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Editorial

Child protection in the era of multiple emergencies
Sileshi Lulseged

Original articles

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Guidelines for Authors

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Editorial

Child protection in the era of multiple emergencies……..……...…1
Sileshi Lulseged

Original articles

Outcome of preterm twins compared to preterm singleton neonates, a multicenter prospective observational study in Ethiopia.…….…….…….…….5
Abayneh G Demisse, Zemene Tigabu, Yohannes H Matebe, Gesit M Amaru, Zelalem T Bonger, Sara Aynalem, Aseat Dimtse,Workneh Netsanet Gidi, McClure Elizabeth, Assaye Nigussie, Amha Mekasha, Bogale Worku, Riccardo E Pfister, Robert L Goldenberg, Lulu M. Muhe

Admission and outcome patterns among neonates admitted to the Federal Police referral hospital's neonatal intensive care unit in Addis Ababa, Ethiopia….……...…...21
Wondwossen Desta Atlaw, Etsehiwot Shiferaw

A-5-year analysis of pediatric brain tumors in a tertiary care center, in a sub-saharan African country. ….……...…….…...31
Chalew Alemayehu Balcha, Damte Shimelis Awoke, Daniel Hailu Kefene

Pattern of skin diseases in children attending the dermatology clinic in Alert referral hospital, Addis Ababa, Ethiopia: a retrospective study….…….…….…….43
Zehara Gashaw , Dagnachew Shibeshi, Lulu M Muhe

Neonatal Tetanus: case series from Dilla univeristy referal hospital, Ethiopia…..……...…….57
Shimelis Bonsa, Robel Hussen Kabythmer, Afomia Tadesse Tefera

Guidelines for Authors…….……..65

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EDITORIAL

CHILD PROTECTION IN THE ERA OF MULTIPLE EMERGENCIES

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It is currently widely recognized that multiple emergencies, acute or protracted, constitute a major component of the complex humanitarian crisis of international concern. Natural disasters, disease outbreaks (Ebola, HIV infection, COVID-19, etc.), terrorist attacks, conflicts, or other crises cause emergencies that call for child protection involving prevention strategies and response. Emergencies or disasters, in general, require effective and sustainable solutions, particularly in children, as their impact can be long-lasting and significant both at the individual and societal levels (1,2). Besides the huge immediate vulnerability and effect, children are also most likely to suffer long-term developmental, physical, and psychological setbacks (1,3). Indeed, public health emergencies and their consequences are typical examples that affirm the dictum often quoted "children are not just little adults." Child protection interventions in emergency situations are specifically required to address the needs of affected children at various locations, including crisis sites, health service delivery posts, camps for internally displaced populations, and refugee facilities.

Exposure to multiple types of abuse like extreme violence such as maiming, torture, abduction, rape, neglect, and mistreatment are heightened in emergencies (2,4) exerting far-reaching consequences among children. It has been emphasized that children are often more at risk of domestic violence, physical and sexual abuse, and corporal punishment in these situations (5). Weakened protective social structures and coping mechanisms that arise from the immense strain on families and the community result in abuse of children by the family, the community, and various community and government establishments. Reports also show that in the chaos that can follow emergencies, children are especially at risk of sexual violence and exploitation and indicate that sexual violence against girls, often hidden, is one of the most prevalent types of violence during and after emergencies, particularly armed conflicts (6). There are also clear indications that harmful practices such as early marriage or female genital mutilation and their untoward effects can become more prevalent in the aftermath of emergencies (7,8).

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Of note, it has been underscored that there is no word strong enough to describe the horrific conditions that children in armed conflict endure (9). Evidence shows that children can accidentally be killed, conscripted into armed groups, in a conflict or a natural disaster situation, or become separated, abandoned, abducted, or orphaned (10,11)). Conflicts and the associated violence and insecurity can have major psychological effects, and unaccompanied and separated children can be extremely vulnerable to exploitation and trafficking (12). Their distress can also last well beyond the end of the crisis unless appropriate support is provided in time (13). The stressful situations experienced by children in times of emergency can lead to short and long-term psychosocial distress and mental disorders such as sleeping problems, nightmares, withdrawal, problems concentrating, guilt, confusion, insecurity, and post-traumatic stress hindering the successful future development of the child (14).

Despite the growing international attention and wide condemnation of the recruitment and use of children in armed conflict, they are forced into service with armed forces or armed groups unhampered (8)–often forced both to witness and commit violence, while being abused, forced to use drugs, exploited, injured, or even killed as a result (12,15). Moreover, in emergency contexts, children become particularly vulnerable to being exploited through child labour, often become the victims of the worst forms of labour as well as forced to directly engage in armed conflict, trafficked for sexual exploitation, and involved in illicit work which is likely to harm their safety and health (9,16). As suggested by others in previous reports (5,17), the physical, emotional, and spiritual consequences of sexual violence in and after emergencies require, in general, a comprehensive and multi-sectoral response.

A broader framework that supports prevention and response needs to be developed or adopted to strengthen child protection systems before, during, and after emergencies. As outlined by others (18), this needs to consider legal and policy environment, institutional capacity, community contexts, and detailed planning. Out of necessity, a strong involvement from the government is required to ensure a formal and effective child protection system. Such a system needs to be in place well before an emergency – emergencies in this era with major multiple emergencies occurring simultaneously – and be adjusted to the context as the emergencies occur. When law and order break down in emergency situations, children are usually subjected to arbitrary arrest and detention for suspected involvement in crime or administrative offenses. The possibility that they encounter the justice system and might experience arbitrary arrest, torture, and other forms of ill-treatment increases. Prevention and response strategies need to address this and a host of other possibilities and the challenges among children in emergencies need to be explored adequately to guide interventions based on the emergency type and the context in which it occurs.

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ORIGINAL ARTICLE

OUTCOME OF PRETERM TWINS COMPARED TO PRETERM SINGLETON NEONATES: A MULTICENTER PROSPECTIVE OBSERVATIONAL STUDY IN ETHIOPIA

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ABSTRACT

Background: *In recent decades there has been a major increase in multiple birth rates, and the rate of twining vary from 6-9 per thousand life births to 20 per thousand live births across different areas of the world. Many studies have demonstrated higher neonatal and perinatal mortality and morbidity rates in twin deliveries compared to singleton births. This study was aimed to compare the outcomes of preterm twins and preterm singletons.*

Methods: *A prospective, observational multicenter study was conducted from July 2016 to May 2018 in five tertiary hospitals in Ethiopia. All preterm, liveborn infants born at or transferred at less than 7 days of life to one of the study hospitals with an estimated gestational age below 37 weeks were included.*

Results: *A total of 3,703 preterm neonates admitted to participating neonatal intensive care units were included in the study, of which 1171(31.6%) were twins. After adjusting for birth weight and gestational age, the mortality rate for preterm singletons of 31.0% was higher than the mortality rate for preterm twins of 24.8%, which was statistically significant (p-value = 0.001), OR of 1.37 (95% CI: 1.15 to 1.64). The study also identified an inverse relationship between birth weight and gestational age, and mortality. Male singletons were more likely to die than male twins (440 (32.4%) vs. 141 (23.4%); AOR 1.56 (95% CI: 1.22, 1.99); p=0.001)*

Conclusion: *Our study showed that the mortality of a singleton preterm infant was significantly higher than the mortality of a preterm twin infant.*

Keywords: Preterm; twins; singleton; neonatal intensive care units; multi-center

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Introduction

Globally, in recent decades, there has been a significant increase in multiple birth rates. For example, the rate of twinning varies from 6-9 births per thousand live births in South and South-East Asia while it is above 20 per thousand live births in Central African countries (1,2,4). The amount and quality of research on twins vary greatly, with the majority of epidemiolog-ical evidence coming from high-income countries. Fewer reports originated in developing countries. (3) A large review has found high rates of multiple birth in African LMIC compared to Asia. The twinning champion was believed to be Nigeria with rates above 18 per 1000 livebirths but several sub-Saharan and Central-African countries have rates above 15 per 1000(4). According to a demographic and health survey conducted in Ethiopia, the rate of multiple births from 2008 -2013 was 11.1 per 1000 births (5).

Many studies have demonstrated higher neonatal and perinatal mortality and morbidity rates in term twin deliveries compared to singleton births (6, 7). However, these studies have focused mainly on term neonates (6, 7). Reasons for higher mortality risk for twins include the higher rate of antepartum complications associated with preterm birth, as well as intrauterine growth restriction and uteroplacental insufficiency (8, 9). Among twins, the second twin is generally considered at higher risk of severe morbidity and mortality because of obstetric complications that may occur following the delivery of the first twin. These complications may include placental separation, cord prolapse, uterine atony, long delivery interval and cervical spasm (10,11).

Twinning rate is increasing in developing countries, and its impact on mortality and morbidity patterns is significant. In low-resource countries such as Ethiopia, there is a paucity of reliable data for such analyses. To our knowledge, little is known about whether the outcome of preterm twin neonates is different than preterm singleton neonates. The current study aims at assessing the mortality outcome of twins compared to singletons as well as twin A with twin B. Our rationale to study on preterm is to see the outcome of preterm twins and preterm singleton in developing country where the health system is very weak to manage these neonates, to our knowledge most of the studies were conducted on term twins and term singleton(6,7), and handling preterm and twin babies in developing countries is a challenge.

Methods

Study design

A sub-analysis of a prospective multi-centre observational study conducted from July 2016 to May 2018 to assess outcomes of twins and singletons preterm within a broader study on causes of mortality in preterm neonates (12). Socio-demographic and clinical maternal and neonatal characteristics were recorded.

We compared maternal and neonatal demographics as well as morbidity patterns and survival at 28 days postnatal between twin and singletons. We also compared survival

between twin A (first born twin) and twin B (second born twin) and assessed early neonatal deaths (neonatal deaths in first week of life) and late neonatal deaths (neonatal deaths occurring after seven days postpartum and within 28 days of life).

Study settings

This multi-center study was conducted in five tertiary hospitals in Ethiopia with the intention to obtain a geographical representation across regions in the country. The centers were located in the northwest (University of Gondar Hospital), Southwest (Jimma University Hospital), and three hospitals within the Addis Ababa region (Ghandi Memorial Hospital, St. Paul's Hospital Millennium Medical College, and Tikur Anbessa Hospital). These centers were selected because of high annual case load. All centers are academic and referral hospitals and provide care to both inborn (babies born in the study health facilities) and out-born neonates (babies born outside of study health facilities) by pediatric residents, pediatricians and in 3 sites, neonatologists.

Study participants

All preterm, liveborn infants born at or transferred at less than 7 days of life to one of the study hospitals with an estimated gestational age below 37 weeks were approached for parental consent by the study staffs. Gestational age was determined according to hierarchical algorithm: (1) ultrasound before 28 weeks of gestation; (2) ultrasound at or after 28 weeks of gestation and agreement with a reliable last menstrual period or New Ballard Score; (3) reliable last menstrual period and the New Ballard Score (13) (4). If the discrepancy between last menstrual period and the New Ballard Score was greater than 2 weeks, the last menstrual period date was used; and (5) without reliable ultrasound and last menstrual period estimate, the New Ballard Score alone was used. Excluded were neonates who withdrew from the study and higher order multiples (see study flow diagram).

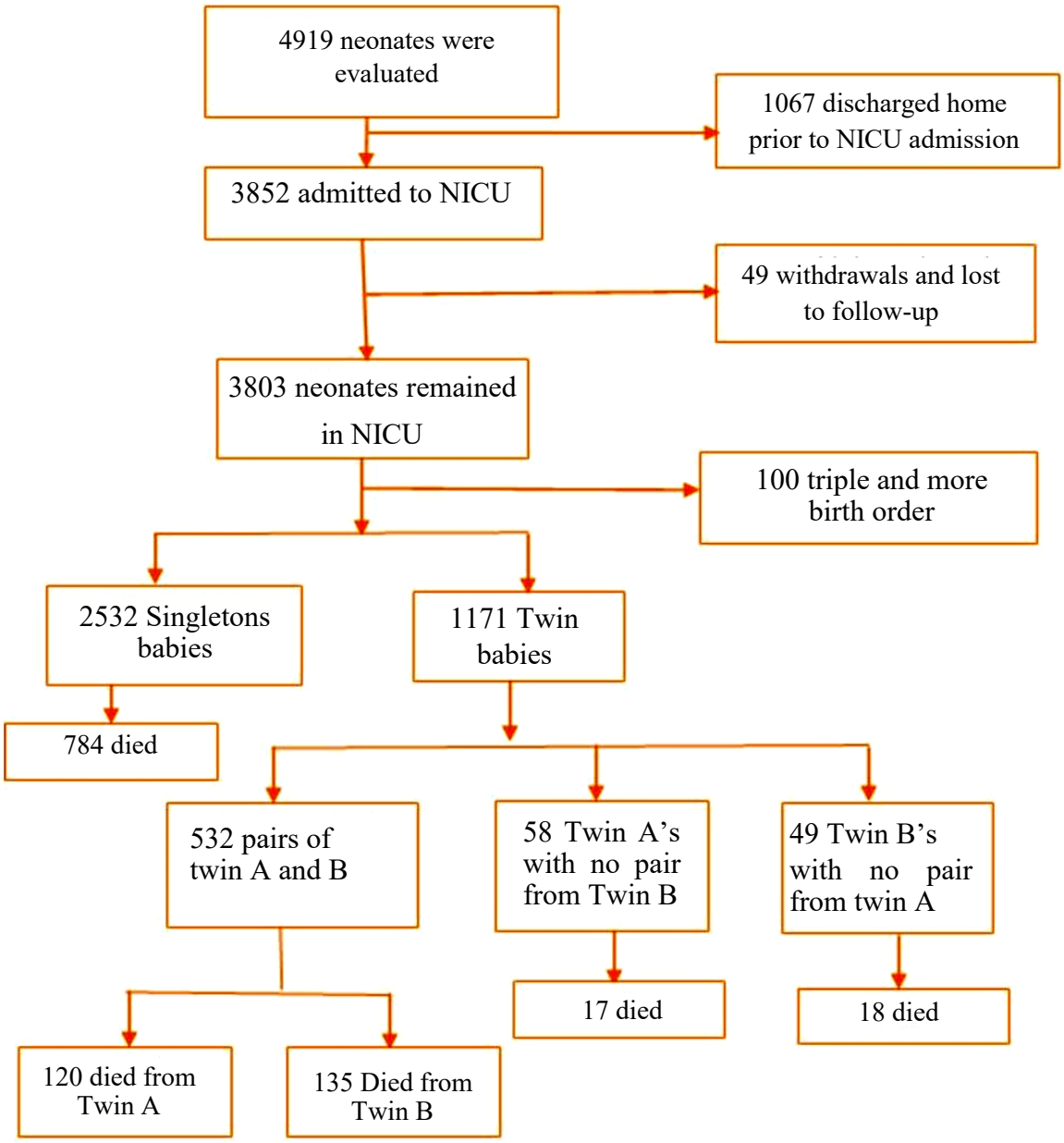

Figure 1, Study flow diagram; newborn intensive care unit

Data collection and analysis

Specific case report forms were filled for eligibility, socioeconomic status, maternal and obstetric history, and neonatal admission information including physical examination and laboratory findings, as well as admission and discharge diagnosis, and survival at 28 days. Imaging, laboratory results and microbiology of blood and cerebrospinal fluid specimens were limited, it was not done for all. We defined polycythemia when the venous hematocrit was greater than or equal to 65% and hypoglycemia when the blood sugar level was below 45 mg/dl (14). In the present study, radiologic examination including X-ray was performed inconsistently. However, for the diagnosis of RDS, clinical criteria such as rapid labored breathing, grunting, presence of

subcostal retraction, cyanosis, and decreased air entry in bilateral lung field plus or minus chest X-ray findings immediately or within a few hours of delivery were used. Neonatal sepsis was defined after assessing the risk factors for infection including maternal infection during labor, clinical signs and symptoms suggestive of infection, hematologic profile, and C-reactive protein.

