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RESEARCH ARTICLE

CAUSES OF NEONATAL DEATH IN NEONATAL CARE UNITS IN SULAIMANI PEDIATRIC AND MATERNITY TEACHING HOSPITALS FOR THE YEARS 2017-2018

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ABSTRACT

Neonatal period is a highly vulnerable period of life when a neonate may develop certain serious problems which lead to death. Neonatal period is the most hazardous period of life because of various problems and diseases which a neonate faces. In Iraq, deaths in neonatal period account for more than half of under-five year's children deaths, highlighting urgent need to introduce health interventions to improve essential neonatal care and to evaluate and determine the main causes of death.

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INTRODUCTION

The neonatal period is defined as the 1st 28 days after birth and may be further subdivided into the very early (birth to less than 24 hr), early (birth to <7 days), and late neonatal periods (7 days to <28 days). The perinatal period is most often defined as the period from the 28th wk of gestation through the 7th day after birth. Infancy is defined as the 1st year after birth[1]. Although being newborn is not a disease, a large numbers of children die soon after birth: many of them in the first four weeks of life (neonatal deaths), and most of those during the first week (early neonatal deaths). For every baby who dies in the first week after birth, another is born dead (fetal deaths or stillbirths). Causes and determinants of neonatal deaths differ from those causing and contributing to post neonatal and child deaths[2].

Aim of study

Identification of cause-specific mortality in a particular setting is important to design interventions directed to improve neonatal survival. Therefore, in order to address neonatal death in sulaimania and possibly identify areas of prevention, we studied causes of neonatal death in both NCU at SPTH and SMTH, and to estimate the major causes of death in the 2 NCUs and differences in causes between the two NCUs.

PATIENTS AND METHODS

This is a retrospective study through which analysis of the medical records of all the neonates who died in the NCU SPTH and SMTH (surgical unit) for 2 years from 1st of January 2017 to 31 of December 2018 done after taking permission from hospitals authorities. The SPTH NCU As a tertiary and a referral hospital for the regions in sulaimania governorate, receives high risk babies delivered within the institutions and private hospitals and also receives referrals from other health facilities. SMTH NCU receives babies delivered from labour room and operation theater (in the same hospital) who needs follow up and medical interventions, surgical NCU which receives many cases referred from NCU at SPTH and SMTH, all the babies died up to 30 days of age are included in this study. The data regarding the (name, gender, residency, weight, gestational age, mode of delivery, place of delivery, mother age, type of congenital anomalies, age at death, age on admission, duration of stay in NCU (days), date of death(month), final diagnosis of death,, site and type of delivery, were abstracted from the individual neonatal medical records and death certificates. gestational age were distributed in 5 groups : (≤28weeks),(29-32 weeks),(33-36 weeks), (37-42weeks),(> 42 weeks). body weight were distributed in different groups weight: (<1500 grams, 1500 - 2499 grams,

2500 grams-3000 grams, 3000-4000 grams,>4000 grams). Analysis of data was carried out using the available statistical package of SPSS-21 (Statistical Packages for Social Sciences- version 21, 2012). Data were analyzed using Statistical test (Chi- square test) and P values >0.05 were regarded as significant, Data were presented in simple measures of frequency, percentage, tables& figures.

