Outcome of Pregnancy among Parturients Complicated with Heart Disease in Rajavithi Hospital

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Objective: *To compare the maternal and perinatal outcomes at Rajavithi Hospital from January 1st, 2000 to December 31st, 2004,(5 years),(3rd period) with those occurring in the previous two periods: 1st and 2nd (1965-1970,(6 years) and 1985-1990,(6 years) respectively.*
Material and Method: *Retrospective analysis of various medical records of 196 cases diagnosed pregnancy with heart disease.*
Results: *The prevalence of parturients complicated with heart disease was 0.41%, an increase of 2 and 5 times compared with the first and second period, respectively. Congenital heart disease was the most common type of disorder in the second and third period (64.28% and, 49.49%, respectively) while rheumatic heart disease was the most common disorder in the first period (54.86%). Most of the cases in the 2nd and 3rd periods were delivered by operative vaginal delivery (46.43% and 44.90%, respectively),while spontaneous vaginal delivery was the most common mode of delivery in the first period (78.99%). All of the postpartum and perinatal complications except postpartum hemorrhage were significantly higher in the worse class of NYHA (class III/IV) than those in the better class of NYHA (class I/II). The maternal death rate in the third period increased 1.81 times and 13.66 times compared with those in the first and second periods, respectively.*
Conclusion: *Congenital heart disease was the most common heart disease in pregnancy from 1985 to 1990 and 2000 to 2004. Patients in the NYHA class III/IV had worse maternal and fetal outcomes than those in the NYHA class I/II except for postpartum hemorrhage. Maternal mortality rate was highest from 2000 to 2004 (12.57 per 100,000 live births).*

Keywords: *Heart disease, Pregnancy, Maternal outcome, Perinatal outcome*

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Heart disease is one of the most important medical complications during pregnancy as it is one of the common, indirect obstetric causes of maternal death[1]. It is obvious that pregnancy imposes an additional burden on the cardiovascular system in both normal and cardiac pregnant women[1]. The marked hemodynamic changes stimulated by pregnancy have a profound effect on underlying heart disease in the pregnant women[2]. These changes can introduce special therapeutic problems resulting in high morbidity and mortality as well as perinatal morbidity and mortality. From 1985 to 1998, 50% of indirect maternal deaths in Rajavithi Hospital, occurred in parturients with heart disease[3]. Prevalence of heart disease in pregnant women delivered in Rajavithi Hospital during two periods (1965-1970) (6 years) and (1985-1990) (6 years) were 0.198%[4] and 0.077%[5], respectively.

The present retrospective study was carried out to assess the prevalence, demographic characteristics, maternal and perinatal outcomes of the parturient complicated by heart disease in Rajavithi Hospital from 2000 to 2004 (5 years) (3rd period) compared with those of 1965-1970 (1st period) and 1985-1990 (2nd period) in Rajavithi Hospital[4,5].

Material and Method

A retrospective analysis of the data was carried out on the medical records of parturients complicated with heart disease who were delivered at

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Rajavithi Hospital from January 1st,2000 to December 31st, 2004. Those with gestational age less than 28 weeks and in-complete data were excluded from the present study. The data was analyzed using chi-square test or Fisher exact test with the $p < 0.05$ was considered significant, and data reported as mean and standard deviation.

Results

During the present study period 2000-2004, there were 47,725 deliveries with 204 cases (0.43%) of parturients complicated with heart disease at Rajavithi Hospital. Eight incomplete medical records (3.9%) were excluded, thus, 196 cases remained in the present study. The prevalence rate of parturients complicated with heart disease was 0.41%. Almost all previous two studies' data were compared with those of the present study. The prevalence and types of heart disease compared with those of 1965-1970 and 1985-1990 periods are shown in Table1. Table 2 shows the details of heart disease. Rheumatic heart disease was the most common type of heart disease from 1965 to 1970, while congenital heart disease was the most common type from 1985 to 1990 and 2000-2004. Table 3 shows obstetric characteristics of the parturients complicated with heart disease in the third period. Mode of delivery is shown in Table 4. Spontaneous delivery was the most common route of delivery from 1965 to 1970, while the instrumental vaginal delivery was the most common route of delivery in the second and third periods.

Ante-and postpartum complications of the parturients complicated with heart disease in the third period are shown in Table 5. Anemia was the most common in both ante-and postpartum periods. Table 6 shows the effects of cardiac functional class at delivery on maternal and perinatal outcomes. Apart from postpartum hemorrhage, all postpartum and perinatal complications were significantly higher in those with New York Heart Association(NYHA) class III/IV than those with NYHA class I/II.

