MATERNAL MILK SUPPLEMENTATION AMONG PREGNANT WOMEN IN KUANTAN, PAHANG

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ABSTRACT

Pregnancy is a crucial period for mothers to ensure proper weight gain and adequate nutrients intakes. This is important for healthy fetal growth. There are increasing numbers of maternal milk supplements which claimed to provide the essential nutrients that are needed during pregnancy such as iron, folic acid, and docohexanoic acid. The current study was conducted to assess the practice of maternal milk supplements (MMS) intake among pregnant women in Kuantan, Pahang, whether or not its consumption plays a role in meeting the requirements for total energy and nutrients intakes. Questionnaires regarding intake of MMS were distributed to 150 subjects to observe the practice of its consumption. A total of 54 subjects (from 2nd and 3rd trimesters) were interviewed to obtain their diet history using multiple pass 24-hours dietary recall method. Their total energy and nutrients intakes were compared to the Recommended Nutrients Intake for Malaysia (RNI, 2005). It was found that almost three quarter (70%) of the subjects consumed MMS. Women who consumed MMS during pregnancy were found to be significantly younger, of lower parity and lower pre-pregnancy body mass index. It was also shown that the women's dietary intakes without MMS supplementation were insufficient to meet the RNI for total energy and some selected nutrients. The results of this study indicate that MMS could play a role in increasing the dietary intakes of total energy, protein, and calcium, of pregnant women who are not consuming these nutrients sufficiently as recommended.

KEYWORDS: Maternal milk supplementation, Pregnancy, Energy, Nutrients, Dietary intake

INTRODUCTION

Pregnancy is one of the crucial periods of being a mother. It is important to pay a very special attention on body weight and food intake during pregnancy because it will determine the extent of fetal growth (Andersen *et al.*, 2002). According to Recommended Nutrient Intake (RNI) for Malaysia, pregnant women should add approximately 280 kcal and 470 kcal for 2nd and 3rd trimester, respectively, accordingly (National Coordinating Committee on Food and Nutrition, 2005). Without proper management of weight gain and nutrients intakes during pregnancy, it may lead to undesirable effects for both mother and fetus (Miese-Looy, Rollings-Scattergood and Yeung, 2008). Based on Shin & Song (2015) and Yekta *et al.* (2006), pregnant women with pre-pregnancy body mass index (BMI) less than 19.0 kg/m^2 tend to give birth to small-for-gestational age infants. In contrast, overweight and obese pregnant women have higher risk to develop more complications such as miscarriage, stillbirth, hypertension and diabetes (Boots and Stephenson, 2011; Salihu, 2011).

Milk is one of the important foods during pregnancy for many cultures as it provides energy and other essential micronutrients which benefit birth outcomes (Borazjeni, Ahmadi and Shahri, 2011). Requirements for essential nutrients during pregnancy such as protein, vitamin D, and calcium, may be achieved by consuming one to two servings of milk daily (Conway, 2012). It has also been reported that milk consumption is one of the significant predictors of birth weight, where each additional cup of milk consumed daily was associated with a 41 g increase in birth weight (Mannion, Gray-Donald and Koski, 2006).

Nowadays, with the advancement of food technology, the maternal milk supplements (MMS) are increasingly available in the market. The MMS products are fortified and claimed to provide the essential nutrients which are needed during pregnancy such as folic acid and docohexanoic acid (DHA). Recently, the consumption of these MMS is gaining wide popularity among pregnant women in Malaysia. Therefore, the present study was performed to identify the practice of MMS consumption among pregnant women in Kuantan, Pahang, and its potential association with their total energy and nutrients intakes.

MATERIAL AND METHODS

Respondents

This cross-sectional study was conducted at two health clinics located in Kuantan, Pahang. The respondents were pregnant women who attended these clinics for regular antenatal check-up. Before recruitment into the study, the research purpose was explained to and verbal consent was obtained from, the subjects.

Study protocol

There were two phases of the data collection. In Phase 1, subjects answered a set of self-administered questionnaires. This questionnaire consisted of questions concerning demographic and anthropometry data, and information regarding MMS consumption. Subjects who reported to consume MMS during this pregnancy period were then invited to participate in Phase 2, in which multiple pass 24-hours dietary recall was conducted. A food checklist was constructed based on Malaysian foods which contain several essential nutrients during pregnancy such as folic acid, vitamin D, iron and calcium. Dietary intakes of subjects were assessed (by including and excluding MMS intake) using Nutritionist Pro Software (Axxya Systems LLC, Stafford, Texas, USA). Other types of supplements i.e. vitamin-mineral supplements prescription by doctors consumed by subjects were also taken into consideration.

