

PERINATAL MORTALITY AUDIT AT SHARIF MEDICAL AND DENTAL COLLEGE LAHORE – PAKISTAN

FAUZIA BUTT AND NAZISH RAZZAQ

Department of Gynae and Obstetrics, Sharif Medical and Dental College / Sharif Medical City Hospital, Lahore

ABSTRACT

Introduction: Perinatal mortality rate (PNMR) is an indicator of quality of health in a system. It is multifactorial in aetiology and is significantly influenced by the provision of health care services. Pakistan is among the countries with highest PNMR so major efforts are needed to reduce perinatal mortality in this region.

The objective of this study was to determine the perinatal mortality rate, to identify major causes responsible for these mortalities, and to suggest possible preventive measures. This is a descriptive cross sectional survey. It was carried out in the department of Obstetrics and Gynaecology, Sharif Medical City Hospital, from Jan, 2008 to Jan, 2009.

Patients and Methods: A prospective review of all perinatal deaths that occurred between 28 weeks of gestation and 1st 7 days of neonatal period during one year period was recorded. Babies born before 28 weeks, delivered outside Sharif Medical City Hospital, and weighing less than 1kg were excluded. Perinatal deaths were analysed according to maternal and fetal characteristics and cause of death determined according to Aberdeen classification. Outcome measures include stillbirth rate, early neonatal death rate, and perinatal mortality rate.

Results: During one year period, total births were 1116, out of which 48 were perinatal deaths, 58.33%, (95% CI 44.38-72.28) were stillbirths, and 41.67% (95% CI 27.72-55.62) were early neonatal deaths. Still birth rate was 25.08/1000 total births, and early neonatal death rate was 18.38/1000 live births. Perinatal mortality rate was 43/1000 total births. Maternal hypertensive disorders were responsible for maximum still births 22.92% (95% CI 11.03-34.81). Early neonatal deaths due to infections were responsible for 25% deaths (95% CI 12.75-37.25) primarily due to prematurity.

Conclusion: Maternal hypertension, congenital anomalies and neonatal infections still remains major causes for perinatal mortality. Regular perinatal death audits and adequate provision of health care services in a given system will reduce the prevalence of these disorders.

Key Words: Still births, Neonatal deaths, Prematurity.

INTRODUCTION

Perinatal mortality rate (PNMR) is an indicator of quality of health in a system. It is multifactorial in aetiology and is significantly influenced by the provision of health care services. Pakistan is among the countries with highest PNMR so major efforts are needed to reduce perinatal mortality in this region. Pakistan's demographic health survey conducted showed perinatal mortality rate of 63 – 92 / 1000 births from two provinces of Pakistan of which almost half are stillbirths. Although there is a decline in infant mortality the neonatal mortality is still higher and contributes to around 60 % of deaths. This will be primarily due to inadequate attention to programs of maternal and newborn care.¹

Perinatal mortality audits are usually done to determine the underlying causative factor whether primary or secondary, and missed opportunities to

ascertain how to improve future management. The major preventable factors include delay in seeking medical care, inadequate provision of health services, and delay in transfer of these services by health care providers.^{2,3} Studies have confirmed an association between the establishment of an effective audit process and improvement in quality of maternal health services and a reduction in perinatal mortality rate.^{4,5}

The aim of this study was to perform a qualitative perinatal death audit of antepartum, intrapartum and early neonatal deaths and propose means of reducing the perinatal mortality rate (PMR).

MATERIALS AND METHODS

It was a descriptive cross sectional study conducted at Obstetrics and Gynaecology department of Sharif Medical City Hospital (SMCH), a tertiary care 300

bedded hospital using convenient sampling technique. This hospital is attached to a private sector Sharif Medical and Dental College (SMDC) located in Jati Umra, Raiwind. The hospital serves as referral center for kasure district and nearby 41 villages. A satellite clinic is also situated in main Raiwind city to provide medical care on subsidised rates for convenience and facilitation of patients. SMCH is the only private referral tertiary hospital in Raiwind. The three municipal hospitals do not have an effective round the clock comprehensive emergency obstetric care, and therefore, most cases which need emergency operative delivery and blood transfusion were referred to public hospitals where there was a long queue for operation. Delayed operative delivery was indicated as one of the avoidable factors in perinatal deaths. Among private sector hospitals, Gynaecology and Obstetric department of SMDC provides 24 hour's comprehensive emergency operative service in this area. The neonatology unit is equipped with two warmers, two incubators and two ventilators to meet the needs of admitted patients. With up gradation of gynaecology and paediatric departments audits were conducted regularly. The idea behind these audits was to see the prevalence of disorders in this area so that measures will be taken to improve the services in this populated area.

