MAGNITUDE, RISK FACTORS, AND OUTCOME OF NEONATES WHO DEVELOP SCLEREMA NEONATORUM AT TERITIARY HOSPITALS, ADDIS ABABA, ETHIOPIA,2023/24. A DESCRIPTIVE PROSPECTIVE OBSERVATIONAL STUDY

A RESEARCH THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, PEDIATRICS, AND CHILD HEALTH DEPARTMENT IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE SPECIALITY CERTIFICATE PROGRAM IN PEDIATRICS AND CHILD HEALTH

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ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF MEDICINE DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

MAGNITUDE, RISK FACTORS, AND OUTCOME OF NEONATES WHO DEVELOP SCLEREMA NEONATORUM AT TIKUR ANBESSA SPECIALIZED HOSPITAL AND GANDHI MEMORIAL HOSPITAL, ADDIS ABABA, ETHIOPIA

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Abbreviations

SN……. Sclerema Neonatorum

SFN ……...Subcutaneous Fat Necrosis

WHO……. World health organization

NICU ……Neonatal intensive care unit

GMH……. Gandhi memorial hospital

TASH……Tikur Anbessa Specialized Hospital

PI……...Principal Investigator

EDHS-……...Ethiopian demographic health survey

UNICEF……United nation international children's emergency fund

SPSS …….....Statistical Package for Social Sciences version 26

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ABSTRACT

Background: The classic description of sclerema neonatorum (SN) is credited to Underwood, who described it in 1784 and appropriately termed it "skin bound disease." In 1817, Alibert introduced the term sclerema, derived from the Greek word *skleros*, meaning hard. Sclerema neonatorum is a disorder of the subcutaneous fat in debilitated neonates and is considered best as a sign of a potentially fatal underlying disease process and not a specific disease entity.

Sclerema neonatorum is an uncommon severe panniculitis that manifests as a diffuse skin hardening in critically ill, premature, and low-birth weight infants. SN is a disease of the subcutaneous adipose tissue. It is characterized by hardening of the skin that gets bound down to the underlying muscle and bone, hindering respiration and feeding and is associated with congenital anomalies, cyanosis, respiratory illnesses and sepsis.

Objectives: To determine the magnitude, risk factors and outcome of neonates who develop sclerema neonatorum at TASH and GMH, Addis Ababa, Ethiopia in the year 2023/24

Methods: An institutional based, observational and cross-sectional study with prospective data collection. The study period was from 1st May 2023 to 31st January, 2024 at the NICU of TASH and GMH. Using single population proportion formula with a 95% level of confidence and 5% precision the sample size required is 422 but due to the condition being rare convenience sampling method is used and all neonates who develop the condition during the study period were included. Data was entered into Statistical Package for Social Sciences version 26 (SPSS) for subsequent descriptive statistics where applicable.

RESULT: A survey of 52 neonates who developed sclerema neonatorum, admitted to NICU of TASH and GMH was done, the majority 41(78.8%) of the neonates end up in death. nearly half of the neonates 29(55.8%) were 1500-2499 gm at birth. About one-third of neonates (34.6%) were born at gestational age of 34 – 36^{+6} weeks, and a quarter (26.9%) born at 32 – 33^{+6} weeks

CONCLUSION: nearly three-fourth of neonates who developed sclerema neonatorum died from the condition. Since sclerema neonatorum is a devastating condition prompt diagnosis and quick intervention is of paramount importance.

Key words-sclerema neonatorum, sepsis, outcome

1. INTRODUCTION

1.1. Background of the study

Globally 2.4 million children died in the first month of life in 2020. There are approximately 6700 newborn deaths every day, amounting to 47% of all child deaths under the age of 5 years, up from 40% in 1990.(1)

The world has made substantial progress in child survival since 1990. Globally, the number of neonatal deaths declined from 5 million in 1990 to 2.4 million in 2020. However, the decline in neonatal mortality from 1990 to 2020 has been slower than that of post-neonatal under-5 mortality.(1)

The chances of survival from birth varies widely depending on where a child is born. Sub-Saharan Africa had the highest neonatal mortality rate in 2020 at 27 (25–32) deaths per 1000 live births, followed by central and southern Asia with 23 (21–25) deaths per 1000 live births. A child born in sub-Saharan Africa is 10 times more likely to die in the first month than a child born in a high-income country.(1)

Most neonatal deaths (75%) occur during the first week of life, and in 2019, about 1 million newborns died within the first 24 hours. Preterm birth, childbirth-related complications (birth asphyxia or lack of breathing at birth), infections and birth defects caused most neonatal deaths in 2019.(1)

The rate of neonatal mortality in Ethiopia was 20.7 per 1000 live births. Women who hadn't autonomy in health care increase neonatal death by 2.72 times compared with those that had autonomy. Hadn't postnatal care been caused grown neonatal death by 5.48 times. Delivering at a health institution had 0.61 times lowered neonatal death risk compared with delivering at of health institution without a health facility.(2)

The neonatal period is the most critical time of human life for diseases. Neonatal morbidity and mortality are significant contributors to under-five morbidity and mortality in a low-income country like Ethiopia. Women are one of the key actors for the improvement of maternal, neonatal, and child healthcare utilization.(2)

