

## RELATIONSHIP BETWEEN NUTRITIONAL KNOWLEDGE AND HEALTHY ATTITUDE AND PRACTICE DURING PREGNANCY

Mitra Mirsanjari<sup>1</sup>, Wan Abdul Manan Wan Muda<sup>1</sup>,  
Affizal Ahmad<sup>1</sup>, Mohd Shukri Othman<sup>2</sup>, Maryam Mosavat<sup>2</sup> & Mir Mehrdad Mirsanjari<sup>3</sup>

<sup>1</sup>School of Health Sciences, Universiti Sains Malaysia, 16150, Kubang Kerian, Kelantan.

<sup>2</sup>School of Medical Sciences, Universiti Sains Malaysia, 16150, Kubang Kerian, Kelantan.

<sup>3</sup>Department of Environmental Sciences, Malayer University, Malayer, Iran.

**ABSTRACT.** *In prenatal nutrition, intake of adequate and balanced diet is required for successful pregnancy outcomes. The aim of this study is to determine whether there is an association between different levels of nutritional knowledge of pregnant women and healthy attitude and practice. This was a cross-sectional study among a group of normal pregnant Malay women who were selected based on systematic sampling during their routine antenatal follow up in the clinic of Obstetrics and Gynaecology. A self-administered questionnaire of knowledge, attitude and practice of food and nutrition was used. The association of knowledge with healthy food practice and attitude was obtained with chi-square test. Findings of this study showed there was a significant association between level of nutritional knowledge and food practices on: frequency of snack ( $P= 0.003$ ) and fast food consumption ( $P= 0.043$ ), choice of healthy food for dinner ( $P = 0.005$ ) and lunch ( $P= 0.016$ ), frequency of eating chicken ( $P= 0.002$ ), consumption of vitamin and mineral supplements ( $P= 0.006$ ), type of activity during free time ( $P<0.001$ ), kind of drink ( $P= 0.038$ ), attitude about significance of physical activity ( $P= 0.003$ ) and most important items when buying foods ( $P= 0.006$ ). On the other hand, there was no significant association between knowledge level of participants and their frequency and type of breakfast intake ( $P= 0.836$ ), consumption of healthy snacks ( $P= 0.168$ ), frequency of consumption of fish and sea foods, meat, egg, beans, vegetables, fruits, and milk. This study showed most pregnant women have moderate or good nutritional knowledge. But their knowledge needs to be improved in order to affect their practices more effectively.*

**KEYWORDS.** Dietary habits, level of knowledge, pregnancy

### INTRODUCTION

Adequate nutritional intake during pregnancy has been recognized as an important factor for healthy pregnancy and desired birth outcomes (Bawadia *et al.*, 2010). It was found that deficiency of nutrients during gestation may cause the fetus to receive suboptimal micro and macro nutrients, causing inadequate intrauterine growth and development, inherited malformations, preterm deliveries, and pregnancy complications (Redmer *et al.*, 2004). Thus, attention to appropriate dietary behavior and proper nutrient intake will supply adequate nourishment to achieve optimum health for both mother and child (Wen *et al.*, 2010; Verbeke & De Bourdeaudhuij, 2007).

Studies show that nutritional knowledge affects the quality of food intake and also healthy choices of purchased food (O'Brien & Davies, 2007; Verbeke, 2008). Advancement of individual nutrition knowledge (NK) provides new information which may stimulate changing of attitude and subsequently result in enhancement of dietary practices (De Vriendt *et al.*, 2009). One study showed that health advice encouraged expectant mothers to improve their food intake (Anderson *et al.*, 1993); however another study indicated that higher knowledge of pregnant women was not an indicator to cause them to change their nutritional habits (Verbeke & De Bourdeaudhuij, 2007).

Given the importance of knowledge on attitude and practice, and given the existence of limited studies in Malaysia about nutritional knowledge of pregnant women and their dietary behaviours, the objective of this study is to examine whether different levels of nutritional knowledge of pregnant women

are significantly associated with healthy attitude and food practices. The findings of this study can reveal whether pregnant women's nutritional knowledge can result in healthy dietary behaviour including attitude and practice.

## MATERIAL AND METHOD

Sample size was calculated according to Rao soft sample size calculator with margin error of 5% and confidence level of 95%. Response distribution of 50% was considered for an estimated total of 357 respondents. A sample of 400 pregnant women participated; therefore the required sample size was fulfilled. Systematic sampling was carried out from pregnant women attending the Obstetrics and Gynecology clinic for antenatal care. Pregnant women were included in this study whose gestational stage was between 20<sup>th</sup> and 34<sup>th</sup> weeks. Gestational age was calculated from the woman's last normal menstrual period (LNMP) and/or an early ultrasound finding when LNMP was not known or unsure (Nicholson *et al.*, 2006).

