Al Ameen J Med Sci 2023; 16(1):99-106 ● US National Library of Medicine enlisted journal ● ISSN 0974-1143

ORIGINAL ARTICLE CODEN: AAJMBG

Study on maternal morbidity among the pregnant mothers attending a tertiary care hospital in Kolkata

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Received: 01st November 2021; ***Accepted:*** 26th October 2022; ***Published:*** 01st January 2023

Abstract: *Introduction:* Maternal morbidity represents hidden part of iceberg while maternal mortality represents its tip. Thus it is essential to prevent maternal morbidity to put a stop to maternal mortality and maternal near miss episode. *Objectives:* The aim of this study was to find out occurrence and distribution of maternal morbidity among the mothers attending G&O Department of a tertiary care hospital in Kolkata and to assess risk factors of maternal morbidity among the study population and to find out any relationship among them. *Materials & Methods:* An observational descriptive hospital based study conducted among antenatal mothers attending antenatal clinic of a tertiary care hospital over 2 months. Data was collected with help of predesigned pretested questionnaire, clinical examination and review of medical records. Data was complied, analysed and presented.*Results:*22.89% of mothers were suffering from any form of morbidity during 3rd trimester of pregnancy. Most prevalent morbidity was found to be Gestational diabetes (8.42%), followed by Pre eclampsia (3.68%). Maternal residence, maternal obesity, consumption of extra meal and inter pregnancy interval were significantly associated with occurrence of maternal morbidity. Family history of diabetes and hypertension in the first degree relative were significantly associated with occurrence of gestational diabetes and preeclampsia respectively. *Conclusion:* Knowledge of prevalent risk factors of maternal morbidity helps in effective intervention, which should be intensified to reduce maternal morbidity due to preventable causes.
Keywords: Antenatal mothers, Pregnancy complication, risk factors.

Introduction

Maternal death is decreasing all over the world. One-fifth of maternal deaths in the whole world are shared by Indian mothers. Maternal deaths can be compared with the scenario of the iceberg. The base of the iceberg is represented by maternal morbidity while the tip is represented by maternal mortality. There were at least 20 - 30 cases of maternal morbidity for every maternal death. Mothers may experience either acute or chronic morbidity, often with endless sequels affecting normal daily functioning [1].

Maternal morbidity is any condition that is attributed to or aggravated by pregnancy and childbirth which hurts the woman's well-being and /or functioning [2]. There are several causes of maternal morbidity which ranges from common minor illnesses to severe form including life-threatening illnesses and a maternal near miss. This includes haemorrhage, convulsion as a severe form of hypertension, gestational diabetes, heart disease, anaemia, jaundice, infection, etc as moderate form and also mild form as weakness, vomiting, etc [3]. Maternal death is one of the main indicators of health care delivery system, especially in respect to maternal health. But if only maternal mortality is considered a maternal health indicator, then the importance of maternal morbidity is undermined. Maternal morbidity is however antecedent to maternal mortality which is only a fraction of the burden of maternal morbidity.

Maternal morbidity might be a possible cause of lifetime disability leading to poor quality of life. The world development report estimated that the burden of disease due to maternal causes is around 18% [4]. A study in Maharashtra, India describeda high prevalence of maternal morbidity. Around 52.65% of mothers in urban areas and 96.53% in rural areas were affected by at least one maternal

morbidity [5]. The prevalence rate of SAMM (Severe Acute Maternal Morbidity) varied between 0.8% - 8.23%. This may be due to the factors like unavailability of appropriate facilities along with inadequate diagnostic tools which were more likely to be found in resource-poor developing country settings than in more developed country settings [6].

Thus it is essential to assess the maternal health status especially maternal morbidity along with its epidemiological characteristics. With this background, the current study was conducted to find out the occurrence and distribution of maternal morbidity among the mothers attending the Gynaecology and Obstetrics Department of a tertiary care hospital in Kolkata and to assess risk factors of maternal morbidity among the study population and to find out any relationship among them.

