MAGNITUDE OF RETINOPATHY OF PREMATURITY AND ITS RISK FACTORS AMONG PRETERM NEONATES AT JIMMA UNIVERSITY MEDICAL CENTER , OROMIA, ETHIOPIA 2021

Zinaw Sisay (MD)

RESEARCH THESIS TO BE SUBMITTED TO THE DEPARTMENT OF PEDIATRICS AND CHILD HEALTH, JIMMA UNIVERSITY AS A PARTIAL FULFILLMENT FOR SPECIALTY CERTIFICATE IN PEDIATRICS AND CHILD HEALTH

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JIMMA, OROMIA, ETHIOPIA

Declaration

Assurance of principal investigator

I agree to accept the responsibility for the scientific, ethical and technical conduct of the research project and for provision of required progress report as per terms and condition of the faculty of medical sciences in effect at the time of grant is forwarded as the result of this application.

Name of principal investigator	Signature	Date
Dr. Zinaw sisay	_____	_____

Approval of the advisor

This thesis proposal has been submitted with our approval as university advisors

Name of advisor	Signature	Date
Dr. Samson Nadew	_____	_____
Dr. Kumale Tolesa	_____	_____
Ms. Merertu Tsega	_____	_____

ABSTRACT

Background**:-Retinopathy of prematurity (ROP) is now emerging as an important cause of ocular morbidity in low and middle income countries.* ***[1] *Despite this, little is known about ROP in sub-Saharan Africa, Ethiopia. Lack of information has hampered the development of screening programs that would aid early detection and treatment of ROP. [2] The purpose of this study was to determine the prevalence and risk factors which predispose to the development of ROP.*

Objective: - *To assess prevalence of retinopathy of prematurity and its risk factors among neonates discharged from NICU ward Jimma University medical center.*

Methods: *- Institution-based prospective longitudinal study was conducted on infants discharged from NICU and on follow up in HRIC, Department of pediatrics, Jimma University Medical Center during the study period.*

SPSS version 20 was used. Descriptive statistics and Bi-variate and multivariate analysis was performed to identify the prevalence and risk factors of ROP among preterm neonates in Jimma University Medical Center. A p-value of less than 0.05 was considered as significant.

Result: *A total of 71 infants were included in this study. This study revealed that the minimum and maximum age of the study participants was 26 days and 60 days respectively. More than half 43 (60.6%) of the study participants were males. The prevalence of ROP in this study is 2.8%.There was no statistically significant risk factor in our study.*

Conclusion and recommendation;

The prevalence of ROP in this study of preterm babies is 2 of 71 screened (2.8%) and it did not progress to severe blinding disease; rather it spontaneously regressed, this show that the problem is actually happening in our set up and detecting this vision threatening case is very important to halt progression to visual loss. Better survival in the coming years could lead to increased epidemic of ROP blindness. It is important to set up screening protocols and its attendant equipment in our Setup to be able to identify the few who may develop vision threatening disease.

Key words: *- Preterm birth, low birth weight, Retinopathy of prematurity, childhood blindness, prevalence, Ethiopia*

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ABBREVIATION AND ACRONYMS

AAP	American Academy of Pediatrics
BW	Birth weight
ETROP	Early treatment of Retinopathy of Prematurity
HRIC	High risk infant clinic
ICROP	International classification of retinopathy of prematurity
GA	Gestational Age
JMC	Jimma Medical Center
LMIC	Low and middle income country
NICU	Neonatal intensive care unit
ROP	Retinopathy of prematurity
SSA	Sub-Saharan Africa
UK	United Kingdom
VLBW	Very low birth weight
W H O	World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1 .Back ground

Retinopathy of prematurity (ROP) is a vasoproliferative disorder of the retina among premature

babies. ROP begins to develop between 32 and 34 weeks after conception, regardless of gestational age at delivery and has two distinct phases.[3, 4] During the acute first phase; the normal vasculogenesis of the retina is disturbed by the relative hyperoxia of the extra uterine environment. This causes vasoobliteration and non-vascularization of some areas of the anterior retina. The subsequent hypoxia causes a second chronic phase, characterized by the proliferation of vascular and glial cells arteriovenous shunt formation, occasionally leading to involution or permanent cicatricial changes and visual impairment. In its more severe forms, it results in severe visual impairment or blindness, both of which carry a high financial cost for the community but also a high individual cost by affecting the normal motor, language, conceptual, and social development of the child [5].

