

MALAYSIAN NURSES' KNOWLEDGE ABOUT ADIPONECTIN AND ITS ASSOCIATION WITH GESTATIONAL DIABETES AND OBESITY IN PREGNANCY

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ABSTRACT

The prevalence of gestational diabetes mellitus (GDM) is increasing worldwide and even in Malaysia. Hence, the knowledge of adiponectin with regards to gestational diabetes mellitus is a key contributor to disparity in maternal and neonatal morbidities. This study aimed to assess nurses' knowledge of adiponectin and its association with gestational diabetes and obesity in pregnancy. A cross-sectional survey was employed. Respondents were selected by purposive sampling using a pre-tested, structured questionnaire. Ninety one nurses (100%) were aware that obesity increased adverse health outcome among pregnant women, but some confusion exists among nurses about adiponectin with regards to pregnancy. Most of the nurses lack confidence in providing care to pregnant women with many (82.4%) addressed the need for education on this topic. In the one-way ANOVA analysis, nurses' knowledge score was significantly associated with education level ($p < 0.001$) and working experience in maternity units ($p < 0.001$). This study demonstrates gaps in the knowledge of adiponectin and its association with obesity and pregnancy. Continuous nursing education for nurses on adiponectin and obesity-related issues in early pregnancy should be strengthened to enhance knowledge and confidence in providing quality antenatal services.

Keywords : Nurses, adiponectin, obesity, pregnancy, gestational diabetes

INTRODUCTION

GDM is a public health problem that currently affects a large part of the female population and has short and long-term consequences for the fetus and the mother. It has been reported that GDM affects 1%–14% of all pregnancies. Its incidence has been steadily rising and this reflects secular increases in maternal obesity (Lindsay, 2009; Bener, 2012). A national cross-sectional household survey conducted in 2006 involving childbearing women aged 18 years and beyond had identified the prevalence of diabetes as 11.6% despite measure taken to improve diabetes care in pregnancy since 1992 in Malaysia (Letchuman, *et al.*, 2010; Nirmala, *et al.*, 2013). This would be worrisome as GDM and obesity are associated with a number of adverse outcomes for the mother and foetus. For

example, the mother has a higher risk of Caesarean section, hypertensive disorders and developing type 2 diabetes later in life whereas the foetus may predispose to macrosomia, shoulder dystocia, Erb's palsy and asphyxia (Lindsay, 2009; Gasim, 2012).

Evidence revealed that GDM is associated with high body mass index (BMI) in pre-pregnancy and pregnancy stages. The combination of increased maternal adiposity and reduction in insulin sensitivity influenced by hormonal products appears to be the causative factors in insulin resistance during gestational period (Thyfault *et al.*, 2005; Chen *et al.*, 2006; Nagalla *et al.*, 2015).

Adiponectin, a hormone secreted by adipose tissue, possessed profound insulin-sensitizing properties (Kadowaki *et al.*, 2006). Adiponectin circulates at high concentrations in the plasma and has been linked to

obesity and insulin resistance diabetes (Mazaki-Tovi *et al.*, 2009; Miehle *et al.*, 2012, Haghiac *et al.*, 2014). Adiponectin secretion is inversely proportional to increase weight in obese individual. Low adiponectin in an obese individual increased the risks of negative clinical outcomes (Rosenberg, 2005; Mocarski and Savitz, 2012). Moreover, higher adiponectin level is associated with lower risk of diabetic mellitus type 2 across diverse population (Li *et al.*, 2009). GDM is associated with long term morbidity and mortality for the mothers (Type-2 diabetes mellitus, cardiovascular disease); and their infants (childhood obesity, metabolic syndrome) and the prevalence of this metabolic complication is constantly increasing (Mazaki-Tovi *et al.*, 2009; Miehle *et al.*, 2012, Haghiac *et al.*, 2014).