The total number of deliveries conducted in one year period from Jan, 2008 to Jan, 2009 was 1116. All perinatal deaths that occurred between 28 weeks of gestation and 1st 7 days of neonatal period were recorded during this period. The data was recorded on standard structured perinatal death audit form of Department of Obstetrics and Gyneacology. All perinatal deaths were classified according to Aberdeen classification for the cause of perinatal deaths.

Table 1: Distribution of deliveries and Perinatal Mortality in one year period.

	Frequency	% Age, 95% CI
Total Births	1116	
Total Live Births	1068	
Still Births	28	(58.33%, 95% CI 44.38-72.28)
Still Birth Rate	25.08/1000 total birth	
Early Neonatal Deaths	20	(41.67%, 95% CI 27.72-55.62)
Early Neonatal Death Rate (Per 1000 Live Birth)	18.38/1000 live births	
Perinatal Mortality Rate (Per 1000 Total Births)	43/ 1000 total births	

Neonatal deaths reflect only babies born at Sharif Medical City Hospital (SMCH) and admitted to neonatal unit. Births before 28 weeks and babies weighing less than 1kg were excluded because the neonatal unit of SMCH cannot adequately take care of this group of newborns. Maternal variables that were identified included booking status, maternal age, parity, duration of gestation, ante-partum complications like medical disorders (diabetes, hypertension, and anaemia), intra-partum and post-partum complications, and mode of delivery. Neonatal variables included were fetal birth weight, sex, and cause of death. Frequencies and rates were calculated, and 95% confidence intervals were determined. Main outcome that were measured were still birth rate, early neonatal death rate, and perinatal mortality rate.

LIMITATION OF STUDY

Aetiopathogenetical mechanism of still births is a subject of prime importance and this can be achieved only through the medium of well conducted autopsies. The limitation of this study was that we did not conduct autopsies to determine the cause of death.

OPERATIONAL DEFINITIONS

Perinatal Period: Birth from 22 weeks or > 500 gm birth weight to 7 completed days of life.

Early Neonatal Period: From birth to 7 completed days of life.

Low Birth Weight (LBW): Less than or equal to 2500 g birth weight.

Perinatal Mortality Rate (PMR): Still-births + first week deaths divided by total births expressed as per 1000.

Stillbirth: Complete expulsion from the mother of a fetus weighing 500g or more who shows no life at or after birth.

Still Birth Rate: The number of stillbirths per 1000 births.

Early Neonatal Death (END): Death of a live born infant weighing 500g or more who dies during first completed seven days of life.

RESULTS

In a total of 1116 total births in one year period, from Jan 2008 to Jan 2009, 48 perinatal deaths were recorded. Among them 28 (58.33%, 95% CI 44.38-72.28) were stillbirths, 20 (41.67%, 95% CI 27.72 – 55.62) were early neonatal deaths. Stillbirth rate was 25.08/1000 total births and early neonatal death rate was 18.38/1000 live births. Perinatal mortality rate was 43 / 1000 total births (Table 1).

Most of the perinatal deaths 54%, (95% CI 40.07-68.27) were in un-booked cases. Among the total perinatal deaths 52.08% (95% CI 37.95-66.21) were delivered by spontaneous vaginal delivery, 47.92% (95% CI 33.79-62.05) were delivered by cesarean section. 62.50% perinatal deaths (95% CI 48.8-76.2) were in males and 37.50% deaths (95% CI 23.18-51.2) were in females. Most of the perinatal deaths 62.5% occurred when the gestational age is < 37 weeks, while 37.50% (95% CI 23.8-51.2) were in gestation > 37 week (Table 2).

In a total of 48 perinatal deaths, 37 (77.08%, 95% CI 65.19 – 88.97) were in the maternal age group of 21 – 30 years, 10 deaths (20.83%, 95% CI 9.34-32.32) were in the maternal age group of 31 – 40 years, and 1 death (2.08% 95% CI – 1.96 – 6.12) was in women < 20 years of age. About 60.42% (95% CI 46.59-74.25) of the total perinatal deaths occurred in G₁ – G₄, 10 (20.83%, 95% CI 9.34 – 32.32) deaths occurred in primigravida, while only 18.75% (95% CI 7.71 – 29.79) deaths occurred in multigravida (Table 2).