RESULTS

The study showed that the total number of ND was 950. Total number of admissions to SPTH and SMTH NCUs in 2 years and death rates are shown in table no(1). the total number of live deliveries in SMTH was (18441,19234) in (2017,2018) respectively. The admission rate per live births to SMTH NCU was (51%, 36%) during (2017, 2018) respectively. while percentages of ND according to place of death was 42.7% (n=406) in SPTH NCU and in- NCU SMTH was 53.6 %(n=509) and surgical ward was 3.7% (n=35). Obstetrical variable showed that 56% of ND belongs to mother aged 20 - 30 years, 33.5% were >30 years while only 9.3% were <20 of age as in Figure (7), In regard to the mode of delivery 60% (n=560) of ND were delivered spontaneously versus 40% (n=388) delivered by CS& 57.7% (n=548) were male and 42% (n=399) were female and male to female ratio was 1.37:1 as shown in table(2). According to gestational age, of 950ND, 603(63.5%) of ND were preterm and 347 (36.5%) were term as shown in Figure (2). Regarding the age at which the death occurred 32% (n=302) of ND died during first 24 hours while 81% (n=771) have died during 1st week (including the 1st 24 hours), the mean age of death was 5 days as shown in Figure (4). The months at which the neonates died July was the highest 103 as shown in Figure (3). Regarding body weight, 60% (n=578) of total ND had a body weight of less than 2.5kg among these 63.5% (n=367) had weight less than1.5 kg, 83% (n=502) of all preterm weight was less than 2.5kg & 57% (n=345) of preterm weight was less than 1.5kg as in Figure (1). Table (2) shows the distribution of cases according to sex, mode of delivery, address. The major causes of deaths were respectively: RDS 28% (267), congenital anomalies 22.5% (214), NI 21% (201), birth asphyxia 9% (85), prematurity 8% (76), respiratory causes 3.6% (34). The major causes of deaths with percents, distributed according to place of death are shown in Table (3). The main cause of death in SPTH NCU was N I 29%(117) a n d 2st congenital anomalies 21% (86) then RDS 19% (76), in SMTH NCU the main cause was RDS 37.5%(191) then congenital anomalies19%(96), then NI 16%(82), in surgical unit main cause was congenital anomalies 91% (32) then NI 6% (2) these variations was statistically significant p-value<o.oo1).

The cases of RDS occur mainly in the premature neonates 253(94 %) while there were only 14 cases (5%) in term neonates Figure (5) and most of it 71% (191) in SMTH NCU and regarding the body weight 88%(235) was less than 2.5kg. Regarding the age of death 47% (125) of RDS cases died during 1st 24 hours & another 47%(126) during 2-4 days of age as shown in table (5), 65% (175) were delivered by NVD others 34% (92) by C.S. The causes of congenital anomalies was mostly in full term babies 66%(142) versus 34%(72) in preterm cases figure (5), and 45%(92) in NCU SMTH & 38%(78) in NCU SPTH, &the remaining in surgical NCU, Most of surgical cases were associated with congenital anomalies 91%(32) of total 35 cases. 64% (136) of congenital anomalies cases were males and females were 36 % (78) with male to female ratio 1.7:1. 41 % (91) of congenital anomalies was C.H.A and constitutes 9.6% (91) of all deaths, 22%(50) was multiple congenital anomalies and form 5.4% of all deaths, 8% (18) were TEF&A, other types of anomalies constitute 37% of all congenital anomalies, figure (6) shows types of congenital anomalies with percent, Table (4) shows distribution of congenital anomalies in surgical unit. Neonatal infection as a third cause of death in our study include 94%(189) of septicemia or sepsis &6%(12) meningitis, NI was the leading cause of death in NCU SPTH 28%(117), 50% (101) of all NI cases died during 2-7 days of age and 41%(82) after 1st week of age and 56%(113) were male while 43%(88) were female, 67%(134) of NI occurred in low body weight <2.5 kg. 63% (127) delivered by NVD 95% of theme delivered in the hospital. Birth asphyxia contributed to 9%(85) of all deaths and occurred mainly in term babies 72%(61), & 71%(60) in body weight > 2.5 kg & 65%(50) delivered by NVD, among the NCU SMTH cases of birth asphyxia 97%(40) had Apgar score <7 at 1st minute and 80% (47) had score <7 at 5 minutes.

The total percent of dead premature neonates was 63% (603), but only 13% (76) of preterm neonates died from prematurity alone, The other represent deaths of premature babies from other causes. Prematurity as a cause of death in our study represented as extreme prematurity & 89% (66) had weight less than 1.5 kg and 74%(56) had gestational age less than 28 weeks, 79%(60) occurred in NCU SPTH. Respiratory disorders (rather than RDS) represent 3.6%(34) of all deaths 60%(20) occurred in NCU SPTH. Respiratory causes includes 82.4%(28) of pneumonia a n d 17.6%(6) pneumothorax. Aspiration syndrome represents 3%(29) of deaths and 72%(21) occurred in NCU SPTH and includes meconium aspiration represent 93%(27) a n d milk aspiration 7%(2). Other causes of death represents 4.5%(44) of them 15 cases hemorrhagic disorders: (8)cases pulmonary hemorrhage a n d (7) cases intracranial hemorrhage,(9) cases acute renal failure, (9) cases had complication of hyperbilirubinemia, (6) heart failure, (5) arrhythmia, (2)cases had cold injury.

