The Effect of Parity on Lipid Profile in Normal Pregnant Women

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Abstract

A cross sectional study was carried out at Ramathibodi Hospital between June and August 1997. The objective of this study was to determine maternal serum lipid levels at delivery and the effect of parity on maternal lipid profile. Study population was normal term pregnant women aged 20-35 years who delivered normal infants with a birthweight ≥ 2,500 grams. Maternal serum lipid levels at delivery were determined from 177 normal term pregnant women. Their mean age was 27.6±4.5 years. The first parity (P1) was about 52 per cent, whereas, the second and third parity (P2 and P3) were 37 and 11 per cent, respectively. Mean maternal serum total cholesterol (TC) levels in P1, P2 and P3 were 258.3±46.9, 266.7±47.1 and 295.7±61.2 mg/dl, respectively. Serum triglyceride (TG) levels in P1, P2 and P3 were 265.2±81.1, 280.3±72.1 and 260.7±82.8 mg/dl, respectively; serum low density lipoprotein-cholesterol (LDL-C) in P1, P2 and P3 were 136.9±45.2, 144.9±43.3 and 173.4±62.1 mg/dl, respectively; and serum high density lipoprotein-cholesterol (HDL-C) levels were 64.6±16.6, 65.7±17.8, 67.2±16.0 mg/dl, respectively. Serum TC and LDL-C levels increased with parity. There was a significant difference between maternal TC and parity ($F=4.702$, $p=0.01$) as well as LDL-C and parity ($F=4.883$, $p<0.01$), especially P1 and P3. There was no significant difference between maternal TG and parity as to HDL-C and parity ($p>0.05$).

Key word : Pregnant Women, Parity, Lipid Profile

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Hyperlipidemia is a condition in which serum lipid is higher than normal. It is one of the health problems nowadays caused by a high fat diet and lack of exercise. When associated with obesity, psychosocial stress, smoking, alcohol, etc will lead to coronary heart disease[1] which has been the first major cause of death among Thai population since 1989. The mortality rate increased from 56 to 76.5 per 100,000 population in 1991 and 1996[2].

Health promotion is one way to promote good health before disease starts by the concept of "prevention is better than cure" and should be conducted as early as possible. During pregnancy, a mother should receive more calories than usual for herself and for her baby. The physiological changes especially serum lipid increase with gestational age[3] and parity[4]. It has been shown that the risk of having gall stones among women who had hypercholesterolemia and pregnancy was higher than normal[5]. Dietary intake, behavioral and cultural factors played an important role in lipid levels especially during pregnancy[6]. A study in experimental mice showed that a high fat diet in pregnant mice could lead to abnormal fat metabolism in the growing mice till adulthood[7].

The life style has changed especially in urban areas. Both husband and wife are working and have less time for cooking. Either fast food or street food may be other alternatives. The lack of knowledge in food choices for instance high fat, low fiber, etc can lead to hyperlipidemia and do harm to the health of both mother and baby.

It is interesting to know how pregnancy affects maternal serum lipid. It should be worthwhile to see the results and generalize for health promotion aspect among pregnant women.

Objectives:

The objectives of this study were to determine maternal serum lipid levels at delivery and to identify the association of parity with maternal serum lipid levels.

MATERIAL AND METHOD

This was a cross-sectional study carried out at Ramathibodi Hospital between June and August 1997. The study population was normal pregnant women aged 20-35 years, with gestational age 40±2 weeks and body mass index of 18.5-24.9 kg/m^2 before getting pregnant. They had no obstetric complication, no history of chronic illness, no familial history of type II hypercholesterolemia and no history of smoking or drinking alcohol.

Questionnaires for data collection of maternal background characteristics were used.