This gestational age (20 to 34 weeks) was preferred because the discomforts due to nausea in the first trimester had receded and those related to late pregnancy such as backache, lower limb oedema or breathing difficulties had not yet begun (Couto *et al.*, 2009). Other inclusion criteria were pregnancy without any complications, Malay ethnicity, single foetus, and age of 18 to 44 years.

In this study Malay pregnant women were preferred as the majority (98%) of referees were Malay. Furthermore based on Malaysian adult nutrition survey 2003, Malay women have the highest mean BMI at 25.39 kg/m<sup>2</sup> compared to Chinese and Indian. Moreover, according to Mirnalini (2008) among the three major ethnic groups in Malaysia, Malay women had the highest intake of energy (1479± 17 kcal) and carbohydrates (215± 2.48) but protein and fat intake were less than Chinese and more than Indian ethnic groups.

Exclusion criteria consisted of diagnosis of complication at the time of enrollment (conditions such as: cervical incompetence, diabetes mellitus, hyper or hypothyroidism, gastric disorders, hypertension, pre-eclampsia, any type of placenta previa and bronchial asthma), and inability to correspond with research staff. Before the study, the research purposes were explained to the subjects. Only pregnant women who signed the consent form took part in the study. Data collection was performed from September 2010 to August 2011. The protocols of study were evaluated and approved by the Institutional Review Board of the Health Sciences Campus and Human Research Ethical Committee of the Universiti Sains Malaysia project code [JEPeM 229.4.(1.10)].

### ***Instruments***

The participants' nutritional knowledge, attitude and practices were assessed with a validated questionnaire developed by Technical Working Group on Research (TWG -R) (Karim *et al.*, 2008a). KAP questionnaire contained 57 questions including 8 demographic questions, 21 items for knowledge, 8 for attitude and 12 practice questions with 3 and 8 subdivisions for the last two questions respectively. The knowledge questions comprised 5 components (nutrient function, energy of food, nutrient insufficiency, food selection and supplies of nutrients) whereas the attitude and practice questions represented 4 concepts (dietary intake, affect of food on health, food alternatives and quality of diet). Each question of nutrition knowledge had four answer choices. Scores on the knowledge part of KAP questionnaire were calculated by giving one mark to each correct answer but no mark for an incorrect or void response.

Attitude questions consisted of various types of answers. For each question of attitude a 3 point-scale was presented. Two points were given for favorable responses and zero points for unfavorable. Answers with the neutral intermediate answer choice were given one point (Karim *et al.*, 2008a). In the practice part of the KAP questionnaire, questions with answers reflecting the frequency of usage of food items or exercise were given one point for the favorable answer and zero for the unfavorable one. For the questions with yes/no answer one point was given for the correct response and zero for the wrong answer.

There were six open ended questions for listing the names of foods or snacks or types of activity during free time. Answers in these questions were coded manually before entering the data. One point was allocated when two answers out of three were considered healthy preferences and zero was given when two answers were unhealthy. The minimum achievable score for each of the three parts was zero while the maximum score was 21, 16 and 21 for nutritional knowledge, attitude, and practice respectively. The raw scores of knowledge, attitude and practice were consequently converted to percentages.

According to the recommendation of the Technical Working Group on Research of Ministry of Health, the categories of nutrition knowledge were considered poor for percentages < 50% with scores 0-9, moderate for 51-74% with 10-14 and good for percentages above 75% with 15-21 (Karim *et al.*, 2008a). According to this categorization, we considered attitude as negative for percentages of 0 to 50%, moderate for 51 to 74% and positive for percentages above 75%. Practice was assessed as poor for percentages of 0 to 50%, moderate for 51- 74% and good for percentages above 75%. (Pon *et al.*, 2006).

### ***Statistical Analysis***

Data entry and analysis were completed using SPSS version 18.0. Mean and standard deviation for continuous variables and frequency of categorical variables were obtained through descriptive analysis. Association between different levels of knowledge (poor, moderate and good) and different nutritional practices and attitude (healthy and unhealthy) were obtained using chi-square tests with a significant level of  $\alpha$  less than 0.05. Multiple Linear Regression Analysis was used to obtain the association between nutrition knowledge and demographic and gestational characteristics.