The survival of a newborn during the early neonatal period is determined by both individual (gestational age, cause of death, and delay one) and facility (residence, type of health facility and delay three) level factors. Thus, to have a positive early neonatal outcome, a tailored intervention is needed for the three major causes of death (i.e. Infection, birth injury, and complications of the intrapartum period). Furthermore, promoting maternal health, improving the health-seeking be-

haviour of mothers, strengthening facility readiness, and narrowing down inequalities in service provision are recommended to improve the newborn's outcomes during the early neonatal period.(3)

Sclerema neonatorum, scleredema and SCFN are skin conditions affecting the subcutaneous tissues of neonates in the first 1 to 2 weeks of life, with SN being generalized and the other two presenting with circumscribed lesions. Neonates suffering from SN have comorbidities like congenital malformations, respiratory and gastrointestinal illnesses and sepsis. Sclerema neonatorum is an uncommon severe panniculitis that manifests as a diffuse skin hardening in critically ill, premature, and low-birthweight infants.(4)

SN is a disease of the subcutaneous adipose tissue. It is characterized by hardening of the skin that gets bound down to the underlying muscle and bone, hindering respiration and feeding and is associated with congenital anomalies, cyanosis, respiratory illnesses and sepsis.(4,5)

1.2. Statement of the Problem

Although SN is heralding severe underlying disease, the presence of SN is not routinely reported or documented on a physical examination finding and there is no comprehensive study indicating the prevalence, risk factors and outcome in Ethiopia.

The incidence of sclerema neonatorum is not known. The largest case series have been published between 1940 and 1970, while fewer cases have been reported in last few decades.(6)

It has been postulated that improved perinatal intensive care has substantially reduced the number of affected infants, rendering sclerema neonatorum a rare diagnosis in the setting of modern neonatal intensive.(6)

1.3 Significance of the study

Most of the studies done globally are from the 40 to 50 years back. There are very few studies done in Africa and there is no comprehensive study in Ethiopia.

Number of neonates admitted to NICU has only the diagnosis of sepsis without documentation of the physical finding of sclerema though it is an important sign. Early detection and rational treatment are important in preventing death.

2. Literature Review

SN typically occurs in the first weeks of life in the setting of sepsis, pneumonitis, intracranial hemorrhage, enteritis, cyanosis, or heart disease, often with rapid progression to death, because skin hardening adversely affects respiration and feeding .(4,6)

The significant findings from the 28 cases reviewed by Wilson E.Hughes et al are (1) Average age of onset was 4 days with extremes from birth to 70 days; (2)25 percent of the mothers were ill at the time of delivery;(3)All but 2 of the deliveries were spontaneous;(4) Average birth weight was 2800 gm with variations from 2150 to 4100 gm ;(5)The majority of infants exhibited abnormal behavior at birth ,weakness and cyanosis being the most common symptoms ;(6) Almost all children had difficulty of with body temperature control and evidences of other complications besides sclerema ;(7) 75 % died, with the average age of death 10 days;(8) 11 neonates were autopsied ,thickening of connective tissue bands being the most common findings.(7)

Various etiological theories have been proposed. Most of the evidence favors the hypothesis that sclerema neonatorum may be a manifestation of severe shock in early infancy, and that the hardening of fat and thickening of collagen fibers in the subcutaneous tissues may result from insufficiency of peripheral circulation.(7)

The generally accepted etiology appears related to the inadequately developed neonatal enzyme system involved in the desaturation of palmitic and stearic acids to form oleic acid, which results in an abundance of saturated fatly acids. Because of the relative decrease in the unsaturated fatty acid content, fat solidification occurs more readily and appears to account for the clinical changes.(8)

Usually SN occurs in undernourished, debilitated, or premature infants. It appears suddenly on the third or fourth day after birth but may arise within the first few weeks of life. The board like stiffness of the skin is due to the rapid solidification of subcutaneous fat. Induration commonly appears first over the lower extremities, especially the calves, and extends cephalad to involve almost the entire skin with the exception of the palms, soles, and scrotum.(8)

In a study of 18 infants by warren J. Warwick who exhibited the sign, 14 were found to have pneumonia. Sclerema developed as a terminal event (within 8 hours of death) in five instances. In six others, the time of appearance ranged from 14 hours to 5 days before death. In these cases death was the result of a progressive disease.(9)

In infants, the differentiation of scleredema from sclerema neonatorum, subcutaneous fat necrosis, and scleroderma may be difficult, and histology diagnosis is therefore important.(9)

In study of 17 cases by Khetarpal et al in 1964 Eleven were males and the rest female. The birth weight ranged between 1.05 kg. and 2.75 kg. with an average of 1.80 kg. All of them excepting on infant were less than 2.5 kg. in weight at birth. Eleven of these were premature by gestation and one was postmature. No relation was observed between the parity of the mother and the sclerema. Five were first-born and tile rest were born to multiparous women. The delivery was spontaneous in 15 cases and by caesarian section in two. The rectal temperatures at the time the sclerema was noticed varied from 97 to 98 oF in six cases, 96 to 97oF in two cases and 94 oF to 96 oF in eight cases and below 94 oF in one case. Sclerema was associated with respiratory infection (including empyema) in four cases. Eight cases were associated with jaundice. Two cases were preceded by major operative procedures, one for unilateral cleft lip and the other for tracheoesophageal fistula. One case had multiple congenital anomalies. The day of development of sclerema varied from the 2nd to the 17th day with an average of 6.5 days. The extent of involvement varied. The site which was affected initially was the lower limbs, most often over the calves. The other common areas involved were the cheeks. Feeding and respiratory difficulty was noticed in 12 cases. The activity of the babies in general was poor, whether it was due to sclerema *per se*, associated infection or other diseases is difficult to say.(10)

