

Road Traffic Accidents with Head Injury in Pregnant Women: A Clinical Audit from a Tertiary Care Hospital

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Conflict of interest: Nil

Abstract:

Background: To study the clinical impact on the mother and fetus after Road Traffic Accidents with Head Injury and the effect on maternal and fetal outcomes of their management in Pregnant women.**Materials:** Out of 38 pregnant women included in this study, 13 (34.21%) were in the age group of 18 to 24, 11 (28.94%) were from the age group of 25 to 34 and 14 (36.84%) were from the age group of 35 to 44. The mean age was 25.60±2.15 years. 08 (21.05%) were in gestational age of 20 to 24 weeks, 14 (36.84%) were in gestational age of 24 to 30 weeks, 10 (26.31%) were in gestational age of 31 to 35 weeks**Results:** Among the 38 pregnant women with RTA head injuries, 09 (23.68%) had preterm labour, 07 (18.42%) had Premature rupture of membranes (PROM), 11 (28.94%) had Preterm PROM, 06 (15.78%) had placental abruption, 03 (7.89%) developed chorioamnionitis/sepsis, 02 (5.26%) patients were admitted in High dependency unit. Overall adverse outcomes were 15 (39.47%), the remaining new born were normal. The successful delivery of new born in the adverse status of maternal head injuries was observed in 60.53% patients.**Conclusions:** Pregnant women admitted to Emergency department with head injuries following Road Traffic Accidents tend sustain more severe injuries than normal women. The emergency admissions are to assess and monitor the fetal status and the maternal obstetric complications. However good outcome was possible with timely intervention and assistance of RTA patients and deliver the new born.**Keywords:** Pregnancy, Road Traffic Accidents, Mortality, Fetus, Full Term And Termination Of Pregnancy.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

In India Road traffic accidents (RTA) are on the rise due to increase in the vehicular traffic and increased road ways. [1] Women whether they are driving or not driving are involved in Road traffic accidents. When the women happen to be pregnant and get involved in Road traffic accidents, the consequences can be severe. [2] RTAs are the most common cause of non-obstetric trauma associated with fetal deaths (2.3 per 100000 live births). [3]

Adverse outcomes from RTA especially when the pregnant women are driving. [4] But less common in non-driving pregnant women or pedestrians. [5] The maternal mortality rate reported from the western countries is of 3.5 women per 100000. [6] In India the prevalence is less common; is 1.55%. [7] In USA the automotive data sampling system specifies that when the women are driving 50% of those women are likely to sustain RTA. [8]

Safety guidelines for pregnant women when driving questions the guideline to use safety belts

and air bags. [9] There was proven data that maternal mortality increases following RTA with pregnant women as drivers. [10] Such accidents tend to trigger immediate delivery or being more likely to die of the trauma resulting in severe blunt injuries (Injury severity score > 9 and above, fall of systolic blood pressure less than 90 mmHg). [11].

Pregnant women could develop perinatal mortality when involved in RTA due to sudden increase in intra-abdominal pressure which could lead to pre-term delivery or emergency Caesarian section. [12] But demographic characteristics of the women, trimester of pregnancy, socio-economy of the country, and type of head injury resulted due to speed of the vehicles play an important role. [13]

The physiology of Pregnancy results in raised plasma volume and cardiac output caused by the increased production of the hormones estrogen and progesterone produced by trophoblast cells. [14] Such changes during pregnancy certainly affect the

clinical judgment of traumatic brain injury (TBI) in turn the also the resuscitation process. [14]

Resuscitation in RTA cases with pregnant women consists of treating the mother and the fetus; the former is by preventing hypotension, hypovolemia and hypoxia and the later consists of constant monitoring of the heart rate and fetal movements. [15]

Radiological investigations could expose the fetus to radiation and hence care must be taken and avoid contrast where necessary. A multidisciplinary team consisting of anesthetist, OBG specialist and neurosurgeon are a must to save the two lives. [16]

In pre-term delivery of the fetus availability of neonatal ICUs are of important consideration in the treatment of the premature infants. [17] The present study is conducted in the above contest to study the clinical impact on the mother and fetus after Road Traffic Accidents with Head Injury and the effect on maternal and fetal outcomes of their management in pregnant women.

Materials

38 pregnant women at varying stages of gestation reported to have met with RTA attending a tertiary care Hospital in Kerala were included in the study. An ethics committee approval from the Institute was obtained. An ethics committee approved consent form signed by the attendees was used and the data was recorded in a proforma.

Inclusion Criteria: Pregnant women involved in RTA were included. Patients with Head injuries alone in RTA were included. Patients involved in all types of RTA were included. Patients with all stages of gestation were included. Pregnant women of all age groups were included.

Exclusions Criteria: Pregnant women who had previous head injuries were not included. Pregnant women with bleeding diathesis, hypertension, and diabetes Mellitus were excluded. Demographic data and type of RTA were recorded. All the patients were thoroughly examined by the intensivists, OBG specialists, and neurosurgeons on duty.