## **RESULTS**

The mean and standard deviation (SD) of participants' demographic and gestational characteristics are shown in Table 1. Participants' age ranged from 18 to 42 with mean 29.68 (SD= 5.02). Mean (SD) of nutritional knowledge score was 13.8 (3.4), indicating 65.7% correct responses. Preliminary analysis of simple linear regression for demographic and gestational variables showed that household size, housing tenure, occupation, educational level, monthly income, number of pregnancies and number of deliveries had a significant association with nutrition knowledge. Multiple linear regressions revealed that only occupation (adjusted b= 1.72, 95% CI 1.07, 2.37,  $p < 0.001$ ) and educational level (adjusted b= 2.83, 95% CI 2.18, 3.47,  $p < 0.001$ ) were significant predictor factors for nutritional knowledge.

Results of this study (Table 2) show significant association between groups with different levels of nutritional knowledge (poor, moderate and good) and healthy snack consumption of two or more times per day ( $p = .003$ ); eating fast foods 2-3 times per month or less ( $p = .043$ ); healthy choice of food for dinner and lunch including different food groups ( $p = .005$  and  $.016$ ) respectively; consumption of chicken every day or 2-3 times per week ( $p = .002$ ), healthy drink selection ( $p = .038$ ); healthy intake of vitamin and mineral supplements ( $p = .006$ ); healthy activity during free time such as sport or outdoor activity ( $p < .001$ ); attitude about significance of physical activity for human health ( $p = .003$ ) and nutrient content or good for health as the most important factors while buying foods ( $p = .006$ ). On the contrary, there was no significant association between knowledge groups of participants and their frequency of eating breakfast ( $p = .691$ ), type of breakfast taken ( $p = .836$ ), and consumption of healthy snacks ( $p = .168$ ).

**Table 1. Mean and standard deviation of demographic and gestational characteristics.**

Variables	n	Mean (SD, range)
Age (years)	400	29.6 (5.0, 18-44)
Gestational age(weeks)	400	26.6 (4.4, 20-34)
Household size	399	4 ( 2, 1-14)
Hemoglobin ( g/dl)	379	11.7 (1.0, 7.3-14.8)
Weight (kg)	376	60.4 (12.2, 36.5-100)
Height (cm)	379	155.3 (5.8, 139-178)
Gravid	399	<b>Frequency (%)</b>
Primi gravida (1)		117 (29.3)
Multi gravida (2-5)		235(58.8)
Grand multigravida (> 5)		47(11.7)
Parity	399	
0-1		215(53.8)
2-4		155(38.8)
>= 5		29(7.2)
Abortion	399	
0		295(73.9)
1-2		83(20.8)
≥ 3		21(5.2)
Education level		
Lower education	400	155(38.7)
Higher education		245(61.2)
Monthly income (RM)		
≤1500	399	118(29.0)
1501-3500		156(38.9)
>3500		125(30.9)

**Table 2: Some questions of knowledge, attitude and practice on food and nutrition questionnaire.**

<b>Knowledge</b>
1. Over consumption of energy (calories) can lead to:
2. The following items are important information on a food label, except...
3. Body mass index is an indicator of...
4. In order to avoid obesity and maintain a desirable body weight we have to balance our food intake with:
5. The risk of consuming food with excessive sugar is...
<b>Attitude</b>
1. State your preference for fast foods e.g. Burger, hotdog, pizza, fried chicken:
2. When you go to buy food items what are your priorities?
3. Shade the 3 main sources from which you acquire nutrition information.
4. To what is extent physical activity important for health?
<b>Practice</b>
1. Specify 3 types of food you normally eat for breakfast.
2. Specify 3 types of food you normally eat for lunch.
3. Specify 3 types of food you normally eat for dinner.
4. How often do you eat egg?
5. How often do you eat chicken or duck?
6. How often do you eat snacks?
7. How often do you eat fruits?
8. How often do you exercise for at least twenty minutes each time?