A study evaluating premature newborns at a tertiary pediatric hospital in Bangladesh from 1998 to 2003 reported a 10 percent incidence of sclerema neonatorum. Sclerema neonatorum was a relatively common, grave condition in this setting, heralded by poor feeding, jaundice, and bacteremia and signaling the need for prompt antibiotic treatment.(11)

In a case report of a patient who is a previously healthy, 4-week-old, term, African American male who presented to the pediatric emergency department with severe respiratory distress and listlessness. He was profoundly acidotic He received aggressive resuscitation including intravenous fluids, sodium bicarbonate, vasopressors, and endotracheal intubation. Blood and urine cultures ultimately grew a pan-sensitive E. coli. His physical exam upon presentation was significant for diffuse hardening of his skin that spared his palms, soles, and genitalia. He had significant impairment of joint mobility that prevented him from being positioned for a lumbar puncture despite use of neuromuscular blockade. Throughout his hospital course, his integumentary

exam slowly returned to normal with treatment of his underlying infection. His course was further complicated by a cerebral Sino venous thrombosis and a failed extubation. He completed a course of antibiotic therapy and was ultimately discharged home after a 34-day hospitalization.(12)

In an Indonesian study of a single-center retrospective cohort study of 365 neonatal sepsis subjects from all risk factors, the highest mortality rate was found in neonates with sclerema (83.1%), and the lowest mortality rate in neonates without tachypnea (11.6%). Further multivariate statistical analysis revealed two risk factors associated with mortality, such as tachypnea (OR 4.94, 95% CI 2.257–10.841; $p < 0.001$) and sclerema (OR 34.47, 95% CI 15.135–78.509; $p < 0.001$). Further analysis also reported several risk factors associated with prolonged length of stay, such as very low birth weight ($p < 0.001$), premature rupture of the membrane ($p = 0.009$), preterm gestational age ($p < 0.001$), and non-hospital delivery location ($p = 0.013$). In neonatal sepsis, the presence of tachypnea and sclerema was significant risk factors for mortality. Meanwhile, premature rupture of the membrane, very low birth weight, preterm gestational age, and non-hospital delivery location were risk factors associated with prolonged length of stay.(13)

2.1. CONCEPTUAL FRAMEWORK

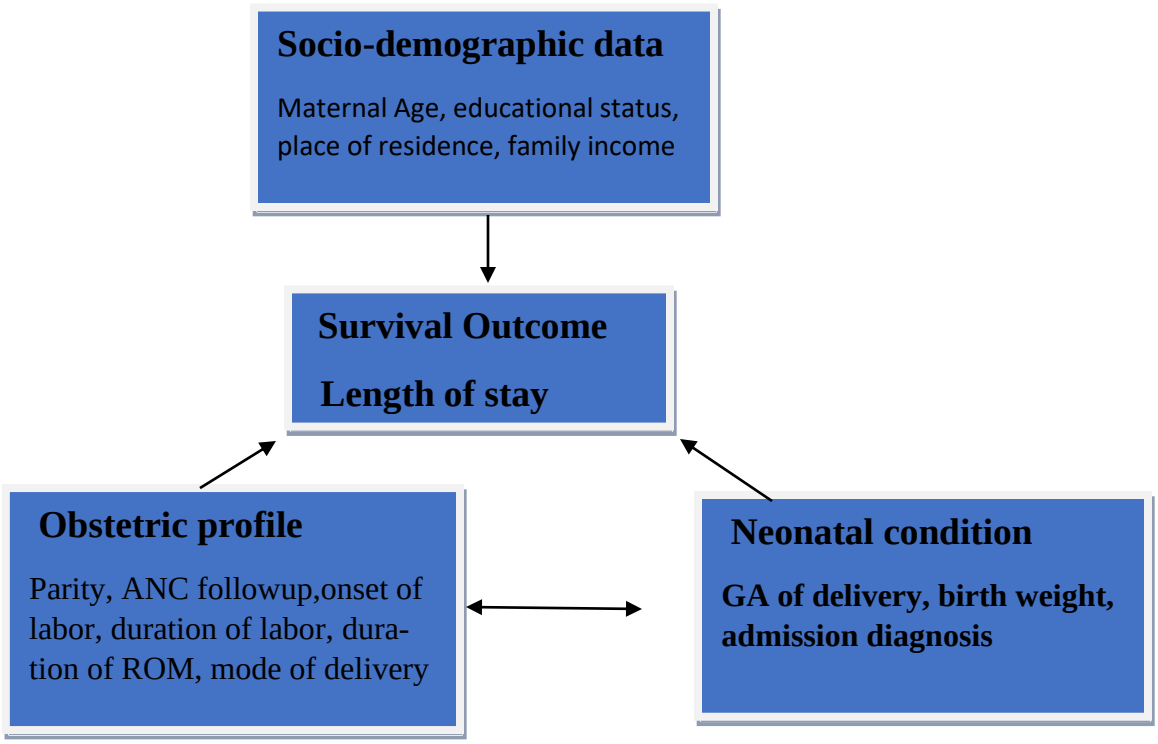

Figure 1: conceptual frame work Figure 1:conceptual frame work

3. Objectives

3.1. General Objectives

- To determine the Magnitude, Risk factors, and Outcome of neonates who developed sclerema neonatorum at NICU of TASH and GMH, Addis Ababa, Ethiopia,2023/24