Perinatal death rate gradually decrease with increasing birth weight and was highest in preterm babies. In our study 31 deaths (64.5%) of the perinatal deaths were in babies weighing < 2.5kg, 14 deaths (29.17%, 95% CI 16.31 – 42.03) were in babies weighing 1kg to 1.5kg, 11 deaths (22.92%, 95% CI 11.03 – 34.81) were in babies weighing 1.5 – 2 kg, while 6 deaths(12.50%, 95% CI 3.14-21.86) were in babies weighing 2 – 2.5 kg, 17 deaths (35.42%, 95% CI 21.89 – 48.95) were in babies weighing > 2.5 kg (Table 2).

Neonatal infections, hypertensive disorder and congenital anomalies were most frequent causes of perinatal deaths in this study. Among the 28 causes of still births, maternal factor i.e hypertensive disorders was most common i.e. 11 deaths (22.92%, 95% CI 11.03-34.81), followed by mechanical factor 6 deaths (12.5%, 95% CI 3.14-21.86), 5 deaths due to obstructed labour, and one death due to ruptured uterus. Antepartum haemorrhage and diabetes were responsible for 2 deaths each (4.17%, 95% CI -1.49 – 9.83). Congenital anomalies were responsible for 10 deaths (20.83%, 95% CI 9.34 – 32.32) and among

Table 2: Demographic Characteristics (N = 48).

Characteristics	Still Births	End	Total	Percentage %	95% CI
Booked	7	15	22	45.83%	31.73 – 59.93
Un-booked	13	13	26	54.16%	40.07 – 68.27
Parity					
Primigravida	5	5	10	20.83%	9.34 – 32.32
G ₁ – G ₄	14	15	29	60.42%	46.59 – 74.25
> G ₅	1	8	9	18.75%	7.71 – 29.79
Age (Years)					
15 – 20	0	1	1	2.08%	-1.96 – 6.12
21 – 30	14	23	37	77.08%	65.19 – 88.97
31 – 40	5	5	10	20.83%	9.34 – 32.32
Gestational Age (Weeks)					
28 – 32 weeks	3	13	16	33.33%	19.99 – 46.67
33 – 36 weeks	7	7	14	29.17%	16.31 – 42.03
> 36 weeks	7	11	18	37.50%	23.8 – 51.2
Birth Weight					
1000 – 1500 gm	5	9	14	29.17%	16.31 – 42.03
1500 – 2000 gm	7	4	11	22.92%	11.03 – 34.81
2000 – 2500 gm	2	4	6	12.50%	3.14 – 21.86
2500 – 3500 gm	5	12	17	35.42%	21.89 – 48.95
Gender					
Male	14	16	30	62.50%	37.95 – 66.21
Female	16	12	18	37.50%	33.79 – 62.05

anomalies neural tube defects i.e anencephaly and hydrocephalus were most prevalent. In 5 deaths no cause was found i.e unexplainable (10.42%, 95% CI 1.78 – 19.06) (Table 3).

Among 20 cases of early neonatal deaths, 8 cases were due to congenital anomalies and 12 deaths (25%, 95% CI 12.75 – 37.25) due to neonatal infections. Out of 12 early neonatal deaths, 8 deaths (66.66%) were due to complications associated to prematurity i.e respiratory distress syndrome and sepsis. In most of the neonatal deaths un-booked status and low birth weight (< 2.5 kg) was common factor (Table 3).

DISCUSSION

It is estimated that more than 3.3 million babies are stillborn every year; and 3 million deaths occur in the early neonatal period. Ninety – eight per cent of the deaths take place in the developing world and the risk of death in the neonatal period is six times greater than in developed countries. Over 40% of global neonatal deaths take place in Asia, which is where most children are born. The high mortality rate in the South – central Asian sub region presents a formidable challenge and essential steps

need to be undertaken for the achievement of millennium development goal 4 (reducing neonatal mortality).^{6,7}

