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Original Research Article

Autopsy Study of Death In Pregnancy: Ten Years Retrospective Study

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Article Info

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Maternal Death,
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Abstract

Over 100,000 Indian women dies annually from pregnancy and child birth related causes, thus accounting for one-quarter of maternal death worldwide. Death records remain an important source of maternal deaths. Deaths in pregnancy may be due to conditions directly related to pregnancy (PRD), conditions exacerbated/ associated with pregnancy (PAD), or conditions unrelated to pregnancy (PUD). Death may occur during any trimester, during labour/ birth, or postpartum due to any cause. So the present study was undertaken with a view to include all deaths in pregnancy irrespective of the cause of death to discuss the utility of autopsy record as an additional data source for ascertainment of maternal death. In this study, we review deaths in pregnancy (maternal deaths) that were investigated and autopsied at the Apex Medical Centre between 1999 and 2008 to discuss. A total of 158 deaths in pregnancy occurred out of the total 8550 medicolegal deaths with maternal death rate of 7.1 per 100,000 populations per year. Pregnancy Unrelated Death (PUD) was the commonest group in pregnancy death followed by PRD and PAD, with poisoning as the commonest cause of death followed by burns and postpartum haemorrhage. The age of victims ranges from 14 years to 46 years with peak at 21-30 years. Married outnumbered unmarried in maternal death. Most of the death was found in first trimester followed by second trimester and postpartum period. Natural death was the commonest manner in pregnancy death followed by suicidal and accidental death.

1. Introduction

According to 10th revision of the International Statistical Classification of Diseases and Related

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Health problems (ICD), maternal death means death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.^{1,2} Few studies on pregnancy death have included suicides³ or motor vehicle traffic accidents⁴ or homicides.⁵ Death records remain an important source of maternal deaths. Many studies of maternal deaths in India based their statistics on clinical cause of death without reference of autopsy reports.⁶⁻⁹ This is because the autopsy is not performed routinely in such maternal deaths due to socio-religious reasons and hence autopsy reports to confirm cause of death were not available for such cases.¹⁰ Thus, review of autopsy reports may prove to be useful approach in increasing the ascertainment of maternal deaths. Against this background present study of maternal deaths was undertaken with a view to include all deaths in pregnancy irrespective of the cause of death.

2. Material and Methods:

The study attempted to review all medicolegal deaths during the period from January 1999 to December 2008. All the autopsies had been performed in the mortuary of Government Medical College at Yeotmal, a rural district of Maharashtra, India. The district has a population of 24,58,271 has spread in an area of 13,582 km². The centre is an Apex Medical Centre, where about 70% of the total medicolegal autopsies done across the district are performed here. In India the police department is legally bound to arrange autopsies in all medicolegal deaths. We included all cases of maternal deaths irrespective of the cause of death i.e death during pregnancy and postpartum period (up to 42 days postpartum), where medicolegal autopsy was conducted. Out of a total of 8550 medicolegal deaths during the study period of 10 years, 158 cases (1.8%) were the deaths in pregnancy. The deaths in pregnancy may be due to conditions related to pregnancy, conditions associated with pregnancy or conditions unrelated to pregnancy.

3. Results:

3.1. Incidence of death in pregnancy

The incidence of death in pregnancy out of the total medicolegal deaths is shown in [table 1](#). Of the total 8550 medicolegal deaths during the period 1999 to 2008, only 158 victims (1.8%) were the death in pregnancy. The rate of death in pregnancy in the region is 7.1 per 100,000 populations per year.

Year	Total Medicolegal autopsies	Death in Pregnancy	
		No	%
1999	840	10	1.2
2000	843	14	1.7
2001	892	16	1.8
2002	813	18	2.2
2003	761	25	3.3
2004	801	19	2.4
2005	788	19	2.4
2006	967	20	2.1
2007	940	8	0.9
2008	905	9	1.0
Total	8550	158	1.8

3.2. Groups and causes of death in pregnancy.

The different groups and cause of death in pregnancy are shown in [table 2](#). The deaths in pregnancy are grouped as Pregnancy Related Death (PRD) in which the death is directly related to the pregnancy and its complication. Second group is Pregnancy Associated Death (PAD) in which death is indirectly related or associated to the pregnancy and death is due to exacerbation of the pathological condition. Third group is Pregnancy Unrelated Death (PUD) in which the death is due to other causes not related with the pregnancy; however, pregnancy may be the reason for terminating one's own life.