Healthcare providers' knowledge and confident, particularly adiponectin with regards to GDM and obesity is essential in providing antenatal health and surveillance of pregnant women. A study on improving healthcare providers' knowledge, attitude and practice found that general practitioners and nurses who have a higher level of knowledge and confidence lead to stronger trust, better monitoring, and better adherence to new reproductive health guidelines. Due to the lack of knowledge and low confidence in practice, healthcare provider face difficulties in prescribing treatment and are reluctant to diagnose, instead they preferred to refer patient to specialist (Himelfarb, 2004; Alotaibi *et al.*, 2016).

Knowledge is essential in everyday nursing practice. However, knowledge of adiponectin and its association with gestational diabetes and obesity in pregnancy among nurses have been under scrutiny. A study indicated that nurses' understanding the impact of maternal obesity to health and healthcare delivery is below the baseline (Kirk *et al.*, 2009). This is similar with the study of Knight *et al.*, (2010) which emphasized the importance of surveillance and evidence to address primary prevention in guiding appropriate management and service provision.

Data concerning nurses' knowledge of adiponectin with regards to GDM and obesity in early pregnancy; as well as their perceived confidence are limited. Furthermore, limited international or Malaysian research is available that reports on the role of nurses in adiponectin education and its association with gestational diabetes and obesity in pregnancy.

Therefore, the knowledge and confidence level of nurses towards caring for GDM obese women during pregnancy period cannot be accurately assessed. Importantly, it is imperative that nurses who represent the frontline providers of care for mothers to acquire a sound adiponectin-related knowledge with regard to GDM and obesity to prevent complication during pregnancy.

AIM

The aim of this study was to assess nurses' knowledge of adiponectin and its association with gestational diabetes and obesity in pregnancy in a referral teaching hospital.

METHODOLOGY

Study design and setting

A cross-sectional study was conducted from January to February, 2011 in the maternity units (Antenatal Ward, Postnatal Ward, Labour Room, and Antenatal Clinic), Hospital Universiti Sains Malaysia (Hospital USM), a referral and tertiary teaching hospital located on the northern east coast of peninsular Malaysia.

Population and sampling method

The study population included all registered nurses holding a certificate in midwifery division 1 with at least a year of clinical experience in maternity unit, Hospital USM with a willingness to participate in the study. Purposive sampling was used to recruit the respondents to the study. The number of respondents was determined by proportionate allocation based on the maternity staff strength and counterchecked using the Raosoft Inc. sample size calculator with 10% margin of error, 95% confidence interval and 50% response distribution rate (Raosoft Inc, 2004). After considering 20% drop out rate, the authors found the minimum required sample size was 80. Consenting respondents (91) were surveyed using a self-administered, structured questionnaire.

Ethical approval

Permission to conduct the study was approved by the Human Research Ethics Committee of USM. A letter of permission was also obtained from the director of Hospital USM.

Questionnaire design

The self-administered questionnaire used in this study was developed by the research team based on

literature reviews, which aimed to assess the nurses' knowledge regarding adiponectin and its association with GDM and obesity, particularly in early pregnancy and their perceived confidence in the provision of care for antenatal women. The questionnaire used in this study comprised three sections:

- Socio-demographic characteristics, including level of nursing educational status, clinical years of working experiences.
- Knowledge of adiponectin in relation to GDM and obesity in early pregnancy.

The nurses were asked about their knowledge on adiponectin in relation to GDM and obesity in early pregnancy, which was determined through 13 questions with 'True' and 'False' options. One mark was awarded to each correct response and zero was given to each wrong response. The total marks obtained were converted into a percentage from raw mark using the following formula: (raw mark x 100)/13. The level of knowledge was interpreted based on the percentage marks obtained, which were classified in three categories: poor (<50%), fair (≥50 to 80%) and good (≥80%).

- Confidence level in providing care and education on adiponectin.

