The pilot study was conducted to obtain the accurate sample size. In total, 30 pregnant Thai-Muslim women were recruited.

Then sample size was calculated based on the proportion of pregnant Thai-Muslim women who had the basic religious knowledge regarding the Islamic law of Ramadan fasting during pregnancy from pilot study (0.83) when alpha error at 0.05 and acceptable error was 3%. The calculated sample size added 10% estimated dropout were 663. The providers or nurses at antenatal clinic introduced the study to the pregnant women. Non-probability convenience sampling was used to approach the participants. A self-administered questionnaire was used to collect the data. The questionnaire was designed after a thorough literature review, the content validity was tested by 3 experts and pilot study on 30 pregnant Thai-Muslim women was performed. The reliability of the questionnaire was measured by calculating Cronbach's alpha (0.72). The questionnaire's structure used simple Thai language or Yawi language, medical term was avoided. The final version of the questionnaire was composed of 6 pages, divided into 5 sections including demographic

information, obstetric information, pregnant Thai-Muslim women' knowledge, attitude and practices about Ramadan fasting during pregnancy, with a Likert scale for ranking importance of the characteristics.

Demographic data and obstetric data were determined as frequency, mean with standard deviation, and percentage. Data were analyzed using IBM SPSS software for Windows version 22 (IBM Corp, Armonk, NY, USA). Descriptive statistics test were applied for all data. Chi-square tests, independent sample t-tests, Fisher's exact test were used to compare differences in the variables between groups and  $p < 0.05$  was considered statistically significant. Univariate and multivariate logistic regression models were used to evaluate factors that contributed to the knowledge, attitudes and practices of Ramadan fasting in pregnant Thai-Muslim women.

## Results

A total of the 663 eligible healthy pregnant Thai-Muslim women who matched inclusion criteria were enrolled into this study. All of them provided their informed consent and data were collected. The questionnaires were completed by 619 participants, giving a response rate of 93.4%. The flow chart of data collection is shown in Fig. 1.

Pregnant women in this study had a mean age of  $29.2 \pm 6.16$  years and 97.7% were married. Regarding education, 35.9% graduated from high school and 84.2% had Islamic education. In all, 195 (31.5%) of the participants were housewife and 37.5% had a household income about 5,001-10,000 bahts per month.

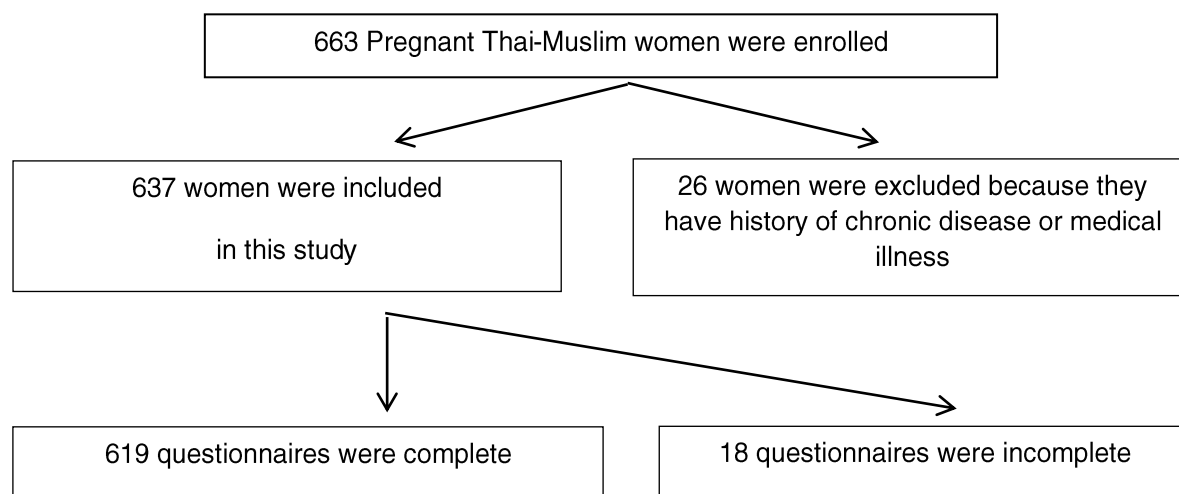
There were 71.2% multigravidas, while 35.5% of the participants had two to five children. The majority of respondents (43.1%) were in the 2<sup>nd</sup> trimester of gestational age, and 55.5% of participants who fasted during their 3<sup>rd</sup> trimester of gestational age had increasing total weight gain during Ramadan fasting more than participants who fasted in 1<sup>st</sup> trimester (44.0%) and 2<sup>nd</sup> trimester (44.9%).