Material and Methods

A descriptive cross-sectional hospital-based study was conducted over 2 months in the antenatal clinic of the Gynaecology and Obstetrics department of a tertiary care hospital in Kolkata. Taking the prevalence of 52.65% of maternal morbidity in the urban area, the sample size was calculated by the formula, N= Z2pq/L2; where N= sample size, p=prevalence, q=100-p, Z= standard normal deviate=1.96, L= allowable error. The sample size was estimated at 345. Taking into account of 10% nonresponse rate, the final sample size was calculated as 380.

380 registered antenatal mothers in their third trimester of pregnancy were selected for the study after obtaining informed verbal consent, who had attended the antenatal clinic from September to October 2019. They were interviewed face-to-face with the help of a predesigned pretested questionnaire.

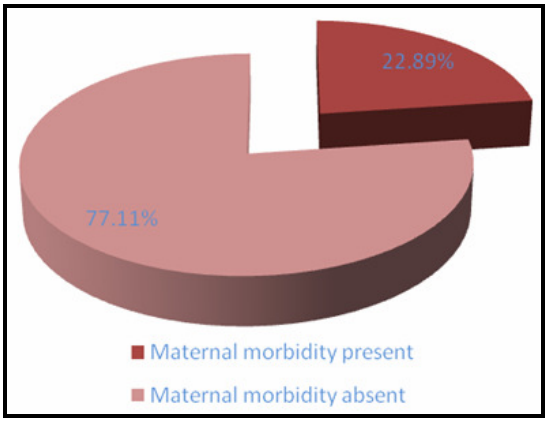
The anonymity of the respondents was ensured and the confidentiality of the responses was maintained. A detailed interview was conducted on socio-demographic profile, personal history, and past and present medical and obstetric history using a predesigned, pretested, semi-structured questionnaire after translating into the local language. A detailed clinical examination was performed including an anthropometric assessment. All medical records were analyzed. Those who were not willing to provide information were excluded from the study.

Ethical permission was obtained from Institution Ethics Committee. All collected data were compiled and analysed by MS Excel 8.0 and Epi info 3.4.3. Results were presented as percentages & proportions and the Chi-square test was applied as the test of significance.

Results

In the current study, 380 mothers who were registered with the antenatal clinic of a medical college and hospital in Kolkata and their 3rd trimester of pregnancy were considered as the study population. 10% teenage mothers, 4.47% illiterate, 9.74% from lower socioeconomic class, 12.11% working and 59.47% from nuclear families were found to be in the study population.

Fig-1: Distribution of study subjects acc to presence of maternal morbidity (N=380)



It was found that 22.89% (87) of mothers were suffering from any form of morbidity during 3rd trimester of pregnancy. (Fig: 1) Most prevalent morbidities was found to be Gestational diabetes (32, 8.42%), followed by Pre eclampsia. (14, 3.68%) . Only 5% of mothers suffered from anaemia during pregnancy. Hypothyroidism and Obstetric cholestasis were found in 2.36% and 2.63% respectively. 4.21% suffered from other illnesses like asthma, hyperacidity, urinary tract infection and typhoid infection.

Table-1: Distribution of study subjects according to socio- demographic profile and maternal morbidity: (N= 380)				
Sociodemographic profile	**Maternal morbidity**		**Total**	**Statistical Test applied**
	Yes (N1= 87) No (%)	**No (N2= 293) No (%)**	**N= 380 No (%)**	
Age:				
< 20	13 (34.21)	25 (65.79)	38 (10)	X^2 = 7.6099 p value= 0.054801
20- 25	35 (18.04)	159 (81.96)	194 (51.05)	
25- 30	33 (25)	99 (75)	132 (34.74)	
> 30	6 (37.5)	10 (62.5)	16 (4.21)	
Range: 18-35 yrs Mean = 23.83 yrs SD = 3.216yrs				
Educational Status:				
Illiterate	6 (35.29)	11 (64.71)	17 (4.47)	X^2 = 1.55 p value= 0.213
Educated	81 (22.31)	282 (77.69)	363 (95.53)	
Socioeconomic status:				
Upper	8 (16)	42 (84)	50 (13.16)	X^2 =1.7755 p value= 0.41182
Middle	69 (23.55)	224 (76.45)	293 (77.10)	
Lower	10 (27.03)	27 (72.97)	37 (9.74)	
Residence:				
Rural	41 (18.98)	175 (81.02)	216 (56.84)	X^2 = 4.3416 p value= 0.037192
Urban	46 (28.05)	118 (71.95)	164 (43.16)	
Occupational Status:				
Working	14 (30.43)	32 (69.57)	46 (12.11)	X^2 = 1.6855 p value= 0.194198
Home maker	73 (21.86)	261 (78.14)	334 (87.89)	
Type of family:				
Nuclear	49 (21.68)	177 (78.32)	226 (59.47)	X^2 = 0.4651 p value= 0.495272
Joint	38 (24.68)	116 (75.32)	154 (40.53)	