3.2. Specific Objectives

- Measure the Magnitude of sclerema neonatorum in neonates admitted to TASH and GMH, Addis Ababa, Addis Ababa, Ethiopia,2023/24
- Assess the outcome of sclerema neonatorum in neonates admitted to TASH and GMH, Addis Ababa, Addis Ababa, Ethiopia,2023/24
- Identify the risk factors associated with sclerema neonatorum, Addis Ababa, Ethiopia,2023/24

4. Methods and materials

4.1. Study setting

The study was conducted at Tikur Anbessa specialized hospital and Gandhi memorial hospital at the NICU, Addis Ababa, Ethiopia. Tikur Anbessa specialized hospital, established in 1964, is the largest tertiary hospital in the country. The hospital is administered by Addis Ababa University and is the largest and oldest teaching hospital among all in Ethiopia providing teaching for about 300 medical students and 350 residents each year. TASH provides diagnosis and treatment for approximately 500,000 patients each year. The neonatal intensive care unit has 6 rooms. Gandhi memorial hospital is a maternal and new born hospital established by Indian community in Ethiopia in 1951. There is an average admission of 250 neonates per month at NICU of TASH and GMH each.

4.2. Study design

The study was an Institution based observational and cross- sectional study with prospective data collection

4.3. Study Period

The study included all neonates seen at NICU at Tikur Anbessa Specialized hospital and Gandhi Memorial Hospital from 1st May 2023 to January 31st 2024.The primary investigator will collect data regarding neonates who develop SN after being confirmed by neonatology fellow/pediatrician during the study period.

4.4. SOURCE POPULATION

All neonates admitted to NICU of TASH and GMH was studied in the mentioned time period.

4.5. Study Population

All neonates admitted to NICU of TASH and GMH who developed sclerema neonatorum was studied in the mentioned time period.

4.6. Sample size

With the general assumption that this study was presented with a level of confidence interval of 95% and 5% precision, I will use the single population proportion formula to calculate the minimum sample size for this study. Since there is no similar study is found

Sample size: $n=\frac{Z^2P(1-P)}{d^2}=\frac{1.96^2*0.5*(1-0.5)}{0.05^2}=384$

where: n= the minimum sample size

P=the expected prevalence of sclerema neonatorum

d= the level of precision (margin of error)

Z= the value at 95% confidence level

Adding 10% of the calculated value for missing and incomplete data makes the final sample size required 422.

Since it is difficult to obtain the mentioned sample size, we included all cases who developed sclerema neonatorum. A convenience sampling method is used.

4.7. Inclusion and exclusion criteria

- Inclusion criteria
    - All neonates admitted to the NICU of TASH and GMH from1st May 2023 to January 31st 2024.
- Exclusion criteria
    - No exclusion criteria

4.8. Data collection and measurement

The data was collected from chart of admitted neonates to NICU of TASH and GM. The primary investigator collected data regarding neonates who develop SN after confirmed by neonatology fellow/pediatrician during study period. The questionnaire was piloted and if any revision is needed the questionnaire was modified on the result of the pilot study. The questionnaire consists of socio-demographic information, maternal age, educational status, occupation, family source of income, birth weight, GA, place of delivery, time of arrival to NICU, age of diagnosis of SN, clinical data, outcome.

4.9. Data Handling

The investigator checked for data cleanliness and completeness. The hard copies were converted into soft copies, stored on a hard drive, and was ready for analysis, and backup copies was stored on a separate drive.

4.10. Study Variables

Independent Variables

- Socio-demographic data: Maternal Age, Sex, Residency, Parity
- Economic status of parents, educational status

Dependent Variables

- NICU length Stay
- Survival
- Death

4.11. Data Quality Assurance

The primary investigator collected data and its completeness was checked and coded. The converted soft copy was again cross-checked with the hard copy for neatness, completeness, and consistency before carrying out any statistical analysis.

4.12. Data Analysis

After a thorough cleaning and checking for its completeness data was entered into the statistical package for Social Science ver.26 (SPSS) for subsequent descriptive analysis such as Mean frequencies and percentages as appropriate.

4.13. Ethical Consideration

Ethical clearance to conduct this study was obtained from the pediatrics and child health Department's Research and Publications Committee of the School of Medicine, College of Health Sciences, Addis Ababa University and Addis Ababa health bureau. Confidentiality was fully maintained during Data collection and further analysis and dissemination of results.

4.14. Dissemination of findings

The output of this study was displayed both in tabular and graphical presentations. The finding of the study was presented on the research defense day and a formal report was submitted to the Department of Pediatrics and Child Health with both soft and hard copies. The research output will also be published in local or international scientific journals.

4.15. Operational definition

A clinical case of sclerema neonatorum is a critically sick or debilitated neonate who develop generalized hardening of skin adherent to the underling skin and/or bone confirmed by neonatologist or pediatrician.

5. RESULT

5.1. Socio-demographic related Characteristics

Among a total of 52 mothers who participated in the study, 52 of the women completely answered the given questionnaires. And among them 38 (73.1%) of them were in the age group of <35 years old. Most of the women's 50 (96.2%) were married, from the mothers which were participated in this study 20 (38.5%) of them completed secondary education and followed by 13 (25%) of them were able to read and write only, respectively. Regarding income of the family, 25 (48.1%) of the family income were the range of 5001 – 10000 ETB (Table 1).