DISCUSSION

There is a great variation in neonatal mortality between NCUs. This variation probably reflects the difference in admissions numbers &severity, and level of care. In the present study the overall neonatal death rate was 4.2%. It was as 4%, 9% in the studies in, Canada[20] Pakistan[21]. our study finding was much lower than those of the figures reported from Kenya[22] (24,6%), Arafa and Alshehri (Saudi Arabia) 22.4%[23]. the neonatal death rate relatively to admissions in SPTH NCU was 5.7%,6.4% in (2017 and 2018) respectively table (1), agrees with a previous study done by Hussein K H and Hamawandi AM[24] in the same NCU for the years (2011,2012) the death rate was (5.45%,6.34%) respectively, but in SMTH NCU the total death rate was 3.4% (2.5%,5.1% in 2017 & 2018) Table (1), the neonatal admission rate per live delivery was (51%,36%) in SMTH NCU in (2017 and 2018) respectively, which is higher than study done in NCU in Baghdad Teaching Hospital-Medical City Numan and Baraa [25] where the admission rate per live delivery was (13.4%) in 2007 and (10%) in 2009, the admission rate in SMTH NCU in 2018 was lower than 2017 as in the last 5 months of 2018 the admissions to NCU SMTH is restricted only to cases who needed medical treatment and interventions and those who needs follow up kept separately in

Table 1. Number and percent of admissions and death rates in SPTH&SMTH NCUs

Place of death	Admitted cases (n)		Dead cases & rate %		Death rate	
	2013	2014	2013 N (%)	2014 N (%)	Total dead N	Total death rate (%)
NCU SPTH	3179	3496	181(5.7%)	225(6.4%)	406	6%
NCU SMTH	9510	5244	239(2.5%)	270(5.1%)	509	3.4%
Total	12689	8740	420(3.3%)	495(5.6%)	915	4.2%

Table 2. Distribution of gender, mode of delivery & address according to place of death

		place of death							
		SPTH NCU		SMTH NCU		surgical unit		Total	
		N	Column N %	N	Column N %	N	Column N %	N	Column N %
Sex	male	248	61.1%	278	54.9%	22	62.9%	548	57.9%
	female	158	38.9%	228	45.1%	13	37.1%	399	42.1%
	Total	406	100.0%	506	100.0%	35	100.0%	947	100.0%
Mode of delivery	N V D	231	56.9%	312	61.3%	19	54.3%	562	59.2%
	C/S	175	43.1%	197	38.7%	16	45.7%	388	40.8%
	Total	406	100.0%	509	100.0%	35	100.0%	950	100.0%
Address	CITY	118	29.1%	283	55.6%	19	54.3%	420	44.2%
	OUT SIDE C.	288	70.9%	226	44.4%	16	45.7%	530	55.8%
	Total	406	100.0%	509	100.0%	35	100.0%	950	100.0%

Table (3) main causes of death according to place of death

	Place of death										
	NCU SPTH			NCU SMTH			Surgical unit			Total	
	N	Row N %	Column N %	N	Row N %	Column N %	N	Row N %	Column N %	N	Column N %
RDS	76	28.5%	18.7%	191	71.5%	37.5%	0	0.0%	0.0%	267	28.1%
Congenital anomalies	86	40.2%	21.2%	96	44.9%	18.9%	32	15.0%	91.4%	214	22.5%
Neonatal infections	117	58.2%	28.8%	82	40.8%	16.1%	2	1.0%	5.7%	201	21.2%
birth asphyxia	44	51.8%	10.8%	41	48.2%	8.1%	0	0.0%	0.0%	85	8.9%
prematurity	16	21.1%	3.9%	60	78.9%	11.8%	0	0.0%	0.0%	76	8.0%
respiratory failure	20	58.8%	4.9%	14	41.2%	2.8%	0	0.0%	0.0%	34	3.6%
aspiration syndrom	21	72.4%	5.2%	8	27.6%	1.6%	0	0.0%	0.0%	29	3.1%
hemorrhagic diseases	7	46.7%	1.7%	8	53.3%	1.6%	0	0.0%	0.0%	15	1.6%
acute renal failure	7	77.8%	1.7%	2	22.2%	0.4%	0	0.0%	0.0%	9	0.9%
kernicterus	6	66.7%	1.5%	3	33.3%	0.6%	0	0.0%	0.0%	9	0.9%
heart failure	3	60.0%	0.7%	2	40.0%	0.4%	0	0.0%	0.0%	5	0.5%
Arrhythmia	2	50.0%	0.5%	2	50.0%	0.4%	0	0.0%	0.0%	4	0.4%
necrotising entero colitis	0	0.0%	0.0%	0	0.0%	0.0%	1	100.0%	2.9%	1	0.1%
cold injury	1	100.0%	0.2%	0	0.0%	0.0%	0	0.0%	0.0%	1	0.1%
Total	406	42.7%	100.0%	509	53.6%	100.0%	35	3.7%	100.0%	950	100.0%