Only maternal residence was significantly associated with the occurrence of maternal morbidity. Maternal age, educational status, occupation of the mother, socioeconomic status and family type were not significantly associated with maternal morbidity (Table 1).

Maternal obesity and less consumption of extra meals were significantly associated with the occurrence of maternal morbidity. Although exposure to addiction was found in 7.11% and passive smoking in 17.11% and addiction, exposure to passive smoking did not contribute significantly to maternal morbidity. 48.15% of addicted mothers consumed chewing tobacco, 22.22% smoked and 29.63% consumed alcohol during their antenatal period. 100% of mothers consumed iron folifer tablets in the recommended dose. In the relationship between past obstetric history and maternal morbidity, inter pregnancy interval of less than 3 yrs was found to be significantly associated with maternal morbidity. Gravida and the past obstetric outcome did not contribute significantly. Family history of diabetes and hypertension in the first-degree

relative was significantly associated with the occurrence of gestational diabetes and preeclampsia respectively (Table 2).

Table-2: Distribution of study subjects according to personal and obstetric attributes and maternal morbidity: (N= 380)

Personal Attributes	Maternal morbidity		Total	Statistical Test applied
	Yes (N1= 87) No (%)	No (N2= 293) No (%)	N= 380 No (%)	
Nutritional Status :				
Normal	134 (85.90)	22 (14.10)	156 (41.05)	X^2 = 19.1802 p value= **0.000068**
Overweight	134 (74.86)	45 (25.14)	179 (47.11)	
Obese	25 (55.56)	20 (44.44)	45 (11.84)	
Consumption of extra meal during antenatal period :				
Yes	27 (16.36)	138 (83.64)	165 (43.42)	X^2 = 7.0466 p value= **0.007941**
No	60 (27.91)	155 (72.09)	215 (56.58)	
Exposure to addiction during antenatal period:				
Yes	9 (33.33)	18 (66.67)	27 (7.11)	X^2 = 1.7941 p value= 0.180432
No	78 (22.10)	275 (77.90)	353 (92.89)	
Exposure to passive smoking during antenatal period:				
Yes	49 (75.38)	16 (24.62)	65 (17.11)	X^2 = 0.1315 p value= 0.716874
No	244 (77.46)	71 (22.54)	315 (82.89)	
Gravida:				
Primi	56 (20.36)	219 (79.64)	275 (72.37)	X^2 = 3.6118 p value= 0.05737
Multi	31(29.52)	74 (70.48)	105 (27.63)	
Inter-pregnancy interval:				
< 3 yrs	22 (36.07)	39 (63.93)	61(16.05)	X^2 = 7.1407 p value= **0.028146**
≥3 yrs	9 (20.45)	35 (79.55)	44 (11.58)	
NA	56 (20.36)	219 (79.64)	275 (72.37)	
Past Obstetric outcome:				
Favourable	22 (27.5)	58 (72.5)	80 (76.19)	X^2 = 0.6614 p value= 0.416066
Unfavourable	9 (36)	16 (64)	25 (23.81)	
Acc. to Family history of Diabetes :				
Family history of Diabetes	Presence of Gestational Diabetes		Total (380)	X^2 = 57.6483 p value= **0.00001**
	Yes (32)	No (348)		
Present	22 (30.99)	49 (69.01)	71 (18.68)	
Absent	10 (3.24)	299 (96.76)	309 (81.32)	
Acc. to Family history of Hypertension :				
Family history of Hypertension	Presence of Pre eclampsia		Total (380)	X^2 = 12.4305 p value= **0.0004222**
	Yes (14)	No (366)		
Present	7 (11.48)	54 (88.52)	61 (16.05)	
Absent	7 (2.19)	312 (97.81)	319(83.95)	