PUD (84 cases) was the commonest group in death during pregnancy followed by PRD (43 cases) and PAD (31 cases). In PUD, the commonest cause of death was poisoning (36 cases) followed by burns (31 cases). The other cause of death like drowning, hanging, electric shock, mechanical injury, snake bite and natural illness were not common. In PRD, the commonest cause of death

was PPH (18 cases) followed by puerperal sepsis (8 cases). In PAD, hepatic failure with anaemia/consolidation (12 cases) was the commonest cause of death followed by consolidation (6 cases).

Table 2: Groups and cause of death in pregnancy

Groups and Cause of death	Number	%
I. Pregnancy Related Death (PRD)		
Antepartum haemorrhage	3	1.9
TOP	1	0.6
Ectopic Pregnancy	3	1.9
Obstructed Labour	1	0.6
Perforation of Uterus	1	0.6
PPH	18	11.4
Puerperal Sepsis	8	5.1
Pulmonary embolism	2	1.3
Amniotic fluid embolism	1	0.6
DIC	3	1.9
Undetermined	2	1.3
Total	43	27.2
II. Pregnancy Associated Death (PAD)		
Hepatic failure and Anaemia/ Consolidation	12	7.6
Meningitis	3	1.9
Sickle cell disease	3	1.9
Consolidation	6	3.8
Brain Infarct	1	0.6
Gastroenteritis	1	0.6
Heart Disease	3	1.9
Tuberculosis	2	1.3
Total	31	19.6
III. Pregnancy Unrelated Death (PUD)		
Burns	31	19.6
Drowning	4	2.5
Poisoning	36	22.8
Hanging	2	1.3
Electric shock	2	1.3
Mechanical Injury	4	2.5
Snake Bite	2	1.3
Natural disease - Malignancy	3	1.9
Total	84	53.2
Sum Total	158	100.0

3.3. Age distribution

The distribution of age is given in [table 3](#). The age of death in pregnancy ranges from 14 years to 46 years. 89.9% of the deaths were between the ages of 11-30 years with peak at 21-30 years (66.5%) followed by 11-20 years (23.4%). In PAD group, the age ranges from 19 years to 45 years with peak at 21-30 years (64.5%) followed by 31-40 years (19.4%). In PRD, the age ranges from 19 years to 35 years with peak at 21-30 years (81.4%) followed by 31-40 years (11.6%). In PUD, the age ranges from 14 years to 46 years with peak at 21-30 years (59.5%) followed by 11-20 years (38.1%).

3.4: Marital status:

The distribution of marital status of the death in pregnancy is given in [table 4](#). In death during pregnancy, 87.3% of the cases were married and 12.7% were unmarried with married unmarried ratio of 0.14:1. In PAD and PRD group, almost all pregnant women were married. Thus, most of the unmarried women belonged to PUD group with almost 17 out of 20 unmarried women committed suicide due to unwanted pregnancy before marriage.

3.5. Duration of pregnancy:

As shown in [table 5](#), most of the death in pregnancy was observed in first trimester (50 cases). 40 deaths (25.3%) occurred in second trimester and 24 deaths (15.2%) occurred in third trimester, prior to labour. Only 1 death (0.6%) occurred during labour and 43 deaths (27.2%) occurred in the postpartum period. Thus, 72 % of deaths occurred during pregnancy, 0.6% during labour and 27.2% during postpartum period. In PAD group, most number of death in pregnancy occurred in 3rd trimester (12 cases) and postpartum period (13 cases). Whereas in PRD, maximum death in pregnancy occurred in postpartum period (26 cases). In PUD, most number of death was found in 1st trimester (40 cases) followed by 2nd trimester (33 cases).