Table 1:Socio-demographic characteristics of mothers who admitted their baby at NICU, (n = 52), in Addis Ababa, Public Hospitals, Ethiopia, February, 2024.

Variable	Category	Frequency	Percent
Age of the mothers	< 35 Years	38	73.1%
	≥ 35 Years	14	26.9%
Place of residence	Urban	35	67.3%
	Rural	17	32.7%
Marital status of the women	Unmarried	2	3.8%
	Married	50	96.2%
Educational status of the mothers	Able to read & write	13	25%
	Primary education	9	17.3%
	Secondary education	20	38.5%
	Certificate & above	10	19.2%
Occupational status of women's	Housewife	26	50%
	Government employ	14	26.9%
	Self-employed	12	23.1%
Average family monthly income in ETB.	2000 – 5000	19	36.5%
	5001 – 10000	25	48.1%
	≥ 10001	8	15.4%

5.2. Obstetrics and gynecological related Characteristics

In relation to maternal obstetric and gynecological characteristics, among study participants 28 (53.8%) of the mothers were multipara, of them 18 (34.6%) were 34 – 36^{+6} weeks of gestational age, followed by 14 (26.9%) were 32 – 33+6 weeks. In relation to onset of labor 39 (75%) were start spontaneously, and among them 33 (63.5%) the duration of labor was normal. And among participants 10 (19.2%) of the women had prolonged rupture of membrane, 35 (67.3%) of them were delivered VIA spontaneous vertex delivery (Table 2).

Table 2:Obstetrics and Gynecological characteristics of the mothers who admitted their baby at NICU, (n = 52), in Addis Ababa, Public Hospitals, Ethiopia, February, 2024.

Variable	Category	Frequency	Percent
Parity	Primiparous	24	46.2%
	Multiparous	28	53.8%
Gestational age of the pregnancy	≤ 31^{+6} weeks	8	15.4%
	32 – 33^{+6} weeks	14	26.9%
	34 – 36^{+6} weeks	18	34.6%
	≥ 37 weeks	12	23.1%
Inter pregnancy space	PP	13	25%
	< 24 months	23	44.2%
	24 – 36 months	9	17.3%
	≥ 36 months	7	13.5%
Onset of labor	Spontaneous	39	75
	Induced	5	9.6%
	No labor	8	15.4%
Duration of labor	Normal	33	63.5%
	Prolonged	11	21.2%
	No labor	8	15.4%
Duration of ROM	< 18 hr.	42	80.8%
	> 18 hr.	10	19.2%
Mode of delivery	Spontaneous vertex delivery	35	67.3%
	C/S delivery	17	32.7%

Type of pregnancy

The overall assessment of the pregnancy status of the delivered women who were participated in the study as shown in the figure below (Figure 2)

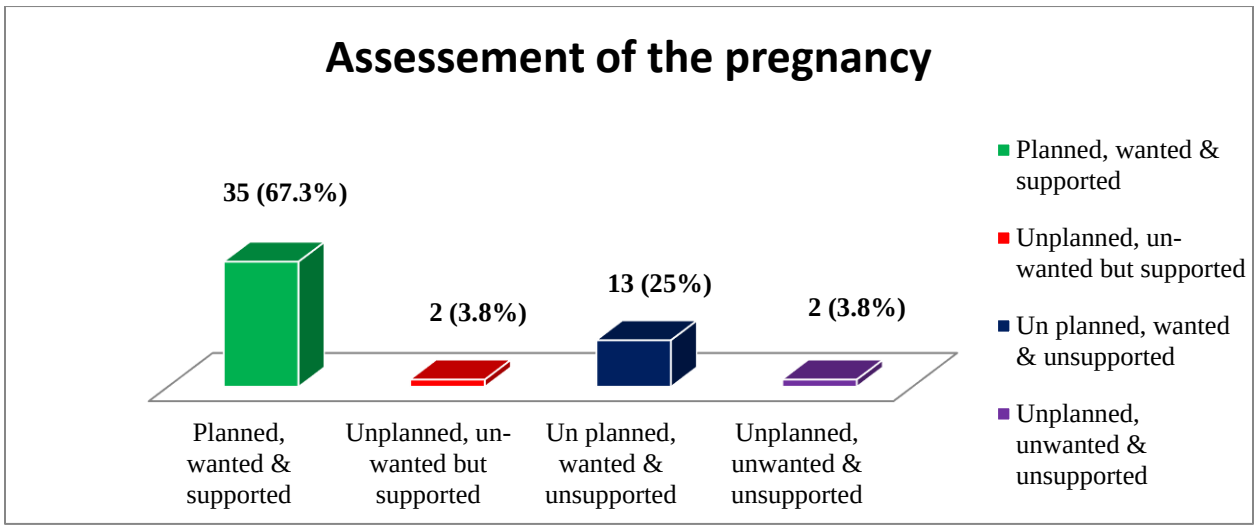

Figure 2:Women's pregnancy status among those mothers delivered and participated in the study, in selected public hospitals, in Addis Ababa, Ethiopia, February, 2024.