**Table 3. Association of nutritional knowledge and healthy or unhealthy attitude and practice.**

Attitude †† / practice †	n	Knowledge						X <sup>2</sup> (df)	p value
		poor n(%)		moderate n(%)		good n(%)			
		Unhealthy	Healthy	Unhealthy	Healthy	Unhealthy	Healthy		
Type of snack †	401	34(18.3)	38(17.7)	93 (50)	90(41.9)	59(31.7)	87(40.5)	3.563(2)	0.168
Frequency of eating snacks †	401	64(18.7)	8(13.6)	165(48.2)	18(30.5)	113(33)	33(55.9)	11.456(2)	0.003
Attitude to fast foods ††	400	54(16.5)	17(23.3)	153(46.8)	30(41.1)	120(36.7)	26(35.6)	1.985(2)	0.371
Frequency of eating fast food †	397	35(23.3)	36(14.6)	69(46.0)	112(45.3)	46(30.7)	99(40.1)	6.276(2)	0.043
Food preference for breakfast †	398	29(16.4)	41(18.6)	83(46.9)	99(44.8)	65(36.7)	81(36.7)	0.357(2)	0.836
Food preference for dinner †	398	24(26.4)	46(15)	45(49.5)	137(44.6)	22(24.2)	124(40.4)	10.566(2)	0.005
Food preference for lunch †	398	6(30)	64(16.9)	12(60)	170(45)	2 (10)	144(38.1)	6.870(2)	0.016
Frequency of eating chicken †	401	29(28.4)	43(14.4)	47(46.1)	136(45.5)	26(25.5)	120(40.1)	12.847(2)	0.002
Type of drink †	401	17(12.7)	55(20.6)	58(43.3)	125(46.8)	59(44)	87(32.6)	6.565(2)	0.038
Taking vitamin & mineral supplements †	401	15(34.9)	57(15.9)	18(41.9)	165(46.1)	10(23.3)	136(38)	10.127(2)	0.006
Type of activity during free time †	401	30(12)	42(27.6)	115(46.2)	68(44.7)	104(41.8)	42(27.6)	17.989(2)	<0.001
Importance of physical activity ††	395	18(32.7)	53(15.6)	25(45.5)	156(45.9)	12(21.8)	131(38.5)	11.391(2)	0.003
Frequency of physical activity †	401	46(15.8)	26(23.6)	132(45.4)	51(46.4)	113(38.8)	33(30)	4.453(2)	0.108
Most important when buying food ††	401	33(27.3)	39(13.9)	48(39.7)	135(48.2)	40(33.1)	106(37.9)	10.265(2)	0.006
Least important when buying food ††	401	7(36.8)	65(17)	5(26.3)	178(46.6)	7(36.8)	139(36.4)	5.595(2)	0.061
Frequency of eating breakfast †	401	13(21)	59(17.4)	29(46.8)	154(45.4)	20(32.3)	126(37.2)	0.739(2)	0.691

## DISCUSSION

In this study the association between nutrition knowledge (NK) of pregnant women and their nutritional behaviour was obtained in order to examine whether higher level of NK contributed to healthier nutritional practices and positive attitudes. Maternal healthy nutrient intake during pregnancy may affect the wellbeing of expectant mother (Nielsen *et al.*, 2006), and developing fetus (Sanjeev *et al.*, 2011), birth outcomes (Bawadi *et al.*, 2010) and child's disease in adulthood (Barker, 2001).

The results of this study showed that nutrition knowledge of pregnant women was significantly associated with healthier choice of foods for their daily meal (lunch and dinner) and type of drinks, rare consumption of fast foods, and frequent consumption of chicken and healthy use of vitamin and mineral supplements. These findings seem to confirm those of previous studies which stated that higher NK results in healthier dietary intake especially fruit and vegetables (Wardle *et al.*, 2000), cereals, dry vegetables, cheese and unsaturated fat (Dallongeville *et al.*, 2001). The association of NK and healthy eating habits can be explained by the fact that individual exposure to new information may possibly arouse changes in attitude and consequently result in enhanced dietary behaviour (O'Brien & Davies, 2007; Verbeke, 2008).

Our study also revealed no significant difference between different groups of NK (poor, moderate and good) regular breakfast intake, healthy choice of food for breakfast, kinds of snacks usually consumed, and regular consumption of fish and sea food, meat, beans, egg, vegetables, fruits, and milk. Surprisingly our study showed significant association between knowledge and unhealthy types of physical activity during leisure time. Although the association between knowledge score and attitude about the importance of physical activity for health was significant.

Showing no or negatively significant difference may be contributed to the fact that knowledge by itself may be not enough to encourage healthy dietary behaviour (Shepherd & Towler, 1992; Wardle *et al.*, 2000; Worsley, 2002). Although lack of knowledge, as reported by Buttriss (1997), was the most important barrier in encouraging changes in food habits (Karim *et al.*, 2008b), some other factors also may influence a person's nutritional habits. Evidence shows that dietary behavior is also determined by factors such as demographics (Smith & Owen, 1992), lifestyle and health factors (Tuorila & Pangborn, 1988) and socio- psychological factors (Kristal *et al.*, 1995).