The maternal mortality of the parturients complicated with heart disease were 9/257 (3.50%), 1/84 (1.19%), and 6/196 (3.06%) in the first, second, and third period, respectively. In terms of maternal death rate compared with 100,000 live births, the maternal mortality of the parturients complicated with heart disease was 6.96, 0.92, and 12.57 per 100,000 live birth in the first, second, and third periods, respectively.

Discussion

In the present study, the prevalence of parturients complicated with heart disease increased nearly 6 times compared with the second period and twice compared with the first period. A few decades before, rheumatic heart disease was the most common heart disease in pregnant women[6,7]and nowadays, it is still the most common heart disease in some developing countries[8]. However, recently it is the same trend around the world that the most common heart disease in parturients is congenital[9,10]. Although congenital

Table 1. Prevalence of heart disease in parturients at Rajavithi Hospital in 3 periods of study

Type of heart disease	Period I (1965-1970)	Period II (1985-1990)	Period III (2000-2004)
Total birth	129,304	109,028	47,725
Parturients complicated with heart disease	257	84	196
Prevalence	0.20%	0.08%	0.41%
1) Congenital heart disease	87 (33.85%)	54 (64.28%)	75 (38.27%)
2) Rheumatic heart disease	141 (54.87%)	28 (33.33%)	60 (30.61%)
3) Cardiac arrhythmia	17 (6.61%)	2 (2.39%)	17 (8.67%)
4) Other types of heart disease	12 (4.67%)	0	4 (2.04%)
5) Congenital heart disease + rheumatic heart disease	0	0	9 (4.59%)
6) Congenital heart disease + cardiac arrhythmia	0	0	1 (0.51%)
7) Congenital heart disease + other types of heart disease	0	0	11 (5.61%)
8) Rheumatic heart disease + other types of heart disease	0	0	17 (8.67%)
9) Rheumatic + cardiac arrhythmia + other types of heart disease	0	0	1 (0.51%)
10) Rheumatic + congenital heart disease + other types of heart disease	0	0	1 (0.51%)

Table 2. Details of heart disease*

Type of heart disease	Period I (1965-1970) (n = 257)	Period II (1985-1990) (n = 84)	Period III (2000-2004) (n = 196)
1. Congenital heart disease	87 (33.85%)	54 (64.28%)	97 (49.49%)
Atrial septal defect	49 (19.07%)	22 (26.19%)	40 (20.41%)
Ventricular septal defect	4 (1.56%)	12 (14.28%)	24 (12.24%)
Patent ductus arteriosus	29 (11.28%)	14 (16.67%)	10 (5.10%)
Pulmonary stenosis	3 (1.17%)	2 (2.38%)	2 (1.02%)
Tetralogy of Fallot	0	2 (2.38%)	3 (1.53%)
Eisenmenger's syndrome	0	0	3 (1.53%)
Primary pulmonary HT	0	0	1 (0.51%)
Double outlet right ventricle	0	0	1 (0.51%)
Coarctation of aorta	0	1 (1.19%)	0
Ebstein anomaly	0	1 (1.19%)	0
Dextrocardia	2 (0.78%)	0	0
Transposition of great arteries	0	0	1 (0.51%)
Coronary aneurysm	0	0	1 (0.51%)
Coronary AV-fistula	0	0	1 (0.51%)
Multiple lesions	0	0	10 (5.10%)
2. Rheumatic heart disease	141 (54.86%)	28 (33.33%)	88 (44.90%)
2.1 Single valvular lesion	92 (35.80%)		42 (21.43%)
Mitral regurgitation	9 (3.50%		26 (13.27%)
Mitral stenosis	80 (31.13%)		11 (5.61%)
Aortic regurgitation	2 (0.78%)		1 (0.51%)
Aortic stenosis	1 (0.39%)		1 (0.51%)
Tricuspid regurgitation	0		3 (1.53%)
2.2 Multi valvular lesions	49 (19.07%)		46 (23.47%)
Mitral regurgitation	49 (19.07%)		42 (21.43%)
Mitral stenosis	49 (19.07%)		29 (14.80%)
Aortic regurgitation	0		24 (12.24%)
Aortic stenosis	0		6 (3.06%)
Tricuspid regurgitation	0		24 (12.24%)
Tricuspid stenosis	0		2 (1.02%)
3. Cardiac arrhythmia	17 (6.61%)	2 (2.38%)	19 (9.69%)
Premature ventricular contraction	0		8 (4.08%)
Supraventricular tachycardia	0		3 (1.53%)
Sinus tachycardia cause	12 (4.67%)		0
Heart block	5 (1.95%)		3 (1.53%)
Other arrhythmias	0		5 (2.55%)
4. Other types of heart disease	12 (4.67%)	2 (2.39%)	34 (17.35%)
Mitral valve prolapse	0	0	17 (8.67%)
Pulmonary hypertension	0	0	15 (7.65%)
Cardiomyopathy	0	2 (2.39%)	2 (1.02%)
Hypertensive CVS	4 (1.56%)	0	0
Thyrotoxicosis	2 (0.78%)	0	0
Functional heart disease : Anemia cause?	6 (2.33%)	0	0

