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Histopathological Study of Maternal Death During First Wave of Covid-19

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ABSTRACT
Every five to seven minutes a maternal fatality occurs in India. Direct, indirect, and coincidental reasons can all be categorised as contributing factors to maternal death. MMR is crucial to determine the precise reason of maternal death, which is made possible by comprehensive pathological analysis and meticulous autopsy under the supervision of experts. Retrospective 87 consecutive occurrences of maternal fatalities over the course of a year were the subject of an observational study done in the pathology department of a tertiary healthcare facility. Samples from medical-legal cases are typically sent to the pathology department by the institution's forensic department as maternal fatalities for histopathological analysis. Pathological postmortems were performed in 6 instances. The current study, which comprised 87 cases, reveals that the majority of cases were in the 21-30 age range. In the antenatal care period, there were 71 cases, of which 6 cases occurred in the first trimester, 7 cases in the second, and 58 cases in the third. Maternal deaths (MD) has been reported in 16 cases during the post-partum interval. The remaining 19 instances (21.9%) of maternal mortality died from indirect causes, leaving 68 (78.1%) patients dead from direct causes. Conclusion: In the first wave of COVID-19, there has been an increase in the percentage of maternal mortality attributed to respiratory illnesses. To reduce similar deaths in the future, it is important to identify the cause and any contributing variables. The main emphasis should be on early detection and management of high risk pregnancies in order to lower maternal mortality. The current study has demonstrated the significance of prenatal care during pregnancy in terms of early risk detection, prevention of pregnancy as well as labour difficulties, and assurance of a mother and child's safe delivery.

INTRODUCTION

The MMR definition is "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 pregnancy or its management but not from accidental or incidental causes"[1,2]. There are various facets to the reasons why women pass away during pregnancy and childbirth. The status of women, their health, fertility, and health seeking behaviour are all influenced by social, cultural, and political variables in addition to medical causes, such as logistical issues, shortcomings in the healthcare system, a lack of transportation, etc[2]. The purpose of this study was to describe different causes of maternal death using a thorough autopsy and pertinent information. Therefore, forensic pathologists are crucial in determining the proper cause of death in these circumstances. Review of autopsy results and hospital records can be one of the most helpful tools for identifying pregnancy-related deaths and identifying new patterns.

MATERIALS AND METHODS

The Department of Pathology at Grant Government Medical College and Sir JJ Groups of Hospital in Mumbai undertook the current retrospective cross-sectional and observational study during a one-year period, from January 2020 to December 2020. During this time, 87 cases of maternal deaths that were brought in for postmortem examination were studied. Total 87 cases were included in this study, out of which in 6 cases autopsy was performed in J.J. hospital and 81 cases the autopsy was performed out and viscera were received in J. J. Hospital. Every instance of maternal death that happened during pregnancy or within 42 days of birth was included. Each case's viscera had a careful inspection with special attention paid to maternal death and the royal college of Landon's maternal death recommendations. 10% formalin was used to preserve the organs. To pinpoint the exact cause of maternal mortality, clinical notes, gross specimens, and slides from histopathology were examined. All 6 autopsies are done in J.J.H with covid negative status, and the viscera which are received for which covid 19 status not known, analysis done depending on history provided.

RESULTS

Figure 1 shows that, out of 87 deaths, 57 (65.50%) of them were maternal deaths, the majority of which occurred in the age range of 21-30 years. 20 (22.9%) deaths occurred in people aged 31-40, followed by 8 (9.1%) and 2 (2.29%) deaths in people aged under 21 and 42, respectively (Fig. 1). In the antenatal care period, there were 71 cases, of which 6 cases occurred