Furthermore, less attention to nutritional advice may be due to dietary conservatism and apathy which are considered the most common obstacles to change of dietary habits (Buttriss, 1997). Other barriers the person may encounter include: cost of food and limited income, being busy and not having enough time for preparation and consumption of food, difficulty of taste modification such as giving up liked food and acceptance of unappealing foods (Kearney & McElhone, 1999).

The current study also showed that the demographic variables of education level and occupation were only two predictor factors for NK. These findings are consistent with those of other research that indicated more educated people showed significantly better NK (Parmenter *et al.*, 2000). A possible explanation for this might be that more educated people may be better able to use educational materials like newspapers, books, internet and academic resources in their daily life. The association of NK and occupation in our study is also consistent with that of the other study in which NK about anaemia among females of reproductive age was significantly associated with type of occupation (Upadhyay *et al.*, 2011).

## SUMMARY AND CONCLUSION

Malnutrition is considered a main health problem among communities of developing countries, particularly in southern Asia and sub-Saharan Africa (Schofield & Ashworth, 1996), (World Health Organization, 2002). Deficiency of macro-nutrients (protein, carbohydrates and fat, leading to protein-energy malnutrition) or micro-nutrients (electrolytes, minerals and vitamins, leading to specific micro-nutrient deficiencies) or both are common. (Millward & Jackson, 2004). One of the most probable causes may be transition of communities toward modernism which influences their life style.

Lifestyle of people in Malaysia, one of the most rapid developing countries, has been highly modified because of noticeable socio-economic advancements during recent decades (Ismail *et al.*, 2002). This condition causes communities to proceed towards the ‘westernization’ of eating habits with increased consumption of energy, fat and carbohydrates, skipping meals and depending on fast-food too much (Noor, 2002). Unhealthy nutritional behavior may have particular effect on the health of women during pregnancy since evidence demonstrates that nutritional deficiencies are common among women of reproductive age in developing countries (Villar *et al.*, 2006), (Makrides & Gibson, 2000). This situation may reflect on the health of mother, fetus and next generation because of nutrition’s role as the main intrauterine environmental factor which may affect the fetal genome and have lifelong consequences (Wu *et al.*, 2004).

Strategies for achievement of healthy lifestyle have been conducted by the government through Healthy Lifestyle (HLS) Programmes with the aim of instilling a culture of healthy eating (Noor, 2002). In addition one of the most specific focus areas of National Plan of Action for Nutrition of Malaysia (NPANM) for 2006-2015 was a rehabilitation program for pregnant women (Malaysia, 2003). Enhancement of knowledge, as a necessary factor, through educational and training programs is assumed to result in healthy behavior and practices but it seems not to be enough. Other factors may also influence an individual’s dietary habits such as lifestyle and health issues, demographic characteristics, social and physiological factors (Obayashi *et al.*, 2003). The current study tried to reveal the association of nutrition knowledge to healthy lifestyle of one group of Malay pregnant women during gestation. Realizing this relationship may help to investigate to what extent personal information influenced behavior.

➤ There are some strengths and limitations of this study. Participants in our study were pregnant women who attended antenatal care clinic in a governmental hospital. The place of study provided the opportunity of attendance for respondents with a diversity of socio demographic characteristics. The respondents were from diverse regions of Kelantan state. The large number of samples provided the maximum representation within a normal population of pregnant women.

➤ This study used KAP questionnaire for data collection on nutrition knowledge and its affect on healthy dietary intake. More confirmative information could be obtained by recording 24 dietary recalls of pregnant women. Since the study was conducted during waiting time in antenatal clinic, more dietary information might be obtained if additional specific time apart from care clinic was provided for pregnant women.

➤ Future research in this area may examine the effectiveness of educational programs on healthy nutritional behavior in other parts of the country in different or same population groups. Furthermore, this study suggests that efforts have to be made to continue nutrition education programs with enhancing of knowledge and awareness about food selection decisions according to nutritional content and health of food rather than flavour.

## ACKNOWLEDGEMENT

We would like to thank the pregnant women who participated in this study for being so generous with their time. Appreciation is extended to the midwives at the Obstetrics and Gynecology clinic in Hospital Universiti Sains Malaysia for their co-operation and support. We would like to thank and acknowledge Universiti Sains Malaysia (USM) for financial support of the study through Research University, Postgraduate Research Grant Scheme (1001/PPSK/ 8144011).

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