Discussion

The current study was conducted among 380 antenatal mothers and 22.89% of them were suffering from any kind of maternal morbidity. The highest contribution was found to be by gestational diabetes (8.42%) followed by Preeclampsia (3.68%). However, Suzanne J et al found that 38% of pregnant mothers suffered from maternal morbidity [7]. A study conducted in Delhi by Chhabra P et al found preeclampsia complication (35%) and haemorrhage (35%) as the two most prevalent conditions followed by severe anaemia (22%) and sepsis (13%)[8]. Whereas gestational diabetes (8.42%) was observed as the most common morbidity in current research, followed by preeclampsia (3.68%). Both of these were found to be far less than the occurrence found by Chhabra P et al [8].

According to the socio-demographic profile: In the current study, the residence of mothers played an important role as a socio-demographic attribute of maternal morbidity. This discrepancy may be due to the several challenges faced by rural disadvantaged people. This might be a result of unequal resource allocation, inadequate health care service provision and utilisation by the beneficiaries. But the current study could not elicit a significant association between adverse maternal outcomes and maternal age, educational status, social class, occupation and family type. Suzanne J et al found that extremes of reproductive ages contributed as a risk factor [7].

Similarly, Waterstone M et al elicited in a case control study that age over 35 years was found to be one of the major demographic predictors of maternal morbidity; OR=1.46 (1.11 to 1.92)[9]. This was again substantiated by Mcdonagh M in a review article conducted in East Africa. It had found that ages under 15 years and over 35 years were risk factors for maternal morbidity [10]. A population-based study found that teenage mothers experienced significantly higher severe maternal morbidity compared to those of the 25-29 years age group (OR-1.5)[11]. Another population-based study observed that advanced maternal age (more than 35 years) was associated with severe maternal morbidity [12].

A nationwide study conducted in Canada elicited that extremes of maternal age were associated with severe maternal morbidity and mortality [13]. Lazariu V et al. observed that severe maternal morbidity was more prevalent among mothers of age less than 20 years and more than 35 years, and those less educated[14]. The present study could not elicit any relationship between maternal morbidity and socioeconomic status, which was again supported by the research conducted by Waterstone M et al [9]. However the burden of maternal morbidity was found to be more in low- and middle-income countries, especially among the women from lower socioeconomic status by Firoz, Tabassum et al [15].

Ahmed S observed that maternal educational status improved maternal health and reduction of maternal morbidity and mortality. The three most important socioeconomic factors were educational status, economic status and empowerment status coined in this research article. Those ensured maternal autonomies in her family. It helped her to accomplish her decision-making power in the family. Those empowered women were more likely to utilise the maternal health care services provided to them and thus improved maternal health [16].

According to personal and obstetric attributes: The present study elicited that maternal obesity and consumption of fewer meals contributed significantly as risk factors in the occurrence of maternal morbidity. Pre-pregnancy obesity was associated with severe maternal morbidity as observed by a population-based study [12]. However, a study conducted in New York City hospitals found severe maternal morbidity associated with underweight mothers [14]. Derso et al found that low frequency of meal intake was significantly associated with maternal anaemia during the antenatal period (OR= 3.19; CI 1.54- 6.61) [17].

Guoyao Wu et al elaborated that malnutrition in pregnant women, both undernutrition and obesity can adversely affect maternal health. It led to maternal morbidities like anaemia, antepartum haemorrhage, gestational diabetes and pre-eclampsia/ eclampsia [18]. Similarly, prepregnancy obesity was found to be associated with severe antenatal maternal

morbidity as elicited by Siddiqui A et al in a research conducted in France. It was found that the risk of severe antenatal maternal morbidity was increased among the obese women (OR 2.07, 95% CI 1.61, 2.65) but it was not evident with intranatal or postnatal maternal morbidity [19].

The current study could not elicit addiction as contributing factor to maternal morbidity. But several studies have elicited this relationship. Joan Kegan described spontaneous abortion (20% - 80% higher), ectopic pregnancy (RR 1.5 - 2.5), placental insufficiency, low birth weight, intrauterine growth retardation, preterm delivery (RR 1.2 - 16), childhood respiratory disease, and behavioural issues as long-term effects of prenatal tobacco exposure [20].