The nurses were asked about their confidence level in providing education on adiponectin to mothers during early pregnancy, which were determined through 6 questions. For scaling the responses, 4-point Likert scale was used, and the options included 'strongly disagree', 'disagree', 'agree' and 'strongly agree'. Obtaining high scores indicated a desirable confidence level with regard to providing education on adiponectin to pregnant mothers; the maximum scores were 24.

Validity and Reliability

To ensure validity, drafts of the questionnaire were reviewed by three experts, including two senior lecturers specialising in obstetrics and one senior lecturer in midwifery. The questionnaire was pilot-tested on nurses with background of midwifery division maternity units followed by refinement of ambiguous or deletion of redundant questions before preparation of the final 19-item, structured questionnaire. The Cronbach's alpha value was 0.756, which was indicative of reasonable reliability (Tavakol & Dennick, 2011).

Data collection

Data were collected through a self-administered questionnaire. A research information sheet was distributed by the researchers to nurses after they have completed their shift. The nurses were informed that participation was entirely voluntary and they could refuse or were free to withdraw from the study at any time, without affecting their work status. They were also informed about the time to complete the survey (approximately 15 to 20 minutes). Written informed consent was obtained from respondents who agreed to participate in the study. Upon completion of the questionnaire, the survey questionnaire were collected by the researchers.

Data analysis

Data entry, descriptive and statistical analysis were performed using Statistical Package for Social Sciences (SPSS) software version 18.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics was presented as tables to show frequency distribution of scores as well as their percentage. One-way ANOVA was performed to assess the highest level of education and working experience of these nurses in relationships to knowledge score of adiponectin. Simple linear regression was used to evaluate the relationship between knowledge score of adiponectin on relation to GDM and obesity in early pregnancy with a confidence level of nurses in providing care and education. Level of statistical significance was set at $p \leq 0.05$.

RESULTS

A total of 91 nurses completed the questionnaire. Nine nurses dropped out of the study due to antenatal and maternity leave during data collection. Most nurses participating in this study holds a post-basic in midwifery division I (96.7%). Out of 91 nurses, 32 (35.2%) nurses had 16 years and more of clinical working experience in maternity units (Table 1).

Table 1. Socio-demographic characteristics of nurses (n=91)

Variables	Frequency (%)	
Highest Level of Education	Post-basic in Midwifery Div. I	88 (96.7)
	Post-basic in Midwifery Div. I & Bachelor's Degree	3 (3.3)
Clinical Working Experience in Maternity Units	1-5 years	22 (24.2)
	6-10 years	19 (20.9)
	11-15 years	18 (19.7)
	16 years and above	32 (35.2)

Knowledge of adiponectin with regards to GDM and obesity in pregnancy

All nurses (100%) were aware that obesity increase adverse health outcome to pregnant women (Table 2). However, it is evident that some confusion exists among nurses about adiponectin with regards to pregnancy. More than half of the nurses answered incorrectly the

questions regarding pregnant women with high concentrations of adiponectin at 1st and 2nd trimester. The nurses were unaware that this may increase risk during the period of pregnancy (52.7%) and that pregnant women with high concentrations of adiponectin during 1st and 2nd trimester is associated with the development of foetal abnormality (51.6%).

Table 2. Frequency and percentage of nurses' correct responses of knowledge on adiponectin (n=91)