Pakistan, one of the most populous countries in the world, and number three in Asia where most deaths occur, has an estimated perinatal mortality rate of 60 to 90 per thousand births.¹ In this study the perinatal mortality rate was (PNMR) 43/1000 total births, 28 (58.33%, 95% CI 44.38-72.28) were stillbirths, 20 (41.67%, 95% CI 27.72-55.62) were early neonatal deaths. The results were comparable to other studies conducted in eight lower socioeconomic squatter settlements of Karachi, in which the perinatal mortality rate was 54.1 per 1000 births,⁸ with a stillbirth to early neonatal mortality ratio of 1:1. A survey carried out by Society of Obs and Gynae (SOGP) showed a perinatal mortality rate of 92/1000 births. Another study conducted in Jinnah Postgraduate Medical Center (JP-MC) revealed a PNMR of 97.2/1000 births.^{9,10} Our institutional perinatal mortality rate was lower as compared to those reported in other parts of our country, the reason being better equipment of our nursery with neonatal services, provision of outreach program in Raiwind city for early referral of high risk cases, daily provision of transport facilities in nearby villages, and involvement of consultants, senior registrars in direct provision of antenatal care to these patients.

The results of this study suggest that most of the perinatal deaths were in un-booked cases 54%, (95% CI 40.07 – 68.27) reflecting the fact that these deaths can be avoided by identifying high risk cases and provision of optimal fetomaternal care during antenatal period. The results were comparable to other perinatal death audits in which suboptimal care is most important avoidable factor in perinatal deaths.¹¹

Perinatal deaths were highest in adolescent mother and of increasing parity. In this study 37 deaths (77.08%, 95% CI 65.19 – 88.97) were in the age group of 21 – 30 years, and G₁ – G₄ (60.43%, 95% CI 46.59 – 74.25).¹²

Perinatal death rate gradually increases with decreasing birth weight and duration of gestation, and remain a leading cause of perinatal mortality all over the world. In this study most deaths were in preterm babies i.e (62.5%, 95% CI 48.8 – 76.2), and

Table 3: Causes of Perinatal deaths (Aberdeen Classification).

Causes	Number =48	Percentage %	95% Confidence Interval
<i>Hypertensive Disorders</i>	11		
PIH	9	22.92%	11.03 – 34.81
Eclampsia	2		
<i>APH</i>			
Abruptio placenta	2	4.17%	-1.49 – 9.83
Placenta previa	2		
<i>Mechanical</i>			
Obstructed labour	6		
prolonged Labour			
Cord prolapse	5	12.5%	3.14 – 21.86
Ruptured uterus			
Transverse lie			
Breech			
Forceps	1		
<i>Maternal Infections and Diseases</i>	2		
Heart disease		4.17%	-1.49 – 9.83
Jaundice			
Anaemia			
Diabetes	2		
<i>Isoimmunization</i>	0	0	
<i>Unexplained</i>	5	10.42%	1.78 – 19.06
<i>Neonatal Infections</i>	12		
RDS	4		
Bronchopneumonia	4	25%	12.75 – 37.25
Bleeding disorders	0		
Septicaemia	4		
<i>Congenital Anomalies</i>	10	20.83%	9.34 – 32.32

in low birth weight babies (< 2.5 kg) i.e. 31 deaths (64.5%, 95% CI 51.05 – 78.11), and 17 deaths (35.42%, 95% CI 21.89 – 48.95) were in babies weighing > 2.5 kg. The results were comparable to study conducted at JPMC in which maximum deaths were in preterm infants i.e 75.7% and another study conducted in Kathmandue Medical College Teaching Hospital, 62.5% of preterm births were responsible for perinatal deaths.^{10,13}

Low birth weight, bronchopneumonia, and respiratory distress syndrome are indirectly linked to preterm births. Thus prevention of preterm births remains a target for reduction of deaths in early neonatal period. Regular antenatal checkups, early detection of high risk cases, nutritional deficiencies correction, antibiotic prophylaxis, corticosteroid administration, and improvement in neonatal care will definitely reduce the prevalence of preterm births and its consequences.¹⁴

In this study neonatal infections (25%, 95% CI 12.75 – 37.25) remained a leading cause of early neonatal deaths. The results were consistent with WHO reports on the causes of neonatal death in developing countries and also with other reports from Pakistan. Furthermore, our finding that infection, including sepsis, pneumonia, is an important contributor to neonatal deaths that occurred 3 days postpartum among hospital – born neonates emphasized the importance of monitoring delivery and hospital – acquired infection.¹⁵

