Thai Journal of Obstetrics and Gynaecology
October 2009, Vol. 17, pp. 230-236

OBSTETRICS

Maternal Death at Maharaj Nakorn Chiang Mai Hospital, the 17 Years Experience

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ABSTRACT

Objective: To analyze the characteristics, leading causes and trend of maternal deaths at Maharaj Nakorn Chiang Mai Hospital between the 20th and the 21st centuries.

Study design: Retrospective descriptive study

Methods: The database of Maternal-Fetal Medicine unit and medical records, between January 1991 and December 2007, were reviewed for maternal death cases, causes of death and the causes were categorized into subgroups.

Results: There were 72,952 live births and 50 cases of maternal deaths. The overall maternal mortality ratio (MMR) was 65:100,000 live births. Thirty-four (68%) were referral cases. Between the 20th century (1991-1999) and the 21st century (2000-2007), MMR had been dropped from 67/100 000 live births to 62 /100 000 live births. The direct maternal death was the most common cause of death and the top five leading causes were postpartum hemorrhage (PPH), amniotic fluid embolism, heart diseases, septic abortion and severe pre-eclampsia, respectively. Direct maternal death was decreased (MMR from 46.1 to 33.5%) but indirect maternal death were increased (MMR from 9.6 to 23.9%).

Conclusion: The trend of MMR at Maharaj Nakorn Chiang Mai Hospital appeared to be minimal changed during the 17 years period. The direct maternal death tends to be decreased but the indirect maternal death tends to be significantly increased. PPH was the most common cause of death in both centuries.

Key words: maternal death, maternal mortality ratio, causes

Introduction

Maternal death is one of the most challenging global health problems. According to World Health Organization (WHO) data, almost 600,000 women worldwide die every year due to complications during pregnancy and delivery.[1, 2] Maternal mortality rate varies between developed and developing countries, 24 per 100,000 live births in developed countries[3] and at least 1000 per 100,000 births in some African countries[4] and there are variation of causes of death both across and within geographical regions.[5] However, the trend of overall maternal mortality ratio

(MMR) are lower due to advances in general health care and obstetrics management[5-12] but some studies show an increase in maternal mortality rate from the period between 1997 to 2002.[13-15]

In Thailand, maternal death is an important problem which arises from the risks attributable to pregnancy and childbirth as well as from the poor quality care from the health service system including No antenatal care(ANC). Anyhow, a comprehensive summary of the magnitude and distribution of the causes of maternal deaths was important. The purpose of the study is to determine the maternal mortality rate, causes of death and trend of maternal mortality at our hospital, Maharaj Nakorn Chiang Mai Hospital, which is the tertiary center in Northern part of Thailand. The result of this study will guide to improve our heath care services in reducing maternal death in our hospital.

Materials and Methods

This retrospective descriptive study was conducted at the Department of Obstetrics and Gynecology, Maharaj Nakorn Chiang Mai Hospital, Chiang Mai University. The database of Maternal-Fetal Medicine Unit and medical records were reviewed between January 1991 and December 2007. The maternal death is defined in the International Classification of Diseases, 10th edition (ICD-10) as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. The causes of death are divided into three groups, direct maternal death as death from obstetrical complications during pregnancy, labor or the puerperium, indirect maternal death as death from disease that developed before or during pregnancy and nonmaternal death as death from accidental or incidental causes not related to pregnancy. The maternal mortality rate (MMR) is a number of maternal deaths during a given time period per 100,000 live births during the same time-period. This study was conducted with the approval of the Research Ethics Committee of the Chiang Mai University, Faculty of Medicine. All data were analyzed by SPSS version 15.0 (SPSS, Chicago, IL, USA).

Results

During the study period, there were 72,952 live births and 50 cases of maternal death. Of these, 34 women (68%) were referral cases. Mean age of women was 30 ± 5 years and only 8 of 50 women (16%) were older than 35-years. Eleven cases (22%) were nulliparous and thirteen cases (26%) did not attend antenatal care clinic. Twenty two cases (44%) were preterm birth. The most common routes of delivery were normal vaginal delivery (20 cases, 40%) and cesarean section (13 cases, 26%). Seven cases died before delivery and 4 cases died after induced abortion.