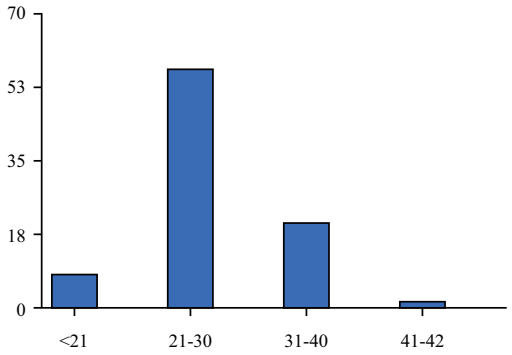

Fig. 1: Bar diagram representing the age distribution

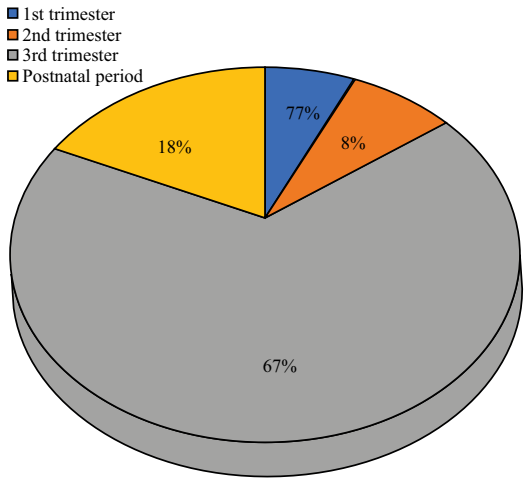

Fig. 2: Pie chart showing number of deaths in 1st, 2nd, 3rd trimester and postnatal period

in the first trimester, 7 cases in the second and 58 cases in the third. 16 occurrences (Fig. 2) occurred in the postnatal stage. Illustrations.

Table 1 shows that 68 (78.1%) of the cases had direct causes of maternal death, whereas the other 19 (21.9%) had indirect causes. Out of 68 cases with a direct cause of death for the mother, 27 (or 30.88%) died from postpartum haemorrhage, 12 (13.7%) from septicemia, 3 (8.4%) from pregnancy-induced hypertension, 3 (3.44%) from intrauterine foetal death, 6 (6.89%) from antepartum haemorrhage, 5 (or 5.74%) from uterine rupture, 3 (3.44%) from ruptured ectopic pregnancy (Three (3.2%) abortion-related problems, two (2.29%) HELLP syndrome complications (Fig. 4a and b), one (1.1%) adverse medication response complications, and one (1.1%) injection abscess and gas gangrene complications.

10 (11.4%) of the 19 cases with indirect causes of maternal mortality involved respiratory illnesses, 2(2.29%) hepatitis (Fig. 5), 2 (2.1%) severe anemia, 2(2.29%) central nervous system related i.e., 1 subarachnoid haemorrhge, (Fig. 6a and b) and 1 viral

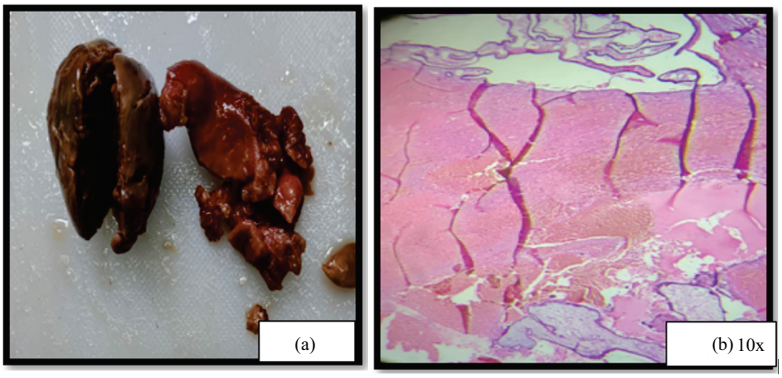

Fig. 3(a-b): (a) Ruptured tubal ectopic (gross image) and (b) Ectopic pregnancy (10x, H and E)