Overall, 87.1% of participants observed fasting during pregnancy. Mean fasting time was  $24.56 \pm 5.66$  days and most of them (63.0%) observed fasting

between 21-30 days. Multigravidas fasted (72.9%) more than primigravidas (27.1%).

Result of baseline characteristic of participants and their relationship with fasting are shown in Table 1. Characteristics of pregnant women with respect to their

age  $\geq 35$  years, Islamic education, multigravida and being in 3<sup>rd</sup> trimester of gestational age during Ramadan were significantly higher in the fasting group than in the non-fasting group ( $p = 0.005, 0.002, 0.016$  and  $0.034$  respectively).



**Fig. 1.** Flow chart of data collection.

**Table 1.** Baseline characteristic of participants and their relationship with fasting.

Characteristic	Fasting		p value
	Yes (%) n = 539	No (%) n = 80	
<b>Age (year)</b>			0.012 <sup>b*</sup>
< 35	411 (85.3%)	71 (14.7%)	
$\geq 35$	128 (93.4%)	9 (6.6%)	
Mean $\pm$ SD	29.44 $\pm$ 6.16	27.39 $\pm$ 5.90	0.522 <sup>c</sup>
<b>Status</b>			0.522 <sup>c</sup>
Single	7 (1.3%)	2 (2.5%)	
Married	527 (97.8%)	78 (97.5%)	
Divorce	5 (0.9%)	0 (0.0%)	
<b>Education</b>			0.464 <sup>b</sup>
No education	21 (3.9%)	3 (3.8%)	
Primary school	116 (21.5%)	10 (12.5%)	
High school	190 (35.3%)	32 (40.0%)	
Diploma	76 (14.1%)	13 (16.2%)	
Bachelor's degree or higher	136 (25.2%)	22 (27.5%)	

**Table 1.** Baseline characteristic of participants and their relationship with fasting. (Cont.)

Characteristic	Fasting		p value
	Yes (%) n = 539	No (%) n = 80	
<b>Islamic education</b>			0.002 <sup>b*</sup>
No education	76 (14.1%)	22 (27.5%)	
Education	463 (85.9%)	58 (72.5%)	
<b>Occupation</b>			0.350 <sup>b</sup>
Housewife	165 (30.6%)	30 (37.5%)	
Employed	95 (17.6%)	11 (13.8%)	
Professional	126 (23.4%)	23 (28.7%)	
Farmer	31 (5.8%)	4 (5.0%)	
Business owner	122 (22.6%)	12 (15.0%)	
<b>Income (bath per month)</b>			0.161 <sup>b</sup>
0-5,000	163 (30.2%)	20 (25.0%)	
5,001-10,000	194 (36.0%)	38 (47.5%)	
10,001-20,000	81 (15.0%)	13 (16.2%)	
20,001-30,000	44 (8.2%)	6 (7.5%)	
>30,000	57 (10.6%)	3 (3.8%)	
<b>Gravida</b>			0.016 <sup>b*</sup>
Primigravida	145 (26.9%)	32 (40.0%)	
Multigravida	394 (73.1%)	48 (60.0%)	
<b>Parity</b>			0.080 <sup>b</sup>
Nulliparous	146 (27.1%)	32 (40.0%)	
One	188 (34.9%)	23 (28.8%)	
Two to five	195 (36.2%)	25 (31.2%)	
More than five	10 (1.8%)	0 (0.0%)	
<b>Gestational age at Ramadan</b>			0.034 <sup>b*</sup>
First trimester	119 (22.1%)	22 (27.5%)	
Second trimester	226 (41.9%)	41 (51.3%)	
Third trimester	194 (36.0%)	17 (21.2%)	
<b>Total weight gain during Ramadan</b>			0.079 <sup>b</sup>
Decrease	114 (21.2%)	18 (22.5%)	
Same	156 (28.9%)	32 (40.0%)	
Increase	269 (49.9%)	30 (37.5%)	