Statistical analysis

The data are presented as mean ± standard deviation (SD) using the Statistical Package for Social Science (SPSS) software Version 14.0. Independent t-test and Chi-square test were performed to analyze the prevalence of MMS consumption according to demographic data. In addition, comparison between total energy and nutrients intakes (with and without MMS intake) and the recommended values (RNI, 2005) were assessed using one-sample t-test.

RESULTS

Demographic characteristics

A total of 150 subjects aged 17 to 42 years old completed the questionnaire regarding MMS consumption in Phase 1 (Table 1). This comprised of 14%, 42%, and 44%, of subjects in 1st, 2nd, and 3rd trimesters, respectively. The mean for gestational age was 24.6 ± 9.4 weeks (range 3 to 41 weeks). Based on self-reported height and pre-pregnancy weight, the pre-pregnancy BMI of the subjects ranged from 14.2 kg/m^2 (underweight) to 37.6 kg/m^2 (obese class II).

Table 1
Demographic characteristics of the respondents (n = 150)

Characteristics	Mean ± SD	Range
Age (years)	30.1 ± 5.0	17.0 – 42.0
Gestational age (week)	24.6 ± 9.4	3.0 – 41.0
Pre-pregnancy weight (kg)	57.5 ± 12.7	32.0 – 101.0
Height (m)	1.6 ± 0.1	1.4 - 1.7
Pre-pregnancy BMI (kg/m^2)	23.6 ± 4.9	14.2 - 37.6
Parity	2.5 ± 1.5	1.0 – 7.0

Consumption of Maternal Milk Supplements

In the present study, 70% of the subjects (n=105) consumed MMS during pregnancy. The respondents reported to be consuming 1.87 ± 0.68 (ranging 1 to 5) glasses of MMS daily. Out of this, 56% (of which 43 were primiparous) reported that this was the first time they have ever consumed MMS. The rest of the subjects (44%) had been consuming MMS since their previous pregnancies.

As for choice of MMS, 46% of the subjects reported that they chose specific brands based on the nutritional claims. Approximately 27% of these women explained that they consumed MMS for the benefit of their unborn babies. The rest of the respondents consumed these MMS due to, the encouragement of healthcare providers, friends or family members, advertisements, and as meal replacement during bouts of morning sickness.

About 30% of the subjects (n=45) did not consume MMS during pregnancy. However, they reported to drink other types of milk such as low fat cow's milk, goat's milk, and soybean milk. Among the reported reasons for not taking MMS were; belief that regular milk such as full cream or low fat milk could provide the nutritional benefits similar to MMS. In addition, more than half (56%) of the subjects reported of having side effects while consuming cow's milk (including these MMS products), which might be due to lactose intolerance.

Maternal Milk Supplementation Practice

The age, parity and pre-pregnancy BMI were significantly different between groups of subjects who did and did not consume MMS, as shown in Table 2. Women who consumed MMS were significantly younger (29.5 ± 4.7 vs 31.4 ± 5.5 years old, $p=0.03$), and had lower parity (2.2 ± 1.3 vs 3.2 ± 1.7, $p=0<0.001$), than those who did not consume MMS. Other than that, MMS consumers were significantly ($p=0.04$) of lower BMI (23.1 ± 4.8 kg/m²) compared to the non-consumers (25.0 ± 5.0 kg/m²). However, there were no differences in terms of occupation, total income, and educational levels, between both groups.

Total Energy and Nutrients Intakes

Among the respondents, only 54 agreed to participate in the Phase 2 of the study (comparison of the total energy and nutrient intakes against RNI for Malaysia). These included 24 women from 2nd trimester and 30 women from 3rd trimester, of pregnancy. Initially, all trimesters were planned to be included in this phase. However, by the end of the study, only seven subjects from 1st trimester managed to be interviewed for dietary recall. Due to this small number of respondents, it was decided to only include the subjects from the 2nd and 3rd trimesters.