5.3. Health service-related Characteristics

Majority of the mothers 42 (80.8%) of them were delivered at hospital, and only 12 (23.1%) of them had history of medical illness, among which PIH accounts for the majority 9(75%). about one-third 18(34.6%) had blood culture growth, commonest (27.8 %) being CONS, to be followed by Acinetobacter (22.2 %).

Table 3:Health and health service-related character of the mothers who admitted their baby at NICU, (n = 52), in Addis Ababa, Public Hospitals, Ethiopia, February, 2024.

Variable	Category	Frequency	Percent
Place of delivery	Hospital	42	80.8%
	Local health center	10	19.2%
History of illness among mothers	Yes	12	23.1%
	No	40	76.9%
Types of illness	GDM	3	25%
	PIH	9	75%
Maternal iron supplementation	For 1 month	5	9.6%
	For 2 months	32	61.5%
	≥ 3 months	15	28.8%

Any substance use	Yes	2	3.8%
	No	50	96.2%
Requirement of vasopressor	Yes	9	17.3%
	No	43	82.7%
Requirement of mechanical ventilation	Yes	15	28.8%
	No	37	71.2%
Any blood culture growth	Yes	18	34.6%
	No	25	48.1%
	Not collected	6	11.5%
	Not sent	3	5.8%
Culture sensitivity	Ceftriaxone	1	1.9%
	Ceftazidime	2	3.8%
	Ciprofloxacin	3	5.8%
	Vancomycin	1	1.9%
	Meropenem	4	7.7%
	Amikacin	5	9.6%
	Gentamycin	2	3.8%
	Cefotaxime	1	1.9%
	Chloramphenicol	1	1.9%
	Piperacillin-Tazobactam	1	1.9%
	Resistance to all	3	5.8%
CPR done	**Yes**	**17**	**32.7%**
	No	**35**	**67.3%**
Leukocytosis	Yes	25	48.1%
	No	27	51.9%

Types of delivery

The figure below shows types of delivery, among delivered mothers who have got Neonatal care service in the study area (Figure 3).

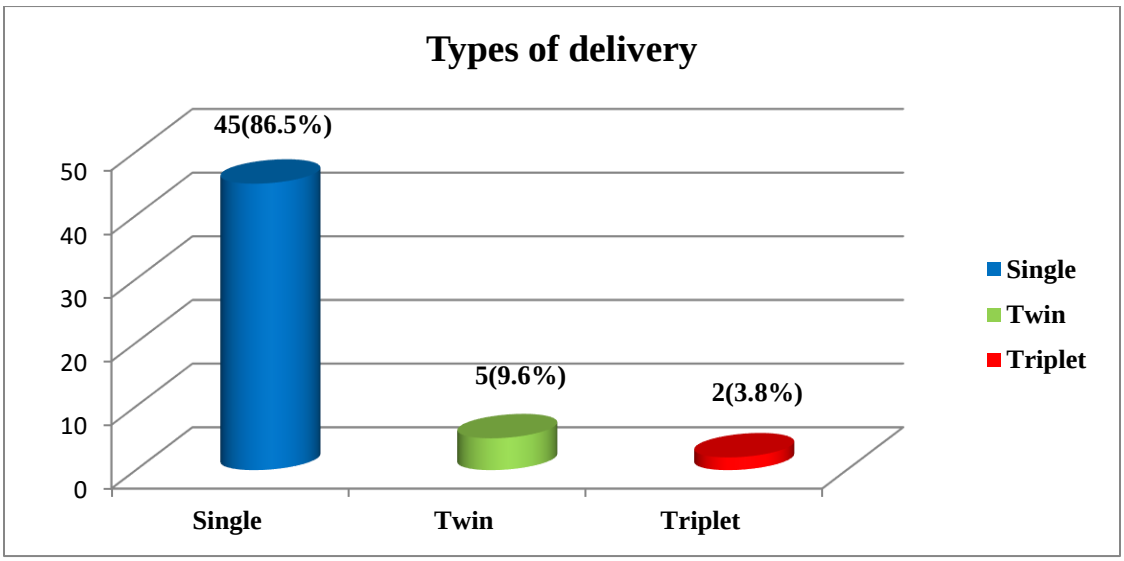

Figure 3:Types of delivery among the mothers who have delivered and participated in the study, in selected public hospitals, in Addis Ababa, Ethiopia, February, 2024.

Pattern of culture growth

The figure below shows that, among neonates admitted at NICU due to neonatal sclerema, types and patterns of culture growth during the study period (figure 4).