Data are presented as mean  $\pm$  standard deviation in case of continuous variables and n (%) in case of frequencies compared between fasting group and non-fasting group,

\* p < 0.05 is considered significant,

<sup>a</sup> = p-value from independent t-tests,

<sup>b</sup> = p-value from chi-squared tests,

<sup>c</sup> = p-value from Fisher's Exact Test

Summary of participant's knowledge about the Islamic law of Ramadan fasting during pregnancy are shown in Table 2. The results of participants' knowledge about the Islamic law of Ramadan fasting during pregnancy in the fasting group did not differ from the non-fasting group with respect to all knowledge's statement. The majority of participants

knew that Ramadan fasting is a religious obligation for the healthy pregnant women (83.2%) and Islamic law clear exemption from fasting for pregnant women, then must make up the missed days later (85.5%). Approximately half of them reported to have correct knowledge about the conditions in which they could exempt from Ramadan fasting during pregnancy.

**Table 2.** Pregnant Thai-Muslim knowledge about the Islamic law of Ramadan fasting during pregnancy.

Statement	Pregnant women fasting group	Islamic law knowledge		p value
		Yes (%)	No (%)	
1. The Ramadan fasting is a religious obligation for the healthy pregnant women	Fasted	453(84.0%)	86(16.0%)	0.144
	Nonfasted	62 (77.5%)	18 (22.5%)	
2. Islamic law clear exemption from fasting is permitted for pregnant women, then must make up the missed days later	Fasted	464(86.1%)	75 (13.9%)	0.252
	Nonfasted	65(81.3%)	15(18.7%)	
3. If you are worried that fasting may increase the risk of malnutrition, you can exempt from Ramadan fasting.	Fasted	317 (58.8%)	222 (41.2%)	0.137
	Nonfasted	40 (50.0%)	40 (50.0%)	
4. If you are worried that fasting may increase the risk of fetal low weight gain, you can exempt from Ramadan fasting.	Fasted	288 (53.4%)	251 (46.6%)	0.063
	Nonfasted	33 (41.3%)	47 (58.7%)	
5. An eating of the leftover food or spicy food has a negative effect on your health.	Fasted	245 (45.5%)	294(54.5%)	0.348
	Nonfasted	41 (51.3%)	39 (48.7%)	
6.If you abstinence from the predawn meal, it will make you tired due to a longer period of fasting	Fasted	368 (68.3%)	171 (31.7%)	0.419
	Nonfasted	51 (63.8%)	29 (36.2%)	
7. If the fetal movement decreases, you should stop your fast, and see the doctor.	Fasted	426 (79.0%)	113 (21.0%)	0.284
	Nonfasted	59 (73.7%)	21 (26.3%)	



Summary of participants' attitudes about Ramadan fasting during pregnancy are shown in Table 3. The attitudes of participants in the fasting group did not differ from the non-fasting group with respect to all attitude's statement, except in their believe that fasting during pregnancy did no harm for maternal health, there were significant higher in

the fasting group than in the non-fasting group (73.8% vs. 56.3%,  $p = 0.004$ ). Most pregnant women had positive attitude about Ramadan fasting especially in the spiritual system. However, some pregnant women thought that fasting during pregnancy had effect for the fetus and maternal health.