S/N.	Knowledge on adiponectin in pregnancy	Correct response n (%)
1	Obesity increase adverse health outcome to pregnant women	91 (100.0)
2	Pregnant women with low concentration of adiponectin during the 1st and 2nd trimester are more likely to be at risk during the pregnancy period	71 (78.0)
3	Pregnant women with high concentrations of adiponectin during the 1st and 2nd trimester with an increased risk during the pregnancy period	43 (47.3)
4	Pregnant women with low concentrations of adiponectin during the 1st and 2nd trimester is associated with the development of fetal abnormality	60 (65.9)
5	Pregnant women with high concentrations of adiponectin during 1st and 2nd trimester is associated with the development of foetal abnormality	44 (48.4)
6	Pregnant women with low concentrations of adiponectin during the 1st and 2nd trimester are more likely to develop GDM	77 (84.6)
7	Pregnant women with high concentrations of adiponectin during the 1st and 2nd trimester are more likely to develop GDM	48 (52.7)
8	Obese pregnant women with low concentrations of adiponectin during the 1st and 2nd trimester are at risk to develop DM	56 (61.5)
9	Obese pregnant women with high concentrations of adiponectin during the 1st and 2nd trimester are at risk to develop DM	61 (67.0)
10	Low adiponectin levels have been associated with type 2 diabetes	74 (81.3)
11	High adiponectin levels have been associated with type 2 diabetes	46 (50.5)
12	Adiponectin is functions in glucose and fatty acid metabolism	88 (96.7)
13	Adiponectin play a role in inflammatory	66 (72.5)

Confidence level in providing nursing care

Majority of the nurses lack confidence in providing care to pregnant women. For example, most of them feel they have insufficient knowledge (strongly disagree/disagree response) regarding the relationships between plasma adiponectin and pregnancy (70.3%),

plasma adiponectin concentration and maternal overweight (70.3%) as well as adiponectin concentration and GDM (67.0%). Additionally, more than three quarter of the nurses (82.4%) think they require more education regarding the relationships between plasma adiponectin and pregnancy (Table 3).

Table 3. Confidence level of nurses in providing care (n=91)

S/N.	Statements	Frequency (%)			
		Strongly disagree	Disagree	Agree	Strongly agree
1	I have sufficient knowledge to provide health teaching for obese antenatal women	3 (3.3)	18 (19.8)	69 (75.8)	1 (1.1)
2	I have sufficient knowledge regarding the relationships between plasma adiponectin and pregnancy	4 (4.4)	60 (65.9)	27 (29.7)	0 (0)
3	I have sufficient knowledge regarding the relationships between plasma adiponectin concentration and maternal overweight	3 (3.3)	61 (67.0)	27 (29.7)	0 (0)
4	I have sufficient knowledge regarding the relationships between plasma adiponectin concentration and GDM	3 (3.3)	58 (63.7)	30 (33.0)	0 (0)
5	I feel confident to provide health education to obese antenatal women	1 (1.1)	27 (29.7)	62 (68.1)	1 (1.1)
6	I require more education regarding The relationships between plasma adiponectin and pregnancy	1 (1.1)	15 (16.5)	47 (51.6)	28(30.8)

Factors Associated with the Level of Knowledge of Nurses:

The nurses' knowledge score was significantly associated with education level ($p < 0.001$) and working experience in maternity units ($p < 0.001$) (Table 4).

Table 4. Factors affecting the knowledge score of nurses (n=91)

Variables	n	Knowledge score		
		Mean (SD)	Statistic	P-value
Level of Education				
Post-basic in Midwifery Div. 1	88	16.43 (5.341)	14.229	<0.001 ^a
Bachelor's Degree	3	10.67 (4.041)		
Working Experience in Maternity Units				
1-5 years	22	6.23 (2.844)	14.363	<0.001 ^a
6-10 year	19	9.16 (2.609)		
11-15 years	18	11.67 (2.142)		
16 years and above	32	9.38 (2.780)		

^a One-way ANOVA

Association between knowledge and confidence level

Table 5 indicates that there was no significant association between knowledge score of adiponectin on relation to GDM and obesity with respect to confidence level of the nurses in providing care to the pregnant women.