According to 72,952 live births, the Maternal Mortality Rate (MMR) of this study was 65:100,000 live births. The study period was divided into two centuries, for the 20th century (1991 -1999) and the 21st century (2000 – 2007). The maternal dead cases were significantly decreased from the 20th century to the 21st century (37 to 13 cases) so the MMR was slightly decreased from 67.2 to 62.2 per 100,000 live births. In the last 5 years of the 21st century, the MMR was slowly increased as shown in Fig. 1.

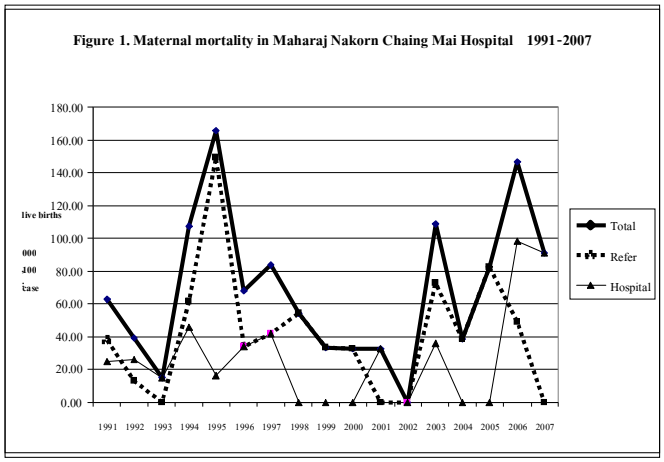

Table 1. causes of maternal death in the study period. There were 31 direct maternal death, 10 indirect maternal death and 9 nonmaternal deaths. Between the 20th and the 21st century period, the direct maternal death was decreased (MMR from 46.1 to 33.5) but indirect maternal death was increased (MMR from 9.6 to 23.9).

Table 1. Number of maternal death from 1991 to 2007

Year	Direct maternal death		Indirect maternal death		Nonmaternal death		Total live birth
	Cases	MMR	Cases	MMR	Cases	MMR	case
1991 – 2007	31	42.5	10	13.7	9	12.3	72,952
● 1991 – 1999	24	46.1	5	9.6	8	15.4	52,060
● 2000 – 2007	7	33.5	5	23.9	1	4.8	20,887

If the referral cases were excluded, the overall MMR in the entire 17 years period was 26.04:100,000 live births and tended to increase from the 20th (24.98:100,000 live births) to the 21st centuries (28.73:100,000 live births). The tendency of MMR without referral cases was similar to the overall MMR. Between the 20th and the 21st century period, the direct maternal death was decrease (MMR from 13.45 to 4.79) but indirect maternal death tended to increased (MMR from 7.68 to 19.15).

Table 2. Number of maternal death from 1991 to 2007, excluded referral cases

Cause of death	Direct maternal death		Indirect maternal death		Non maternal death	
	Total(case)	MMR	Total(case)	MMR	Total(case)	MMR
1991 – 2007	8	10.97	8	10.97	6	8.22
● 1991 – 1999	7	13.45	4	7.68	6	11.52
● 2000 – 2007	1	4.79	4	19.15	0	0

The 5 common causes of death are shown in Table 3. In the entire 17 years period, the most common causes of death were postpartum hemorrhage (PPH), amniotic fluid embolism (AFE), heart disease, septic abortion and severe preeclampsia (severe PIH), respectively. Moreover, PPH was the most common cause of death in both the 20th and the 21st century period.

Table 3. Causes of maternal death

Years	Causes of maternal death	MMR (case:100,000 live birth)
1991-2007	Postpartum Hemorrhage	21.93
	Amniotic Fluid Embolism	6.85
	Heart disease	6.85
	Septic abortion	5.48
	Severe Preeclampsia	4.11
1991-1999	Postpartum Hemorrhage	23.05
	Septic abortion	7.68
	Severe Preeclampsia	5.76
	Malaria	5.67
	Heart disease	5.67
2000-2007	Postpartum Hemorrhage	19.15
	Amniotic Fluid Embolism	14.36
	Heart disease	9.54
	Other	4.79

If referral cases were excluded, the five common causes of death in the total 17 years period were heart disease, malarial infection, PPH, severe PIH and AFE, respectively.