Table 2
Demographic characteristics of the respondents in relation to MMS consumption

Characteristics	Consuming MMS (n=105)		Not Consuming MMS (n=45)		*p*-values
	Mean / No	(Range / %)	Mean / No	(Range / %)	
Age	29.5	(17– 41)	31.5	(20– 42)	[a] 0.03
Parity	2.2	(1– 6)	3.2	(1– 7)	[a] <0.001
Gestational Age (week)	25.4	(9– 41)	22.5	(3 – 39)	[a] 0.09
Height (m)	1.56	(1.4 - 1.7)	1.56	(1.5 - 1.7)	[a] 0.88
Pre-pregnancy Weight (kg)	56.2	(32.0 - 92.0)	60.5	(40.0 - 101.0)	[a] 0.06
Pre-pregnancy BMI (kg/m^2)	23.1	(14.2 - 37.0)	25.0	(17.5 - 37.6)	[a] 0.04
Occupation					
- Working	60	(75.0%)	20	(25.0%)	[b] 0.51
- Not Working	45	(64.3%)	25	(35.7%)	
Monthly Income					
- First Class	13	(65.0%)	7	(35.0%)	[b] 0.61
- Second Class	92	(70.8%)	38	(29.2%)	
Educational Level					
- Lower education	65	(67.7%)	31	(32.3%)	[b] 0.46
- Higher education	40	(74.1%)	14	(25.9%)	

[a] Independent t-test; [b] Chi-square test

The total energy consumption was assessed according to specific age (19 to 29 years and 30 to 50 years) (Table 3). This is because these two groups have different requirements according to RNI (2005). Among the 2nd trimester mothers, the mean total energy (2,247 ± 364 kcal) with MMS among respondents aged 19 to 29 years showed no significant difference compared with the RNI. Whereas for the older group (30 to 50 years), the total energy consumed (2,233 ± 416 kcal) was significantly (*p=0.013)* lower than the recommended value. However, the mean total energy of both age groups, were found to be significantly (*p=0.08 and p<0.001,* respectively) did not meet the RNIs after excluding the energy contribution of MMS (Table 4). In terms of protein, the mean intake with MMS (89.2 ± 25.5 g) was significantly (p<0.001) higher than RNI. Vitamin D was significantly (p<0.001) lower than the RNI without MMS consumption but no difference was observed with its intake. It was also found that folic acid (p<0.001) and iron (p<0.001) intakes were higher than their RNIs even by excluding the nutrients contributed by the MMS. For calcium, the mean intake was significantly (p<0.001)

greater than RNI with the consumption of the MMS but was significantly ($p<0.001$) lower than recommendation without it. Fiber intake, on the hand, was significantly below the recommendation either with or without the MMS consumption ($p<0.001$, respectively).

Table 3
Intakes of total energy and nutrients (including MMS) compared to their RNIs in the 2nd trimester (n=24)

Energy and nutrients	RNI for Malaysia, (2005)	Nutrient intake with MMS (Mean ± SD)	Range	*p*-values[a]
Total energy (kcal)				
• Age 17 – 29 (n =9)	1890	2247 ± 364	1786 – 2970	0.378
• Age 30 – 50 (n =15)	1940	2233 ± 416	1460 – 3156	0.013
Protein (g)	61	89.2 ± 25.5	61.6 – 166.8	<0.001
Fiber (g)	20-30	5.9 ± 3.1	2.0 – 12.8	<0.001
Vitamin D (µg)	15	3.1 ± 12.4	0.0 – 61.2	0.474
Folic acid (ug)	600	3860 ± 2030	308 – 5013	<0.001
Iron (mg)	100	192.7 ± 104.8	20.7 – 435.0	<0.001
Calcium (mg)	1000	2402 ± 1099	687 – 5639	<0.001

RNI – Recommended nutrient intake; MMS – maternal milk supplementation
[a] using one sample T-test

Table 4
Intakes of total energy and nutrients (excluding MMS) compared to their RNIs in the 2nd trimester (n=24)