* One patients may had more than one type

Table 3. Obstetric characteristics (n = 196)

Obstertic characteristics	Number (%)
Age of patients (Mean ± SD) (years)	26.35 ± 6.21
< 20	31 (15.7)
20-29	107 (54.0)
30-39	55 (27.8)
40-49	5 (2.5)
Gravidity	
Primigravida	98 (50)
Multigravida	98 (50)
GA at first ANC (Mean ± SD) (wks)	17.21 ± 8.11
First trimester (< 12 wks)	58 (29.60)
Second trimester (12-28 wks)	111 (56.60)
Third trimester (28-42 wks)	27 (13.80)
GA at delivery (Mean ± SD) (wks)	37.73 ± 2.45
Birth weight (Mean ± SD) (gms)	2,731.48 ± 580.77
NYHA functional class at first ANC	
Class I	166 (84.7)
Class II	30 (15.3)
Class III	0
Class IV	0
Surgical corrected heart disease	
Before pregnancy	70 (35.7)
During pregnancy	2 (1.02)

NYHA = New York Heart Association
GA = Gestational age, ANC = Antenatal clinic

heart disease was the most common type of heart disease among parturients in the third period and the second period in Rajavithi Hospital, its prevalence was slightly more than that of the rheumatic heart disease (49.4%: 44.9%).

It was postulated that there could be two reasons to explain these events. First, on establishment of the Institute of Cardiovascular Diseases at Rajavithi Hospital in1988. Since then, congenital cardiac surgery was increasingly performed on young women, who later became pregnant and were then referred to the Obstetric and Gynecology Department for antenatal care.

The increasing number of parturients who received pre-conceptional cardiac correction (35.7%) in the third period compared with 28.76% in the second period supports this postulation and also explained the downtrend of cardiac surgery performed during pregnancy from 3.89%, 2.38%, and 1.02% in the first, second, and third periods respectively.

The second reason is that Rajavithi Hospital is the biggest tertiary hospital of the Ministry of Public Health in Thailand and many provincial and district hospitals referred the high-risk pregnant women, especially heart diseases, to this hospital for appropriate obstetric care.

Table 4. Mode of delivery

Mode of delivery	Period I (n = 257) Number (%)	Period II (n = 84) Number (%)	Period III (n = 196) Number (%)
Spontaneous vaginal delivery	203 (78.99)	32 (38.09)	56 (28.57)
Operative vaginal delivery	47 (18.29)	39 (46.43)	88 (44.90)
Forceps extraction	11 (4.28)	19 (22.61)	80 (40.82)
Vacuum extraction	33 (12.84)	19 (22.61)	8 (4.08)
Breech assisting	4 (1.56)	1 (1.19)	0
Cesarean section	6 (2.33)	13 (15.47)	52 (26.53)
Indications			
CPD			15 (7.65)
Breech			10 (5.10)
Previous section			7 (3.57)
Fetal distress			7 (3.57)
Maternal heart disease			4 (2.04)
Unfavorable cervix			3 (1.53)
Failed induction			3 (1.53)
Placenta previa			1 (0.51)
Infertility			1 (0.51)
Failed forceps			1 (0.51)

CPD = Cephalopelvic disproportion

Operative vaginal delivery was the most common mode of delivery in the second and third periods (46.43% and 44.90%, respectively). While spontaneous vaginal delivery was the most common mode of delivery in the first period (78.99%)[4,5]. Many studies reported that the most common mode of delivery was spontaneous vaginal delivery[6,11-13]. Operative vaginal delivery was recommended for the parturients with certain cardiac conditions to shorten the second stage of labor as there was wider fluctuations in maternal hemodynamic from pushing effort during this stage[14]. Most parturients complicated with heart disease are more tolerable to vaginal delivery than cesarean section[15]. Although cesarean section in cardiac patients has usually been restricted to obstetric indications is preferable in parturients with marginal cardiovascular reserve to avoid the physical stress of labor[16].