Table 4. Distribution of congenital anomalies in surgical unit

TYPE	count	N%
TEF & ATRESIA	14	42.10%
intestinal Artesia	6	14.30%
multiple anomalies	6	15.80%
diaphragmatic hernia	3	7.90%
gastroschiasis	3	7.90%
imperforated anus	2	5.30%
hydrocephalus	1	2.60%
Total	35	100.00%

Table 5. Relation of RDS& NI cases according to place of death, age at death, length of remain in hospital

(p value <0,0001)		Place of death											
		NCU SPTH				NCU SMTH				Total			
		cause of death				cause of death				cause of death			
		RDS		N I		RDS		N I		RDS		N I	
		N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
Age At Death	1ST 24 H	20	26.3%	9	7.7%	105	55.0%	8	9.8%	125	46.8%	17	8.5%
	2-3 DAYS	42	55.3%	20	17.1%	48	25.1%	14	17.1%	90	33.7%	34	17.1%
	4-7 days	9	11.8%	35	29.9%	27	14.1%	31	37.8%	36	13.5%	66	33.2%
	> 7 days	5	6.6%	53	45.3%	11	5.8%	29	35.4%	16	6.0%	82	41.2%
	Total	76	100%	117	100%	191	100%	82	100%	267	100.0%	199	100%
length remain in hospital	1 day	45	59.2%	62	53.0%	105	55.0%	8	9.8%	150	56.2%	70	35.2%
	2-3 Days	21	27.6%	34	29.1%	48	25.1%	14	17.1%	69	25.8%	48	24.1%
	4-7 days	6	7.9%	12	10.3%	27	14.1%	31	37.8%	33	12.4%	43	21.6%
	> 7 days	4	5.3%	9	7.7%	11	5.8%	29	35.4%	15	5.6%	38	19.1%
	Total	76	100%	117	100%	191	100%	82	100%	267	100.0%	199	100%

