Introduction

Ramadan is the holiest month in the Islamic calendar and Muslims fast during this month. Ramadan fasting is one of the five pillars of Islam, and is observed by millions of Muslims all over the world. Believers are commanded to abstain from food, drink and conjugal relationships from sunrise to sunset as a sign of restraint and introspection. Food and fluid intake are mainly nocturnal and usually, food frequency and quantity, sleep duration at night and daily physical activity are reduced. The food habits are not similar outside and during Ramadan in that the proportion of fat, protein and carbohydrate intake can differ during Ramadan. There is a tendency to consume foods and drinks that are richer in carbohydrates than those consumed during other months of the year. The quality of ingested nutrients can also differ during Ramadan compared with the rest of the year. The period in which the person fasts may vary depending on the geographical location of the country and the season of the year, and can be as long as 18 hours/day in the summer of temperate regions ***(Ziaee, 2006).***

During the month of Ramadan, adult Muslims abstain from eating, drinking, smoking, and sexual activity from sunrise to sunset. Fasting during Ramadan forms one of the

five pillars of Islam, along with announcement of faith, praying five times a day, Zakat (giving to the poor), and Hajj (pilgrimage to Mecca). In 2010, there were approximately 1.6 billion Muslims worldwide and this number is growing ***(Kridli, 2015).***

Concurrence of fasting with pregnancy as a physiological condition introduces some controversies regarding the condition of the mother and the fetus. Pregnant women are exempt from fasting if it poses a risk to the fetus; however, many still fast while others are more cautious about its practice. Many pregnant show great interest in fasting and are able to perform this religious practice; however, they are concerned about their fetus and inquire about the possible associated complications during pregnancy According to the statics, in West Africa, 90% of pregnant women fasted during the month of Ramadan. The prolonged hunger presents itself as hypoglycemia or hyperketonuria, which may affect the neonatal weight, neonatal mortality and disability. During fasting, pregnant and breastfeeding women experience changes in metabolism, sleep patterns and daily physical activity ***(Cunigham et al., 2010).***

Most Muslims observe Ramadan every year. Exemption from fasting is permitted for women who are

pregnant or breastfeeding, but the missed fasts must be completed before the next Ramadan ***(Rashed, 2010)***.

Muslim women choose to fast during pregnancy because of a sense of religious duty, familial support, positive views on fasting, and difficulty in completing the missed fasts at another time. A previous study found that Muslim women believed the only reason not to fast would be perceived harm to mother or fetus, but that fasting during pregnancy is safe for healthy women. Women feel strong spiritual, emotional, physical, and social benefits from fasting; it is seen as a way of maintaining cultural identity and unity among their communities ***(Robinson et al., 2005).***

Many women asking their obstetrician if fasting is safe for their baby or not? There have been many studies on metabolic changes and different aspects of human health during and after Ramadan, but there have been few studies on the effect of fasting on pregnancy outcome and there are also some controversies in the findings of different studies ***(Ziaee et al., 2006).***

Ramadan fasting during pregnancy is a controversial issue. A group of pregnant women do not fast due to the probable harmful effect on fetal health. Although Ramadan fasting may be postponed to the postnatal period, some

pregnant women obey it as a religious activity ***(Joosoph, 2004).***

There are several reports regarding the effects of Ramadan fasting on the human metabolism. Fasting leads to a decrease in serum glucose, insulin, lactate, and carnitine, as well as an increase in free fatty acids, hydroxy butirate, cholesterol, and triglyceride levels. As we know, maternal glucose infusion causes stimulation of short-term fetal activity and uteroplacental blood flow is essential for fetal development and wellbeing ***(Osol, 2009).***

During the month of Ramadan, healthy adults abstain from food and drink from dawn to sunset. Pregnant are allowed, if they choose, to postpone the fast until after delivery. However, most of the women would like to fast with their families rather than doing this alone later. Therefore, most Muslim pregnant women fast during the holy month of Ramadan. Consequently, diet restriction and fasting could adversely affect pregnancy outcome, especially if Ramadan falls during the hot summer months with long days of fasting ***(Mirghani, 2006).***

Aim of the Work

This study aimed to find out the association between fasting during Ramadan and obstetric outcome in third trimester.

The primary outcome measure is the difference between the three study groups regarding the fetal birth weight.

The secondary outcome measure is the difference between the three study groups regarding unwanted fetal outcomes (e.g., IUGR, neonatal sepsis, or NICU admission), AFI and mode of delivery.

Study question:

In pregnant women in the third trimester, does fasting during the holy month of Ramadan has a poor obstetric outcome regarding to hypoglycemic symptoms, fetal growth, AFI, mode of delivery, birth weight and neonatal outcome?