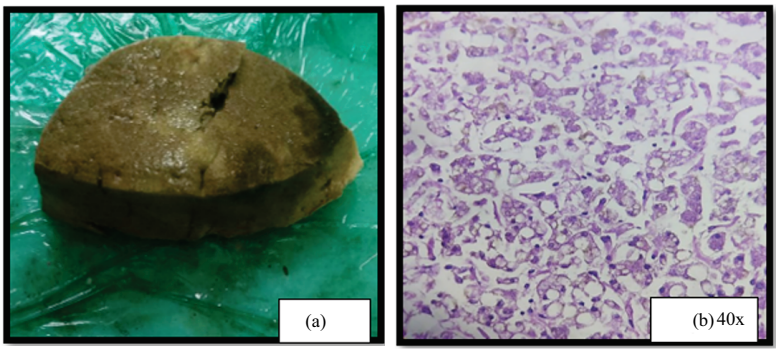

Fig. 4(a-b): (a) Cholestasis of liver (Gross Image) and (b) Cholestasis of Liver (40x, H and E)

Table 1: Distribution of causes of maternal mortality

Causes	No. of cases n = 87	Percentage n = 100%
Direct causes (68)		
Postpartum Hemorrhage	27	30.88
Septicemia	12	13.70
Eclampsia and preeclampsia	3	3.44
Abortion related	3	3.20
Hepatic disease of pregnancy (HELLP syndrome)	2	2.29
Ruptured uterus	5	5.74
Antepartum haemorrhage	6	6.89
Ruptured ectopic	3	3.44
IUFD	3	3.44
DIC	3	3.44
Complications of drug reaction during treatment	1	1.10
Injection abscess and gas gangrene	1	1.10
Indirect causes (19)		
Respiratory disease	10	11.40
Severe anemia	2	2.29
Hepatic disease (Hepatitis A and E)	2	2.29
Central nervous system relted (1Subarchanoid haemorhage+1 viral meningitis)	2	2.29
Cardiovascular disease (RHD)	1	1.14
Disseminated TB	1	1.33
Malaria	1	1.33

meningitis (Fig. 7a and b), 1 (1.1%) rheumatic heart disease, 1 (1.1%) malaria (Fig. 8) and 1 (1.1%) abdominal Koch' cases (Fig. 9a and b). Out of 10 cases with respiratory disease, 2 were found to have pulmonary tuberculosis (Fig. 10), 2 cases of Bronchopneumonia, 3 cases of lobar pneumonia, 2 cases of interstitial pneumonia, 1 case of Resolving pneumonitis.

DISCUSSIONS

Reducing maternal morbidity and death is a top priority for healthcare in underdeveloped nations and is a global problem. The WHO recommends the Maternal Death Review (MDR) method to examine delivery procedures and outcomes in hospitals and the community. It is broken down into facility-based and community-based maternal mortality reviews and

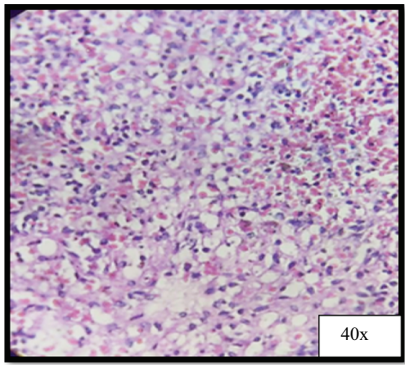

Fig. 5: Viral hepatitis showing mononuclear inflammatory infiltrate (40x H and E)

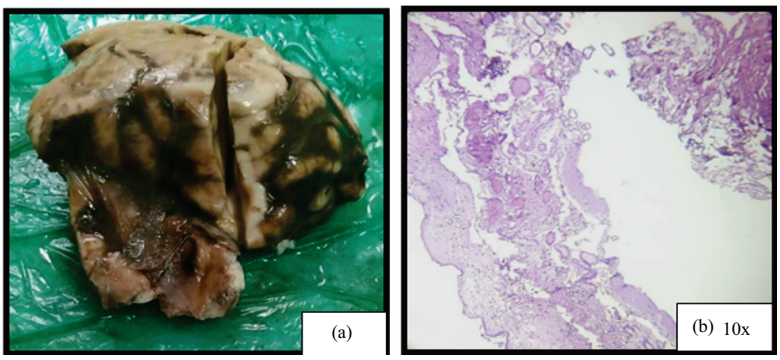

Fig. 6(a-b): (a) Subarachnoid haemorrhage (Gross Image) and (b) Subarachanoid haemorrhage (10x, H and E)