With an estimated 298 000 neonatal deaths annually and a reported neonatal mortality rate of 49 per 1000 live births, Pakistan accounts for 7% of global neonatal deaths. Infection (36%), preterm birth (28%) and birth asphyxia (23%) account for 87% of neonatal deaths worldwide.¹⁶ In this study early neonatal death rate was 18.38/1000 live births and neonatal infections contributed to maximum deaths.¹⁷ The results were comparable to another study conducted in Agha Khan University where early neonatal mortality of 34.8 per 1000 live births (95% CI: 24.1 – 45.5) was recorded.¹

Among the 48 perinatal deaths, congenital anomalies were responsible for 10 deaths (20.83%, 95% CI 9.34 – 32.32). The prevalence of birth defects in United Kingdom is 2% and in United States 3%.¹⁸ The high prevalence of congenital anomalies in this study especially neural tube defects may reflect exposure of the city with industrial pollutant as most of these patients belong to areas nearby industrial estates. However in future studies will be conducted to determine the cause and risk factors for congenital anomalies to reflect true situation in this area. In the mean time administration of folic acid in pregnancy period, early antenatal booking, and use of ultrasound for picking up congenital anomalies will definitely reduce the prevalence of this factor.

In this study when obstetrical factors were identified for the cause of perinatal deaths, 11 deaths (22.99%, 95% CI 11.03 – 34.81) were due to hypertensive disorders. Preeclampsia and eclampsia still remains our main killers.¹⁹ The reasons for high prevalence being: non-availability of emergency antihypertensive drugs, delayed diagnosis, lack of referral, and difficulty in transportation to hospital. These mortalities can easily be prevented by improvement in transportation facilities in time of emergency, increasing outpatient services in outreach areas for early referral, and extensive availability of emergency anti-hypertensive drugs in this area.

Birth asphyxia is 2nd leading cause of neonatal mortality especially due to intrapartum complications ie obstructed labour and antepartum haemorrhage. In this study obstructed labour, and ruptured uterus were second common cause of stillbirths af-

ter hypertension, and were responsible for 6 deaths (12.5%, 95% CI 3.14 – 21.86) and antepartum haemorrhage was responsible for 2 deaths (4.17%, 95% CI -1.49 – 9.83). As most these births were in villages where untrained birth attendants conduct deliveries obstructed labour remained neglected. In most of the villages the population exceeds 35000 to 150,000 and the numbers of skilled birth attendants are few to meet the needs of growing population. The survey in 2006/2007 indicated that only 39% of births were assisted by skilled birth attendant (SBA).²⁰ Training of birth attendants, early identification and referral of high risk cases, reducing cost for emergency and un-booked patients, monitoring of labour, and provision of emergency cesarean sections may prevent these still births. The results when compared with another prospective study conducted in an urban Pakistani population, 2003 – 2005 birth asphyxia contribute 26% of deaths.²¹

In this study after pregnancy induced hypertension, gestational diabetes was most prevalent preventable medical disorders. Among still births 2 deaths (4.17%, 95% CI -1.49 – 9.83) were recorded in gestational diabetic mothers whose blood sugar level were uncontrolled. Regular antenatal checkup, control and monitoring of blood glucose levels by timely admissions, and appropriate time and mode of delivery will definitely reduce the prevalence of this disorder and its contribution to still births.¹⁰

Unexplainable deaths are an enigma. In this study there were 5 unexplained still birth (10.42%, 95% CI 1.78 – 19.06). Previous literature on unexplained stillbirth has reported proportions of unexplained stillbirths from around 10% up to as high as 70%. In this study we did not do postmortem examination of still births, and examination of placenta, cord and membranes, so identifiable causes of unexplained deaths might be missed.²² We can reduce the perinatal mortality rates in SMCH, but only “if” we want to. This is a big “if”. Neonatal infections, hypertensive disorders, congenital anomalies and obstructed labour are all preventable through improved services in this area.

In *conclusion*, in the prevention of perinatal deaths significant areas remain for health care improvements and this audit highlights the importance of care during antenatal period, labour and delivery. PIH, neonatal infection, congenital anomalies and obstructed labour are all prevalent disorders in this area so improvement in neonatal services, provision of emergency antihypertensive therapy, early booking, early identification of high risk cases, training of birth attendants, availability of 24 hours emergency cesarean section facilities, proper monitoring of labour, identification of high risk area from where

congenital anomalies were coming are the areas which need attention if we want to improve the perinatal health services in this area.