Discussion

The maternal mortality is an indicator of health care system of each country. In Thailand, the improvement of maternal health is one of the millennium development goals (MDG) of United Nation Development Programmed. The target is to reduce the maternal mortality ratio by three quarter between 1990 and 2015, however there are only few studies about maternal mortality in Thailand.[8, 16]

From the data of World Health Organization (WHO), MMR of developed country is 24:100,000 live births and MMR of developing country is 450:100,000 live births.[9] In this study, MMR of our hospital is 68:100,000 live births, which is in the range between developed and developing country. If compares with MMR of Thailand[17] (24:100,000 live births), MMR of Maharaj Nakorn Chiang Mai Hospital is higher than the average MMR of the whole country. Although referral cases were excluded, MMR of our hospital is 30.16:100,000 live births, which is still higher than the average of the country. The explanation is that the hospital is a tertiary care center which has to take care all of the patients in Chiang Mai province

and northern region of Thailand. Moreover the referral cases had tendency of having serious complications and increased risk of morbidity and mortality, therefore leading to high MMR. The other reason is that many people in the northern region of Thailand especially hill tribe area could not access the medical or antenatal care in the hospital, therefore the risk of maternal death was more increased.

In the 20th century, the medical technology was rapidly improved so that maternal mortality rate was decreased as in the result of many studies in other countries.[5-8,10,12,18,19] The study at Rajavithi Hospital, Thailand[8], showed that the MMR was decreased from 81.3:100,000 live births in 1973-1977 to 18:100,000 live births in 1984-1998. In this study comparing between the 20thand 21st centuries, the MMR was only slightly decreased. However, there is one study in Australia that shows the increasing rate of MMR[13] which is the same as MMR in our hospital that tends to be increased in the latter 5 years. The reasons for increasing and higher rate of MMR in our hospital were described previously.

The most common cause of maternal death in our hospital during 1991-2007 was from direct maternal death (62%), which was similar to many studies.[1,2,5-10,12,13,19] However, this finding has changed during the 21st centuries that the cause of death from indirect maternal death tends to be increased. Most of direct maternal deaths can be prevented by improvement in obstetric skill and the personals health care system, thus maternal death from direct causes tends to be decreased in the 21st century. On the contrary, the reason that indirect maternal deaths seems to be increased in the latter period is because the improvement in medical technology made the women with medical complications such as heart disease can survive and pregnant. Moreover, at the present time, elderly pregnant women seem to be increased[6,9,12,18] and many of these women have some medical diseases before pregnancy which may be a risk factor of indirect maternal death. Our finding is similar to many studies in some developed countries.[6,9,12,18]

In this study, PPH is the leading cause of death both in the 20th and the 21st centuries even it is the preventable condition. The suggestion is, to emphasize every health care personal in early detection and prevention of PPH, especially in the local hospital that does not have a good health care service system such as blood bank, quality of team care in labor room (obstetrician and midwife), etc. From this study, 87% (14 from 16 cases) of PPH were referral cases. However, maternal death from PPH in the 21st century tended to be decreased similar to many previously studies.[1-3, 5-13, 16, 18, 19] Moreover, the preventable cause of maternal death such as PPH, AFE, heart disease, septic abortion and severe PIH were significantly decreased in the 21st century when compared with the 20th century, this reflects the improvement in obstetric care in Chiang Mai and northern Thailand. Nevertheless, when referral cases were excluded, the most common cause of death was maternal heart disease. Therefore, one of the important strategies to prevent maternal death is the preconceptional counseling and well planned pregnancy for reducing of complication during pregnancy and decrease maternal mortality.

Malarial infection is one of the common causes of maternal death in our hospital. This problem is unique in northern Thailand which is the endemic area of malarial infection. Even most of them have malarial immunity, but malarial infection may have serious complication in pregnant women and also increase the risk of death especially. Moreover, this complication will be more severe in non-immune patient such as people in urban area, thus malarial infection is the second common cause of death when referral cases were excluded.

Limitations of this study are a retrospective study, small population (only 50 cases of maternal death), missing of some details in many cases and long study period (17 years). Furthermore, the MMR may higher than the real MMR in our hospital because our setting is the tertiary care center and 68% of all cases in this study are referral cases. Moreover, due to the completion of equipment and health care personal in our hospital, MMR in this study may not represent the real setting of public health in the northern Thailand.

In conclusion, this is one of the few studies about maternal death in Thailand until now. The result of this study can be a reference to other tertiary care hospital in Thailand even some details may be different in different

region. Moreover, the result of this study can be applied clinically, such as the important of PPH prevention and planned pregnancy, to reduce maternal mortality and improve obstetric care in the future.