Table 5. Association of knowledge score and confidence level of the nurses (n=91)

Variables	Coefficient β (95% of CI)	t-Statistics	P-value
Total knowledge level	0.257 (-0.043, 0.556)	1.704	0.092

CI, confidence interval

Coefficient of determination (R^2) = 0.032

DISCUSSION

Nurses with midwifery division 1 are specialists in normal pregnancy and birth, and their role is to look after a pregnant woman and her baby throughout a phase of antenatal, labour and birth (Malaysian Midwives Board, 2006). The Millennium Development Goals (MDGs) address that knowledge is important to improve maternal health. It is our believe that clinical knowledge of adiponectin level and its association with GDM and obesity is crucial. Furthermore, care for women with normal pregnancy are carried out by nurses with midwifery division 1 as stated in the code of professional conduct and practice of a nurse and midwife (Malaysian Midwives Board, 2006). Hence, they are expected to be competent in both knowledge

and skills. Since obesity has become an emerging issue in pregnant women, it has been revealed that high adiponectin level is important in decreasing the risk of metabolic syndrome.

Nurses' knowledge of adiponectin with regards to GDM and obesity

All the nurses who participated in this study know that obesity increase the risk of adverse health outcome for pregnant women. However, the nurses had some confusion about adiponectin with regards to GDM and obesity during pregnancy. According to Leddy *et al.*, (2008), basic understanding of adiponectin was important for nurses, midwives and other healthcare professions in determining interventions for the obese pregnant women.

Nurses' confidence in providing care for mother during pregnancy

Majority of the nurses lack confidence in providing care to pregnant women. More than three quarter of them think there is a need for further training and education about adiponectin and its effect on pregnancy. Training can increase self-confidence of nurses in providing care and education to the pregnant women. This was supported by Bocquier *et al.*'s (2005) study which revealed that 80% of the general practitioners agreed training in the field of weight control is a need to have better management for the obese patients. Rurik *et al* (2013) also recommended that more education program for primary care provider is necessary to improve obesity management. Moreover, a study by Jezewski and Feng (2007) showed that education program regarding adiponectin and obesity in pregnant women, for the nurses without prior-exposure is warranted to increase quality of care for the mothers. Therefore, the findings from this study suggested that continuous nursing training and education programs about adiponectin with regards to GDM and obesity should be provided to nurses in maternity units to further concrete their confidence in providing care and health education on obesity and its management in case of pregnant women.

Associated factors of nurses' knowledge

Nurses with more working experience in maternity units scored higher than nurses who have less working experience. This finding is similar with Al-Ahmadi's (2009) study which indicated that both educational

level and working experience of a nurse in a particular field influence his/her skills in caring and in communication with patients. Another study (Hannon and Murphy, 2007) on nurses' knowledge on risks and lifestyle factors associated with osteoporosis also found that nurses with more working experience gained higher knowledge score than nurses with less working experience. Chong *et al.*, (2002) suggested that working experience can assist nurses to gain insight and increase knowledge along with this education programmes can equip the nurses with adequate confidence level. Therefore, nurses who obtained higher knowledge score may have gained their knowledge due to their working experiences in maternity units (Chong *et al.*, 2002).

Association of knowledge score with confidence level

This study failed to show the association between nurses' knowledge score of adiponectin with regards to GDM and obesity in relation their confidence level in providing care and health education to the pregnant women. However, this is in contrast with one early study from Singapore by Chong *et al.* (2002). This study suggested that raising nurses' knowledge directly increase their confidence level and ability to provide antenatal care to the mothers. This could be explained by the fact that knowledge can reinforce power,

subsequently leading to increase confidence level of a person (Perron *et al.*, 2005).

Limitations of the study

There were some limitations to this study. The small sample size from a referral teaching hospital make generalisations to the whole population of nurses working at the maternity units in Malaysia, or those in other developing and developed countries difficult. The findings of this study would suggest that a national study which involves several institutions and greater number of nurses is needed. Additionally, the questionnaire surveys are limited in that only specific questions are asked, thus limiting the type and scope of information collected from the study subjects.

CONCLUSION

The study showed a deficiency of knowledge in adiponectin existed among the nurses which may restrain their confidence level. In addition, responses indicated that many nurses did not have a comprehensive understanding of adiponectin and its association with gestational diabetes and obesity in pregnancy. It can be concluded that there is a need to advocate nurses for in-service continuous nursing education regarding adiponectin and its role in pregnancy.

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