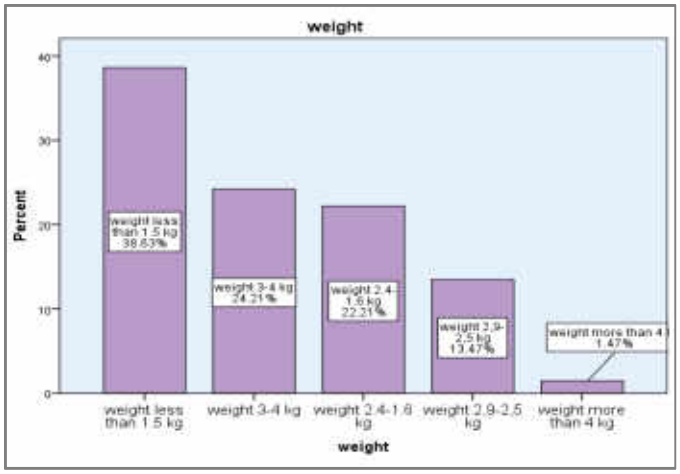

Figure 1. Percent of dead cases according to body weight

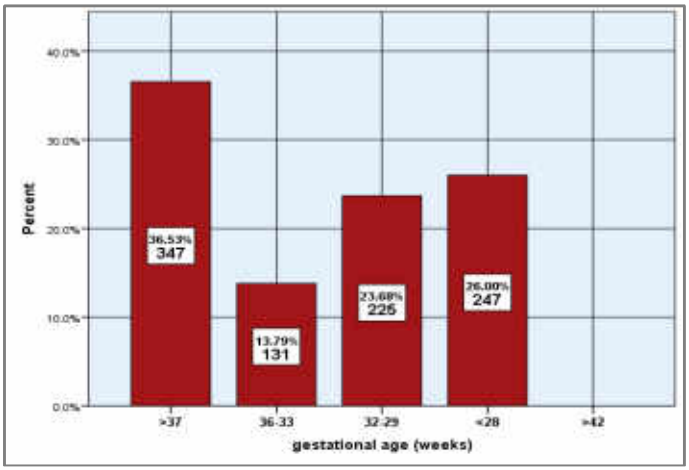

Figure 2. percent of dead cases according to gestational age

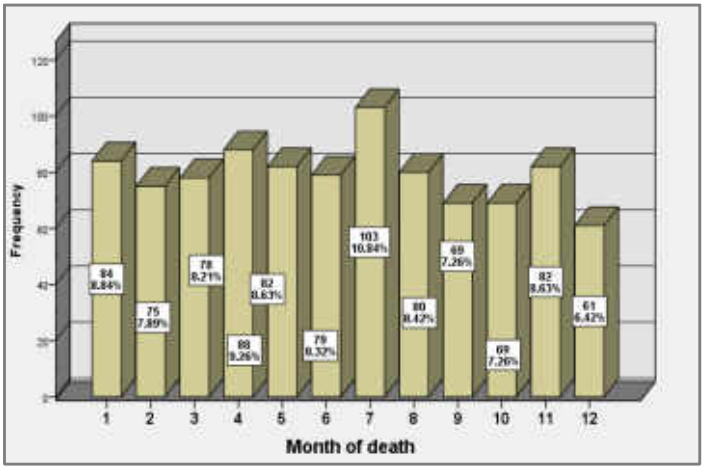

Figure 3. Percentages of deaths according to months

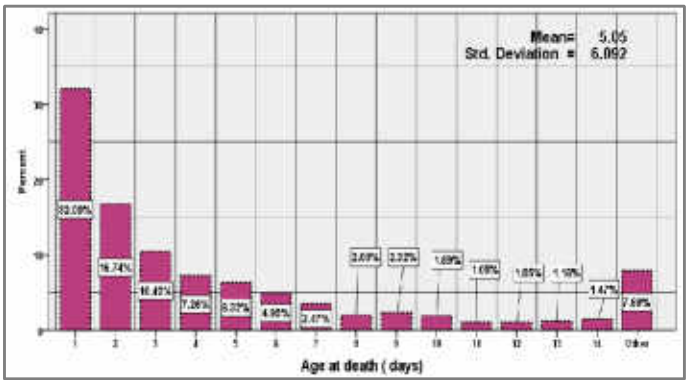

Figure 4. Age at death

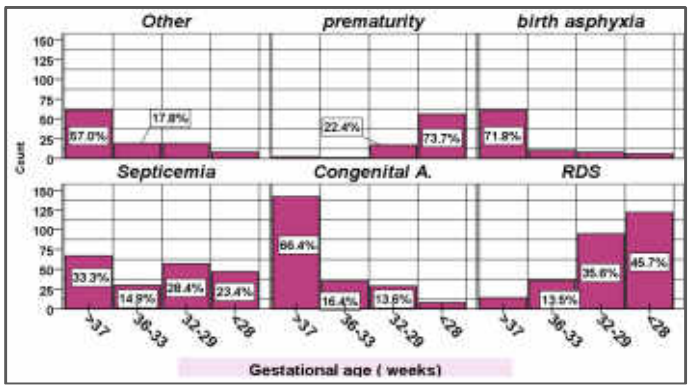

Figure 5. Relation of causes of death to gestational age (p-value=0.0001)