Statistical assessment

The mean, median and standard deviations were analyzed, and descriptive statistics calculated with Stata version 14.2 (2017 package).

Patient and public Involvement

Informed and written consent was obtained from parents or caretakers prior to the infants' participation in the study. Consent information was available in English, Amharic or Oromifa languages, as appropriate.

Ethical approval and informed consent

The Institutional Review Board of Addis Ababa University, Jimma University and the University of Gondar approved the primary study protocol (IRB approval number: AAUMF 03-008). Informed, written consent was obtained from all participants' parents. Confidentiality of the information was guaranteed.

The study was supported by a grant from the Bill & Melinda Gates Foundation.

Data sharing

No additional data available.

Results

Of 4,919 preterm newborns screened during the study period, 3,852 were admitted and 1,067 were discharged home. As shown in figure 1, after exclusion of higher multiple babies (triplets, quadruplets) (2.6%) and some withdrawal (1.3%), a total of 3,703 preterm neonates were included for analysis

Demographics

Overall, 31.6% of admitted preterm neonates were twins. The male to female ratio was 1.15 and the singleton to twin birth ratio was 2.16. The overall mean birth weight was 1,728 grams for singletons and 1,701 grams for twins; 33.0% and 26.8% had a birth weight over 2000 gram, respectively. Table 1 details demographics and the main outcomes, early and late neonatal death. In terms of geographic differences in twining within various parts of Ethiopia, the University of Gondar had a higher rate with 314 (36.9%) twins compared to the rest of study sites, followed by Ghandi memorial hospital 128 (35.1%). The mean gestational age for both preterm singletons and preterm twins is 32.9 weeks, and the mean birth weight is 1728 gram for preterm singleton and 1701 gram for preterm twins. When we look at the gender 1357 (54.4%) of singleton are male and 602(51.9%) of twins are male. One thousand thirty-nine (41%) of preterm singleton and 541(46.2%) of preterm twins gestational age is 32-34 weeks. Early neonatal death was identified in 599(76.4%) of preterm singleton and 214(73.8%) of preterm twins.

Table 1. Neonatal demographics and outcomes of preterm singletons vs. twins admitted to study sites in Ethiopia from July 2016 to May 2018

	Singletons n=2,532 (%)	**Twins n=1,171 (%)**
Mean gestational Age	32.9	32.9
Mean birth Weight	1728	1701
Gender	2,496	1,160
Female	1139 (45.6)	558 (48.1)
Male	1357 (54.4)	602 (51.9)
Birth Weight (grams)	2,481	1,152
<1000	120 (4.8)	35 (3.0)
1000-1499	638 (25.7)	286 (24.8)
1500-1999	907 (36.6)	522 (45.3)
≥2000	816 (33.0)	309 (26.8)
Gestational age (weeks)		
<28	78 (3.1)	23 (2.0)
28-31	611 (24.1)	277 (23.7)
32-34	1039 (41.0)	541 (46.2)
35-37	804 (31.8)	330 (28.2)
Deaths	784/2,532 (31.0)	290/1,171 (24.8)
Early Neonatal death (<7days)	599 (76.4)	214 (73.8)
Late Neonatal death (7-28 days)	185 (23.6)	76 (26.2)

Maternal clinical characteristics related with neonatal mortality

Overall, there was no statistical difference between maternal characteristics of deceased singletons and twins. Most maternal morbidities such as hypertension and antepartum hemorrhage occurred more frequently among mothers of singletons, but none of these differences were statistically significant (Table 2). Antepartum hemorrhage is more seen in mother of singleton 297(35.7%) than twins 62 (29%) with AOR of 1.30 (95% CI: 0.66,2.57) and p value of 0.447. Eclampsia is more seen in mother of singleton 68(27.9%) than twins 16(6.3%) with AOR of 5.73 (95% CI: 0.48,8.12) and p value of 0.167. Cardiac disease is more seen in mother of singleton 34 (23.8%) than twins 8(12.5%) with AOR of 2.54 (95% CI: 0.14,5.16) and p value of 0.527. When we look at the mode of delivery C-section is more done for mothers of singleton 958 (31.1%) than twins 436(21.3%) with

AOR of 1.36 (95% CI: 0.99,1.85) and p value of 0.052. Mothers whose age is between 30-39 gave birth more to preterm singleton 636 (31.5%) than preterm twins 312(23.7%) with AOR of 1.37 (95% CI:0.96,1.95) and p value of 0.082.

Table 2. Comparison of maternal characteristics of deceased preterm singleton and twins admitted to study hospitals with adjusted odds ratio for birth weight and gestational age

	Total	Singleton	Twin		Adjusted for birthweight and gestational age		
		N (% died)	N (% died)	COR	AOR	95% CI	p-value
HIV*	95	69 (21.7%)	26 (30.8%)	0.63	0.58	0.18, 1.93	0.378
Hypertension	984	769 (32.9%)	215 (24.2%)	1.54	1.13	0.76, 1.68	0.534
Urinary tract infection	164	116 (36.2%)	48 (29.2%)	1.38	1.54	0.69, 3.44	0.292
Antepartum hemorrhage	359	297 (35.7%)	62 (29.0%)	1.36	1.30	0.66, 2.57	0.447
Preeclampsia	836	647 (33.1%)	189 (25.4)	1.45	1.07	0.71, 1.62	0.749
Eclampsia	84	68 (27.9%)	16 (6.3%)	5.76	5.73	0.48, 8.12	0.167
Cardiac disease	42	34 (23.5%)	8 (12.5%)	2.15	2.54	0.14, 5.16	0.527
Gestational diabetes	47	45 (24.4%)	2 (0.0%)	NA	NA	NA	NA
Mode of Delivery							
C-Section	1394	958 (31.1%)	436 (21.3%)	1.67	1.36	0.99, 1.85	0.052
Vaginal	2231	1523 (30.5%)	708 (27.3%)	1.17	1.53	1.89, 1.25	0.001
Maternal Age							
<20	269	213 (31.5%)	56 (39.3%)	0.71	0.67	0.34, 1.34	0.259
20-29	2431	1643 (30.7%)	788 (24.2%)	1.39	1.44	1.16, 1.80	0.001
30- 39	948	636 (31.5%)	312 (23.7%)	1.48	1.37	0.96, 1.95	0.082
≥40	41	32 (31.3%)	9 (22.2%)	1.59	1.87	0.26, 3.56	0.534

Clinical outcome and mortality of preterm singletons and twins

Overall, the most common discharge diagnosis was respiratory distress syndrome (RDS) but there was no statistical difference between singletons (1,163; 47.1%) and twins (511; 45.1%) with an AOR 1.07 (95% CI: 0.91 to 1.24); p=0.3.Polycythemia, hypoglycemia, hyperbilirubinemia, and hypothermia were significantly more often associated with twins, and congenital malformations and sepsis with singletons (table 3). Polycythemia is more seen in preterm twins 63(5.6%) than preterm singleton 86(3.5%) with AOR of 0.62 (95% CI:0.44,0.88); p=0.006. Hyperbilirubinemia is more seen in preterm twins 391(34.3%) than preterm singleton 740(29.8%) with AOR of 0.83 (95% CI:0.72,0.97); p=0.020. Hypoglycemia is more seen in preterm twins 348 (31.1%) than preterm singleton 550(22.5%) with AOR of 0.67 (95% CI:0.57,0.78); p=0.001. . Sepsis is more seen in preterm

singleton 943(39.7%) than preterm twins 404 (35.8%) with AOR of 1.21 (95% CI:1.04,1.40); p=0.012. Hypothermia is more seen in preterm twins 724(63.9%) than preterm singleton 1373(55.5%) with AOR of 0.71 (95% CI:0.61,0.82); p=0.001. Female death is more seen in preterm singleton 332 (29.2%) than preterm twins 145(26%) with AOR of 1.15 (95% CI:0.89,1.50); p=0.292.

Table 3. Morbidity and mortality between singleton and twin preterm neonates admitted to study sites.

	Single	Twin	Adjusted for gestational age and birth weight		
Variable	**n=2,532**	**n=1,171**	**AOR**	**95% CI**	**P-value**
Respiratory distress syndrome	1163 (47.1)	511 (45.1)	1.07	0.91, 1.24	0.431
Polycythemia	86 (3.5)	63 (5.6)	0.62	0.44, 0.88	0.006
Hyperbilirubinemia	740 (29.8)	391(34.3)	0.83	0.72, 0.97	0.020
Hypoglycemia	550 (22.5)	348 (31.1)	0.67	0.57, 0.78	0.001
Congenital malformation	99 (4.0)	9 (0.8)	5.09	2.56, 10.1	0.001
Sepsis	943 (39.7)	404 (35.8)	1.21	1.04, 1.40	0.012
Hypothermia	1373 (55.5)	724 (63.9)	0.71	0.61, 0.82	0.001
Male Death	440 (32.4)	141 (23.4)	1.56	1.22, 1.99	0.001
Female Death	332 (29.2)	145 (26.0)	1.15	0.89, 1.50	0.292
Overall Death	784 (31.0)	290 (24.8)	1.37	1.15, 1.64	0.001

After adjusting for birthweight and gestational age, the 7-day mortality in singletons (599; 23.7%) was significantly higher than in twins (214; 18.3%; p=0.001) with an AOR of 1.37 (95% CI: 1.15 to 1.64) and the 28-day mortality rate in singletons was higher than in twins (784; 31.0% vs 290; 24.8%; AOR 1.37 (95% CI: 1.15 to- 1.64). The majority of singletons 599 (76.4%) and twins 214 (73.8%) died within the first 7 days (Table 1).

For both twins and singletons, we confirmed the inverse relationship between birth weight and gestational age, and mortality (Table 3). Male singletons were more likely to die than male twins (440 (32.4%) vs. 141 (23.4%); AOR 1.56 (95% CI: 1.22, 1.99); p=0.001) (Table 4).

Eighty-seven percent of preterm twins and 85.9% of preterm singleton born at gestational age less than 28 weeks have died. When we look at the gender, 29.2% of female preterm singleton and 26% of preterm twins have died. Mode of delivery, 31.1% of preterm singletons born by cesarean section have died while 21.3% of preterm twin with the same mode of delivery have died.

Table 4. Mortality of preterm neonates admitted to study sites by demographics.

	Categories	Singleton		Twin	
		Total Birth	Percent Died	Total Birth	Percent Died
Gestational age (N=2,532)	<28	78	85.9	23	87.0
	28-31	611	57.9	277	50.2
	32-34	1039	23.4	541	17.7
	35-37	804	14.9	330	10.6
Infant gender (N=3,656)	Female	1139	29.2	558	26.0
	Male	1357	32.4	602	23.4
Birthweight (N=3,633)	<1000	120	82.5	35	82.9
	1000-1499	638	50.8	286	48.6
	1500-1999	907	23.9	522	17.4
	>=2000	816	15.7	309	8.1
Maternal age (N=3,689)	<20	213	31.5	56	39.3
	20-29	1643	30.7	788	24.2
	30-39	636	31.5	312	23.7
	>40	32	31.3	9	22.2
Mode of delivery (N=3,663)	Caesarean section	958	31.1	436	21.3
	Other	1551	30.7	718	27.0

Clinical differences between twin A (first born) and twin B (second born)

First-born twins (twin A) were slightly more often girls and had a higher birthweight. Their morbidity was generally lower than for the second twin (twin B) except for necrotizing enterocolitis, but this was not statistically significant. Twin A had significantly less asphyxia with organ failure with an COR 0.34 (95% CI: 0.16, 0.70), and also respiratory distress, anemia and polycythemia, but no difference in overall mortality was noted (table 5). When we look at the weight difference between twin A and B; 251(48%) of Twin A weigh 1500-1999 gram compared to twin B 231(44.1%) COR 1.17(95% CI:092,1.49). RDS is diagnosed more on twin B 237(46%) than twin B 222(43.1%) with COR of 0.89 (95% CI:0.70,1.14). Asphyxia with organ failure is diagnosed more twin B 29(5.7%) than twin A 10(2%) with COR of 0.34 (95% CI:0.16,0.70). Hypoglycemia is diagnosed more twin A 161(31.6%) than twin B 154 (30.3%) with COR of 1.06 (95% CI:0.81,1.38). Sepsis is diagnosed more twin B 189(36.9%) than twin A 180(35.1%) with COR of 0.92 (95% CI:0.71,1.19). Polycythemia is diagnosed more twin B 32(6.9%) than twin A 24(4.7%) with COR of 0.75 (95% CI:0.44,1.29). More twin B 135(25.4%) died than twin A 120(22.6%) with COR of 0.86 (95% CI:0.65,1.14).

Table 5. Clinical differences between twin A (first born) and twin B (second born) of preterm twin pairs admitted to study sites. Single twin admissions were omitted.