J Roelands established that smokers had an increased risk of deep vein thrombosis (OR1.3, 95%CI 1.1-1.6), pulmonary embolism (OR 2.5, 95% CI 2.1 - 3.0), stroke (OR 1.7, 95% CI 1.2-2.5), myocardial infarction (OR 4.6, 95% CI 3.3-6.4), pneumonia (OR 2.9, 95% CI 2.7- 3.2) and other co-morbidities even during the antenatal period [21]. Those mothers who had a family history of diabetes and hypertension were significantly prone to gestational diabetes (P=0.00001) and preeclampsia (P=0.00042) respectively, as found by the current study. Women with a family history of diabetes were found to be at an increased risk for gestational diabetes, as substantiated by Gertrud S et al [22].

According to Retnakaran R et al, familial history of type 2 diabetes represented as an independent risk factor for gestational diabetes which might be more relevant in nulliparous women than in parous one (t = –2·29, P= 0·0235) [23]. A meta-analysis conducted in Iran found that mothers with a family history of Diabetes had a 3.46 times risk of developing Gestational diabetes [24]. However, a study in Peru found a lesser risk of Gestational diabetes with a family history of Diabetes.(OR=1.53) [25] Cincotta R.B and Brennecke S.P showed that a family history of pre-eclampsia was associated with an increased risk of severe pre-eclampsia in primigravida mothers (RR = 3.4; 95% CI, 1.5–7.6; P = 0.018) [26]. A similar finding was also obtained by Patricia C.F.M, who showed that the risk of eclampsia and Haemolysis elevated liver enzymes and low platelet (HELLP) syndrome was more common in Brazilian women with a strong family history of hypertensive disorders (OR 3.65, 95% CI 1.65–8.09, p = 0.001) [27]. The prospective cohort study conducted in Poland found that paternal and maternal history of hypertension led to an increased risk of gestational hypertension around 1.98 and 3.26 respectively[28]. Chia-Tung Wu et al. found that mothers with a family history of hypertension had a relative risk of 2.6 for preeclampsia and 2.79 for gestational hypertension [29].

In this study, it was found that only short inter-pregnancy intervals among past obstetric history contributed significantly to maternal morbidity(P=0.028). This might be due to inadequate time for recovery of maternal health after each episode of pregnancy. Agustin et al found that women with short inter-pregnancy intervals were at increased risk of maternal morbidity like the third trimester bleeding (OR 1.73, CI 1.42-2.24), premature rupture of membranes (OR 1.72, CI 1.53-1.93), puerperal endometritis (OR 1.33, CI 1.22-1.45), anaemia (OR 1.30, CI 1.18-1.43) and also maternal mortality (OR 2.54, CI 1.22-5.38) [30].

The current study could not elicit a significant association between maternal morbidity and parity, along with the past obstetric outcome. Although Suzanne J found an association with previous maternal morbidity by 2.5-fold, the current study could not elicit such a significant association [7]. Mcdonagh M in a review article established the risk of maternal morbidity with both past unfavourable obstetric history and short inter-pregnancy interval [10].

Conclusion

Maternal mortality constitutes a fraction of the burden of maternal morbidity. Maternal morbidity often leads to the permanent squeal of disability that is more common in developing countries. The present study observed the burden of maternal morbidity as 22.89%. Urban residence, an inter-pregnancy interval of less than 3 years, a family history of hypertension and diabetes, maternal obesity and less consumption of meals during the antenatal period were found to be significant

contributors. Intensive monitoring and screening of risk factors during the prenatal period along with appropriate and effective intervention can minimise the burden of maternal morbidity.

Health education of the mothers for danger signs can improve their health-seeking behaviour. Thus prevention of maternal morbidity can reduce maternal near misses and disability along with maternal mortality. Appropriate implementation of national programmes regarding maternal health, adequate decision-making capacity, adequate planning of programme implementation along with interventions and appropriate resource allocation can effectively reduce maternal morbidity and also maternal mortality as well.

Acknowledgment

Author thanks the antenatal mothers who participated in the study.

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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Cite this article as: Sain S. Study on maternal morbidity among the pregnant mothers attending a tertiary care hospital in Kolkata. *Al Ameen J Med Sci* 2023; 16(1): 99-106.

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