Energy and nutrients	RNI for Malaysia, (2005)	Nutrient intake without MMS (Mean ± SD)	Range	*p*-values[a]
Total energy (kcal)				
• Age 17 – 29 (n =9)	1890	1883 ± 406	1412 – 2789	0.008
• Age 30 – 50 (n =15)	1940	1912 ± 428	1160 – 2856	<0.001
Protein (g)	61	66.7 ± 17.0	41.7 – 110.9	0.242
Fiber (g)	20-30	5.9 ± 3.1	2.0 – 12.8	<0.001
Vitamin D (µg)	15	0.0 ± 0.1	0.0 – 0.4	<0.001
Folic acid (ug)	600	3778 ± 2166	73 – 5009	<0.001
Iron (mg)	100	177.6 ± 103.1	7.0 – 410.4	<0.001
Calcium (mg)	1000	433 ± 188	192 – 915	<0.001

RNI – Recommended nutrient intake; MMS – maternal milk supplementation
[a] using one sample T-test

For the 3rd trimester subjects, total energy intake (with the consumption of MMS) of both age groups was not significantly different than the recommended values. However, when the energy supplemented by MMS was excluded, the means of total energy intake among subjects aged 19 to 29 years old (2017 ± 465 kcal, *p<0.001*) and aged 30 to 50 years old (2118 ± 558 kcal, *p=0.015*) demonstrated significantly lower values compared to their respective RNIs (Tables 5 and 6). The respondents demonstrated significantly higher protein intake than recommended,

with (p=0.002) or without (p<0.001) the consumption of MMS. Intakes of other nutrients among the 3rd trimester mothers generally showed a similar pattern to those of the 2nd trimester respondents.

Table 5
Intakes of total energy and nutrients (including MMS) compared to their RNIs in the 3rd trimester (n=30)

Energy and nutrients	RNI for Malaysia, (2005)	Nutrient intake with MMS (Mean ± SD)	Range	*p*-values[a]
Total energy (kcal)				
• Age 17 – 29 (n =20)	2080	2307 ± 471	1674 – 3365	0.139
• Age 30 – 50 (n =10)	2130	2406 ± 574	1508 – 3331	0.211
Protein (g)	78	107.2 ± 72.4	56.8 – 471.4	0.002
Fiber (g)	20-30	9.5 ± 5.2	2.9 – 21.7	<0.001
Vitamin D (µg)	15	4.3 ± 2.0	0.2 – 10.2	0.075
Folic acid (ug)	600	4452 ± 1440	472 – 5012	<0.001
Iron (mg)	100	209.5 ± 73.6	19.6 – 258.6	<0.001
Calcium (mg)	1000	1360 ± 440	640 – 2412	<0.001

RNI – Recommended nutrient intake; MMS – maternal milk supplementation
[a] using one sample T-test

Table 6
Intakes of total energy and nutrients (excluding MMS) compared to their RNIs in the 3rd trimester (n=30)

Energy and nutrients	RNI for Malaysia, (2005)	Nutrient intake without MMS (Mean ± SD)	Range	*p*-values[a]
Total energy (kcal)				
• Age 17 – 29 (n =20)	2080	2017 ± 465	1445 – 3065	< 0.001
• Age 30 – 50 (n =10)	2130	2118 ± 558	1358 – 3146	0.015
Protein (g)	78	78.3 ± 20.9	39.0 – 128.0	<0.001
Fiber (g)	20-30	6.1 ± 4.4	1.1 – 20.4	< 0.001
Vitamin D (µg)	15	0.2 ± 0.5	0.0 – 2.5	< 0.001
Folic acid (ug)	600	4417 ± 1523	112 – 5008	<0.001
Iron (mg)	100	195.2 ± 72.6	11.5 – 246.7	< 0.001
Calcium (mg)	1000	461 ± 220	140 – 1091	< 0.001

RNI – Recommended nutrient intake; MMS – maternal milk supplementation
[a] using one sample T-test

The frequency and percentage of total energy and nutrients intakes meeting the recommendations (RNI, 2005) among the respondents in both trimesters, including and excluding energy and nutrients from MMS, were presented in Tables 7 and 8. It can be observed that most of the subjects did not meet RNI for total energy (according to age groups and trimesters).