	Twin A N (%)	Twin B N (%)	COR	95% CI
Gender female	262/528 (49.6)	244/527 (46.3)	1.14	0.89, 1.45
Birthweight (grams)	N=524	N=524		
<1000	16 (3.1)	17 (3.2)	0.97	0.48, 1.94
1000-1499	115 (22.0)	142 (27.1)	0.76	0.57, 1.01
1500-1999	251 (48.0)	231 (44.1)	1.17	0.92, 1.49
≥2000	142 (27.1)	134 (25.6)	1.08	0.82, 1.42
Respiratory distress syndrome	222 (43.1)	237 (46.0)	0.89	0.70, 1.14
Asphyxia with organ failure	10 (2.0)	29 (5.7)	0.34	0.16, 0.70
Hypoglycemia	161 (31.6)	154(30.3)	1.06	0.81, 1.38
Sepsis	180 (35.1)	189 (36.9)	0.92	0.71, 1.19
Necrotizing enterocolitis	25 (4.9)	22 (4.3)	1.15	0.64, 2.07
Anemia	59 (11.5)	50 (9.7)	1.21	0.81, 1.80
Polycythemia	24 (4.7)	32 (6.2)	0.75	0.44, 1.29
Died	120 (22.6)	135 (25.4)	0.86	0.65, 1.14

Discussion

Worldwide the largest proportion of under five deaths are newborns of which prematurely born demand the highest death toll (22). Twinning is a frequent cause of premature delivery and although twins make for 3-15% of all newborns with large regional differences, they generally use a disproportionate high number of hospital beds compared to singletons. In our study more than 30% of admitted preterm neonates were twins (23).

Both preterm singleton and twin deliveries often require special care during pregnancy and after delivery. Comparing the mortality patterns between preterm twin neonates and preterm singleton neonates will have significant implications for allocation of healthcare resources, especially in developing countries. In this large multi-center study, although the mortality in preterm neonates was high, preterm singleton neonates were more likely to die than preterm twin neonates were.

In our study, while the mortality of both groups was very high, the mortality rate of singletons 784 (31.0%) was higher than that of twins 290 (24.8%). This finding was similar to the study done in Northern Belgium, in which twins compared to singletons had lower or comparable neonatal mortality rates (15). For example, in one study done in Korea, the neonatal mortality rate was lower in twin pregnancies than in singleton pregnancies for those with gestational ages > 29 weeks (16). Contrary to our findings, most studies have shown an

overall higher mortality rate among twins than singletons, but these were usually not restricted to preterm infants (17,18). We interpret these findings such that twins are more likely to be delivered preterm and since preterm infants have a higher mortality than term infants the mortality in twins if all births are considered will be higher. However, in our study, where only preterm infants were included, among those infants, the mortality was lower.

There are a number of potential explanations for the lower risk of mortality among preterm twins compared to preterm singletons. First, the increased mortality of preterm singletons could be explained by the belief that twin pregnancies are considered as high risk and might be monitored more closely than preterm singletons. Gestational age and birth weight affects the outcome of neonates and existing literature demonstrates that, in singletons, the highest growth peak occurs between 36 and 38 weeks, whereas in twins, this peak occurs between 32 and 36 weeks perhaps increasing the organ system maturation resulting in better adaptation and survival (19,20).

The cause of preterm in twins is less pathological than the cause of preterm in singletons', twins are programmed to be born preterm, not because of an underlying pathology but because of a limited uterine environment (19). Additional possible explanations could be that in preterm twins beyond 31 weeks' gestation, the lungs undergo an earlier in utero maturation than those of singleton fetuses. The difference in mortality could also be explained by increased rate of lung maturity (22). In our study, we also noted a higher rate of RDS in singletons than twins, with RDS also being the leading cause of mortality (23). The other possible reason could be increased rate of congenital malformations found in singletons than twins which could contribute to the mortality of singleton babies. Finally, it is possible that in this study sicker singleton infants were admitted to the NICUs since it is probable that the healthier singletons were discharged home while the healthy twins were more likely to be observed in the NICUs.

In the current study, we identified an inverse relationship between gestational age and birth weight with mortality in both preterm twins and preterm singletons; similar findings were reported from studies in Japan (24). The immaturity in several organ systems to support adaptation in extrauterine environment increases the risk of mortality in very preterm and low birth weight infants (25, 26).

In this study, we noticed more male singletons die than twins. Similar results were reported in a study done in Asia. The underlying mechanisms contributing to this are not well understood but some hypotheses have been proposed including genetic and endocrine differences. Currently, pulmonary disease and its complications remain predominant causes of early death, because of the inhibitory effects of androgens on lung development (28,29).

Our study was a large, prospective study, involving multiple centers in a low-resource setting with a high neonatal mortality (30,31).

The current finding will help to understand the increased risk of mortality found in preterm singletons compared to preterm twins. The finding of this study should be interpreted with caution because of limitations including the lack of data on zygosity and placental chorionicity.

Strengths of the study

Our study was a large, prospective study, involving multiple centers in a low-resource setting with a high neonatal mortality

Limitations of the study

Our study has one important limitation which is that not all of the study participants had ultrasound done during the first trimester of pregnancy to determine gestational age which is needed to validate that they are truly preterm infants. We used last menstrual period method or the New Ballard method to determine prematurity.

Conclusions

We conclude that there is a higher mortality among preterm singletons compared to preterm twins; additionally, gestational age and birth weight have an inverse relation with mortality in both preterm singletons and twins.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the research, authorship and/or publication of this article.

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Contributions of authors

AGD: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

ZTK: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

YHM: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

GMA: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

ZTB: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

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EMM: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

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RLG: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

LMM: contributed to conception and design; contributed to acquisition, analysis and interpretation; drafted the manuscript critically revised the manuscript; gave final approval and agrees to be accountable for all aspects of work; insuring integrity and accuracy.

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ORIGINAL ARTICLE

ADMISSION AND OUTCOME PATTERNS AMONG NEONATES ADMITTED TO THE FEDERAL POLICE REFERRAL HOSPITAL'S NEONATAL INTENSIVE CARE UNIT IN ADDIS ABABA, ETHIOPIA

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ABSTRACT

Background: *The rate of morbidity and mortality in the neonatal period remains high in Ethiopia. Assessing the Neonatal intensive care unit cases regularly is vital as the disease pattern and mortality are not known in the police population.*

Objective*: The aim of this study was to identify the number, types, clinical features of sick neonates admitted and their discharge outcome at the neonatal intensive care unit of Federal police hospital, Ethiopia since the time of its establishment two years ago.*

Methods: *A hospital-based cross-sectional retrospective review of medical records of sick neonates 0-1 month of age admitted to the neonatal unit at the Federal police Hospital, Addis Ababa Ethiopia from September 01, 2019 to October 30, 2021.*

Results: *The medical records of all 155 sick neonates during the study period were included in this study. Among the estimated 3600 deliveries at federal police hospitals during the study period, the neonatal admission rate was 155/3600 (4.3 %). The majority of neonates, 130 (83.9%), were admitted with the age less than 48 hours. Ninety-one (58.7 %) were male and 64(41.3 %) were female neonates making the male to female ratio 1.4:1. Prematurity accounts for 54 (34.8%) of admissions. Sepsis was the main reason for admissions 58 (37.4%), followed by birth asphyxia 12 (7.7%), and neonatal jaundice 10(6.4 %). On discharge, 133 (85.8%) were improved and discharged, 2(1.29%) left against medical advice, and 3(1.9%) were referred while 17(10.9%) of the admitted patients died.*

Conclusion: *Prematurity related causes, neonatal infection and birth asphyxia were the main reasons for neonatal admissions and neonatal mortality was high in the first 24 hours of age. Neonatal admissions at Federal Police Hospital NICU mirror the national profile of Ethiopian Neonatal Intensive Care Units. Due attention should be given to address these issues and to reduce mortality.*

Keywords: Federal Police Hospital, Prematurity, Neonatal sepsis, Perinatal Asphyxia

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INTRODUCTION

Neonatal Intensive care unit (NICU) is a place for the care of neonates below 28 days. NICU care is an essential component of hospital care; hence, critically ill neonates are admitted to different levels of units with the aim of reducing morbidity and mortality. NICU is also one of the implemented neonatal care interventions that are imperative for the survival of neonates in developing countries (1).

The pattern and outcome of neonates admitted to the NICU varies across the world depending on the NICU setup, staff type, training level, causes and severity of admitted cases. In high income countries, the main causes of mortality and morbidity in the neonatal period include prematurity and congenital abnormalities (2), while in the developing countries, preventable causes such as birth asphyxia, severe infection including tetanus, and premature birth predominate (3).

Although not uniform, many of the previous studies reported in Ethiopia, prematurity, sepsis, and perinatal asphyxia (PNA) as the major reasons for neonatal morbidity and mortality (4-8). Regular assessment of the illness patterns in hospital NICU settings is an indicator to show the availability, utilization and effectiveness of mother and child health services (9). Therefore, the aim of this study was to assess the pattern of admission and outcome of neonates that were admitted to the newly established NICU of Federal police hospital (FPH) from September 1, 2019 to October 30 2021.

PATIENTS AND METHODS

Study area: This study was conducted at the FPH, Addis Ababa Ethiopia, which is one of the largest hospitals and located at the heart of Addis Ababa. The hospital was established in 1961. The major services provided by the FPH include internal medicine, orthopedics, surgical, OBGYN, Pediatrics, Ophthalmology, Pathology, ENT, physiotherapy, Radiology etc. FPH is also a primary referral center for all police health facilities in the country. The Pediatrics department offers services for police members and their families from Addis Ababa and the regions and includes an emergency department, outpatient clinics, pediatric wards, and the neonatal intensive care units (NICU). The NICU was established two years ago and serves as a level II referral unit. Annually, approximately 1800 births take place at the FPH in Addis Ababa. The police NICU accepts sick and high risk children delivered within the institution, referrals from other health facilities, and home deliveries. The NICU is staffed with one General practitioner, one Health officer, three pediatricians, and eight nurses. The NICU has a 20-bed capacity and has five rooms; one for preterm babies, one for term babies, one isolation room for communicable diseases, and one transition room for mothers where comparatively stable neonates and one for those who need kangaroo mother care. It has an infant warmer and four radiant warmers to keep the room warm and three incubators for premature neonates. The unit does not have a mechanical ventilator

continuous positive airway pressure (CPAP) machine but uses bubble CPAP locally developed for neonates with respiratory distress. The babies receive oxygen through nasal prongs or nasal catheter from oxygen cylinders. The NICU has two phototherapy machines but no oxygen concentrators.

Study design: Hospital based retrospective study with medical records review.

Inclusion and exclusion criteria: All admitted sick neonates since the establishment of FPH NICU were included. Cases that were referred from the delivery or operation room with suspected illnesses but later did not fulfill admission criteria and returned as normal following evaluation by an attending Senior in the NICU were excluded.

Ethical consideration: Letter of permission was obtained from the police hospital CEO and directors (management) committee before conducting the research.

Data collection and analysis: Data were collected retrospectively from admission/ discharge registration books, as well as death certificates, using a pretested, structured questionnaire prepared for this study. Important variables were extracted by the pediatricians practicing in the neonatal ward. The investigated variables included sex of the patient, age at admission, gestational age, birth weight, and place of birth, antenatal care follow-up, maternal age, and parity, duration of hospital stay, address, and mode of delivery, causes of admissions, treatment given and causes of death etc. Data were entered, cleaned, checked for completeness, compiled, and analyzed using SPSS version 20 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were computed and percentage and frequencies were determined

RESULTS

3.1. Socio-demographic status of neonates admitted: As seen in figure 1, the majority of the newborns, 130 (83.9 %), were admitted in less than 24 hours of age, while the rest were admitted in 24hr to 7days, 18(11.6 %), and 7 to 28 days, 7(4.5%), of age.

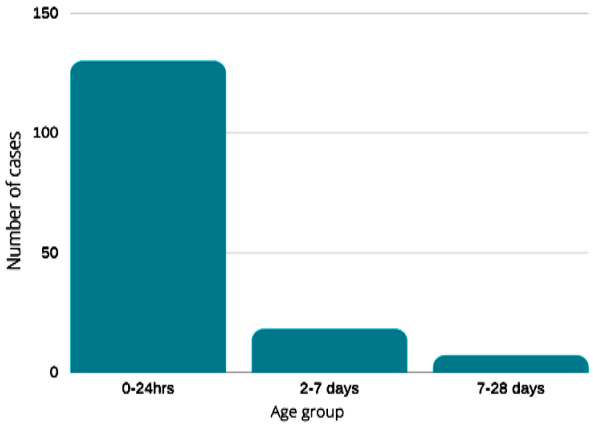


Figure 1: Number of neonates according to their age at admission, Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

As seen in table 1, Out of the 155 neonates who were eligible for the study, 91(58.7%) were male and 64 (41.3%) were female making the male to female ratio 1.4: 1. Among all the neonates, 151 (97.4%); were born at FPH while the rest were born at home 4 (2.6%). Around two thirds 104 (67.1%) were term and 46(29.6 %) were preterm. Concerning birth weight of neonates, 101(65.1 %) were NBW/ normal birth weight (2.5- 4kg), 37(23,8 %) were LBW/low birth weight between (1.5-2.5 kg) and 8 (5.1 %) were VLBW(< 1.5 kg) and 9 (5.8%) were macrosomic (>4000 kg). With regards to anthropometry, 139(89.8 %) neonates were appropriate for their gestational age, 8 (5.1 %) were small for gestational age and 8(5.1 %) were LGA.

Table 1: Demographic characteristic of neonates admitted to The Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Variables	Frequency	Percentage
Gender		
Male	91	58.7
Female	64	41.3
Place of Birth		
Hospital	151	97.4
Home	4	2.6
Gestational age		
< 34 weeks	21	13.5
34–36^{+6} weeks	25	16.1
37–41^{+6} weeks	104	67.1
>42 weeks	5	3.2
Birth weight		
<1500	8	5.2
1500-2,499g	37	23.8
2,500–3,999 g	101	65.2
>4,000 g	9	5.8
Anthropometry		
Appropriate for gestational age	139	89.8
Large for gestational age	8	5.1
Small for gestational age	8	5.1
Hospital stay		
0–24 hours	135	87.1
24hrs–7 days	11	7.1
>7 days	9	5,8

3.2 Demographic characteristics of mothers of neonates admitted: The majority of mothers' 149(96.1%) were in the age range from 18 to 35 years, followed by 6 (3.9 %) who were more than 35 years of age while there were no mothers below 18 years of age. There were 57 (36.8 %) primiparous mothers and 98 (63.2 %) multiparous women. All mothers 100% had an ANC follow-up. Three (1.93%) mothers were positive for hepatitis B antigen and 1(0.64 %) for human immunodeficiency virus (HIV) with HIV-exposed neonate. The mode of delivery was normal or vaginal delivery in 99 (63.9%) and cesarean section in 47 (30.3 %). There were 9 (5.8%) breech presentations and instrumental deliveries. The Majority 144(92.9%) of the study's neonate mothers delivered singleton, and the rest 11(7.1%) had twin deliveries (Tables 2).