Bhatla et al[13] reported that rheumatic heart patients in NYHA class I/II had better maternal and fetal outcomes than those in NYHA class III/IV. However, cesarean deliveries and postpartum complications were comparable in their study. In the present study, the only mode of delivery and postpartum hemorrhage were comparable, but other postpartum complications and all the adverse perinatal outcomes of the parturient in NYHA class I/II were better than those in NYHA class III/IV. Postulated reasons for the increasing incidence of IUGR and prematurity in patients with NYHA

Table 5. Maternal complications in pregnant women with heart disease

Maternal complications	Number (%) (n = 196)
Antepartum complications	
Anemia	34 (17.34)
Congestive heart failure	20 (10.20)
Arrhythmias	15 (7.65)
Gestational diabetes	4 (2.04)
Infection	3 (1.53)
Premature rupture of the membranes	3 (1.53)
Pregnancy induced hypertension	2 (1.02)
Placenta previa	1 (0.51)
Abruptio placentae	1 (0.51)
Postpartum complications	
Anemia	35 (17.86)
Congestive heart failure	12 (6.12)
Arrhythmias	11 (5.61)
Postpartum hemorrhage	13 (6.63)
Infection	6 (3.06)
Maternal death	6 (3.06)

Table 6. Effects of cardiac functional class at delivery on maternal and perinatal outcomes

	NYHA I/II (n = 172)		NYHA III/IV (n = 24)		p-value*
	Number	Percent	Number	Percent	
Maternal outcome					
Mode of delivery					
Vaginal delivery	52	30.23	4	16.67	
Cesarean section	43	25.00	9	37.50	0.275
Operative vaginal delivery	77	44.77	11	45.83	
Postpartum complications					
Congestive heart failure	2	0.58	10	41.67	<0.0001
Arrhythmias	6	4.09	5	20.83	0.005
Anemia	27	15.79	8	33.33	0.04
Infection	3	1.75	3	12.50	0.025
Postpartum hemorrhage	9	4.68	4	16.67	0.058
Maternal death	1	0.58	5	20.83	<0.0001
Adverse perinatal outcome					
Preterm delivery	10	5.85	11	45.83	<0.0001
IUGR	15	8.72	6	25.00	0.027
Stillbirth	2	1.17	3	12.50	0.014
Apgar score < 7	7	4.09	9	37.50	<0.0001
Birth weight < 2,500 gm	29	16.89	18	75.00	<0.0001
Transfer to NICU	7	4.09	10	41.67	<0.0001

IUGR = Intrauterine growth restriction
NICU = Neonatal intensive care unit

class III/IV including hemodynamic compromise, maternal arrhythmias and usage of cardioactive drugs such as diuretics, digitalis, and beta-blockers, which have been associated with impairment of uterine blood flow[17-19].

The maternal mortality rate from heart disease in the parturients complicated with heart disease increased 2.57 times in the third period (3.06%) compared with the second period (1.19%). When total live births were used as the reference, it increased 13.66 times in the third period (12.57per 100,000 live births) compared with the second period (0.92 per100,000 live births). The maternal mortality rate from heart disease was 1.17 per 100,000 live births in the same hospital from 1984 to 1998[3]. Inappropriate intrapartum care was suggested as one of the causes of this 13.66 times increasing compared with the second period, as 66% of deaths (4 of 6 cases) could have been prevented if they had received appropriate intrapartum care. Maternal death mostly occurred in the parturients complicated with heart disease in NYHA class III/IV (5/6) compared with those in NYHA class I/II (1/6) ($p < 0.0001$). Abdel-Hady et al[20] reported only 1 (1.16%) maternal death in the patients complicated with heart disease (NYHA class IV). Sawhney et al[12] also reported the similar higher maternal mortality rate occurring in the patients complicated with rheumatic heart disease in the class III/IV (8/10) compared with those in NYHA class I/II (2/10).