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การเสียชีวิตของหญิงตั้งครรภ์ในโรงพยาบาลมหาราชนครเชียงใหม่ จากประสบการณ์ 17 ปี

เปรมจิต เจริญวีรกุล, เกษมศรี ศรีสุพรรณดิฐ, ธีระ ทองสง

วัตถุประสงค์การวิจัย *: เพื่อวิเคราะห์อัตราการเสียชีวิตของหญิงตั้งครรภ์ และสาเหตุการเสียชีวิตของหญิงตั้งครรภ์ในโรงพยาบาลมหาราชนครเชียงใหม่ในช่วง 17 ปีที่ผ่านมา*

รูปแบบการวิจัย *: เป็นการศึกษาเชิงพรรณนาแบบย้อนหลัง (Retrospective Descriptive Study)*

วิธีดำเนินการวิจัย *: เก็บรวบรวมข้อมูล จากฐานข้อมูลเรื่องการเสียชีวิตของหญิงตั้งครรภ์ ในรพ.มหาราชนครเชียงใหม่ ช่วง เดือนมกราคม 2534 ถึง เดือนธันวาคม 2550 ของหน่วยเวชศาสตร์มารดาและทารกภาควิชาสูติศาสตร์และนรีเวชวิทยา และนำข้อมูลที่ได้มาวิเคราะห์โดยแบ่งเป็นกลุ่มตามสาเหตุการเสียชีวิต*

ผลการวิจัย *: จำนวนการเกิดมีชีพทั้งหมด 72,952 รายและมีการเสียชีวิตของหญิงตั้งครรภ์ทั้งหมด 50 ราย อัตราการเสียชีวิตของหญิงตั้งครรภ์โดยรวมคิดเป็น 65 ต่อ 100,000 ของการเกิดมีชีพ โดยที่ผู้เสียชีวิต 34 ราย (คิดเป็นร้อยละ 68) เป็นผู้ป่วยที่ส่งต่อมาจากโรงพยาบาลอื่น เมื่อเปรียบเทียบอัตราการเสียชีวิตของหญิงตั้งครรภ์ ช่วง ทศวรรษที่ 20 (ปี 2534-2542) กับ ทศวรรษที่ 21 (ปี 2543-2550) พบว่ามีการเปลี่ยนแปลงเล็กน้อยจาก 67 เป็น 62 ต่อ 100,000 ของการเกิดมีชีพ ซึ่งการเสียชีวิตจากสาเหตุโดยตรงเป็นสาเหตุที่พบมากที่สุดคิดเป็นร้อยละ 42.49 เมื่อแยกวิเคราะห์ตามโรค พบว่าสาเหตุการเสียชีวิตของหญิงตั้งครรภ์ห้าอันดับแรกได้แก่ ภาวะตกเลือดหลังคลอด, ภาวะน้ำคร่ำอุดตันในปอด,โรคหัวใจ, การแท้งติดเชื้อ และภาวะความดันโลหิตสูงเนื่องจากการตั้งครรภ์ เมื่อเปรียบเทียบในช่วงทศวรรษที่ 20 และ 21 พบว่า การเสียชีวิตของหญิงตั้งครรภ์จากสาเหตุโดยตรงลดลงจาก ร้อยละ46.10 เป็น ร้อยละ 33.5 แต่การเสียชีวิตของหญิงตั้งครรภ์จากสาเหตุโดยอ้อมกลับพบเพิ่มขึ้นจาก ร้อยละ 9.6 ไปเป็น ร้อยละ 23.9*

สรุป *: อัตราการการเสียชีวิตของหญิงตั้งครรภ์ ในโรงพยาบาลมหาราชนครเชียงใหม่ลดลงเล็กน้อยในช่วง 17 ปีที่ผ่านมา สาเหตุการเสียชีวิตโดยตรงลดลง ในช่วง 7 ปีหลัง แต่สาเหตุการเสียชีวิตโดยอ้อมกลับเพิ่มขึ้น อย่างไรก็ตามภาวะการตกเลือดหลัง คลอดก็ยังคงเป็นสาเหตุการเสียชีวิตที่สำคัญที่สุดของหญิงตั้งครรภ์ในทั้งสองทศวรรษ*

คำสำคัญ *: การเสียชีวิตของหญิงตั้งครรภ์, อัตราการเสียชีวิตของหญิงตั้งครรภ์*