Table 2. demographic characteristics of mothers of neonates admitted to The Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Variables	Frequency	Percentage
Maternal Age		
<18 years	0	0
18–35 years	149	96.1
≥35 years	6	3.9
Parity		
Para I	57	36.8
Para II–IV	98	63.2
≥Para IV	0	0
Abnormal Lab findings		
HIV positive	1	0.64
VDRL reactive	0	0
HBSag positive	3	1.93
Mode of Neonate's presentation		
Cephalic	99	63.9
Cesarean section	47	30.3
Breech	3	1.9
Instrumental	6	3.9
Number of gestations		
Singleton	144	92.9
Twins	11	7.1
Triplets	0	0

3.3. Admission diagnosis (Disease patterns) of the neonates Reviewing the diagnosis at the time of admission shows that over a quarter of the sick neonate 54(34.8%) were premature with several complications such as sepsis, RDS, hypothermia, hypoglycemia, jaundice, anemia, NEC, polycythemia, DIC, etc. Neonatal sepsis was identified in 58 (37.4%)

newborns among which 36 (62.1%) were early onset cases while EONS and 7 (12 %) were late onset cases. Other common causes of neonatal admissions were respiratory distress 39 (25.2%), perinatal asphyxia 12(7.7 %) and neonatal jaundice 10(6.4%). Congenital malformations were documented in 12(7.7%) include cleft lip, cleft palate, polydactyl, and myelomeningocele/MMC , hydrocephalus, Tracheo-esophageal fistula /TEF, and congenital heart diseases (Table 3). Neonatal admissions due to respiratory distress were due to Transient Tachypnea of the newborn/ TTN 11 (28.2%), Pneumonia 10(25.6%), Meconium Aspiration Syndrome/MAS 9 (23.1%) and Respiratory distress syndrome/ RDS 9(23.1%). Of the total cases with pathologic jaundice, 10 (6.4%) were due to ABO & RH-incompatibilities, whereas 19 cases were related to other systemic illnesses.

Table 3. Clinical diagnoses of neonates admitted to the Federal police referral Hospital, Addis Ababa Ethiopia September 1, 2019 to October 30, 2021

Characteristics	**Frequency**	**Percentage**
Prematurity	52	33.5
Term	103	66.5
Total	**155**	**100**
Neonatal infections		
Early onset neonatal sepsis (EONS)	36	62.1
Late onset neonatal sepsis (LONS)	7	12
Meningitis	4	6.9
Diarrhea	1	1.7
Other	10	17.2
Total	**58**	**100**
Respiratory distress		
Transient tachypnea of newborn(TTN)	11	28.2
Pneumonia	10	25.6
Meconium aspiration syndrome (MAS)	9	23.1
Respiratory distress syndrome (RDS)	9	23.1
Total	**39**	**100**
Neonatal Jaundice	10	6.4
Total	**155**	**100**
Hypoxic ischemic Encephalopathy	12	7.7
Total	**155**	**100**
Congenital malformations *	12	7.7
Total	155	100

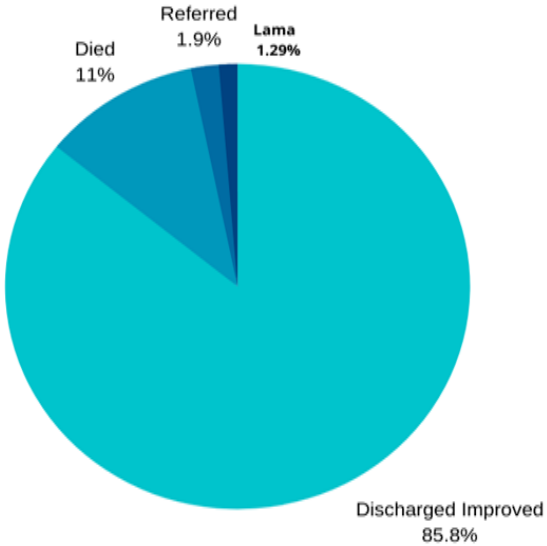
*includes cleft lip,cleft palate, polydactyly, MMC, congenital heart diseases, TEF,imperforate anus.

3.4. Treatment given to sick neonates: In addition to general NICU supportive care, Antibiotics 124(80%), Intranasal oxygen/INO2 or water bubble CPAP/Continuous airway pressure 81 (52.2%), Iv fluids/10%DW 68 (43.8%), incubator care 68(43.8%), phototherapy 34 (21.9%), Kangaroo Mother care/KMC 16 (%) and other 28(%) i.e calcium gluconate, aminophylline, blood transfusion, Fresh Frozen Plasma. FFP etc. , were the treatments offered to the sick neonates. Antibiotics, IV fluid and oxygen were the common interventions used for the management.(Table 4).

Table 4. Treatment of neonates admitted to the Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Treatment	Frequency	Percentage
Antibiotic	124	80
INo2, CPAP	81	52
10%DW	86	55.45
Incubator care	68	43.8
Phototherapy	34	21.9
KMC	16	10.3
Other	28	18

3.5. Outcome and major causes of death* of neonates As seen in Figure 2 , out of 155 neonates studied 133 (85.8%) were improved and discharged, 3(1.9%) were referred and 2 (1.3%) were left against medical advice and 17(11%) of the admitted patients died. The main causes of death were prematurity 52 (33.5%), Sepsis 58(37.4%), 39(24.5%) by birth asphyxia 10(6.5%) and sepsis 22(10%) (Table 3).



*Major causes of death include: Prematurity with its Complication, Perinatal asphyxia, Neonatal infections

Figure 2: Outcome and major causes of death of neonates admitted at Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30

The neonatal mortality rates of NICUS ranged from 4 to 46% in developed countries and 0.2 to 64.4% in developing countries (20).The overall neonatal mortality rate in our study was 17(10.9%) which is significantly lower than the rates reported from some developing countries, such as South Africa (13.8%), Nigeria (14.2%) Bangladesh (20.6%) and St. Paul's Hospital (23.2%) and higher than in Pakistan 6.2% and Nepal, 4.6 %(4,12,13,16).

There is a great variation in neonatal death statistics between NICUs from different parts of the world. This variation in mortality can be explained by several reasons such as severity of neonate's illness, the level of care in the studied NICU, skill of the staff, and doctor-patient ratio. The three major causes of death in the present study were prematurity, birth asphyxia and sepsis. These findings are consistent with previous studies in Ethiopia and other developing countries (12, 16). Mortality rates were even higher among the preterm and low birth weight neonates. Provisions of quality neonatal care, including quality resuscitation, thermal care, and appropriate feeding, are important to avert some of these factors (16).

LIMITATION OF THE STUDY As this is a retrospective cross-sectional study, cause–effect relation could not be analyzed and it could be also subjected to study design-related bias. Charts may not be complete for some of the cases. Blood cultures and chest X-ray were not done consistently for the diagnosis of sepsis and respiratory distress syndrome (RDS) respectively.

CONCLUSIONS AND RECOMMENDATIONS: The outputs of the research had identified the main reasons for NICU admission and the major cause of death in neonates (Prematurity, neonatal infection and birth asphyxia) and neonatal mortality was high in the first 24 hours of age. The research recommends further follow up audits to further improve the quality of care of the NICU through prioritizing, planning and allocating resources and better referral linkage between police health facilities in the country.

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ABBREVIATIONS

EONS : Early onset neonatal sepsis; FPH : Federal police hospital ; LONS : Late onset neonatal sepsis ; LBW: Low birth weightl; MMC: Meningiomyelocele . NMR: neonatal mortality rate; NICU : Neonatal intensive care unit; PNA: Perinatal asphyxia ; RDS: Respiratory distress syndrome ; TTN: Transient tachypnea of the newborn.

Competing interests

The authors declare that they have no competing interest

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ORIGINAL ARTICLE

A-5-YEAR ANALYSIS OF PEDIATRIC BRAIN TUMORS IN A TERTIARY CARE CENTER IN A SUB-SAHARAN AFRICAN COUNTRY

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ABSTRACT

Background: *Tumors of the central nervous system (CNS) are the second most common group of cancers in childhood, exceeded by the leukemias. It is the most common pediatric solid tumor accounting for 20% of all childhood malignancies. The pattern and outcome of these tumors in children has not been studied in Ethiopia. This study aimed to assess the epidemiology and outcome of pediatric brain tumors in a tertiary care center in Addis Ababa, Ethiopia.*

Methods: *A retrospective review of medical records of children less than 15 years of age diagnosed with primary brain tumor in Tikur Anbessa Specialized Hospital Department of pediatrics from January 1, 2014 to January 1, 2019 was done. Treatment outcome was assessed clinically based on resolution of symptoms and absence of neurologic disability*

Results: *There were 86 children with the diagnosis of brain tumor in the study period and 49/86 (57%) were males and the male to female ratio was 1.5:1. The age at presentation ranges from 2.4 -14 years (mean 7.1 years). Headache was the commonest presentation among 65/86 (75.5%) children while early morning vomiting accounted for 57/86 (66.2%). Ataxia and gait abnormality contributed to 42/86 (48.8%). Among the 41 children whose pathologic result was available, the commonest tumor was medulloblastoma 13/41 (31.7%), followed by astrocytoma 8/41 (19.5 %) and craniopharyngioma 5/41 (12.1%). Six months and 5 years survival was 40% (35/86) and 2.3% (2/86) respectively.*

Conclusion: *Medulloblastoma and astrocytoma were common brain tumors in children, we had the longest PSI and as a result, very low survival which calls for early diagnosis and treatment.*

Keywords: brain tumor, children, survival, Sub-saharan Africa

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INTRODUCTION

The brain tumor is the most common pediatric solid tumor accounting for 20% of all childhood malignancies, and affecting 35 per million children globally (1,2). Unlike leukemia, management of CNS tumors requires a good multidisciplinary team. Higher rate of treatment abandonment is documented in view of complexity of the treatment. Treatment is of long duration, involving neurosurgery, radiation, chemotherapy, and high cost of treatment (3-5).

CNS tumors are the leading cause of cancer related deaths in childhood and adolescents. Furthermore, they may cause short- and long-term consequences due to the disease itself or its treatment. The overall mortality among this group approaches 30% (6). The incidence of CNS tumors is highest in infants and children 5 years of age or younger (6,7). However, only scarce data is available about pediatric brain tumors in low/ mid income countries (LMIC) (3).

For all histologic types, pediatric and young adult populations have a better survival than do older adults. As an example, for all primary malignant brain tumors combined, the five-year survival rate among children under age 14 is 62 percent, compared to 5 percent in adults 65 years of age and older (8).

Only a few risk factors have been proven: predisposing genetic syndromes (such as neurofibromatosis, tuberous sclerosis), ionizing radiation (therapeutic or accidental exposure), parental age, birth defects, particularly for nervous system anomalies. Strong protective dose-response relations observed for maternal consumption of fruit, vegetables, vitamin C, nitrate, and folate (2,9,10)

The aim of this study is to identify the magnitude and outcome of children with brain tumor in a tertiary care center.

Patients and Methods

Study area

The study was conducted in Tikur Anbessa Specialized Hospital Department of Pediatrics and Child Health, Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia which is located at an altitude of 2355 meters above sea level, the hospital started giving service in 1952. It has many departments among which pediatrics and child health is the one that is launched in 1964. Pediatrics neurosurgical and the oncologic unit has been functional for the last 5 years. It is the only tertiary hospital in the country where ppediatric brain tumors are being treated with proper neurosurgical intervention, chemotherapy as well as radiotherapy. Patients are usually referred from different centers across the country.

Study design

A retrospective review of medical records of children below 15 years of age with the diagnosis of primary brain tumor from January 1, 2014 to January 1, 2019 was done.

Data were collected regarding age, sex, location of the tumor, clinical features, imaging modality, histologic features, treatment modality, and outcome of treatment was

analyzed. Treatment outcome was assessed clinically based on the resolution of symptoms and absence of neurologic disability. We adopted the WHO (world health organization) classification of brain tumors (9). Data were analyzed using SPSS version 21 and the findings were analyzed and compared with available literature.

Ethical clearance

This study was cleared ethically by the Department of Pediatrics and Child Health Research and Publication Committee.

Definition of terms

Primary brain tumors are defined as tumors of the brain parenchyma, cranial nerves, meninges, and the pituitary gland and immediate surrounding structures.

Operational definitions

- Infratentorial: below the tentorium cerebelli: including fourth ventricle, brain stem, cerebellum and spinal cord (NB. Spinal cord tumors are not included in the study).
- Supra-tentorial : above the tentorium cerebelli: including, 3rd ventricle, lateral ventricle and cerebral hemispheres.
- Diffuse: tumors having disseminated feature involving both supratentorial and infratentorial regions;
- Survival: was defined according to D.H Fiser (10).
- Disability was defined accordD.H.Fiser's recommendation of 'assessing the outcome of pediatric intensive care (10). According to the D.H.Fiser pediatrics cerebral performance category scale in children less than 16 years of age: scale 1 is normal at age-appropriate level of functioning, stage 2 is mild disability (may have minor developmental delay and mild neurologic deficit), scale 3 is moderate disability (child will have below aage-appropriate functioning, could attend special education because of cognitive difficulties), scale 4 is severe disability (child is conscious but unable to attend school and the child will be dependent on others), in scale 5 the child will be in coma at various degrees with no evidence of cortical function.

Results

Among the study participants 52/86 (60.5%) were males with male to female ratio of 1.5:1. Mean age at presentation was 7.1 years (ranging from 2 months to 14 years). The majority of the cases 43/86 (50%) were between 5-9 years and 6/86 (6.9%) below one year. Family income was less than 1000 birr (equivalent to $23.14) per month in 26/86 (30.2%) and 30/86 (34.9%) were from Oromia region (central and eastern part of Ethiopia). Demographic characteristics of these children is shown in table 1.

Table 1: Demographic characteristics of children with primary brain tumor attending a tertiary care center, Addis Ababa, Ethiopia.

Variable	Number	Percent (%)
Age (years)		
< 1	6	6.9
1-4	15	17.4
5-9	43	50
10-14	22	25.5
Gender		
Male	52	60.4
Female	34	39.6
Family income (Birr/month)		
< 1000	26	30.2
1000-4999	31	36.0
5000-10,000	6	6.9
>10,0009	7	8.1
Unknown	16	18.6
Address (region)		
Oromia	30	34.9
Amhara	19	22.4
Addis Ababa	20	23.3
Others	17	19.8

Headache was the commonest presenting symptoms in 65/86 (75.5%) of all children who could express themselves. While early morning vomiting accounted for 57/86 (66.2%) of the patients. Ataxia and gait abnormality was present in 42/86 (48.8%) of children who could ambulate. Clinical presentation of children is shown in table 2.