**Table 3.** Pregnant Thai-Muslim's attitudes about Ramadan fasting during pregnancy.

Statement	Pregnant women fasting group	Agree (%)	Disagree (%)	p value
1. The fasting in Ramadan month, you will get better merit than another month.	Fasted	483 (89.6%)	56 (10.4%)	0.876
	Nonfasted	72 (90.0%)	8 (10.0%)	
2. I want to fast with my family, because I do not want to make up the fasting later alone.	Fasted	411 (76.3%)	128 (23.7%)	0.091
	Nonfasted	54 (67.5%)	26 (32.5%)	
3. Ramadan fasting gives you peace of mind.	Fasted	474 (87.9%)	65 (12.1%)	0.594
	Nonfasted	72 (90.0%)	8 (10.0%)	
4. Ramadan fasting during pregnancy is not harmful	Fasted	398 (73.8%)	141 (26.2%)	0.001*
	Nonfasted	45 (56.3%)	35 (43.7%)	
5. The fasting during pregnancy, make cause of fetal low birth weight	Fasted	161 (29.9%)	378 (70.1%)	0.261
	Nonfasted	19 (23.8%)	61 (76.2%)	
6. I feel weak and fatigue from the fast during pregnancy	Fasted	314 (58.3%)	225 (41.7%)	0.447
	Nonfasted	43 (53.8%)	37 (46.3%)	

\* p-value < 0.05 is considered significant

Summary of the predictive factors related with fasting during pregnancy in a univariate and multivariate logistic regression analysis are shown

in Table 4. A univariable analysis demonstrated that their age > 35 years, Islamic education, multigravida, the third trimester of gestational age during Ramadan



and attitude respect to the Ramadan fasting during pregnancy is not harmful were significant variables for increased the fasting during pregnancy. After adjustment for potential confounding factors, these three variables included their age > 35 years, Islamic education and attitude respect to the Ramadan

fasting during pregnancy is not harmful were identified as independent factors for increased the fasting during pregnancy (Adjusted OR 2.478, 95%CI 1.174–5.230,  $p = 0.017$ , 2.244, 95%CI 1.236–3.988,  $p = 0.006$  and 2.042, 95%CI 1.244–3.352,  $p = 0.005$  respectively).

**Table 4.** Variables correlated with their relationship of fasting during pregnancy from the univariate and multivariate logistic regression analysis.

Variable	Crude OR (95%CI)	p value	Adjusted OR (95%CI)	p value
<b>Characteristics Age (year)</b>				
< 35	1		1	
≥ 35	2.457 (1.194-5.054)	0.015*	2.478 (1.174-5.230)	0.017*
<b>Islamic education</b>				
No education	1		1	
Education	2.311 (1.337-3.995)	0.003*	2.244 (1.263-3.988)	0.006*
<b>Gravida</b>				
Primigravida	1		1	
Multigravida	1.795 (1.104-2.917)	0.017*	1.363 (0.816-2.277)	0.237
<b>Gestational age</b>				
First trimester	1		1	
Second trimester	1.019 (0.580-1.790)	0.948	0.624 (0.309-1.260)	0.188
Third trimester	2.110 (1.077-4.134)	0.030*	1.157 (0.641-2.091)	0.628
<b>Ramadan fasting during pregnancy is not harmful</b>				
Disagree	1		1	
Agree	2.217 (1.369-3.589)	0.001*	2.042 (1.244-3.352)	0.005*

\* p-value < 0.05 is considered significant

Summary of participants' practices about Ramadan fasting during pregnancy are shown in Table 5. A majority of pregnant women (80.0%) broke a fast immediately after hearing an Azan sound regularly. Some pregnant women often broke a fast with sweet foods (29.1%) and delicatessen foods (13.4%). Overall, 315 (58.4%) of pregnant women had to eat the leftover foods sometimes. Regarding cycle of sleep during Ramadan fasting, 338 (62.7%) slept less at night time sometimes, 375 (69.6%) slept more at

daytime sometimes. Overall, 118 (21.9%) of pregnant women missed antenatal care appointments because they felt weak sometimes. Most pregnant women (71.2%) forgot to take iron-supplement drug sometimes. In Ramadan month, 230 (42.7%) of pregnant women still made religious activity regularly.

The results of participants' adversities encountered from Ramadan fasting during pregnancy are shown in Table 6. The most common complications were the weakness and fatigue.