Maternal blood was drawn before giving intravenous fluid in the labor room and sent for biochemical analysis. Serum TC, TG and HDL-C levels were analyzed by enzymatic method of Richmond [8], enzymatic method of Jacob[9] and precipitation technique of Gordon[10], respectively. In addition, serum LDL-C levels were calculated by Friedwald formula[11] as shown below:-

$$LDL\text{-}C = TC\text{-}[HDL\text{-}C + (TG / 5)] \text{ mg/dl}$$

Statistical analysis

Descriptive statistic was used for analysis of maternal background characteristics. The association of parity with maternal serum lipid levels was identified by ANOVA.

RESULTS

There were 177 normal - term pregnant women included in this study. Their mean age was 27.6±4.5 years. The educational attainments at primary and secondary levels were 36 and 37 per cent, respectively. Only 30 per cent were housewives, 15 per cent were government officials and the rest were private workers (Table 1).

The distributions of the first, second and third parity (P1, P2 and P3) were around 52, 37and 11 per cent respectively (Table 2).

Table 1. Background characteristics of 177 normal-term pregnant women.

Variables	Number	Per cent
Age (years)		
20-24	46	25.9
25-29	69	38.9
30-35	62	35.0
0±SD	27.6±4.5	
Education		
Primary	64	36.1
Secondary	67	37.8
High school or higher	46	25.9
Occupation		
Housewives	54	30.5
Government officials	27	15.2
Private workers	96	54.3

Table 2. Distribution of number and percentage of parity among 177 pregnant women.

Parity	Number	Per cent
1	92	52.0
2	66	37.3
3	19	10.7
Total	177	100.0

It is indicated in Table 3 that there was an increasing trend of mean serum TC and LDL-C according to parity. Levels of TC among P1, P2 and P3 were 258.3±46.9, 266.7±47.1 and 295.7±61.2 mg/dl respectively. LDL-C among P1, P2 and P3 were 136.9±45.2, 144.9±43.3 and 173.4±62.1 mg/dl respectively.

By using ANOVA, it was shown that there was a significant difference of serum TC levels among parities (F = 4.702, p-value = 0.01) and LDL-C levels among parities (F=4.883, p value<0.01). To test the differences among parities using the Scheffe method, there was a statistically significant difference between P1 and P3. In other words, there were significant increases in serum TC and LDL-C levels with parity.

Mean serum TG levels were 265.2±81.1, 280.3±72.1 and 260.7±82.8 mg/dl at P1, P2 and P3, respectively, whereas, serum HDL-C levels at the corresponding parity were 64.6±16.6, 65.7±17.8 and 67.2±16.0 mg/dl. However, there were no significant differences between serum TG, HDL-C levels among parities (F=0.8688, p>0.05; F=0.220, p>0.05).

DISCUSSION

From this study there was a condition of hyperlipidemia among pregnant women (TC≥200, TG≥150, LDL-C≥130 mg/dl)[12]. This could be due to the physiologic change during pregnancy. During early pregnancy estrogen and progesterone from placenta stimulate beta cell function of pancreas that increases insulin production, tissue glycogen storage and the stage of anabolism[13]. Fahraeus et al[14] found that hypertriglyceridemia in the second half of pregnancy was caused by abnormal glucose metabolism from human placental lactogen which induced insulin-resistant and increased glycolysis or lipolysis. There was rising of lipoproteins especially very low density lipoprotein, LDL-C and HDL-C. The level of LDL-C was highest during 36 weeks of gestation. High level of estrogen production increased LDL receptors of hepatic cells that caused increased TC and TG synthesis[15].

Various studies have demonstrated that hyperlipidemia during pregnancy started in early pregnancy and maximum at the third trimester [14-20]. In addition, maternal serum lipid increased with parity[4]. Our study also identified significant increases in serum TC and LDL-C levels with parity.

Furthermore, Stiphout[20] reported that one year after pregnancy, levels of HDL-C were significantly lower than the level before getting preg-

Table 3. Mean maternal lipid profile in the third trimester by parity.