3.6. Pregnancy outcome and mode of delivery:

Analysing the pregnancy outcome, live birth was delivered in 39 cases (26 in PRD and 13 in PAD) and abortion in 4 cases. Remaining cases were undelivered. ([Table 6](#)).

Table 3. Age distribution of death in pregnancy

Age	PAD	%	PRD	%	PUD	%	Total	%
11-20	3	9.7	2	4.7	32	38.1	37	23.4
21-30	20	64.5	35	81.4	50	59.5	105	66.5
31-40	6	19.4	5	11.6	1	1.2	12	7.6
41-50	2	6.5	1	2.3	1	1.2	4	2.5
Total	31	100.0	43	100.0	84	100.0	158	100.0

Table 4: Distribution of marital status

Marital Status	PAD	%	PRD	%	PUD	%	Total	%
Married	1	3.2	2	4.7	17	20.2	20	12.7
Unmarried	30	96.8	41	95.3	67	79.8	138	87.3
Total	31	100.0	43	100.0	84	100.0	158	100.0

Table 5: Distribution of victims in relation to duration of pregnancy

Duration	PAD	%	PRD	%	PUD	%	Total	%
1st Trimester	3	9.7	7	16.3	40	47.6	50	31.6
2nd Trimester	3	9.7	4	9.3	33	39.3	40	25.3
3rd Trimester	12	38.7	5	11.6	7	8.3	24	15.2
Labour	0	0.0	1	2.3	0	0.0	1	0.6
Postpartum	13	41.9	26	60.5	4	4.8	43	27.2
Total	31	100.0	43	100.0	84	100.0	158	100.0

Table 6: Distribution of pregnancy outcome and mode of delivery

Groups	Pregnancy Outcome			Type of delivery		Place of delivery	
	Live birth	Abortion	Undelivered	Vaginal	Caesarean	Home	Hospital
PAD	13	0	18	12	1	3	10
PRD	26	0	17	24	2	7	19
PUD	0	4	80	0	0	0	0
Total	39	4	115	36	3	10	29
%	24.7	2.5	72.8	92.3	7.7	25.6	74.4

Table 7: Distribution of Manner of Death

Groups and Cause of death	Manner of Death				Sum Total	%
	Natural	Accident	Suicidal	Homicidal		
I. Pregnancy Related Death (PRD)						
Antepartum haemorrhage	3	0	0	0	3	1.9
TOP	1	0	0	0	1	0.6
Ectopic Pregnancy	3	0	0	0	3	1.9
Obstructed Labour	1	0	0	0	1	0.6
Perforation of Uterus	0	1	0	0	1	0.6
PPH	17	1	0	0	18	11.4

Puerperal Sepsis	8	0	0	0	8	5.1
Pulmonary embolism	2	0	0	0	2	1.3
Amniotic fluid embolism	1	0	0	0	1	0.6
DIC	3	0	0	0	3	1.9
Undetermined	2	0	0	0	2	1.3
Total	41	2	0	0	43	27.2
II. Pregnancy Associated Death (PAD)						
Hepatic failure and Anaemia	12	0	0	0	12	7.6
Meningitis	3	0	0	0	3	1.9
Sickle cell disease	3	0	0	0	3	1.9
Consolidation and Anaemia	6	0	0	0	6	3.8
Brain Infarct	1	0	0	0	1	0.6
Gastroenteritis	1	0	0	0	1	0.6
Heart Disease	3				3	1.9
Tuberculosis	2				2	1.3
Total	31	0	0	0	31	19.6
III. Pregnancy Unrelated Death (PUD)						
Burns	0	20	6	5	31	19.6
Drowning	0	0	4	0	4	2.5
Poisoning	0	0	36	0	36	22.8
Hanging	0	0	2	0	2	1.3
Electric shock	0	2	0	0	2	1.3
Mechanical Injury	0	2	0	2	4	2.5
Snake Bite	0	2	0	0	2	1.3
Malignancy	3	0	0	0	3	1.9
Total	3	26	48	7	84	53.2
Sum Total	75	28	48	7	158	100.0
%	47.5	17.7	30.4	4.4	100.0	

Out of the total deliveries, vaginal delivery occurred in 36 cases and caesarean delivery in 3 cases. 29 deliveries were conducted in the hospital and 10 were occurred at home.