**Table 5.** Practices of pregnant Thai-Muslim women during Ramadan fasting.

Statement	Frequency		
	Frequently (%)	Sometime (%)	Never (%)
<b>Characteristics of fasting</b>			
- You are fasting during pregnancy	343 (63.6%)	195(36.2%)	1 (0.2%)
- You have to eat during a predawn meal	363 (67.4%)	157 (29.1%)	19 (3.5%)
- You break a fast immediately after hearing an Azan sound hearing an Azan sound	431 (80.0%)	103(19.1%)	5 (0.9%)
- You break a fast was late because of work	21 (3.9%)	141(26.2%)	377 (69.9%)
- You break a fast because you feel weak, hungry and thirsty	36 (6.7%)	275 (51.0%)	228 (42.3%)
<b>Eating pattern</b>			
- You break a fast with a sweet foods	157 (29.1%)	325 (60.3%)	57 (10.6%)
- You break a fast with a delicatessen foods	72 (13.4%)	359 (66.6%)	108 (20.0%)
- You eat leftover foods	48 (8.9%)	315 (58.4%)	176 (32.7%)
- You have overeating at breaking a fast time	147 (27.3%)	329 (61.0%)	63 (11.7%)
- You drink at least 6-8 glasses of water per day	326 (60.5%)	205 (38.0%)	8 (1.5%)
<b>Sleep cycle</b>			
- You sleep less at night time	56 (10.4%)	338 (62.7%)	145 (26.9%)
- You sleep more during daytime	81 (15.0%)	375 (69.6%)	83 (15.4%)
<b>Other behaviors</b>			
- You forget to take an iron-supplement drugs	32 (6.0%)	384(71.2%)	123(22.8%)
- You miss antenatal care appointments because feel weak	31 (5.7%)	118 (21.9%)	390 (72.4%)
- You stop working because your body is exhausted	56 (10.4%)	324 (60.1%)	159 (29.5%)
- You make religious activity	230 (42.7%)	304(56.4%)	5 (0.9%)

n = 539 (pregnant women in fasting group)

**Table 6.** Adversities encountered mentioned by participant during Ramadan fasting.

Adversities	Frequency		
	Frequently (%)	Sometime (%)	Never (%)
Weakness, Fatigue	130 (24.1%)	374 (69.4%)	35 (6.5%)
Dizziness	57 (10.6%)	324 (60.1%)	158 (29.3%)
Abdominal pain/ Nausea/ Vomiting	59 (10.9%)	284 (52.7%)	196 (36.4%)
Diarrhea	7 (1.3%)	198 (36.7%)	334 (62.0%)
Abnormal vaginal bleeding	6 (1.1%)	32 (5.9%)	501 (93.0%)
Decreased fetal movement	10 (1.9%)	43 (8.0%)	486 (90.1%)
Fever	0 (0%)	6 (1.1%)	533 (98.9%)

n = 539 (pregnant women in fasting group)

## Discussion

Most pregnant Thai-Muslim women in the three southernmost provinces of Thailand (87.1%) preferred fasting during pregnancy and more than half (63.0%) successfully observed fasting between 21-30 days. These results were similar to previous studies<sup>(3,5,7)</sup> which indicated that most Muslim women fasted during pregnancy.

Our finding showed that women who were  $\geq 35$  years were more likely to fast during pregnancy. The higher rate of fasting adherence in their group could partly be explained by some elderly pregnant women were higher a spiritual reason than in the younger age pregnant women, a sense of religious duty, positive attitude of fasting, cultural reasons and familial support.

In our study, women who had Islamic education were more likely to fast during pregnancy. This might because we recruited most participants from religious area and their Islamic education level appeared to strongly influence their beliefs regarding fasting obligation during pregnancy, such as faith in God and the fear on the day of Judgment<sup>(2)</sup>. There were some pregnant Muslim women who did not fast during pregnancy for worrying about their fetal health and feel guilty because of their religious beliefs<sup>(19)</sup>.

In our study, multigravida women tended to fast more than primigravida women, but the difference was not statistically significant when a multivariate logistics regression model was used to adjust for other variables. However, many studies found that multigravida women observed fast more than primigravida women<sup>(3,23)</sup>, and assumed that primigravida women, experiencing pregnancy for the first time, might be more apprehensive and cautious about fasting<sup>(3)</sup>.