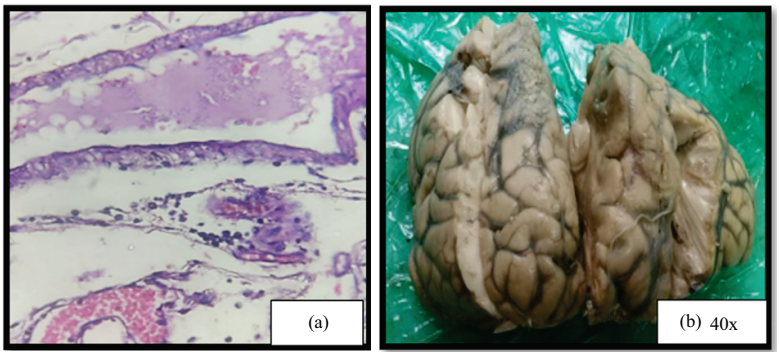

Fig. 7(a-b): (a) Viral meningitis (Gross Image) and (b) Viral meningitis (40x H and E)

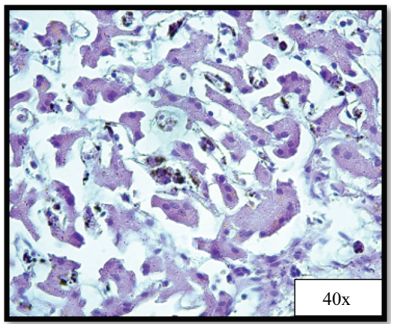

Fig. 8: Intracytolplasmic hemozoin pigment in the kuffers cells in the liver tissue in a case of malaria patient (40x H and E)

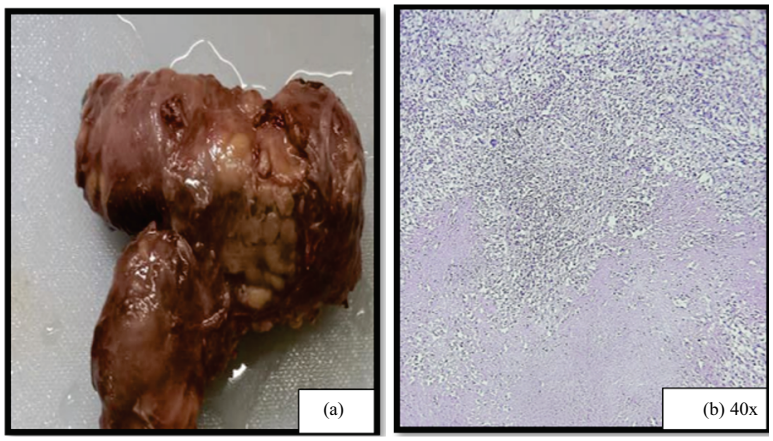

Fig. 9: (a) Omental tissue (Gross Image) and (b) Abdominal tuberculosis showing caseous necrosis (10x, H and E)

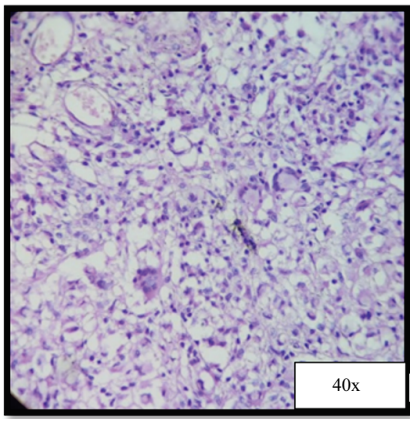

Fig. 10: Pulmonary tuberculosis and giant cells (40x H and E)

analyses fatalities and their factors at all levels. Understanding how epidemiology is changing can help India achieve MDG-5 (Millennium Development Goal 5) in the future[4].