Parity	Maternal serum lipid (mg/dl) Mean ± S.D.			
	TC	TG	HDL -C	LDL-C
1	258.3 ± 46.9 [a]	265.2 ± 81.1	64.6 ± 16.6	136.9 ± 45.1 [b]
2	266.7 ± 47.1	280.3 ± 72.1	65.7 ± 17.8	144.9 ± 43.2
3	295.7 ± 61.2 [a]	260.7 ± 82.8	67.2 ± 16.0	173.4 ± 62.1 [b]
F	4.702 (0.010)*	0.8688 (0.4213)	0.220 (0.803)	4.883 (0.009)

* Figures in the brackets are p-value.
a = mean level of TC ± SD that showed significant difference.
b = mean level of LDL-C ± SD that showed significant difference.

nant ($p<0.001$) and Lewis et al[21] also showed a similar finding. This could be one of the risk factors of CHD among multiparity women with hyperlipidemia.

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ผลของการตั้งครรภ์กับระดับไขมันในเลือดมารดา

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การศึกษาแบบภาคตัดขวาง ดำเนินการเก็บข้อมูลระหว่างเดือนมิถุนายน-สิงหาคม 2540 ในหญิงตั้งครรภ์ ในช่วงไตรมาสที่สาม คลินิกฝากครรภ์โรงพยาบาลรามาธิบดี เพื่อศึกษาระดับไขมันในเลือดของหญิงตั้งครรภ์ครบกำหนด และความสัมพันธ์ระหว่างระดับไขมันในเลือดของมารดากับลำดับของการคลอดบุตร กลุ่มตัวอย่างเป็นหญิงตั้งครรภ์ อายุระหว่าง 20-35 ปี ตั้งครรภ์ปกติ ครบกำหนด ไม่มีภาวะแทรกซ้อนใด ๆ ให้กำเนิดทารกที่มีน้ำหนักแรกเกิด ≥ 2,500 กรัม ทำการเก็บเลือดมารดาขณะรอคลอด เพื่อวิเคราะห์หาระดับโคเลสเตอรอล (Total cholesterol ; TC), ไตรกลีเซอไรด์ (Triglyceride ; TG), ไลโพโปรตีนความหนาแน่นสูง (High Density Lipoprotein Cholesterol; HDL-C) ไลโพโปรตีนความหนาแน่นต่ำ (Low Density Lipoprotein Cholesterol; LDL-C)

ผลการศึกษาในหญิงตั้งครรภ์ 177 ราย พบว่าหญิงตั้งครรภ์มีอายุเฉลี่ย 27.6 ± 4.5 ปี ลำดับการคลอดที่ 1, 2 และ 3 คิดเป็นร้อยละ 52, 37 และ 11 ตามลำดับ ระดับ TC เฉลี่ยตามลำดับการคลอด เท่ากับ 258.3 ± 46.9, 266.7 ± 47.1 และ 295.7 ± 61.2 มิลลิกรัม/เดซิลิตร (มก/ดล.) TG เท่ากับ 265.2 ± 81.1, 280.3 ± 72.1 และ 260.7 ± 82.8 (มก/ดล.), LDL-C เท่ากับ 136.9 ± 45.2, 144.9 ± 43.3 และ 173.4 ± 62.1 และระดับ HDL-C เฉลี่ยเท่ากับ 64.6 ± 16.6, 65.7 ± 17.8, 67.2 ± 16.0 มก./ดล. ตามลำดับ พบความแตกต่างอย่างมีนัยสำคัญระหว่าง ระดับ TC และ LDL-C กับลำดับการคลอด ($F=4.702$, $p = 0.01$; $F=4.883$, $p<0.01$) โดยเฉพาะลำดับที่ 1 และ 3 แต่ไม่พบความแตกต่างอย่างมีนัยสำคัญระหว่าง TG และ HDL-C กับลำดับการคลอด ($p>0.05$)

คำสำคัญ : การตั้งครรภ์, ระดับไขมันในเลือด, มารดา

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