Chapter (1)

Importance of Ramadan fasting

Ramadan is the ninth month of the Islamic lunar calendar; month of blessed, month of revealed the Holy Quran, the best month in a year, and month to achieve Janna. Fasting on Ramadan is one of the five pillars of Islam, pillars are referred here as duties. Ramadan is the most precious month in the Islamic calendar (Hijri) and it is obligatory for the Muslims to fast in the month of Ramadan ***(Joosoph et al., 2004)***.

The month of Ramadan, during which the Qur'an was revealed, a guidance for mankind, and clear proofs of the guidance and the criterion; and whoever of you is resident, let him fast the month**" (al-Qur'an, 2:185).**

The month of Ramadan is not only the month of fasting. It is also the month of the Qur'an. The Qur'an is the Muslim Scripture. "Ramadan is the (month) in which the Qur'an was sent down, as a guide to mankind, also Clear (Signs) for guidance and the differentiation (between right and wrong)" **(al-Qur'an, 2 : 185).**

During Ramadan while individuals abstain from food and drink during day light hours, they get together over food

with families and friends in the evenings. The meal with which the fast is broken is called iftar. Usually the meal is simple designed to provide nourishment, but may sometimes be sumptuous when there is a large get-together of family and friends **(Ghadery et al., 2005).**

Ramadan is a time of spiritual reflection, improvement and increased devotion and worship. Muslims are expected to put more effort into following the teachings of Islam. The fast (sawm) begins at dawn and ends at sunset. In addition to abstaining from eating and drinking, Muslims also increase restraint, such as abstaining from sexual relations and generally sinful speech and behavior. The act of fasting is said to redirect the heart away from worldly activities, its purpose being to cleanse the soul by freeing it from harmful impurities. Ramadan also teaches Muslims how to better practice self-discipline, self-control, sacrifice, and empathy for those who are less fortunate; thus encouraging actions of generosity and compulsory charity ***(Emami et al., 2013).***

Abstaining from food has great ramification on the person observing the fast, physical as well as spiritual. It is an exercise for the discipline and control of the baser self. One learns how to restrain one's urges and desires. Fasting frees the person from the bondage of lusts and desires. Abstaining from intakes also reminds us of the less fortunate

ones, the poor and the destitute. Fasting gives us a general sense of how they feel. It boosts the morale of the poor by knowing that even kings have to go hungry for a while. Fasting makes the rich realize and understand what the poor goes through day after day. Fasting also purifies one's heart and tongue. One is urged to control himself and learn how to abstain from vain talk, lying, and cheating. Although fasting is beneficial to health, it is mainly a method of self-purification and self-restraint. By cutting oneself from worldly comforts, even for a short time, a fasting person focuses on his or her purpose in life by constantly being aware of the presence of God ***(Sadeghirad et al., 2014).***

It becomes compulsory for Muslims to start fasting when they reach puberty, so long as they are healthy and sane, and have no disabilities or illnesses. Many children endeavor to complete as many fasts as possible as practice for later life.

Exemptions to fasting are travel, menstruation, severe illness, pregnancy, and breastfeeding. However, many Muslims with medical conditions insist on fasting to satisfy their spiritual needs, although it is not recommended by the hadith. Professionals should closely monitor individuals who decide to persist with fasting. Those who were unable to fast still must make up the days missed later **(Quran 2:184)**.

A pregnant woman is exempted from fasting if she has reasons to believe that her health or that of her fetus is in any way compromised through doing so. However, she is expected to observe compensational fasting ("qada") after her pregnancy. The fast is nullified if a person deliberately and willingly commits an act which breaks fasting. Under such circumstances, the person must compensate for the fast at a later time, with or without penance. Some of the factors which nullify the fast include consuming any solid or liquid material, sexual intercourse, intentional vomiting, intravenous or intramuscular injections or nutrients, and vaginal bleeding or menstruation ***(Azizi, 2010).***

The Islamic practice of fasting during the month of Ramadan requires healthy adults to completely abstain from taking food and drink between sunrise and sunset daily. This is an essential action, or "wajib", as it is one of the five fundamental pillars of Islam. All respondents surveyed understood this fundamental law. However, there are exceptions to this law, one of which is fasting in the pregnant state. According to the Mufti, the religious leader of the Muslims in Singapore, the Islamic Law on fasting during pregnancy maintains that a pregnant woman who is in good health, capable of fasting and does not feel any worry about herself or to her foetus, is required and expected to fast like

any ordinary woman. She is permitted to abstain from fasting if she is worried for her own health, the health of her foetus, or the health of both herself and her foetus. If she breaks her fast, she should perform the compensational fasting or "qada", which refers to fasting for the days missed after her pregnancy is over, after the current Ramadan ***(Cross, 1990).***

Chapter 2
Caloric requirements during pregnancy

Calorie Intake:

In general, pregnant women need between 2, 200 calories and 2, 900 calories a day. A gradual increase of calories as the baby grows is the best bet. Here is an overview of how calorie needs change during each trimester:

- The first trimester does not require any extra calories.
- During the second trimester an additional 340 calories a day are recommended.
- For the third trimester, the recommendation is 450 calories more a day than when not pregnant.