Table 2: presenting symptoms of patients with primary brain tumor who were on follow up in a tertiary care center , Addis Ababa, Ethiopia.

Presenting symptoms	Frequency	Percent
Headache	65	75.5
Early morning vomiting	57	66.2
Weight loss	52	60.0
Ataxia and gait abnormality	42	48.8
Impaired vision	42	48.8
Motor deficit	39	45.3
Seizure	36	41.8
Increased head size	30	34.8
Change in behavior	28	32.5
Growth impairment	26	30.8
Cognitive impairment	22	25.5
Incontinence	16	19.2
Facial nerve palsy	13	15.1
Aphasia	12	13.9
Neck stiffness	10	12.3
Squinting	8	9.3
Cushing triad	1	1.1

Increased head size and seizure is highest in children less than 5 years of age 15/21 (71.4%) and 13/21 (61.9%) respectively then decreasing with increasing age. Motor weakness was high in age groups > 5 years.

The median pre-diagnostic symptomatic interval (PSI) was 90 days (range 1-2555 days) with parental delay of 60 days (range 2-730 days). The Health professional's delay was 49.5 days (range 1-1975 days). The median duration before intervention after reaching the treatment center was 19.5 days (range 1-150 days).

Out of the 71 children for whom the reasons for delay was known, the majority, 28/71 (39.4%) were delay in diagnosis and intervention (physician related), 20/71 (28.2%) were because of financial constraint and another 20/71 (28.2%) were because of religious reasons or traditional medicine.

Most of the children 50/86 (58.1%) had CT and the remaining had MRI but few had both. MRI result was taken as final imaging diagnosis when patients had both investigations. The most likely imaging diagnosis in all ages was astrocytoma 27/86 (31.4%) followed by medulloblastoma 23/86 (26.7%), . Ependymoma and craniopharyngioma each accounting for (12.7%) of the diagnosis. Table 3 shows the imaging diagnosis of brain tumors.

Table 3: imaging based diagnosis of brain tumors in children who were on follow-up in a tertiary care center in Addis Ababa, Ethiopia

Type of tumor	Number	Percent
Astrocytoma	27	31.4
Medulloblastoma	23	26.7
Craniopharyngioma	11	12.8
Ependymoma	11	12.8
Tuberculoma	4	4.7
Germ cell tumor	1	1.2
PNET*	4	4.7
Choroid plexus Carcinoma	2	2.3
Papilloma	3	3.5
Total	86	100

*PNET:primitive neuro-ectodermal tumor

Medulloblastoma was the imaging diagnosis in 6/21 (28.5%) children <5 years of age, but astrocytoma was the commonest in 34/65 (52.4%) of children 5 years and above.

Most of the tumors were shown to be su-pratentorial in all age groups 50/86 (58.1%)

Among the 41/86 (47.7%) children for whom biopsy was taken, the commonest tumor was found to be medulloblastoma 13/41(31.7%), followed by astrocytoma 8/41 (19.5%) and craniopharyngioma 5/41 (12.1%). Table 4 shows the histologic diagnosis of brain tumors.

Table 4: age based histologic diagnosis of brain tumors in children who were on follow up in care center, Addis Ababa, Ethiopia

Type of tumor	0-<1 year	1-4 years	5-9 years	10-14 years	Total
	N (%)	n (%)	n (%)	n (%)	
Medulloblastoma	0	2/8(25)	7/19(36.8)	4/14(28.6)	13
Astrocytoma	0	1/8(12.5)	6/19(31.6)	2/14(14.2)	9
Craniopharyngioma	0	1/8(12.5)	2/19(10.5)	2/14(14.3)	5
Ependymoma	0	1/8(12.5)	2/19(10.5)	0	3
Tuberculoma	0	0	0	2/14(14.3)	2
Papilloma	2/8(25)	0	0	0	2
Oligodendroglioma		0	1/19(5.3)	1/14(7.1)	2
Gliosarcoma		0	1/19(5.3)	0	1
Meningioma		1/8 (12.5)	0	0	1
Neuroepithelial tumor		0	0	1//14(7.1)	1
Dysmoplastic NE*		0	0	1/14/14(7.1)	1
Pituitary macroadenoma		0	0	1/14(71)	1
Total	2	6	19	14	41

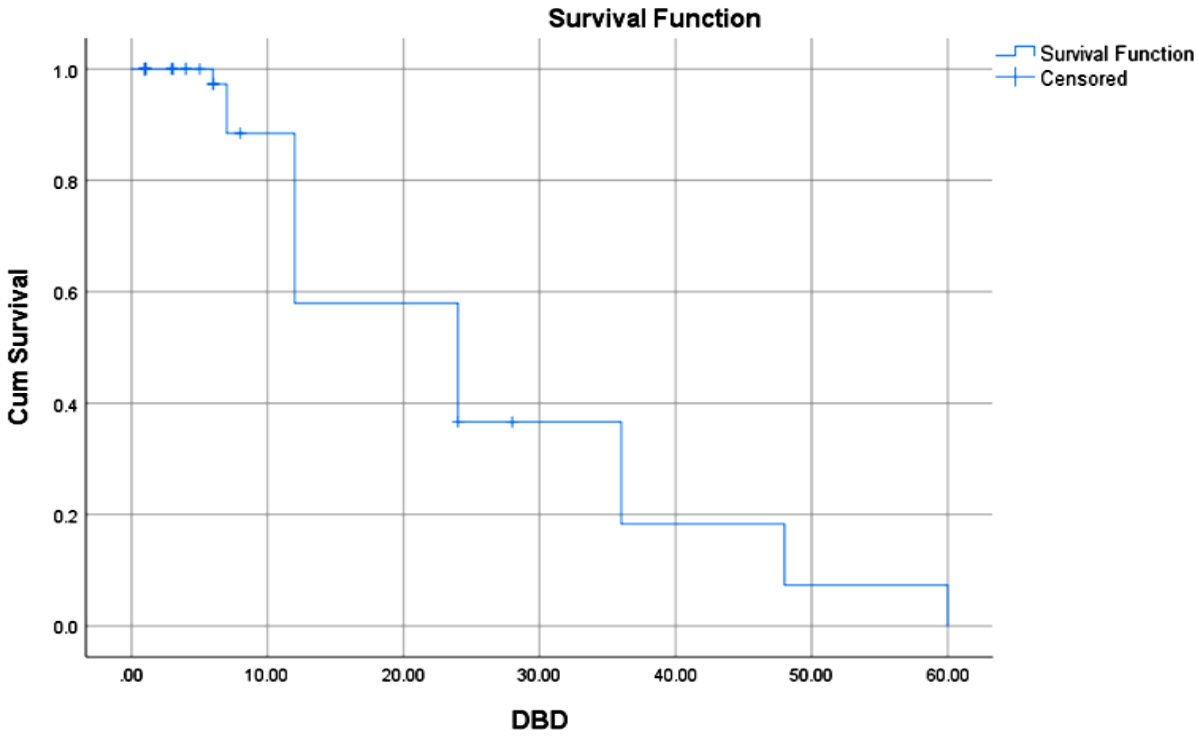
*NE: neuroepithelioma;

The WHO grading of the tumors was done for 26 of the histopathologic types of tumor, most 14/26 (53.8%) were grade I, followed by grade IV 9/26 (34.6%).

Among the most common three histologic types the highest mortality was observed in craniopharyngioma, medulloblastoma and astrocytoma, (2/5, 5/13, 1/8 respectively). When risk stratification was done using the modified Chang's Staging for medulloblastoma 5/13 were high risk and 8/13 were low risk.

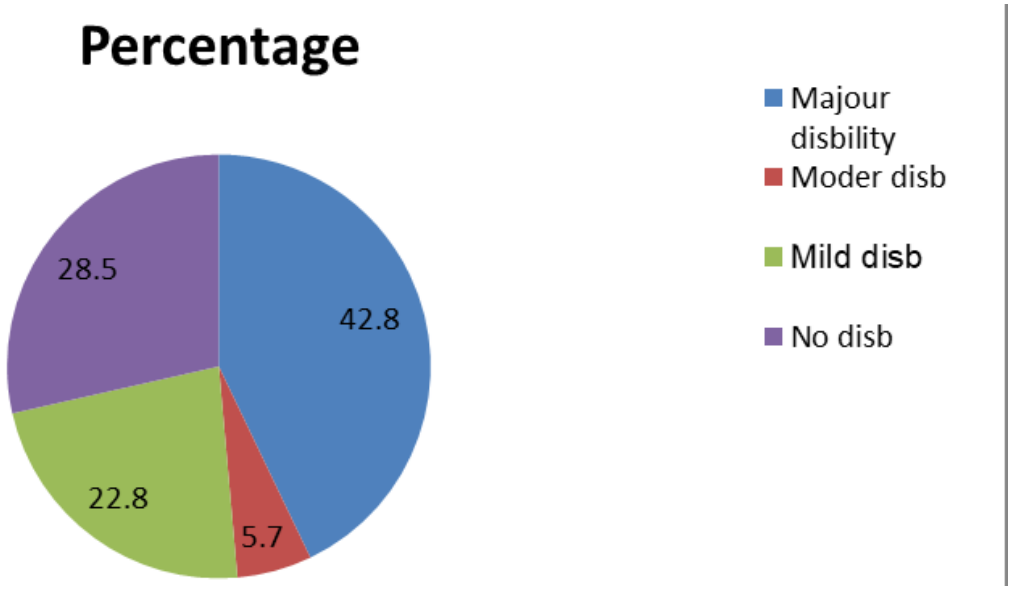
Different neurosurgical interventions was done in 64/86 (74.4%) of the patients. Surgery was the main stay of treatment. In 26/86 children, emergency external ventricular drainage (EVD) or endoscopic third ventriculostomy (ETV) was done to decrease intra cranial pressure. In 48/86 children, GTR or STR of the tumor with or without EVD or ETV was done. Out of 22/86 (25.6%) children for whom intervention was not done, 15/22 (68.2%) children died before intervention. Radiotherapy was given for 10/86 and chemotherapy was given for 27/86 children..

Overall, 6 months, 2 years and 5 years survival as 35/86 (40%), 20/86 (23.2%) and 2/86 (2.3%) respectively but 14/86 were lost to follow-up. The Kaplan -Meier survival curve is as shown in figure 1. Out of the survivors 10/35 sur,vived with no disability while 15/35 survived with major disability. Graph 2 shows the quality of life of survivors.



DBD- duration before death in months

Figure 1. Kaplan-Meier survival curve of children with brain tumor who were on follow up at a tertiary care center, Addis Ababa, Ethiopia



Graph 2: the quality of life of children with brain tumor who attended the follow-up clinic of a tertiary hospital, Addis Ababa, Ethiopia

Discussion

In our study the mean age at presentation was 7.1 ± 3.7 years and this is comparable with the Egyptian study which was 7.1 ± 4.2 years (3), but slightly lower than a Nigerian study which was 9.8 ± 1.5 years (15) and a Moroccan study which was 9.3 years but they included adolescents up to the age of 19 years (4), A study done in Tehran which included children less than 15 years showed a mean age of 6.1 ± 3.65 years was slightly lower but comparable with our study (16).

In our study males were predominantly affected with a male to female ratio of 1.5:1 and this was consistent with many studies. A South Indian study showed a male to female ratio of 1.9:1 (17). Another study which was conducted in morocco showed male to female ratio of 1.2:1 and a similar study in Tehran showed male to female ratio of 1.9:1 (16).

In our study headache, early morning vomiting, visual disturbance, ataxic gait and motor deficit were the most common complaints in that order. This finding is comparable with a Nigerian, Canadian and South Indian studies (13, 15, 17).

The PSI in our study with a median of 90 days and a range of 1-2555 days was significantly higher when compared with other studies. An Israeli study of 300 children average total PSI was 7.7 days (±16.7 days), Denmark study showed median PSI duration of 7 days (range 0-365 days), Japanese study showed median duration of 20.5 days. But the PSI of a Nigerian study mean duration of PSI was 13.4 months which was worse than ours (8-12, 15). Among the causes of delay in our children were parental (religious issues and financial constraints), and delay in diagnosis and intervention. This is similar with the Nigerian study (15).

The imaging diagnosis for the overall children in our study, was medulloblastoma, astrocytoma, ependymoma and craniopharyngioma in that order. This was consistent with pathology result. This result was comparable with the north Indian and Moroccan studies (4, 20, 21).

The age based histologic diagnosis in our study showed medulloblastoma, papilloma, craniopharyngioma, astrocytoma and ependymoma were the commonest in this order in under 5 years of age. This was consistent with a Moroccan study (4).

The histologic diagnosis of the commonest brain tumor for age 5-9 years was medulloblastoma followed by astrocytoma, craniopharyngioma and ependymoma in this order. But, comparatively the imaging diagnosis in this age group rather shows astrocytoma followed by medulloblastoma and Craniopharyngioma. The difference in the two results could be most of the children with the imaging diagnosis of astrocytoma were not operated and histologic diagnosis was not possible. The histologic result shows still medulloblastoma to be the commonest tumor in this age group among children with histologic results. The Egyptian and Moroccan studies showed astrocytoma to be common in this age group (3, 4).

The histologic diagnosis for those ≥10 years

of age showed still medulloblastoma to be the commonest followed by PNET but the imaging diagnosis was astrocytoma followed by medulloblastoma. This variation could be due to lack of surgical intervention for primary imaging diagnosis of astrocytoma tumors in our study.

The fact that most of the tumors were located in the supratentorial region followed by posterior fossa was comparable with the Indian study that showed the majority of the tumors were supratentorial followed by posterior fossa (17).

The main modality of treatment in our children was surgery followed by chemotherapy and radiotherapy. The proportion of children who received radiotherapy was significantly lower when compared with South Indian study (17). Many factors were attributed to this low percentage in our set up; one of which was long waiting list for radiotherapy. Chemotherapy was given mainly for Medulloblastoma, 6/86 (7%). The proportion who got chemotherapy was also lower compared with the same South Indian study, where 50% of their children received chemotherapy (17).