Necessary radiological investigations were carried out (C T scan Brain, X-Ray chest and skull) Adverse maternal outcomes such as maternal death, miscarriage and preterm birth (<37/40 and <34/40) were recorded.

Adverse fetal outcomes like intrauterine death/stillbirth and neonatal death were recorded. Secondary outcomes like preterm labour, mode of delivery (vaginal delivery vs caesarean section), premature rupture of membranes (PROM), preterm

PROM, placental abruption, chorioamnionitis/sepsis and maternal admission to an intensive care unit (ICU) or high dependency unit were recorded.

Fetal outcomes after birth like respiratory distress syndrome, neonatal ICU admission, low birth weight and small for gestational age were recorded.

All the patients were treated by the Hospital protocol with a primary intention to save both the lives was undertaken.

Statistical Analysis: Orthogonal polynomial coefficients were calculated recursively by the method of Fisher and Yates for linear trend testing.

The significance level used to test linear trends was set at 99% (i.e. P=.01 threshold). Odds ratios (ORs) and their 95% confidence intervals (CIs) were obtained from multivariable logistic regression analysis.

Results

Out of 38 pregnant women included in this study, 13 (34.21%) were in the age group of 18 to 24, 11 (28.94%) were from the age group of 25 to 34 and 14 (36.84%) were from the age group of 35 to 44.

The mean age was 25.60±2.15 years. 08 (21.05%) were in gestational age of 20 to 24 weeks, 14 (36.84%) were in gestational age of 24 to 30 weeks, 10 (26.31%) were in gestational age of 31 to 35 weeks, and 06 (15.78%) were in gestational age of 35 weeks and above. 04 (10.52%) of the pregnant women were travelling in train, 11 (28.94%) were travelling in the bus, 13 (34.21%) were travelling in the car, 06 (28.94%) were travelling in a two wheeler, 04 (10.52%) were travelling in 3 wheeler.

The nature of collision in the RTA was head on collision in 07 (18.42%) women, Turnover of the vehicle in 17 (44.73%), lateral impact in 11 (28.954%), impact from behind was in 03 (07.89%) of the accidents.

Time lapse from the occurrence of the accident to the arrival at the casualty of the Tertiary care Hospital was 01 to 03 hours in 04 (1.052%), 04 to 06 hours in 07(18.42%), 07 to 09 hours in 16 (42.10%) women, and more than 09 hours in 11 (28.94%) women.

First aid received in 16 (42.10%) women and not received in 22 (57.89%) women. There was no significant relationship between ages, gestational age, type of vehicle travelling, and time lapse before reaching the casualty and the mode of delivery or admission week after delivery. (P > 0.05), (Table 1)

Table 1: Showing the demographic details (n-38).

Variable	Number	Percentage	P value
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Age			
18 to 24	13	34.21	0.145
25 to 34	11	28.94	
35 to 44	14	36.84	
Gestational Age			
20 to 24 weeks	08	21.05	0.211
25 to 30 weeks	14	36.84	
31 to 35 weeks	10	26.31	
35 and above	06	15.78	
Type of Vehicle			
Train	04	10.52	0.322
Bus	11	28.94	
Car	13	34.21	
2 wheeler	06	15.78	
3 wheeler	04	10.52	
Nature of collision			
Head on Collision	07	18.42	0.411
Turn over	17	44.73	
Lateral impact	11	28.94	
Impact from Behind	03	07.89	
Time lapse on Arrival			
01 to 03 Hours	04	10.52	0.524
04 to 06 Hours	07	18.42	
07 to 09 Hours	16	42.10	
More than 09 Hours	11	28.94	
First Aid Received			
Yes	16	42.10	0.124
No	22	57.89	

The nature of head injuries were observed in the study and found that SAH was seen in 15 (39.47%) of women, IPH was seen in 06 (15.78%) and Extra dural Hemorrhage was seen in 09 (23.68%) of women (Table 2)

Table 2: Showing the type of Head trauma (n-38)

Variable	Number	Percentage	P value
SAH	15	39.47	
IPH	06	15.78	
SDH	08	21.05	
Extradural hemorrhages	09	23.68	

(SAH- Sub arachnoid Hemorrhage, IPH- Intra-parenchymal hemorrhage and SDH- sub-dural hematoma)

Among the 38 pregnant women with RTA head injuries, 09 (23.68%) had preterm labour, 07 (18.42%) had Premature rupture of membranes (PROM), 11 (28.94%) had Preterm PROM, 06

(15.78%) had placental abruption, 03 (7.89%) developed chorioamnionitis/sepsis, 02 (5.26%) patients were admitted in High dependency unit. (Table 3) There was no significant relationship between the different types of labour presentation among the women admitted with RTA and head injuries in the study ($P > 0.05$).