Conclusion

Congenital heart disease was the most common heart disease in pregnancy from 1985 to 1990 and 2000 to 2004. Patients in the NYHA class III/IV had worse maternal and fetal outcomes than those in the NYHA class I/II except for postpartum hemorrhage. Maternal mortality rate was highest from 2000 to 2004 (12.57 per 100,000 live births).

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ผลของการตั้งครรภ์ของสตรีที่เป็นโรคหัวใจที่คลอดที่โรงพยาบาลราชวิถี

เอกชัย โควาวิสารัช, พรรณทิพา นวลปลอด

วัตถุประสงค์*: เพื่อเปรียบเทียบผลของการตั้งครรภ์ของสตรีที่เป็นโรคหัวใจที่คลอดที่โรงพยาบาลราชวิถีทางด้านมารดาและทารกปริกำเนิดในช่วงที่ 3 (พ.ศ. 2543-2547) (5 ปี) กับช่วงที่ 1 (พ.ศ. 2508-2513) (6 ปี) และช่วงที่ 2 (พ.ศ. 2528-2533) (6 ปี)*

วัสดุและวิธีการ*: การศึกษาเชิงพรรณนาแบบย้อนหลัง โดยเก็บข้อมูลของกลุ่มตัวอย่างคือ สตรีที่เป็นโรคหัวใจที่คลอดที่โรงพยาบาลราชวิถี ตั้งแต่วันที่ 1 มกราคม พ.ศ. 2543 ถึง วันที่ 31 ธันวาคม พ.ศ. 2547 โดยรวบรวมจากสมุดบันทึกการฝากครรภ์ ใบย่อครรภ์ และเวชระเบียนของผู้ป่วย โดยเปรียบเทียบกับข้อมูลชนิดเดียวกันของช่วงเวลา ที่ 1 และ 2 ที่มีการนำเสนอในรายงานศึกษาก่อนหน้านี้แล้ว*

ผลการศึกษา*: อัตราความชุกของสตรีที่เป็นโรคหัวใจที่คลอดที่โรงพยาบาลราชวิถีเท่ากับร้อยละ 0.41 ของผู้คลอด ซึ่งเพิ่มขึ้นเป็น 2 และ 5 เท่าของความชุกในช่วงที่ 1 และ 2 ตามลำดับ โรคหัวใจพิการแต่กำเนิดเป็นชนิดของโรคหัวใจที่พบบ่อยที่สุดในช่วงที่ 2 และ 3 คือ ร้อยละ 64.28 และ 49.49 ตามลำดับ ในขณะที่โรคหัวใจรูมาติกพบบ่อยที่สุดในช่วงที่ 1 (ร้อยละ 54.83) ผู้คลอดในช่วงที่ 2 และ 3 ส่วนใหญ่คลอดโดยหัตถการช่วยคลอดทางช่องคลอดเท่ากับร้อยละ 46.43 และ 49.90 ตามลำดับ ส่วนผู้คลอดในช่วงที่ 1 ส่วนใหญ่คลอดปกติ (ร้อยละ 78.99) ภาวะแทรกซ้อนหลังคลอดทุกชนิดตลอดจนภาวะแทรกซ้อนของทารกปริกำเนิดในผู้คลอดที่มี NYHA ระดับ III/IV สูงกว่า ผู้คลอดที่มี NYHA ระดับที่ I/II อย่างมีนัยสำคัญยกเว้นการตกเลือดหลังคลอด อัตราตายของมารดาที่เป็นโรคหัวใจเหล่านี้ ในช่วงที่ 3 เพิ่มขึ้น 1.81 และ 13.66 เท่าเมื่อเทียบกับอัตราตายในช่วงที่ 1 และ 2 ตามลำดับ*

สรุป*: โรคหัวใจพิการแต่กำเนิดเป็นชนิดของโรคหัวใจที่พบได้บ่อยที่สุดในผู้คลอดที่เป็น โรคหัวใจในช่วงที่ 2 และ 3 ผู้คลอดที่มี NYHA ระดับที่ III /IV มีภาวะ แทรกซ้อนทางมารดา และทารกปริกำเนิด มากกว่าผู้คลอดที่มี NYHA ระดับที่ I/II อย่างมีนัยสำคัญ ยกเว้นการตกเลือดหลังคลอด อัตราตายมารดาสูงสุดในช่วงพ.ศ. 2543 - พ.ศ. 2547 เท่ากับ 12.57 ต่อ การคลอดมีชีพ 100,000 ราย*