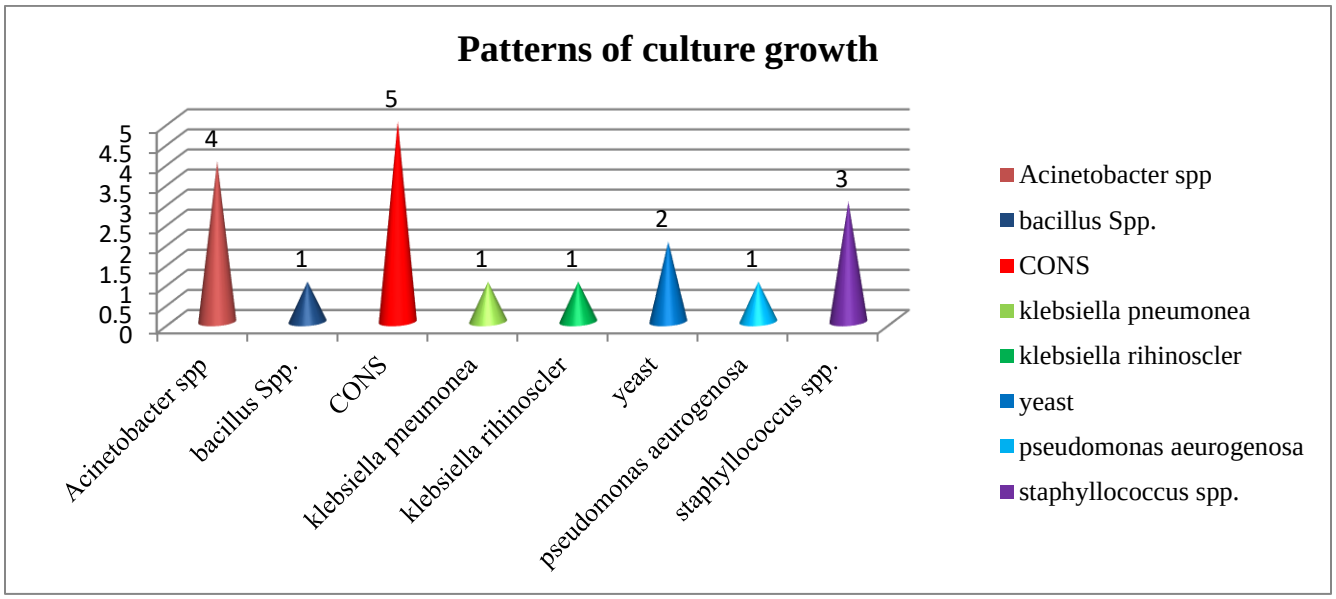

Figure 4:Types and occurrence of culture growth in blood culture, among neonates admitted at NICU due to neonatal sclerema, in selected public hospitals, Addis Ababa, Ethiopia, 2023/24.

5.4. Neonatal related Characteristics

There was a total of 3680 neonatal admission at TASH and GMH in the study period, among which sclerema neonatorum was diagnosed in 52 of them, which were enrolled in this study.

Regarding neonatal related characteristics; more than half of the neonates 29 (55.8%) were male in sex, and 29 (55.8%) of them were in a range of 1500-2499 gm, and those less 1499 gm were 10(19.2%)**.** Regarding age at the diagnosis of the case 40 (76.9%) of them were with < 7 days of their age, and 12 (23.1%) were > 7 days of life. regarding to length of stay in the hospital; 18 (34.6%), 16 (30.8%), 12 (23.1%), and 6 (11.5%) of the babies were stay in the hospital for; one week, two weeks, three weeks and four and above weeks respectively with average days of hospital stay of 12 days. The most common reason of admission was prematurity 26(50%), followed by sepsis 15(28.8%) (Table 4).

Table 4:Neonatal related Characteristics, among neonates admitted at NICU, (n = 52), in Addis Ababa, Public Hospitals, Ethiopia, February, 2024.

Variable	Category	Frequency	Percent
Sex of the baby	Male	29	55.8%
	Female	23	44.2%
Weight of the baby	< 1499 gm.	10	19.2%
	1500-2499 gm.	29	55.8%
	>= 2500 gm.	13	25%
Apgar score	Un known	11	21.2%
	< 7	18	34.6%
	≥ 7	23	44.2%
Weight for GA	SGA	3	5.8%
	AGA	47	90.4%
	Unknown	2	3.8%
Reason to admis-sion	Prematurity	26	50%
	PNA	5	9.6%
	Sepsis	15	28.8%
	Congenital anomaly	6	11.5%
Others reason for neonatal admission	Respiratory distress syndrome	15	28.8%
	Anemia	2	3.8%
	Small bowel obstruction	2	3.8%
	ARM	1	1.9%
	Jaundice	6	11.5%
	TEF	2	2.8%
	Aspiration	2	3.8%
	CHD	1	1.9%
	Hyperbilirubinemia	1	1.9%
	Meningitis	1	1.9%
	Hypothermia	6	11.5%
Affected areas of the body during diagnosis	Generalized	5	9.6%
	Leg and thigh	12	23.1%
	Leg, thigh & Buttock	15	28.8%
	Leg, thigh & upper extremities	10	19.2%
	Lower & upper extremities	2	3.8%
	Lower extremities	7	13.5%
	Thigh & buttock	1	1.9%
Age at diagnosis of the case	< 7 days	40	76.9%
	≥ 7 days	12	23.1%
Any congenital	Yes	19	36.5%

problem	No	33	63.5%
Types of feeding	Direct breastfeeding	13	25%
	NG tube feeding	20	38.5%
	Cup feeding	8	15.4%
	NPO	11	21.2%
Length of stay in the hospital	One week	18	34.6%
	Two weeks	16	30.8%
	Three weeks	12	23.1%
	Four and above weeks	6	11.5%
Neonatal outcome	Survived	11	21.2%
	Died	41	78.8%

Neonatal outcome

The overall outcome level of neonate admitted at NICU due to those neonates developed Neonatal sclerema; from 52 neonate participated in the study 41 (78.8%) of them died, the figure shows below (Figure 5). The cause of death was severe sepsis in all of the cases 41 (100 %).