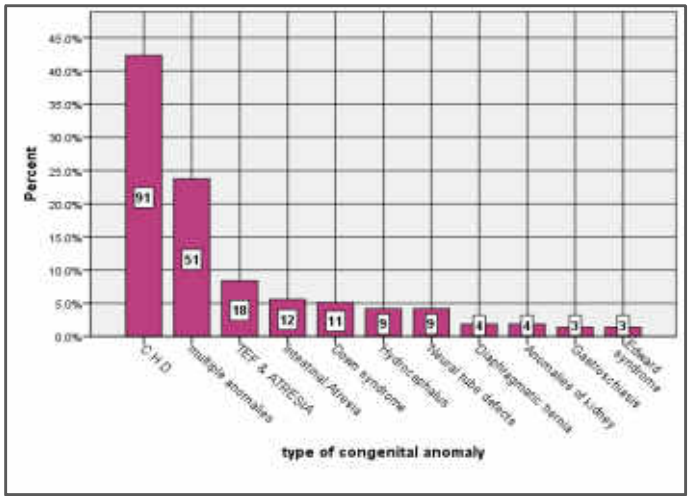

Figure 6. Types of congenital anomalies

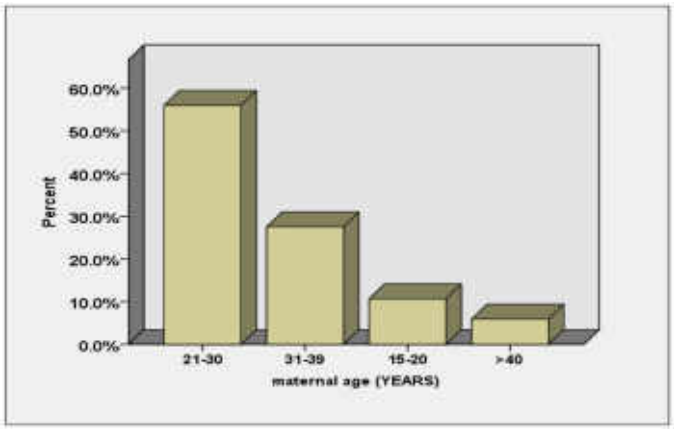

Figure 7. Distribution and percentages of maternal ages of dead cases in years

another word this may contribute to the difference in death rate between the 2 years in SMTH NCU. The male to female ratio was 1.37:1, The predominance of males for death (57.7%) table (2), in our study raises the issues of biological vulnerability of male neonates as found in other studies, Adeolu *et al.* study in Nigeria 2010 (1.5:1)[26] and Indonesian study (2002) (1.5:1)[27], This may be due to many biological factors that have been implicated with increased risks of neonatal deaths in males, including Immune deficiency: increasing the risk of infection and sepsis, later maturity: resulting in higher prevalence of respiratory diseases in male newborn, and higher incidence of urogenital system malformations, the male neonates have approximately two folds higher incidence of sepsis and respiratory distress

syndrome than females [1, 28, 29]. There was No relation between gender and cause of death (p value 0.174). Regarding mother age groups the age group of 20-35 years was 72% which agree with studies Alawqati[14] and Samira and Yaseen[30], there was no relation between mother age and place of death p value =0.099). but statistically significant relation (p-value =0.000) was found between mother age and causes of death this is probably that the age (20-35) is the highly productive age, being at the peak of their reproductive life this agree with Hanady & Saad in Al batool hospital in mousl [31] and Samira and Yaseen in Falluja[30]. Number of deaths vary from one month to another as its shown in Figure (3). The peak number of death occurred in July (103), the main cause of death during this month was RDS 35%(36). it agree with Samira and Yaseen [30], in another study done in SPTH for the years 2001-2005, Rashid *et al.* [32] there was two peaks number of death one in June another in November here the main cause was prematurity and respiratory illnesses, there was no relation between cause of death and month of death p value (0.139).