3.7. Manner of death:

As per [table 7](#), the commonest manner of death was natural (47.5%) followed by suicidal (30.4 %), accidental (17.7 %) and homicidal (4.4%). The manner of death in PAD and PRD group was natural in all cases except two cases in PRD due to perforation of uterus during criminal abortion. In PUD group, the manner of death was unnatural in all cases except three cases. Suicidal death was present in 48 cases, accidental in 26 cases and homicidal in 7 cases.

4. Discussion:

Over 600000 maternal deaths occur each year worldwide.¹¹ In India, many women dies due to pregnancy-related complications and those who survive suffer from severe maternal morbidity.¹² Over 100,000 Indian women dies annually from pregnancy and child birth related causes, thus accounting for one-quarter of maternal death worldwide.¹³ In the present study out of total 8550 medicolegal autopsies reported over a period of 10yrs, 158 cases (1.8%) were the death in pregnancy with rate of 7.1% death in pregnancy per lakh population per year. Fubara et al.¹⁴ reported 6.1% maternal death out of the total medicolegal autopsies performed.

PUD was the commonest group seen in almost 62.5% death in contrast to PRD in 20.8% and PAD in 16.7%. Poisoning (27.5%) was the commonest cause of death followed by burns

(24.2%) in PUD. PPH (11.7%) and puerperal sepsis (4%) were the major cause of death in PRD and hepatic failure with Anaemia/consolidation (10 %) in PAD. Thrombo-embolism remains the leading cause of maternal death in developed countries followed by pregnancy induced hypertension or pre-eclampsia and eclampsia (15,16). In India, hypertensive disease, haemorrhage and sepsis are the major cause of maternal death.¹⁷⁻¹⁹ Bhattacharyya et al.⁸ and Jadhav et al.⁷ also reported haemorrhage, hypertensive disorder and sepsis as the major cause of maternal mortality in India. However, Bardale et al.²⁰, Khosla et al.¹² and Shah et al.¹⁰ reported haemorrhage as the commonest cause of death in pregnancy followed by indirect cause and sepsis. All these studies do not include unintentional accident or intentional injury. Ghaffar et al.²¹ reported 32 cases of pregnant burn females with 23 maternal and 26 foetal deaths. Anandalakshmy and Buckshee²² reported 55.2% maternal deaths were due to direct causes, 43.1% were due to indirect causes and remaining 1.7% was due to unrelated causes. Among the direct causes, death due to sepsis (35.3%) was the leading cause followed by toxemia (16.4%) and haemorrhage (2.6%). In the present study, some of the causes of death like sepsis, anaemia and hepatitis were common but are preventable. Ignorance and lack of awareness of the patients regarding MTP and contraceptives devices, untrained personnel performing illegal and unsafe abortion, deliveries under unsafe conditions and referring the patients late in tertiary care centre are still the root causes of deaths due to sepsis.⁸ Deaths from anaemia are also high due to fact that prevalence of anaemia is still high in developing countries. It also reveals the failure of anaemia prevention programs. A significant number of mother die due to infective hepatitis which indicates the lack of proper sanitation and that of universal precaution in poor resource countries.⁸

In present series, the age of victim in pregnancy death ranges from 14yrs to 46yrs with peak at 21-30yrs. In 25.8% deaths, the age of victims were between 11-20yrs and 12.5% were unmarried. In PUD, 37.3% of the victims were between the age of 11-20 yrs in contrast to 10%

and 4% in PAD and PRD respectively. Thus younger age were more commonly involved in PUD. Similarly all unmarried victims belonged to PUD group usually committed suicide due to unwanted pregnancy before marriage. Kausar²³ reported that despite the Child Marriage Restraint Act (1978), 34% of all women are married below 18yrs and are facing considerable health risks during pregnancy & child birth. Girls below 20yrs are twice as likely to die from child birth as women in their twenties. Shah et al.¹⁰ reported peak age at 25-35 years. Anandalakshmy and Buckshee²² reported 80% of the deaths during pregnancy in age group of 20-29 years.