Survival was 40.6% (35/86), death accounted for 41.8% (36/86) while 15/86 (17.4%) were lost from follow up. Among the survivors 19/86 (21.6%) had major disabilities but 10/35 (28.5%) survived without disability. This clinical outcome is very low compared with various studies including developing countries. In South India the death rate was 15.3% (17). The death rate in our study was comparable with Tehran (16) where 41.4% died, yet the five-year survival in that study was 36% which was significantly higher when compared with ours, where 5 years overall survival was 2.3%. This could be because of long PSI and delay in intervention.

The majory of our patients are from Oromia and Amhara regions this might be because of geographical proximity to the treatment center and also these are the largest tribes in the country.

Conclusion: medulloblastoma and astrocytoma were common brain tumors in children, we had the longest PSI and as a result very low survival that calls for early diagnosis and treatment

Limitations: Some of the medical records had incomplete information.

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Contributions of authors

CA inception of idea, data collection, DS: data analysis and writeup, DA: review of the manuscript

Declarations

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ORIGINAL ARTICLE

PATTERN OF SKIN DISEASES IN CHILDREN ATTENDING THE DERMATOLOGY CLINIC IN ALERT REFERRAL HOSPITAL, ADDIS ABABA, ETHIOPIA: A RETROSPECTIVE STUDY

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ABSTRACT

Background: *A Skin disease, which is estimated to affect between 21 and 87% of children, are the reason for up to a third of outpatient visits to pediatricians and dermatologists. It can possibly result in considerable anxiety, parental worry, and embarrassment to the child and lead to loss of confidence, disruption of social relations, and feeling of stigmatization. This study aimed to assess the pattern of skin diseases in children attending at ALERT referral hospital.*

Methods: *The study setting is ALERT referral hospital, Addis Ababa, Ethiopia. A hospital-based, retrospective, cross-sectional descriptive study was carried out between July and August 2020. All children younger than 12 years, who were diagnosed for skin diseases from May 2018 to May 2020, were included. Four hundred twenty-three children were sampled using a random sampling method. SPSS Version 20 software was used for data analysis.*

Results: *The results showed that 385(91%) of patients had one skin disease and the remaining 38(9%) had two or more skin diseases. Fungal infections were present in30.1% of the cases followed by eczema, which accounted for 27.4%. Among fungal infections, Tinea Capitis (106/116), 91.4% followed by Tinea Corporis and Tinea Pedis were the most common in ALERT dermatology clinic. Among eczema cases, family atopic dermatitis (82/106), 77% was the most common. The result showed seasonal variation in some diseases.*

Conclusion: *Skin fungal infections were the most common followed by eczema, pigmentary disorder, infestation, viral infection, urticaria, bacterial infection, and others. There was some seasonal variation in some diseases.*

Keywords: Pediatrics, Skin diseases, Hospital-based, Retrospective Cross-sectional descriptive study

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INTRODUCTION

Skin provides important functions, including protection from external insults and micro organisms, temperature modulation, and synthesis of vitamin D (1,2). Skin diseases refer to disorders of predominantly the superficial layers of the skin dermis and epidermis. Skin diseases including allergic inflammatory, eczema, bacterial infections, fungal infections, infestations, and viral infections were the repeatedly observed dermatology findings in different studies done in the pediatric age (3–7).

Around the world, skin diseases have invigorated a ton of interest over the years because they are common and possibly preventable and controllable (1,2). In developing countries, skin diseases represent the greatest public health care problem and are a major cause of morbidity(8). In Africa, skin diseases are seen in 21 to 87% of children and are the justification for up to 33% of visits to pediatricians and dermatologists (3).Another study revealed that the overall point prevalence of any skin disease was found to be 58.3% (9).

The increasing frequency of pediatric skin diseases represents a substantial part of morbidity in children. However, only a few data extracted from few studies are currently available about the epidemiology of pediatric skin diseases with an example of allergic and inflammatory skin disease (45.73%) followed by infection (20.1%) (3). The pattern of skin diseases varies from one country to another and even from one district to another inside the same country because of natural variables, hygienic standards, social traditions, and hereditary (10,11).

Generally, the information available on the prevalence and incidence of common skin diseases is scarce. In developed countries, eczematous skin diseases are the most common among children (3), whereas in most developing countries infections and infestations are predominant (12,13). For example, study in Nigeria, Bangladesh, India, Brazil, Tanzania, and Egypt showed various patterns of skin diseases even though infectious causes are the most common among school children (10–12,14,15).

In Ethiopia, there is extremely limited data on the profile of skin diseases in children. In a cross-sectional, hospital based study in Ethiopia, the most common skin diagnoses in youngsters under five were infestations like scabies and pediculosis, pyoderma, fungal infections, and eczema (16). One more study in a large metropolitan clinic in northern Ethiopia showed eczema as the most common diagnosis but it included grown-up patients (17). A community survey in south-west Ethiopia had a restricted scope yet found parasitic infestations as most common(18). Another study on pattern of skin diseases at a tertiary referral hospital in Addis Ababa showed allergic skin diseases were most frequent followed by infections and photo dermatitis, however this examination was done from 1995 to 1997 (19). A recent study conducted in Wolaita Sodo on patterns of skin disease showed that eczema (23.9%), bacterial infections (21.3%),

fungal infections (18.8%), infestations (9.9%), and pigmentary disorders (7.4%). Regarding individual diagnoses, impetigo was the most frequently presenting skin disease (13.8%) followed by tinea capitis (12.7%), atopic dermatitis (11.3%), and scabies (9.6%). One case of podocinids and one of the folliculitis decalvans were also identified and merged as "other" in the category of miscellaneous diseases and 65% of skin diseases were from urban areas(20).

There were limited recent data regarding patterns of skin diseases among children inthe study area. So, our study aimed to assess the pattern of skin diseases in children attending at ALERT referral hospital, Addis Ababa, Ethiopia. Specific objectives included describing the socio demographic characteristics of common skin diseases, evaluating family history, and examining seasonal variations in skin diseases. The finding of this study will guide public health planners and implementers in planning and designing appropriate intervention strategies.

MATERIALSAND METHODS

Study Area: The study setting is ALERT Hospital which is one of the specialized tertiary referral hospitals in Ethiopia. It is located in Addis Ababa. ALERT Hospital was established in 1934 to serve persons affected by leprosy. The hospital currently provides a wide range of services in various departments. These includes emergency, gynecology, general OPD, ART & TB, psychiatry and counseling, dermatology and others. Daily about 900 - 1200 patients are treated who come from all over the country. Pediatric dermatology clinic working five days per week and about 40 patents per day from this the new patient accounts for nearly 15 cases. Currently, there are 22 dermatovenereologists (Addis Ababa University and ALERT staffs) and 42 resident dermatovenereologists working in the dermatology clinic of the hospital.

Study Period: The study was conducted between July and August 2020. Hospital-based retrospective cross-sectional descriptive study design was employed.

Study Population: All children having skin disease age less than 12 years who were seen at dermatologic clinic from May 2018 to May 2020 were included.

Sample size and Sampling Procedures: The source of data was the hospital dermatology outpatient register. A uniform data abstraction sheet was prepared to collect the relevant data from the patient chart. Children whose charts are lost and incomplete were excluded from the study. Asingle population proportion formula was employed. The study took50 % prevalence to include more numbers of cases. The formula gives sample size of 384, considering 10% incompleteness the final sample size is 423 patients. A systematic random sampling method was applied to get those samples. Estimating a total of about 7800 cases to be found in the study period by taking approximately 15 patients per day for 5 days in a week, but due to some inconsistencies, only 5633 patients were included in the study.

All cases were arranged in order serially from the beginning of the study period to the end. K -value was calculated as 5633/423 =13. So, every 13th observation was included in the study.

Variables: The dependent variable for this study was the pattern of skin disease. The independent variables were socio-demographic factors, age, sex, residence, seasonal variation, associated factors (self-history atopy, itching in the family, family history of atopy, and family history of asthma).

Data Collection and Data Analysis: Structured data collection tools were adopted. Datawere collected by trained General Practitioner using chart review and registration logbook (HMIS).The variables collectedfrom patients chart by including age, sex, residency, date of diagnosis,diagnosisand other study variables.The data were coded and cleaned before analysis. Data were entered by EpiData (version 4.2.0.0) and analyzed using SPSS Version 20. Descriptive statistics were used to describe pattern of skin disease. Tables and graphs were used to present the results.

Ethical Consideration: Approval from Addis Ababa University, college of Health Science, Department of pediatrics, and child health research and publicationcommitteewas received beforecommencement to the study.

RESULTS

Socio-Demographic Characteristics of Child

There were 423 pediatric patients card assessed retrospectively about the pattern of skin disease diagnosed at the dermatology outpatient department. Their socio-demographic characteristics are shown below in Table 1. There were slightly more males than females and most patients came from the urban area of Addis Ababa. One hundred twenty three (29.1%) pediatric patients were aged less than one year with an equal percentage of age distribution 111 (26.2%) in preschool (2-5 years) and school age (6-10 years)

Table 1: Demographic characteristic of pediatric patients attending dermatology department at ALERT Hospital, Addis Ababa, Ethiopia

Variables	Category	Frequency	Percent
Age of children in year	Infant (<=1years)	123	29.1
	Toddler (1-2 years)	62	14.7
	Preschool (2-5 years)	111	26.2
	School Age (6-10 years)	111	26.2
	Adolescent (> 10years)	16	3.8
Sex	Male	222	52.5
	Female	201	47.5
Residency	Urban	335	79.2
	Rural	88	20.8

Number of Skin Diseases Diagnosed By Physician

The result showed that most of the 385 patients (91%) had diagnosesof one skin disease while the rest 38 (9%) had two or more skin diseases at the same time.

Categories of skin diseases frequency and proportion

Of those patients with one skin condition 385 (91%), fungal infections were116 (30.1%) followed by eczema 27.4% as shown in Table 2 below. The least frequencies were papulosquamous and miscellaneous disorder each accountingtwo (0.5%) and three (0.8%) values respectively.

Table 2: Frequencies and proportion of skin diseases among pediatric patients attending dermatology department at ALERT Hospital, Addis Ababa, Ethiopia

Single skin disease diagnosis (n= 385)		
Category of skin disease	Frequency	Percent
Fungal infection	116	30.1
Candidiasis	1	0.3
Onychomycosis	2	0.5
Tinea Corporis	3	0.8
Tinea Capitis	106	27.5
Tinea Faciei	1	0.3
Tinea Pedis	3	0.8
Eczema	106	27.5
Atopic dermatitis	82	21.3
Eczema	2	0.5
Infantile Seborrehic Dermatitis	22	5.7
Pigmentary disorder	45	11.7
Pytriasis Alba	24	6.2
Vitiligo	21	5.7
Infestation	42	10.9
Scabies	41	10.6
Myiasis	1	0.3
Viral infection	26	6.8
Molluscumcontagiosum	20	5.2
Wart	6	1.6
Urticarial	21	5.5
Pupular Urticaria	21	5.5
Bacterial infection	16	4.2
Pyoderma	16	4.2
Pilosebaceous disease	5	1.3
Acne	5	1.3
Protozoal infestation	4	1
Cutaneous Leishmaniasis	2	0.6
Mucocutanious Leishmaniasis	1	0.3
Miscellaneous disorder	3	0.8
Keloid	3	0.8
Papulosquamous	2	0.5
Psoriasis	2	0.5

Multiple skin conditions in same patients

Multiple skin diseaseswere diagnosed in 38 (9%) patients. From those with multiple skin diseases, six (15.8%) developed more than one fungal infection 4 (10.5%), and pigmentary disorder as shown in Table 3 below.

Table 3: Children having more than one skin disease diagnosed at ALERT Hospital, Addis Ababa, Ethiopia

Experience of more than one skin disease diagnosis	Frequency	Percent
Bacterial infection and fungal infection	2	5.3
Bacterial infection and eczema	1	2.6
More than one fungal infection	6	15.8
More than one pigmentary disorder	2	5.
Urticaria and viral infection	1	2.6
Eczema and viral infections	2	5
Eczema and fungal infection	1	2.6
Eczema and infestation	4	10.5
Eczema and infestation and fungal	1	2.6
Eczema and pigmentary disorder	2	5.3
Fungal infection and infestation	4	10.5
Fungal infection and viral infection	3	7.9
Fungal infection and pigmentary disorder	4	10.5
Fungal and bacterial and infestation	1	2.6
Pigmentary disorder and infestation	2	5.3
Viral infection and pigmentary disorder	2	5.3
Total	38	100.0

Table 4: The pattern of single skin disease regarding child age diagnosed at ALERT hospital, Addis Ababa, Ethiopia

Pattern of Skin Disease	<1years	1-2 years	2-5 years	6-10 years	>10 years	Total
Bacterial Infection	5	4	4	3	0	16
Eczema	57	20	17	12	0	106
Fungal Infection	14	7	47	44	4	116
Infestation	18	9	5	8	1	41
Miscellaneous Disorder	1	0	1	0	1	3
Papulosquamous	0	0	1	0	1	2
Pigmentary Disorder	5	5	11	20	4	45
Pilosebaceous Disease	1	1	0	3	0	5
Protozoal Infestation	3	0	0	0	1	4
Urticaria	9	6	4	2	0	21
Viral Infection	5	3	7	10	1	26
Total	118	55	97	102	13	385

Family History of Skin Disease

From patients in this study,(22/423) 5.2% of them had family history of the same skin disease and (35/423) 8.04% had a history of itching and (30/423) 7.1% had a history of atopy as shown in Table 5 below

Table 5: Family history of Skin disease history characteristics

Family History	Skin Disease	Frequency	Percent
Having Family History of the Same Skin Disease (N=22)	Fungal infection	12	54.5
	Eczema	6	27.3
	Fungal infection & infestation	1	4.5
	Pigmentary disorder	1	4.5
	Urticaria& viral infection	1	4.5
	Viral infection	1	4.5
History of Itching in the Family (N=35)	Scabies	19	54.3
	Scabies & Atopic Dermatitis	4	11.4
	Atopic Dermatitis	4	11.4
	P. urticaria& MC	1	2.9
	Tinea capitis & scabies	4	11.4
	Impetigo & Atopic Dermatitis	1	2.9
	P. Alba	1	2.9
	Urticaria& viral infection	1	2.9
Family History of Atopy (N=30)	Atopic Dermatitis	22	73.3
	Atopic Dermatitis &Tinea capitis	1	3.3
	P. urticaria & mc	1	3.3
	Tinea capitis	4	13.3
	Tinea pedis	1	3.3
	Vitiligo	1	3.3
Family History of Asthma(N=20)	Atopic Dermatitis	12	60
	Candidiasis	1	5
	Impetigo	1	5
	P. alba	1	5
	Urticaria & MC	1	5
	Scabies	1	5
	SD	1	5
	Tinea capitates	1	5
	Wart	1	5
Child History of Atopy (N=5)	Atopic Dermatitis	5	100

Seasonal Variation of Skin Diseases

This study identified seasonal variation in the pattern of skin diseases. The seasons were related to Ethiopian seasons. According to the Ethiopian National Meteorological Services Agency (NMSA) Ethiopia has four seasons based on the average trends of the weather and rainfall: **Kiremt (meher)** - June, July and August are the summer season. Heavy rain falls in these three months, **Tseday (spring)** - September, October, and November are the season sometime known as the harvest season, **Bega (winter)** - December, January, and February are the dry season with frost in the morning especially in January, and **Belg (autumn)** - March, April, and May are the autumn season with occasional showers. May is the hottest month in Ethiopia. The study showed that fungal skin disease was more common in summer and less common in spring as shown in figure 1 below. The same works for other types of skin disease patterns.