The present study showed that pregnant women in their third trimester were more likely to fast. When a multivariate logistics regression model was used to adjust for other variables, the third trimester of gestational age during Ramadan was not associated with fasting during pregnancy. However, it was different from several other studies which reported higher adherence to Ramadan fasting among women who were in the first trimester, as compared to those in the

second or third trimester<sup>(24,25)</sup>. The higher rate of fasting adherence in women in third trimester of gestational age could partly be explained by the fact that morning sickness had already been improved and pregnant women felt sure that their babies' healths were good from fetal movement.

Approximately half of pregnant women in our study still gained weight albeit fasting, which was similar to the previous study<sup>(26)</sup>. Our finding showed that pregnant women in their all trimester of gestational age had increasing total weight gain during Ramadan fasting. Weight gain after Ramadan could be explained by increase in food consumption, types of foods being rich in carbohydrates, fatty and sugary and lack of physical exercise during Ramadan<sup>(26)</sup>.

Most participants (83.2%) knew that Ramadan fasting was a religious obligation for the healthy pregnant women and 85.5% reported to knew the Islamic law clear exemption from fasting for pregnant women who were worry about their health. However, this was different from previous study<sup>(3)</sup> which showed that only 67.0% of them correctly understood the Islamic law on fasting during pregnancy. Pregnant women who misunderstood the Islamic law believed that fasting in pregnancy was optional<sup>(3)</sup>.

Most participants in the present study believed the fasting during pregnancy did no harm to maternal health which was similar to several previous studies<sup>(3,5,7)</sup>. The beliefs seem to be an important role in decisions to fast during pregnancy.

The main adversities from Ramadan fasting during pregnancy were weakness and fatigue, while dizziness, abdominal pain, nausea and/or vomiting and diarrhea could found sometimes in participants who fasted during pregnancy. These results were similar of the previous studies<sup>(3,7,16,23)</sup>.

Ramadan fasting during pregnancy is a religious event and the choice of whether to fast or not is also motivated by religious beliefs, familial support, societal pressure, and the proper information of fasting during pregnancy. Empowering healthcare providers through generating standard guideline would be an important step. The guideline should specify on certain conditions

which a pregnant woman can fast or keep on fasting, by discussing and counseling her in regard to safety, risk of fasting, delineating the best way of monitoring, and managing lifestyle changes during Ramadan fasting.

### **Strengths and limitations**

This study investigated knowledge, attitude and practice of pregnant Thai-Muslim women's adherence to Ramadan fasting. The study population comprised pregnant women living in the three southernmost provinces of Thailand which are one of the largest Muslim populations in Thailand. This made it an ideal location to study religiously influenced knowledge, attitude and practice of Ramadan fasting.

The data collection were performed shortly after Ramadan, when the women were still be pregnant, thereby allowing the accurate data and avoiding possible recall bias. This study focused on the Islamic law clear exemption from fasting for pregnant women and understanding its religious reason which many studies did not take into the understanding of the reasons. Multiple behaviors were evaluated, including the days and characteristics of fasting, type and amount of food about the practice of Ramadan fasting during pregnancy, sleeping, medication, religious activity, and the antenatal care appointment.

The limitation of the present study was samples were taken from only at antenatal care clinic in the hospitals, which might recruit specific population who were educated. Thus, it could be less generalized and excluded pregnant women who did not attend antenatal care clinic. Another limitation of our study was that we had a large proportion of multigravida women and small proportion of primigravida women. Experience of practicing Ramadan fasting during pregnancy among multigravida might confound the results.

### **Conclusion**

Ramadan fasting is a religious obligation for healthy adult Muslims. Islamic law clearly exempts fasting for pregnant Muslim women who are worried about their health and/or fetal health. This study found

that their age  $\geq 35$  years, Islamic education, influenced women's adherence to Ramadan fasting. Most pregnant women had appropriate knowledge of Islamic law regarding fasting during pregnancy, and many of them preferred fasting during Ramadan. They believed the fasting during pregnancy did no harm for maternal health. Although, the study on health effects of Ramadan fasting in pregnancy outcomes are still unclear, it is important for healthcare providers to be aware of potential risks that may be associated with Ramadan fasting during pregnancy.

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### **Potential conflicts of interest**

The authors declare no conflict of interest.

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