In the current study, (40%) of cases were delivered by C/S which is like Hussein K H and Hamawandi AM[24] study results, Rashid study in Bangladesh 2010[33] (35%) and 60% NVD (95% of them delivered in hospital, this represent cases of SPTH NCU) agree with Aiat in Australia[34] and higher than Indonesian study[27] (59%) of neonatal deaths were products of NVD at home. rates of home delivery were higher in these studies[33,27,], because of more poverty and poor access to health care centers in that countries. While in more developed countries, the majority of deliveries occur in hospital[1]. According to gestational age relation to neonatal death, 63% of deaths were pre term, which is close to Rashid study[33] (59.59%). and higher than Frankul study[24] (15.5%). There was significant relation between age of death and causes of death (p value < 0.0001). Thirty-two percent of this mortality was constituted by deaths within 1st 24 hours and 81% (including the 1st 24 hour) within 1st week of life again reflecting poor perinatal and obstetric services. Similar findings have been reported from Pakistan[35] and other developing countries[36]. There was a significant relation between cause of death and body weight (p value=0.000), (60%) of NDs were less than 2.5kg, which is lower than Foram H study in Ireland 2002[37] (88%), Rashid[33] (67.12%), and higher than Jehan *et al.* study in Pakistan 2009 [38](54%).

The death rate & causes for neonates varied significantly from hospital to hospital, but congenital malformations, neonatal infections and prematurity remain the major causes of death during the first 28 days of life[39]. The cause of death varied significantly from hospital to hospital (p value -<0.001), as shown in Table (3). RDS 37% was the most common cause of death in MTH NCU (agrees with Hanady & Saad in AL-batool[31] where the main cause was RDS (40%) which is also a NCU in maternity hospital and also agree with Numan and Baraa[25]). Neonatal infections was the most common cause of death in SPTH NCU 28% agrees with Adeolu AA et al study in Nigeria 2010[26] in which infection was the most common cause of ND (26.1%) this disagree with Hussein K H and Hamawandi AM[24] where the main cause of death was RDS 26%, the 2nd most common cause was congenital anomalies 21%, 19% in both NCU of SPTH&SMTH respectively. Generaly the cases of RDS in our study constituted for 28% of total deaths and it was the 1st major causes of death table (3), this agree with Numan and Baraa [25] and Dawod *et al.* in UAE[40], disagree with Rashid JA et al[32] where prematurity was the main cause of death (45.7%) and disagree also with Numan 2005[41] in which congenital anomaly was the 1st major cause of death (41%). Most of the cases of RDS were preterm (95 %), same results were found in Smadar Eventov[42]. Around 87% of RDS cases have weight less than 2.5kg, 80% of RDS cases died in 1st 72 hours of life similar results were found in Robert e wood [43].

This study showed that there was a significant increase in the percentage of death from congenital malformations (22.5%), relatively to global estimate of congenital anomalies 9% [19] as cause of death, this result agree with Hussein K H and Hamawandi AM[24] where CHA and other congenital anomalies was(14.7%, 11.7%) respectively& agrees with Martin Ja in England[44](22%) , disagree with Rashid JA[32] (5.8%), its low in regard to Numan 2005[41] where the congenital malformations was the leading cause of death (41%). CHA formed (40.1%) of congenital anomalies, figure (6) This is higher than study in Numan2005[41] (2.9%), Higher than Goonaward *et al.* study in Sri Lanka[45] (17.4%) and higher than Hussein K H and Hamawandi AM[24] (14.7%). and This high percent of CHA in regard to other anomalies is probably because the cases of other anomalies like gastrointestinal anomalies (which formed 25% of congenital anomalies in our study) were referred to another hospitals rather than SPTH (in 2018 surgical cases were referred to Shar hospital). In spite of this high CHA percent it formed (7%) of total ND, in a study in Numan & Ataa 2009[46] CHA was(13.1%) of anomalies, and constituted (7%)of total ND). Regarding the Cases in surgical unit 95% of them have died from Congenital anomalies and 42% (16) of which was due to TEF&A, Similar results in Numan & Ataa 2009[46]. 60% (18n) of surgical cases are refered from NCUof SPTH or SMTH. Neonatal infections formed (21%) of total deaths, which is lower than Rashid study in Bangladesh[33] (28.77%). Numan 2005 [41](33.4%) and close to Bang et al (23%) [48] and Hussein K H and Hamawandi AM (18.9%)[24]. This study showed that sepsis was responsible for (86%) of all NI close to Numan2005 [41] (83.8%). While it was higher than Bang et al study [47]where NI formed (36%) and sepsis alone (20%). 62% of NI cases in SPTH NCU delivered by NVD most of them in hospital which is against Numan and Baraa [25] where 67% of septicemic cases delivered at home.