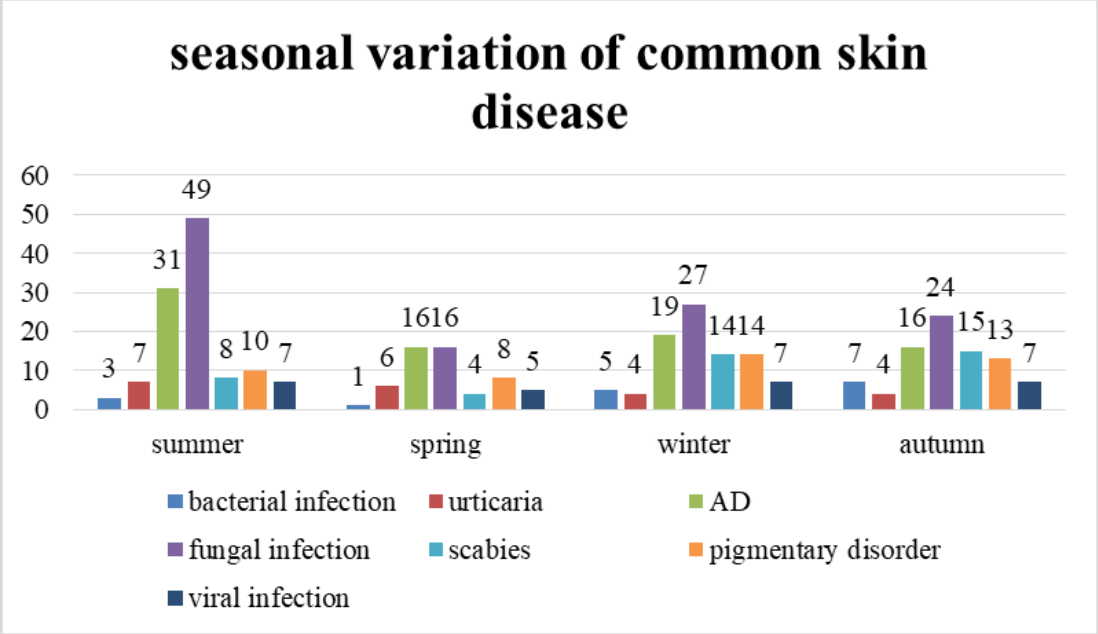

Figure 1: Seasonal variation of the most common skin diseases categories among pediatric patients attending dermatology department at ALERT Hospital in Addis Ababa, Ethiopia

DISCUSSION

One hundred twenty three123 (29.1%) patients were aged less than one year and with an equal percentage of age 111 (26.2%) from 1-2 years and 2-5 years. Mostpatients 385 (91%) were diagnosed to have one skin disease while 38(9%) had two or more skin diseases. This result conforms to most of the findings in other studies(3,4,23,5–7,9,19–22). From this study, fungal infection has a 30.1% proportion followed by Eczema that accounts for 27.4%. Of the fungal infection, which includes Tinea Capitis, Tinea Pedis, Tinea Corposis, Onychomycosis, Candidiasis, and Tinea Faciei, the most common were Tinea Capitis (106/116), 91.4% followed by Tinea Pedis.

Besides, that from the eczema family atopic dermatitis (82/106), 77% was the most common. This pattern is similar to studies conducted in Illubabore, Ethiopia, Tanzania, Egypt, Pokhara, Nigeria, and Northern India (5–7,9,21,22). However, there are other findings which showed different patterns of skin diseases such as those described in Mekelle, Addis Ababa, Dabat, Wolita Sodo, Switzerland, and Turkey (3,4,17,19,20,23,24). Atopic dermatitis was the most common from the allergy family in these studies. The differences may be due to differences in geographical location, sample size, duration of the study, study design, different patient age limits, and socioeconomic status. In particular, other studies were based on outpatient populations, which were different fromours that is a hospital-based study.

Concerning the relationship between skin disease and age group, forage group less than 1 year, 57 (48.3 %) eczema was the mostcommon skin disease followed by 18 (15.3%) infestation.For ages between 1-2 years, 20 (36.4%) eczema is common skin disease-followed by infestation, fungal infection and urticaria. For ages between 2-5 years, 47 (48.4%) fungal infections were recorded followed by 17 (17.5%) eczema, pigmentary disorder, viral infection and infestation with least value of Pilosebaceous Disease and Protozoal Infestation. For ages between 6-10 years, 44 (43.1%) fungal infections were recorded followed by 20 (19.6%) pigmentary disorder with least value of papulo-squamous, protozoal infestation, and miscellaneous disorder besides the same skin disease pattern as shown in the table above for age greater than ten. This result was the same to study conducted in Fulbari, Egypt, India, Tanzania and other places, since they got infection was the case where patients mostly exposed (5–7,9,21,22). But different from other studies since they reported that contact dermatitis and scabies were the most common skin disease in that area (3,4,19,20,23).

Based on gender, it was found that skin disease type in male 27 (66%) infestation and 61 (58%) eczema were the most common. However, for female gender 18 (69%) viral infection is common. More or less this result conforms to the study finding in Aargau, Switzerland on the epidemiology of dermatology that showed Pigmented nevi and eczema were more common in males (3).

Based on the geographical location, 335 (79.2%) were from urban and 88(20.8%) from rural areaswhich is consistent with a study done in another part of Ethiopia (18). This undoubtedly reflects easier access to health care. It was found that skin disease type in urban areas 95 (32%) fungal infection and 82 (28%) eczema were the most common but bacterial infection was rare. However, in rural areas, 24 (33%) eczema and 21 (29%) fungal infection skin disease type are common but urticaria, viral infection, and bacterial infection were rare. This study deviate from report results in Northern Ethiopia which found eczema to be the most common diagnosis however the study included adult patients (17).

The findings of skin types based on age groups are as expected in the literature. Infections such as protozoal infections, fungal infections are more common in older children who start to go outside the home. Eczema and urtical are expected to be common among infants similar to our findings, even though we cannot make conclusions as the numbers are small.

This study showed that fungal infection had higher value in summer and winter but the low value in spring. With changes in seasons, there can be variation in temperature, humidity, ultraviolet rays, wind, atmospheric pollen allergens, and humidity that can have an impact on epidermal barrier function (19).

Of allpatients in this study (22/423), 5.2% of them had the same skin disease of family history which accounts for 12 (54.5%) of them had fungal infection followed by six (27.3%) eczema. Of patients (35/423), 8.04 %) had a history of itching in their family with the most common disease 19 (54.3%) scabies. (30/423, 7.1%) had a history of atopy in their family and 22 (73.3%) of them had AD. Of patients, having family history of asthma, 12 (60%) had also AD as the most common disease in their family. The child history of atopy also shows that AD was the most common skin disease pattern. No comparison was made due to the unavailability of studies found on the relationship between family history and skin disease diagnosis.

This study showed that a higher number of fungal infections (Tinea Capitis), skin allergy (atopic dermatitis), infestation (scabies), viral infection (molluscumcontagiosum and wart), and bacterial infections (impetigo and pyoderma). This is consistent with studies done in other parts of Ethiopia and Tanzania (9,20) which suggest that a hot and humid climate increases susceptibility to infectious skin diseases. Other causes may be poor sanitation and the low socio-economic status of the patients. The magnitude of scabies was 10.6% in this study which was similar to another study conducted in southern Ethiopia, Dabat, and Pokhara(7,20,23), but deviate from a study conducted in Nigeria which showed a 1.2% rate (21). Poor hygiene in winters along with poor sanitation is causes of the increased prevalence of scabies in developing countries.

LIMITATION

Finally, since it was descriptive and retrospective study we didn't included associate factors in details. So, it has been recommended to study by including such factors in detail. Additionally, being retrospective in nature we were unable to collect socio-economic aspects of the patients, which are important factors to understanding skin diseases. Therefore, the researchers again recommend for further study on those socio economic factors.

CONCLUSIONS

One skin disease patients were more than two or more skin diseases. In this retrospective study in the ALERT hospital, the most common pediatric skin diseases were fungal infections, eczema, pigmentary disorders, infestation, and bacterial infection. From this study,

skin fungal infection was the most common followed by eczema, pigmentary disorder, infestation, viral infection, urticaria, and bacterial infection. There was some seasonal variation in some diseases. There was seasonal variation in some diseases. The pattern of pediatric skin disorders represents the distribution of skin diseases in children diagnosed at the hospital.

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ORIGINAL ARTICLE

ANEONATAL TETANUS: CASE SERIES FROM DILLA UNIVERISTY REFERAL HOSPITAL, ETHIOPIA

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ABSTRACT

Background: *Neonatal tetanus is a deadly infection leading to 7-8% of neonatal mortality in developing countries. WHO defines Neonatal tetanus as an illness in a child who has the normal ability to suck in the first 2 days of life, presented with failure to suck between 3rd and 28th days of life and has rigidity and spasms? Though Ethiopia declared maternal and neonatal tetanus elimination in 2017, there has been significant number of neonates presenting with this problem in Neonatal ICU's*

Methods: *This review characterized clinical profile, demography and outcome of seven neonatal tetanus cases admitted at Dilla University hospital, neonatal ICU from September 11, 2018 to September11, 2020.*

Results: *All mothers gave birth at home with unskilled birth attendant, local blade or knife was used to cut the cord. Median age for mothers was 26 years and two out of seven had antenatal care (ANC) follow up and took Two doses of tetanus toxoid (TT) vaccine. Fever, failure to suck, spasm and convulsions were the common presenting symptoms. The overall mortality was 70%.*

Conclusion: *Continuous emphasis on antenatal tetanus immunization and safe delivery practices should be maintained. Clinicians caring for neonates should be aware of the presentations of neonatal tetanus to allow them to diagnose these patients early and initiate appropriate lifesaving management.*

Keywords: Neonatal tetanus, case series, resource limited setting

Background

Four different forms of tetanus are described; local, cephalic, generalized and neonatal. Neonatal tetanus is a form of generalized tetanus caused by a toxin producing bacteria Clostridium tetani, which is gram-positive spore-forming

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anaerobe(1). An infant who has not acquired passive immunity because the mother has never been vaccinated is at risk.

Neonatal Tetanus is most often occurs through cutting of the umbilical cord using non-sterile techniques or applying non-sterile traditional remedies to the umbilical cord stump, but infection of the umbilical stump is not always evident.

A confirmed case of neonatal tetanus is defined by World Health Organization (WHO) as a child with a history of all three of the following: [a] Normal feeding and crying during the first 2 days of life; [b] onset of illness between age 3 and 28 days; and [c] inability to suckle (trismus), followed by stiffness and/or spasms(2).

There are different types of disease severity scoring systems which predicts outcome; the Phillip score, Dakar score and Ablett classification(3). Presence of respiratory distress, tachycardia, late presentation to health facility from time of onset, severe trismus and prolonged spasms are found to be indicators of severe disease or poor prognostic signs (4,5). An ideal score will differentiate those at risk of poor outcome soon after admission. Dakar score is easy to apply but Ablett classification has high predictive value.

Mass Neonatal Tetanus elimination initiative set the initiative of achieving ≥80% coverage with ≥2 doses of tetanus toxoid containing vaccine (TTCV) among reproductive women, achieving skilled birth attendance of ≥70% and enhancing surveillance for neonatal tetanus (NT) cases. Even in 2018, only 47% of the 59 high priority countries achieved >70% skilled birth attendant (SBA) (6).

Ethiopia becomes one of the 42 countries who eliminated neonatal and maternal tetanus. Elimination is achieved when <1 case occurs in 1000 live births in every district across the country. In 2018 the country reported only 14 cases and has achieved 84% coverage of 2 doses of tetanus vaccine for reproductive age women. However Ethiopia's coverage of SBA is 16%, the lowest from the 59 high neonatal and maternal tetanus burden countries (6).

The case-fatality rate of NT without treatment approaches 100%, though with intensive care this can be decreased to 10–20% (7). In 2018, neonatal tetanus accounted for 1% of major causes of neonatal deaths, a significant decrease compared with a 7% contribution to all-cause neonatal mortality in 2000 (8).

Admission to a dark and quiet room, muscle spasm and rigidity control, autonomic dysfunction control, ventilator support when needed, neutralization of tetanus toxin, wound management, and antibiotics are some of the principles of tetanus management(9).

In a study done in Ethiopia, the case fatality rate was 29.2%.The majority of patients in this study had mild to moderate tetanus, and the result was bad in higher grades(10). Though Ethiopia declared maternal and neonatal tetanus elimination in 2017, there has been significant number of neonates presenting with this problem in Neonatal intensive care units

(ICU's) .According to global health observatory data, the number of cases in 2018 was 14 but in 2019 it peak to 107 and 45 in 2020 (11).Most of the NT cases and the majority of deaths occur in remote parts of the country and studies are not done to show the magnitude and clinical profile of neonatal tetanus cases in Ethiopia. Hence this paper helps to characterize the cases found from this part of the country.

Methods

Study setting

The study was conducted at Dilla university Hospital. It serves as a referral center for the people in Gedeo, Sidama, Guji and Borena zones, with estimated population of 1.5million (12). The Hospital has many departments and units. The pediatrics department is one of the departments composed of emergency unit, inpatient wards and neonatal ICU. The neonatal ICU has 30 beds with average of 120 patients being admitted per month.

Data collection

According to WHO a neonate is said to have confirmed neonatal tetanus if the neonate present with normal ability to suck and cry during the first two days of life; AND — could not suck normally between 3 and 28 days of age; AND — developed muscle stiffness and/or spasms(13). Neonates with admission diagnosis of neonatal tetanus from September 11 2018 till August 11, 2020 were included in the study. Medical records were retrieved from record office and data on demography, clinical presentation, course, treatment and outcome were.