Table 7
Prevalence of respondents meeting the RNIs in the 2nd trimester (n = 24)

Energy and nutrients	RNI for Malaysia (2005)	Meeting RNI With MMS n (%)	Meeting RNI Without MMS N (%)
Total energy (kcal)			
• Age 17 – 29 (n =9)	1890	3 (33.0)	1 (11.0)
• Age 30 – 50 (n =15)	1940	4 (27.0)	1 (7.0)
Protein (g)	61	23 (95.8)	12 (50.0)
Fiber (g)	20-30	0 (0.0)	0 (0.0)
Vitamin D (µg)	15	2 (8.3)	0 (0.0)
Folic acid (ug)	600	18 (75.0)	18 (75.0)
Iron (mg)	100	20 (83.3)	19 (79.1)
Calcium (mg)	1000	22 (91.7)	0 (0.0)

RNI – Recommended nutrient intake; MMS – maternal milk supplementation

Table 8
Prevalence of respondents meeting the RNIs in the 3rd trimester (n = 30)

Energy and nutrients	RNI for Malaysia (2005)	Meeting RNI With MMS n (%)	Meeting RNI Without MMS n (%)
Total energy (kcal)			
• Age 17 – 29 (n =20)	2080	8 (40.0)	3 (15.0)
• Age 30 – 50 (n =10)	2130	2 (20.0)	2 (20.0)
Protein (g)	78	29 (96.7)	25 (83.3)
Fiber (g)	20-30	2 (6.7)	1 (3.3)
Vitamin D (µg)	15	18 (60.0)	0 (0.0)
Folic acid (ug)	600	29 (96.7)	28 (93.3)
Iron (mg)	100	28 (93.3)	26 (86.7)
Calcium (mg)	1000	21 (70.0)	1 (3.3)

RNI – Recommended nutrient intake; MMS – maternal milk supplementation

DISCUSSION

This study aimed to investigate the prevalence of MMS consumption among pregnant women and to evaluate their total energy and nutrients intakes during pregnancy. It was found that 27% of the mothers consumed MMS as they perceived it to be good for baby's growth. This reason is in line with the result stated in previous research in which half of the subjects did several changes in their diet, including consuming milk, believing it would benefit both mother and baby (Anderson et al., 1996). It was also found that over about half of the participants who did not consume MMS reported that MMS consumption would cause some gastrointestinal effects. These mothers may have self-diagnosed themselves as lactose-intolerant. However, the prevalence of lactose intolerance among these mothers was not assessed in this study. Mannion

et al. (2006) reported self-diagnosis of lactose intolerance as one of the reasons for avoiding milk consumption during pregnancy, other than to minimize the weight and fat gain during pregnancy and to reduce the risk of delivering babies with allergy.

In addition, subjects who consumed MMS have lower BMI compared to those who did not. This could be assumed that, for the subjects who chose not to consume MMS, this was because they wanted to avoid putting on extra weight during pregnancy. This could possibly relate to the nutrients contents which they considered to be good for them (Mannion et al., 2006). This has been reported by other research which shows that the prevalence of milk consumption reduces with increasing body weight (Dougkas et al., 2011). Higher monthly income and educational background were also associated with increased milk consumption (Borazjeni et al., 2011), although the researchers found no significant difference between these two factors among their study participants.

The MMS seems to increase intakes of total energy, protein and calcium, but did not have any effect on intakes of fiber, folic acid, iron and vitamin D. Although the consumption of MMS increases the total energy intake in some subjects (regardless of trimester), there were still subjects who did not achieve the RNI. This could be explained by the findings obtained in the Malaysian Adult Nutrition Survey (MANS), as reported by Mirnalini et al. (2008). The national survey reported that the average total energy intake of Malaysian non-pregnant women was 1,447 kcal per day, only 74 percent of the RNI for Malaysia (2005). One of the reasons highlighted in that study is under-reporting of total energy. This had been confirmed in another study which concluded that under-reporting would affect the total energy intake results and most of the under-reporters tend to be female (Pryer et al., 1997). In addition, calcium intake was improved when nutrients contributed by MMS were included. It has been previously observed that low milk intake would cause low calcium intake (Borezjeni et al., 2011). For folate and iron intake, the RNI had already been met without MMS. This may be contributed by the multi vitamin-mineral supplementations routinely prescribed by doctors at health clinics.

CONCLUSION

From this study, it was found that mothers who consume MMS during pregnancy are younger, and have lower parity and BMI, compared to those who do not consume it. Further investigation revealed that MMS consumption during pregnancy may influence adequacy of individual maternal dietary intake. It is observed that intakes of total energy and selected nutrients, such as protein and calcium, would be improved by the consumption of MMS. Hence, it would influence the numbers of pregnant mothers who meet the recommended values (RNI, 2005).

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