In the present study, 72% deaths were noted during pregnancy period before labour, 0.6% during labour and 27.2% in postpartum period. In PAD, maximum death was noted in post partum period and third trimester, whereas postpartum period in PRD and first trimester in PUD. Thus unnatural deaths occurred most commonly in first trimester. Anandalakshmy and Buckshee²² reported 58.6% death in post partum period, 35.3% during pregnancy but prior to delivery and 6.03% during labour. Prahlow et al.²⁴ noticed 20% deaths in first trimester of pregnancy, 15.6% in second trimester and 11.1% in third trimester prior to birth, 28.9% during labour/ birth, 24.4% in postpartum period.

The commonest manner of death in pregnancy was natural followed by suicidal and accidental death. The manner of death in PAD and PRD group was natural in almost all cases whereas in PUD group it was unnatural namely suicidal (30.4%), accidental (17.7%) and homicidal (4.4%) cases. Thus it is evident that homicides, suicides and accident account for a large proportion of death in pregnancy. In US, it was found that the risk of being physically attacked or murdered was three times greater among women with unwanted pregnancies.²⁵ However, a study in Maryland showed that the homicide rate was nearly double in all women who were pregnant.²⁶ A different study showed that the leading cause of death among pregnant women in Maryland was homicide (20%), followed by cardiovascular disease (19%).⁵ Adolescent homicide victims were 3.7 times more likely to be pregnant compared with adult homicide victims.²⁶ Krulewitch et al.²⁷

found that pregnant women were significantly more likely than non-pregnant women to have died of gunshot trauma. Fubara et al.¹⁴ reported homicide in 3.3% and accidental death in 5%. A study performed in the state of New Mexico showed that motor vehicle crashes accounted for 70% of injury related death during pregnancy. Of these deaths, 45% of the crashes involved alcohol, and 77% of the pregnant women killed were not wearing seatbelts at the time of the crash.⁴

Walker et al.²⁸ reported that 15% of violent death of pregnant women has been attributed to unwanted pregnancy. Moreover the adolescents committed suicide after realizing they were pregnant. In Bangladesh, pregnant adolescents had a greater risk of suicide death than non-pregnant adolescents.²⁹ Other studies have shown that death from suicide was leading cause of maternal death, overall accounting for 28% of maternal deaths. The majority of suicides died violently in contrast with the usual findings that women are more likely to die of an overdose of medication. Studies are ongoing that investigate the relationship of pregnancy to depression, eating disorders, and pathologic fear of childbirth (tocophobia).^{30,31}

In India, death records remain an important source of maternal deaths. Using death certificate as sole source suffers various draw back because many times in medicolegal deaths, the cause of death is not mentioned in association with the pregnancy.²⁰ Other studies had shown that physicians completing death certificate (records) following a maternal death fail to report that the woman was pregnant or had recent pregnancy in 50% or more of these cases.³² Such mistakes may result in misclassification of the underlying cause of death. If such deaths are not identified as maternal deaths, then they may not be included in the calculation of maternal mortality rates. Therefore, traditional system of collecting data on maternal mortality cannot identify all pregnancy related deaths. Moreover, almost all studies of maternal deaths in India based their statistics on clinical cause of death without reference of autopsy reports.⁶⁻⁹ This is because the autopsy is not performed routinely in such maternal deaths

due to socio-religious reasons and hence autopsy reports to confirm cause of death were not available for such cases.¹⁰ The Maryland study showed that only a small proportion of pregnancy associated deaths can be identified from death certificates alone and that comprehensive identification of pregnancy associated death requires collection of data from additional sources, including autopsy records and linkage of death records with birth and death record.⁵

5. Conclusion:

The use of multiple data sources substantially enhances pregnancy mortality surveillance. Review of autopsy report is one of the important source to identify pregnancy related/ associated death and thus may prove to be useful approach in increasing the ascertainment of maternal death.

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