The case series received approval of the Institutional Human Research Ethics Committee of Dilla College of medicine and health science institutional review board (IRB).

Results

Patients were managed based on Ethiopian NICU training manual(14).All neonates where managed by isolating to dark room. They were given tetanus antitoxin 750 IU intramuscular (IM) and intravenous (IV), stat. Ampicillin and gentamycin was initially started and continued for 14 days as meningitis was difficult to rule out because of patients critical condition. Metronidazole IV was also given for 7 days (Metronidazole is a safe alternative to penicillin, and may now be considered as the first line therapy)(15). Diazepam 0.2mg/kg Q4 hours was started initially then escalated up to Q1 hour and for some even continuous diazepam was given. Chlorpromazine (CPZ) 0.5mg/kg/dose po bid was also added when spasms persisted. Phenobarbital of 10mg/kg po loading then 5mg/kg maintenance was given for case 1 and case 6. Immunoglobulin and facilities for mechanical ventilation were unavailable during the period of the study.

There were seven (n=7) cases of neonatal tetanus admitted over the study period, five of them females and 2 males (Table 1)

Most of the neonates had failure to suck, fever and spasms at initial presentation. Case 7 presented with abdominal distension and vomiting after parents gave traditional medicine when the child fails to feed breast.

The median age at admission and symptom onset were 4.7 days and 3.7 days. Five of the seven neonates died most of them in the first 2 days of admission.

Table 1: Neonatal tetanus: case series in resource limited setting; the new-born's medical profile

Characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Gender	Female	Female	Female	Male	Female	Female	Male
Age at admission (days)	5	3	4	5	6	5	5
Age at onset of symptoms(days)	3	2	4	4	5	4	4
Dakar score	3	5	5	5	2	2	4
Duration of hospital stay(days)	2	13	29	11	2	2	3
outcome	Death	Discharged improved	Discharged improved	Death	Death	Death	Death

All the mothers were illiterate, median age 26 years and were from the poor socioeconomic background (Table 2). Three out of seven mothers had ANC follow-up, however only 2 of them took 2 doses of TT vaccine. All of them delivered at home (no reason given in the document). Cord was cut by using blade for almost all cases except one were the cord was cut by knife.

Table 2: Maternal characteristics of a case serous of neonatal tetanus in resource limited settings, 2021

Characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Maternal age	20	26	28	25	30	30	25
Residence	Urban	Rural	rural	Rural	Rural	Rural	Rural
Gravidity	1	3	6	2	5	5	2
ANC follow-up	No	Yes	No	No	Yes	Yes	No
TT vaccine 2X	No	Yes	No	No	Yes	No	No
Mode of delivery	SVD	SVD	SVD	SVD	SVD	SVD	SVD
Place of delivery	Home	Home	Home	Home	Home	Home	Home
Material used for cutting UC	Local blade	un-known	Knife	Local blade	Local blade	Local blade	Local blade

Discussion

Seven neonatal tetanus cases seen in this cases series were all delivered at home with no SBA. Most mothers didn't take TT vaccine at current or previous pregnancy. Neonates began to develop symptoms early in life and overall outcome of the admissions were poor.

Due to the poor socioeconomic status, maternal illiteracy, and low community awareness, the mothers in this study failed to take complete antenatal care, and/or the tetanus toxoid injections. Non sterile material use (nonsurgical blade, or sometimes knifes) were common in low socioeconomic areas. Mothers with a primary or higher level of education, media exposure and having an ANC visit, had significantly higher odds of having a protected birth against NT(16).

In addition incentive programs for institutional delivery, providing safe delivery kit have paved the way for maternal and neonatal tetanus elimination in India(17)

Mothers of Case 2, case 5 and case 6 had regular antenatal care and two of them (case 2 and case 5) had taken two doses of tetanus toxoid but still their baby developed tetanus. Similar study done in Kenya and Nigeria reported cases of neonatal tetanus that had detectable levels of anti-tetanus antibodies and their mothers were immunized(18,19). The probable causes of these cases include errors in the dosing interval, poor maternal immune response, maternal HIV, vitamin A deficiency and maternal malaria infection. Data on these factors were unfortunately not available in this study but these should be considered in ongoing efforts to eliminate neonatal tetanus.

All the cases did not have any significant clinical event until after few days of life (median of 3.7 days and mode of 4). Most of our neonates had persistent spasms, fever and respiratory distress. Shorter incubation periods (<7d) are usually associated with protracted and more severe neonatal tetanus(3). Also according to Ablett classification occurrence of severe trismus, generalized rigidity, prolonged spasms, severe dysphagia, apneic spells, pulse >120 beats/min and respiratory rate >40 breaths/min were associated with severe disease (4).

In this series the mortality from neonatal tetanus was 70%, which exceeds the average mortality from neonatal tetanus of 50%(18).

Many studies demonstrate improved outcome of neonatal tetanus after introducing a bundle of care. In Ugandan study, the mortality rate was reduced from 84.6% to 25.0% (P =0.02), after introduction of a protocol that suggest magnesium sulphate and diazepam continuous infusions, broad-spectrum antibiotics and bCPAP (20,21)

In a study on eleven cases of neonatal tetanus in Malaysia, all the neonates discharged improved .Early endotracheal intubation and the availability of mechanical ventilation were the main reason for the excellent survival (22).

Conclusion

Neonatal tetanus is a rare disease, with high mortality. The incidence of neonatal tetanus is surging in recent reports, hence continuous

emphasis on antenatal tetanus immunization and safe delivery practices should be maintained. Clinicians caring for neonates should be aware of the presentations of neonatal tetanus to allow them to diagnose these patients early and initiate appropriate lifesaving management. As seen in many studies above, the use intensive neonatal care using mechanical ventilation and magnesium sulphate will increase the survival. Proper guidelines including these management options should be drafted and practiced across all NICU settings.

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N.B. Articles are acceptable only if NOT previously published or submitted elsewhere in print or electronic format, except in form of abstracts in proceedings of conferences.

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- 2500 words, excluding Abstracts, References, Figures and Tables. The manuscript of the Article, should appear under the following headings:

  A) Abstract (vide infra)

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D) Results: should present the experimental or observational data in text, tables or figures. The data in Tables and Figures should not be described extensively in the text.

E) Discussion: The first paragraph should provide a summary of key finding that will then be discussed one by one in the paragraphs to follow. The discussion should focus on the interpretation and significance of the Results of the study with comments that compare and describe their relation to the work of others (with references) to the topic. Do not repeat information of Results section in this section.

- **Abstract**: The Abstracts of an Article is prepared on a separate page and contain 250 words; it should be structured under the titles: a) Background; b) Methods; c) Results; d) Conclusions. Briefly summarize the essential features of the article under above headings, respectively. Mention the problem being addressed in the study; how the study was conducted; the results and what the author(s) concluded from the results. Statistical method used may appear under the Methods paragraph of the Abstract, but do not insert abbreviations or References in the Abstract section.
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- **Acknowledgements**: Appropriate recognition of contributors to the research, not included under the list of authors should be mentioned here; also add a note about sources of financial or research funding, when applicable.

- **References**:-
  - The titles of journals should be abbreviated according to the style used in MEDLINE (www.ncbi.nlm.nih.gov/nlmcatalog/journals)
  - References should be numbered consecutively in the order in which they are first mentioned in the text and identify references in text, tables, and legends by Arabic numerals in parentheses.
  - Type the references on a separate sheet, double spaced and keyed to the text.
  - Personal communications should be placed NOT in the list of references but in the text in parentheses, giving name, date and place where the information was gathered or the work carried out(e.g. personal communication, Alasebu Berhanu, MD, 1984, Gondar college of Medical Sciences). Unpublished data should also be referred to in the text.
  - References with six or less authors should all be listed. If more than six names, list the first three, followed by et al.
  - Listing of a reference to a journal should be according to the guidelines of the International Committee of Medical Journal Editors ('Vancouver Style') and should include authors' name(s) and initial(s) separated by commas, full title of the article, correctly abbreviated name of the journal, year, volume number and first and last page numbers.
  - Reference to a book should contain author's or authors' name(s) and initials, title of chapter, names of editors, title of a book, city and name of publisher, year, first and last page numbers.

The following examples demonstrate the acceptable Reference styles.

Articles:

- Gilbert C, Foster A. Childhood blindness in the context of Vision 2020: the right to sight. Bull World Health Org 2001; 79:227-32
- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employees' clinic. Ethiop. Med J 1980; 18:1-6
- Tsega E, Mengesha B, Nordenfelt E, Hansen B-G; lindberg J. Serological survey of human immunodeficiency virus infection in Ethiopia. Ethiop Med J 1988; 26(4):179-84
- Laird M, Deen M, Brooks S, et al. Telemedicine diagnosis of Diabetic Retinopathy and Glaucoma by direct ophthalmoscopy (Abstract). Invest Ophthalmol Vis Sci.1996; 37:104-5

Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994
- Clipard JP. Dry Eye disorders. In Albert DM, Jakobiec FA (Eds). Principles and Practice of Ophthalmology. Philadelphia: W.B Saunders: 1994. pp. 257-76

Website:

David K Lynch; laser History: Masers and lasers.

http://home.achilles.net/-jtalbot/history/massers.htmAccessed 19/04/2001

2. Brief Communication

Short versions of Research and Applications articles, often describing focused approaches to solve a particular health problem, or preliminary evaluation of a novel system or methodology.

- Word count; up to 2000 words.
- Abstract up to 200 words; excluding: Abstract, Title, Tables/Figures and References
- Tables and Figures up to five.
- References (Vide supra- Original Article)

3. Case Series

- Minimum of three and maximum of 20 case reports.
- Up to 1000 words; excluding: Abstract, Title, Tables/Figures and References
- Abstracts of up to 200 words; unstructured; (vide supra)
- Statistical statements here are expressed as 5/8 (62.5%)
- Tables and Figures: no more than three
- References: maximum of 20

4. Case Report

Report on a rare case or uncommon manifestation of a disease of academic or practical significance.

- Up to 750 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 100 words; unstructured;
- Tables and Figures: no more than three
- References: maximum of 10

5. Systematic Review

Review of the literature on topics of broad scientific interest and relevant to EJPCH readers

- Abstract structured with headings as for an Original Article (vide supra)
- Text should follow the same format as the one required of an Original Article
- Word count: up to 8,000 words, excluding abstract, tables/Figures and references
- Structured abstract up to 250 words
- Tables and Figures up to 8

6. Teaching Article

A comprehensive treatise of a specific topic/subject, considered as relevant to clinical medicine and public health targeting EJPCH readers.

- By invitation of the Editorial Board; but an outline of proposal can be submitted

- Word limit of 8,000; excluding abstract, tables/Figures and references
- Unstructured Abstract up to 250 words

7. Editorial

- By invitation of the Editorial Board, but an Editorial topic can be proposed and submitted.
- Word limit of 1000 words: excluding references and title; no Abstract;
- References up to 15.

Preparation of manuscripts

- Manuscripts must be prepared in English, the official language of the Journal.
- On a single separate sheet, there must be the title of the paper, with key words for indexing if required, and each author's full name and professional degrees, department where work was done, present address of any author if different from that where work was done, the name and full postal address of the corresponding author, and word count of the manuscript (excluding title page, abstract, references, figures and tables). Each table/figures/Boxes or other illustrations, complete with title and footnotes, should be on a separate page.
- All pages should be numbered consecutively in the following order: Title page; abstract and keywords page; main manuscript text pages; reference pages; acknowledgement page; Figure-legends and Tables.
- The Metric system of weights and measures must be used; temperature is indicated in degrees Centigrade.
- Generic names should be used for drugs, followed by propriety brand name; the manufacturer name in parenthesis, e.g. diazepam (Valium, Roche UK).
- Statistical estimates e.g. mean, median proportions and percentages should be given to one decimal place; standard deviations, odds ratios or relative risks and confidence intervals to two decimal places.
- Acronyms/Abbreviations should be used sparingly and must be given in full, at all first mention in the text and at the head of Tables/ foot of Figure, if used in tables/ figures. Eg. Blood Urea Nitrogen (BUN). Intestinal Lung Disease (ILD).
- Use the binomial nomenclature, reference to a bacterium must be given in full and underlined-underlining in typescript becomes italics in print (e.g. Haemophilus influenzae), and later reference may show capitalized initial for the genus (e.g. H. influenzae).
- In the text of an article, the first reference to any medical phrase must be given in full, with the initials following in parentheses, e.g. blood urea nitrogen (BUN); in later references, the initials may be used.
- Manuscript for submission should be prepared in Microsoft Word document file format.

Submission of manuscript

- As part of the submission process, authors are required to check off their submission's compliance with journals requirement.
- All manuscripts must be submitted to the Editor-in-chief of the Journal with a statement signed by each author that the paper has not been published elsewhere in whole or in part, and is not submitted elsewhere while offered to the Ethiopian Journal of Pediatrics and Child Health. This does not refer to abstracts of oral communications at conferences/ symposia or other proceedings.
- It is the author's responsibility to proof-read the typescript or off-print before submitting or re-submitting it to the Journal, and to ensure that the spelling and numerals in the text and tables are accurate.

Manuscript review procedures

The procedures for manuscripts review include:

- Within one week of receipt of a manuscript, the Editorial Board will review it in reference to (i) conformity with the journal's "guidelines to authors (revised version available in all issues starting July 2020)" (ii) relevance of the article to the objectives of the EJPCH, (iii) clarity of presentation, and (iv) plagiarism by using appropriate software.
- The Editorial Board has three options; accept manuscripts for external review, return it to author for revision, or reject it. A manuscript not accepted by a board member is blindly reviewed by another board member. If not accepted by both, the manuscript is rejected by Editorial Board. Decision will be made by the suggestion of a third Editorial Board member if the decisions of the first two do not concur.
- Once accepted for external review, the Editorial Board identifies one (for Brief communication, Case reports and teaching articles) or two (for original articles) reviewers with appropriate expertise. The reviewers will be asked to review and return manuscripts with their comments online within two weeks of their receipt. Reviewers have four options; accept, accept with major revision, accept with minor revision or reject.
- A manuscript accepted subject to revision as suggested by reviewers will be returned to the corresponding author. Author(s) will be given four weeks to respond to reviewers' comments, make necessary changes, and return the manuscript to the Editorial Board. A manuscript not returned in time will be considered withdrawn by the author(s).
- Manuscripts with minor revisions will be cleared by the Editorial and accepted for publication. Those with major revisions will be returned to external reviewers and follow the procedures as outlined for the initial review.

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