As in past research, there was a higher incidence of maternal mortality in the age range of 21-30 years in the current study, with 57 (65.50%) deaths[5,6]. This was also the case for Taye *et al*.[7], Hazarika *et al*.[8], Murthy *et al*.[9], Jashnani *et al*.[10], Panchabhai *et al*.[11] and Kumari *et al*.[12], but Montgomery AL found a considerably smaller number of instances. The present study's higher rate of maternal deaths among women aged 21 to 30 may be explained by the early marriage and pregnancy customs of India.

Similar conclusions were reached by Jashnani *et al*.[10] and Kumari *et al*.[12], who identified 55.55 and 82.8%, respectively, of all maternal deaths that occurred between the 29th week of pregnancy and postpartum. Access to emergency obstetric care is essential in minimising maternal deaths since a considerable number of issues commonly arise before labour begins and throughout the postpartum period. In the current study, it was found that 19 (21.9%) of the cases died from indirect causes whereas 68 (78.1%) of the cases died from direct causes of maternal fatalities. Consistent findings with the current study were reported by Kumari *et al*.[12], Parmar *et al*.[13] and Yerpude Jogdand[14]. Of the 68 (78.1%) cases with direct causes of maternal mortality, 27 (30.88%) instances involved the typical triad of postpartum haemorrhage or obstetrical haemorrhage, septicemia, or sepsis. Twelve cases of septicemia, pregnancy-related hypertension, or eclampsia (13.7%) 7 (8.4%) deaths were classified as major. These results support those of Kumari *et al*.[12] and Parmar *et al*.[13]. Ten of the 19 occurrences of indirect maternal death include respiratory illnesses. Hepatitis A and E each caused 2 (2.66%) individuals to pass away, followed by severe anaemia in 2 (2.1%), rheumatic heart disease in 1 (1.1%), and abdominal Koch's in 1. These results concur with those of Gumanga *et al*.[15].

A significant portion of maternal mortality are caused by haemorrhage, infection, eclampsia, unsafe abortion, unsafe abortion and prolonged labour. A direct result of studying Piane *et al*.[16]. Both pregnant women with sickle cell anaemia and

haematologically normal pregnant women have a reduction in haemoglobin concentration as a result of hemo-dilution. According to other research, the additional causes of maternal mortality were ectopic pregnancy, hepatic disease during pregnancy, and deaths due to abortion[17]. The vaso-occlusive crisis may have harmful effects on the mother and foetus, and in rare instances, it may even be deadly[17]. Autopsy evaluation of maternal deaths is lacking on a global scale. Every case with MD should have a thorough autopsy study[19].

When compared to studies conducted by Panchabhai *et al*.[20] prior to the invention of COVID, the prevalence of respiratory illnesses was on the higher side. It takes commitment from leaders in public health around the world to identify and put into practise the successful plans for the ideal methods of reducing MD. If the mother gets access to the fundamental and essential health care services before, during, and after childbirth, almost 80% of MDs can be avoided[21]. The development and validation of the clinical diagnosis depend heavily on pathology.

CONCLUSION

In the first wave of COVID-19, there has been an increase in the percentage of maternal mortality attributed to respiratory illnesses. To reduce similar deaths in the future, it is important to identify the cause and any contributing variables. The main emphasis should be on early detection and management of high risk pregnancies in order to lower maternal mortality. The current study has demonstrated the significance of prenatal care during pregnancy in terms of early risk detection, prevention of pregnancy as well as labour difficulties, and assurance of a mother and child's safe delivery.

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