Avoid extra calories by cutting down on foods high in fat and added sugars. Replace regular soda, sweets and fried foods with healthy options including low-fat milk and yogurt, whole fruit and whole grains ***(Healthline Editorial Team, 2016)***.

Physical Activity:

Physical activity can help manage weight gain. The activity guidelines for pregnant women are 30 minutes of moderate exercise on most, if not all, days of the week. Make

sure to talk with a doctor before starting or continuing any exercise routine.

How Many Calories?

The mean weight gain during the 9 months of pregnancy is 26 pounds (12 kilograms).

The total energy cost of pregnancy has been estimated at 77, 000 Calories. Over 9 months this averages out to 285 Calories per day.

UK recommendations call for an extra increase of 200 Calories per day in the 3rd trimester only. However this does not account for underweight women, or those who continue their physical activity during pregnancy ***(Gabbe et al., 2012).***

Changes in Energy Requirements:

Research shows that energy needs are different for each trimester; an increase of 5%, 10% and 25% of pre-pregnancy Basal Metabolic Rate is the agreed.

Given these findings it is best to increase calorie intake at each trimester. Based on the estimate of 285 Calories per day overall this would equate to:

- First Trimester - 85 Extra Calories
- Second Trimester - 285 Extra Calories
- Third Trimester - 475 Extra Calories

The calculator above will take into account your pre-Pregnancy Calorie needs (based on age, height, and activity levels) and then add on the extra calories required for growing a healthy baby ***(Gabbe et al., 2012).***

Nutrient Needs During Pregnancy:

The needs for most nutrients are increased during pregnancy to meet the high demands of both the growing fetus and the mother, who herself goes through a period of growth to carry the child and prepare for lactation. In this section, we discuss the general need for increased macronutrients and micronutrient ***(Gabbe et al., 2012).***

Total Energy:

It is often said that a pregnant woman is "eating for two." Although this is technically correct, mothers to be often overestimates their need for additional calories, especially early in the pregnancy. For most women, the extra energy needs are easily met by adding a small snack or two during the day. Eating smaller amounts of food more frequently also has the benefit of helping with some of the uncomfortable side effects of pregnancy, including nausea and heartburn. The focus should be on increasing the consumption of nutrient dense foods and minimizing empty calorie foods that may provide the extra energy needed but

do not provide micronutrients that are needed in much higher amounts compared with increased caloric needs**(*Institute of Medicine, 2002).***

Before 2002, the advice for pregnant women was to increase their energy intake by approximately 300 kcal/day in the second and third trimesters. In 2002 the Institute of Medicine (IOM) revised the Dietary Reference Intake (DRI) recommendations for energy intake during pregnancy. The new recommendations are higher in total calories and more specific in how increased calorie needs should be distributed over the trimesters of pregnancy. The new recommendations advise no additional calories for the first trimester, add 340 kilocalories for the second trimester, and add 452 kilocalories for the third trimester ***(Panel on Macronutrients, Institute of Medicine, 2002).***

In a comprehensive study released in 2004, ***Butte et al***. reported that additional energy needs not only should differ by trimester but also should be based on the mother's preconception BMI.

Nutrient Needs During Pregnancy:

Protein:

Healthy fetal development is dependent on the availability of adequate protein, which provides the basic building blocks necessary for formation of enzymes, antibodies, muscle, and collagen ***(Strobel et al., 2007)***.

Collagen is used as the framework for skin, bones, blood vessels, and other body tissue. During pregnancy, the mother must consume adequate protein to meet the needs of her growing fetus in addition to meeting her own increased needs as she physically grows in size to carry her baby. To accommodate the high demand, the mother's body adapts during pregnancy to conserve protein. Hormones signal the body that she is in a state of anabolism, which causes her body to retain nitrogen for protein synthesis ***(Strobel et al., 2007)***.

The DRI for protein for a no pregnant woman is 0.8 g/kg/day, which comes to approximately 54 g/day for a 150-pound woman. The 2002 DRI for pregnant women recommends 1.1 g/kg/day of body weight or an additional 25 g/day to meet the needs of pregnancy. According to the National Health and Nutrition Examination Survey (NHANES), the average daily protein intake for a women