REFERENCES

- Bhutta ZA, Rehman SJ *Perinatol*. Perinatal care in Pakistan: a situational analysis. *J Perinatol* 1997; 17: 54-9.
- Patrick E M. Perinatal mortality at Frontier Hospital, Queenstown – a 6 – year audit using the Perinatal Problem Identification Programme (PIIP). *SAJOG* 2007; 13: 10-14.
- Analysis of perinatal mortality at a teaching hospital in Dar es Salaam, Tanzania, 1999 – 2003. *Afr J Reprod Health* 2006; 10: 72-80.
- Chan A, King JF, Flenady V, et al. Classification of perinatal deaths: development of the Australian and New Zealand classifications. *J Paediatr Child Health* 2004; 40: 340-347.
- R C Pattinson. Why babies die – a perinatal care survey of South Africa, 2000 – 2002. *SAMJ* 2003; 93: 445-449.
- Siddiqi S, Haq IU, Ghaffar A, Akhtar T, Mahaini R. Pakistan's maternal and child health policy: analysis, lessons and the way forward. *Health Policy* 2004; 69: 117-30.
- Wassan Kiran, Rani Shazia, Haider Gulfareen. Perinatal mortality – A hazardous dilemma. *Rawal Medical Journal* 2009; 34: 195-198.
- Fariyal F, Fikree, Ronald H. Gray. Demographic survey of the level and determinants of perinatal mortality in Karachi, Pakistan. *Paediatric and Perinatal Epidemiology* 1996; 10: 86-96.
- Zaidi S. Maternal and perinatal health in Pakistan. In: Zaidi S, (ed). *Proceedings of a workshop held at Peshawar on 7-8 January 1993 by the Society of Obstetrics and Gynaecology (AOFOG)*. TWEL, Publishers 1993; pp 97-117.
- Korejo Razia, Bhutta Shereen , Noorani J. Khurshid, Bhutta A Zulfiqar. An audit and trends of perinatal mortality at the Jinnah Postgraduate Medical Centre, Karachi. *J Pak Med Assoc* 2007; 57: 168-172.
- Perinatal mortality audit: counting, accountability, and overcoming challenges in scaling up in low – a nd middle – income countries. *Int J Gynaecol Obstet*. 2009; 107: 113-21.
- Babinszki A, Kerenyi T, Torok O, Grazi V, Lapinski RH, berkowitz RL. Perinatal outcome in grand and great – grand multiparity: Effects of parity on obstetrics risk factors. *Am J Obstet Gynecol* 1999; 181: 669-74.
- Manandhr SR, Manandhar DS, baral MR, Pandey S, padhey S. One year audit of perinatal mortality at Kathmandu Medical College Hospital, Kathmandu University Med J 2003; 2: 198-202.
- Shrestha M, Manandher DS, Dhakal S, Nepal N. Two year audit of perinatal mortality at Kathmandu medical college Teaching hospital. *Kathmandu university medical journal* 2006; 14: 176-181.
- Jehan Imtiaz, Harris Hillary, Salat Sohail et al. Neonatal mortality, risk factors and causes: a prospective population – based cohort study in urban Pakistan. *Bull World Health Organ*. 2009; 87: 130-138.
- Nizamani MA, Nizamani SM. An audit of mortality in hospitalized neonates and young infants at Pediatrics department Peoples Medical College Nawabshah. *Medical channel* 2005; 11: 7-15.
- Fehmida shaheen. Clinical audit of perinatal mortality in a teaching hospital. *Pak J Obstet Gynyaecol* 1997; 10: 27-30.
- Gordon Adrienne, Jeffery E Heather. Classification and description of stillbirths in New South Wales, 2002 – 2004. *MJA* 2008; 188: 645-648.
- Fikree FF, Mir A, Haq IU. She may reach a facility but will still die! An analysis of quality of public sector maternal health services, District Multan, Pakistan. *J Pak Med Assoc*. 2006; 56: 156-63.
- Jokhio AH, Winter HR, Cheng KK. Study Involving Traditional Birth Attendants and Perinatal and Maternal Mortality in Pakistan. *N Engl J Med* 2005; 352: 2091-9.
- Sami S, Baloch SN. Perinatal mortality rate in relation to gender. *J Coll Physicians Surg Pak* 2004; 9: 545-48.
- Froen JF, Amestad M, Frey K, Vege A, Sangstad OD, Stray-Ped-ersen B. Risk factor for sudden intrauterine unexplained eath: epidemiologic characteristics of singleton cases in Oslo, Norway, 1986 – 1995. *Am J Obstet Gynecol* 2001; 184: 694-702.