There was statistically significant relation between cause of death(RDS& NI) and age of death and length of remain in NCU(P-value <0.0001) as shown in table (5). 54.7%(64) of N.I in SPTH NCU have died before 7 days of age while it was 64.6%(53) in MTH NCU. Thus E.O.I is more in SMTH NCU, this may be attributed to the age of admission, that all NCU SMTH cases admitted after delivery while SPTH NCU includes admission of different age groups, and these cases(in MTH NCU) may acquired the infection before or during delivery (vertical mother-to-child transmission) as cases of E.O.I, this result of 65% of N.I in SMTH NCU who died before 7 days of life agree with Numan and Baraa [25] in which the early onset infection was 80%. while disagrees with Jacob 2013[48] where L.O.I was more than E.O.I 53% of total deads in SPTH NCU died during the first day of admission and in SMTH NCU only 10% died in 1st 24hours suggesting that these babies in SPTH NCU were admitted in critical condition. This could be because of delay in seeking medical advice or due to lack of timely recognition of disease or late referral due to paucity of trained personnel and physicians. Another cause of death was birth asphyxia which constituted 9 % of all neonatal deaths, which is lower than in Jehan I et al study in

Pakistan 2009[38] (26%), while agrees with Numan and Baraa [25] (9%) and Rashid JA et al[32] (13.3%), the distribution of birth asphyxia cases were 24 cases preterm and 64 cases were term infants figure (5). The prematurity constituted (8 %) of neonatal deaths, which was less than Frankul study[22] (15.5%) & close to Numan 2005[41](10.3%). Respiratory disorders(3.6%) with aspiration syndrome (3.1%) constituted for 6.7% of deaths 70 % (41) of theme occurred in SPTH NCU, respiratory causes including RDS and aspiration syndrome and other respiratory causes forms 35% of total death same results in Numan & Ataa 2009[44] and Awqati et al study in Iraq[14] as (42.3%) were due to difficulty in breathing Disagree with Adeolu AA et al study in Nigeria 2010[26]).Meconium-stained amniotic fluid is found in 10-15% of births and usually occurs in term or post-term infants. Meconium aspiration syndrome develops in 5% of such infants; 30% require mechanical ventilation, and 3-5% die [1]. In this study only 3.1% of all deaths were due to aspiration, 26 was meconium aspiration and 3 cases milk aspiration. the term infants were 19 postterm 5 and preterm 5.

Limitations

1. We excluded 33 cases who have died after 30 days of age. our hospital policy of limitation of neonatal admission is up to 30 completed days of age, but sometimes sever premature babies or VLBW infants are also admitted to NCU in SPTH to receive extra care in NICU, In addition some cases were admitted during neonatal period but died after neonatal period such cases were excluded from this study.
2. Other limits for this study was that Apgar scoring wasn't available in medical record files in NCU in SPTH as it receives cases in variable ages after delivary, some of whom were born at home).
3. The number of cases admitted to NCU at SMTH was too high (9510 during 2017) to calculate the death rate because they are recording and registering any case admitted to NCU even the cases admitted for observation and follow up for few hours and regarded as a cases of admission in NCU.
4. In April 2018 the pediatric surgical department was transferred to another hospital (Shar hospital) so data about neonatal death in surgical unit from that date were not included in this study.

Conclusion

This study concludes that neonatal death rate in SPTH NCU was higher than that in SMTH NCU and among overall causes of the death respiratory causes was the main cause of death but with different percents in the two NCUs, neonatal infection death rate is more in SPTH NCU than SMTH NCU, There was an increase in death rates due to congenital anomalies especially those involving the C.H.A and gastrointestinal tract anomalies. There was also high neonatal deaths in males and low body weight neonates.

Recommendation: we recommend detailed studies and researches to be done to identify and reduce as possible the factors behind high death rates from certain causes mainly respiratory causes, congenital anomalies, neonatal infections. We also recommend better care of preterm and low birth weight babies especially those with respiratory problems,well trained nurse staff in NCU , and steps to prevent or decrease neonatal infections by better antiseptic measures which would significantly reduce sepsis as a major cause of death. Offer early fetal and prenatal diagnosis of congenital malformations by providing better antenatal care services,& good obstetric care.

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