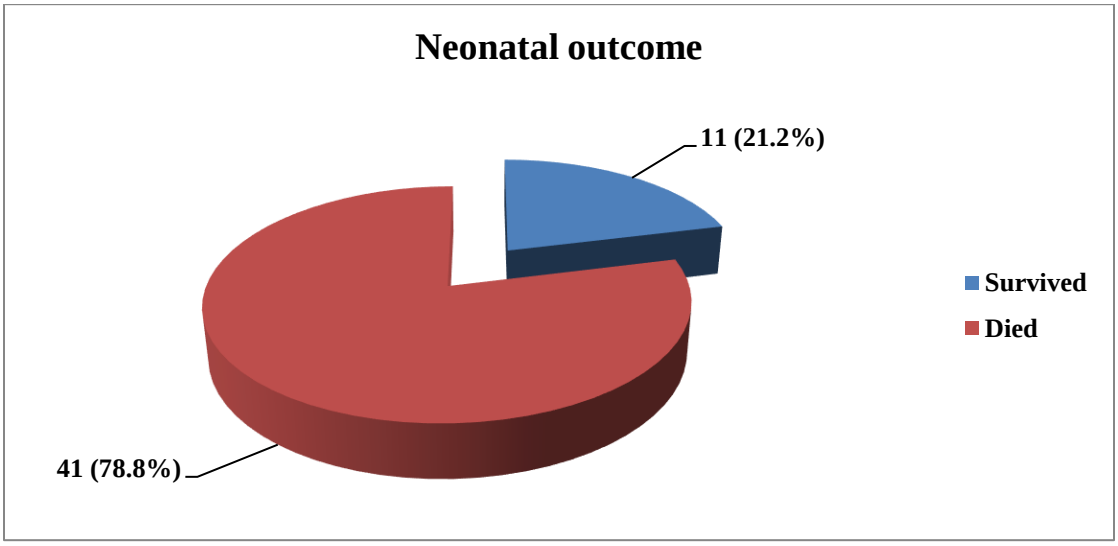

Figure 5:Level of neonatal outcome among neonates developed neonatal sclerema, among neonates and admitted at NICU, in selected public hospitals, Adds Ababa, Ethiopia, and February, 2024.

6.Discussion

This study was an institution based prospective observational cross-sectional study, conducted at NICU of Tikur Anbessa Specialized Hospital and Gandhi Memorial Hospital, Addis Ababa, Ethiopia, involving Fifty-two admitted neonates who developed sclerema neonatorum from 1st May 2023 to 31st Jan 2024.

The study was intended to assess the Magnitude, Risk factors and Outcomes of neonates who developed sclerema neonatorum while admitted to NICU of TASH and GMH in the mentioned time period.

In this study about half of the neonates 29(55.8%) were 1500-2499 gm at birth, about quarter, to be followed by 10(19.2%) being less than 1499 gm. This implies the majority of the neonates were low birth weight which is in favour of studies done in U.S,India,and Indonesia.(7,10,13)

About one-third of neonates (34.6%) were born at gestational age of 34 – 36^{+6} weeks, to be followed by a quarter (26.9%) born at 32 – 33^{+6} weeks. This suggests the majority of the neonates were born preterm which is supported by other study done in Indonesia.(13)

Majority of neonates were diagnosed with SN with in the first week of life 40(76.9%), same findings is also observed in studies done in U.S,and India.(7–10)

Regarding the body part involved at the onset of sclerema in this study, majority 15(28.8%) had the diagnosis after involving the legs, thigh and buttocks, followed by legs and thigh 12(23.1%). This finding is different from studies done in U.S and India which described the initial finding to be on the Calves, progressing cephaloid to involve whole body. The possible explanation for this can be a late diagnosis of the condition in our setup.(8,10)

Concerning neonatal outcome, the majority 41(78.8%) of the neonates end up in death. A comparable rate was observed in the American and Indonesian study.(7,13)

7.Limitation of the study

The physical findings of sclerema neonatorum is not documented on patient chart making it difficult to pick new patients, so a through physical examination had to be done.

The study was done on very small sample size the findings of which may not be representative of the broader population, limiting the ability to generalize.

The study spans over relatively shorter time period, May 2023 to Jan 2024

8. CONCLUSION

The study revealed that the majority of the neonates were born low birth weight and preterm with the most common reasons for admission being prematurity and sepsis. A significant portion of neonates were born with congenital anomaly, commonest being tracheoesophageal fistula type C.

The diagnosis of sclerema neonatorum predominantly occurred within the first week of life. However, the body parts initially affected differed from findings in other countries, possibly indicating a late diagnosis in the study setting.

Neonatal outcomes revealed a grim picture, with the majority of neonates succumbing to the condition.

In conclusion, this study sheds light on the magnitude, risk factors, and outcomes of neonates with sclerema neonatorum in the NICU setting of TASH and GMH in Addis Ababa, Ethiopia. The findings underscore the importance of early detection and intervention strategies to improve neonatal outcomes in similar healthcare settings. Further research and interventions are warranted to address the high mortality associated with this condition and to enhance neonatal care practices in resource-limited settings.

9.Recommendations

Based on the findings of the study, sclerema neonatorum is a devastating condition, it is recommended:

1.For NICU staffs practice infection prevention methods.

2.For residents diagnose the condition quickly, and initiate or revise antibiotics once the diagnosis is made.

3.For the department and Addis Ababa health bureau, provide trainings and resources for the staff involved in neonatal care and conduct further researches including multicenter, longer time span and larger sample sizes to improve reliability, generalizability and applicability of the study findings.

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