Table 3: Showing the adverse maternal outcomes

Variable	Number	Percentage	P value
Preterm labour	09	23.68	0.133
Premature rupture of membranes (PROM)	07	18.42	0.251
Preterm PROM	11	28.94	0.301
Placental abruption	06	15.78	0.147
chorioamnionitis/sepsis	03	07.89	0.231
High dependency unit admission	02	05.26	0.114
Type of Delivery			0.510
Vaginal	24	63.15	
Cesarean	14	36.84	

The adverse fetal outcomes noted in this study were intrauterine death in 03 (7.89%) fetuses, stillbirth in 03 (7.89%) fetuses; asphyxia at birth was noted

in 02 (5.26%) new born, ICU stay for more than 10 days was noted in 07 (18.42%) newborns. Overall adverse outcomes were 15 (39.47%), the

remaining new born were normal. The successful delivery of new born in the adverse status of maternal head injuries was observed in 60.53%

patients. The adverse events noted in the fetuses were 39.47% which was statically significant. (p-Value < 0.05), (Table 4).

Table 4: Showing the adverse fetal outcomes

Variable	Number	Percentage	P value
Intrauterine Death	03	07.89	0.001
Still Birth	03	07.89	
Asphyxia at birth	02	05.26	
ICU stay (> 10 days)	07	18.42	
Total	15	39.47	

A comparative study was conducted between similar studies from the literature and it was observed that the good maternal outcome was 64.97% and good fetal outcome was 69.49% in the study by Azar et al from USA in 2015. The good maternal outcome was 87.26% and good fetal

outcome was 93.47% in the study by Hyde et al in 2003 from USA. the good maternal outcome was 78.97% and good fetal outcome was 74.40% in the study by Kvarnstrand et al, in 2008 from Sweden. The present study showed the final outcome results on par with the international studies.

Table 5: Showing comparative statement of final outcomes (n-38)

Studies	Sample size	Seat belt use	Severity	Good Maternal Outcome	Good Fetal Outcome
Azar et al,[2](2015),USA	5936	No	Mild- severe	3857- 64.97%	4125- 69.49%
Hyde et al,[18] ,2003, USA	322	Yes	Severe- Mod.	281- 87.26%	301- 93.47%
Kvarnstrand et al, [19] 2008, Sweden	1094	No	Moderate	864- 78.97%	814-74.40%
Present Study	38	Yes/No	Mild- severe	31- 81.57%	032- 84.21 %

Discussion:

Road traffic accidents are the second commonest cause of all maternal traumas. [20] The major forces playing role in the brain injury are intrauterine shear forces and impact force and the countercoup mechanism due to rapid deceleration. These forces tend to result in placental abruption or uterine rupture. Wearing seat belts in a wrong method and not using seat belts at all are risk factors. [21] In this study 08 (21.05%) were in gestational age of 20 to 24 weeks, 14 (36.84%) were in gestational age of 24 to 30 weeks, 10 (26.31%) were in gestational age of 31 to 35 weeks, and 06 (15.78%) were in gestational age of 35 weeks and above.

In this study largest numbers of RTA were recorded during the second trimester. Redelmeier DA, May SC et al [22] from a similar study observed that the largest number of RTA with head injury were found during early second trimester and compensated for by the third trimester. In this study the time lapse from shifting the patients from accident site to the arrival at the casualty of the Tertiary care Hospital was 01 to 03 hours in 04 (1.0.52%), 04 to 06 hours in 07(18.42%), 07 to 09 hours in 16 (42.10%) women, and more than 09 hours in 11 (28.94%) women. In another study by Vivian-Taylor J, Roberts CL et al [23] the incidence of obstetrics complications among pregnant women involved in RTAs were 27.6% for induction of labour, 19.1% for preterm delivery and

16.6% for caesarean section. For other complications like PROM it was 04.2%, 1.7% requiring admission to hospital, 1.6% for placental abruption and 1.5% for neonatal respiratory distress.

The pooled incidence of maternal death was 0.36% and the pooled incidence of perinatal death was 0.6%. A comparative study was conducted between similar studies from the literature and it was observed that the good maternal outcome was 64.97% and good fetal outcome was 69.49% in the study by Azar et al from USA in 2015. The good maternal outcome was 87.26% and good fetal outcome was 93.47% in the study by Hyde et al in 2003 from USA, the good maternal outcome was 78.97% and good fetal outcome was 74.40% in the study by Kvarnstrand et al, in 2008 from Sweden.

The present study showed the final outcome results on par with the international studies. A review study of 8 studies amounting to 47 992 women which studied the representation of the maternal and offspring outcomes based on the seriousness of head injury found that for maternal death it was 13.5% and for fetal death it was 0.5%. The absolute risk of a crash during the second trimester was same as the magnitude to the risk associated with sleep apnea. [24]

Conclusions

Pregnant women admitted to Emergency department with head injuries following Road

Traffic Accidents tend sustain more severe injuries than normal women.

The emergency admissions are to assess and monitor the fetal status and the maternal obstetric complications. However good outcome is possible with timely intervention and assistance in delivery of the new born.

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