Classification of the stages of retinopathy of prematurity is necessary for the standardization of treatment practices, and so that interventions can be assessed at a defined stage when progression to blindness is likely. The International Classification for Retinopathy of Prematurity (ICROP) provides a uniform approach to documenting the extent and severity of disease. Four features are evaluated:[6]

Zone – Describes the disease location on the retinal surface in relation to the disc, from the central (zone I) to the outer crescent (zone III).[7]

Stage – Describes the severity from mildest disease (flat white line of demarcation [stage 1]) to most severe (total retinal detachment [stage 5]).

Extent – Described by dividing the retinal surface in 12 sections, similar to hours of a clock.

Presence or absence of plus disease, the most important indicator of disease severity associated with ROP in a hospital with advanced neonatal care in a developing country

There are several risk factors for ROP including, prematurity, very low birth weight(VLBW), supplemental oxygen exposure, respiratory distress syndrome, multiple blood transfusion, mechanical ventilation and surfactant therapy.[8, 9]

Other possible risk factors include sepsis, fluctuations in blood gas measurements, intraventricular hemorrhage, bronchopulmonary dysplasia, systemic fungal infection, and early administration of erythropoietin for the treatment of anemia of prematurity.

In high-income countries, ROP usually occurs in infants with birth weight (BW) <1.5kg or gestational age (GA) <32 weeks. However, ROP has been reported in preterm infants with BW >1.5kg and GA of 32 to 36 weeks in LMIC, probably due to lower quality care.**[1, 10, 11]**

ROP was previously thought not to be a problem in sub-Saharan Africa (SSA) due to the poor survival of preterm infants**.[1]**

The population of infants who develop severe ROP in highly developed countries differs from those who are affected in less well-developed countries, given the complex interaction between case mix, neonatal care, and survival rates, as well as variation in screening practices and follow-up rates of discharged infants. These findings suggest that larger, more mature infants are developing severe ROP in countries with low/moderate levels of development compared with highly developed countries. ROP screening programs need to use criteria that are appropriate for their local population.[1]

1.2. Statement of problem

The World Health Organization's Vision 2020 program identified retinopathy of prematurity (ROP) as a leading cause of childhood blindness, particularly low- and middle-income countries (LMIC). More than 184,700 infants born prematurely worldwide in 2010 were estimated to have developed ROP of any stage, 20,000 of which later became blind or severely visually impaired. [10]

In Africa a study done in Egypt showed that the prevalence to be 19.2%-64.9%. Study in Kenya revealed the prevalence of ROP is between 16.7% and 41%. However, data from Nigeria studies report prevalence between 5.5% and 79%. In south Africa a study showed that the prevalence to be from 16.3% to 33.4%.[2]In

Ethiopia there is one study done among premature infant at Minilk-II Hospital and found the prevalence of ROP being 13%. [7]

ROP is a multifactorial disease and the most important risk factors are preterm delivery, especially before the 32nd week of gestation and birth weight less than 1500 g. Apnea, intraventricular hemorrhage, various maternal factors (diabetes, preeclampsia, mother's smoking), respiratory disorders, infection, vitamin E deficiency, heart disease, increased blood carbon dioxide, increased oxygen (O_2) consumption, decreased PH, decreased blood O2, bradycardia, transfusion, amount of received oxygen and duration of ventilation are other risk factors for ROP.[12]

Myopia (nearsightedness) is a common sequela of regressed or treated ROP. High myopia may cause amblyopia as well as strabismus. Macular scarring can occur, which leads to reduced central visual acuity. Less common complications of severe ROP include cataract and glaucoma. Older children and adults with a history of ROP require periodic ophthalmic examinations throughout their lifetime, due to the risk for late complications including retinal detachment.[13]

Early treatment of Retinopathy of Prematurity (ETROP) trials demonstrated the efficacy of early intervention in prevention of visual acuity loss as well as adverse anatomic outcomes. Laser photocoagulation largely has supplanted cryotherapy in the United States, with improved outcomes. With the improved survival of high-risk neonates, ophthalmologists are encountering premature infants with greater frequency [14]

In Ethiopia, according to study done at WGGA eye center, ROP is one of the common childhood eye problems, which is frequently seen at the outpatient departments 33 of 93 (35.5%). [16] However, there is limited data in the study area about the prevalence and potential risk factors. Therefore, this study aims to determine the prevalence and associated factors of ROP among preterm neonates at Jimma medical center department of pediatrics.

1.3. Significance of study

More than 60% of the world's 15 million preterm births occur in South Asia and Sub-Saharan Africa.[1, 15, 16] However, neonatal care was often of inadequate quality, and coverage of ROP screening and treatment services was low.

Africa is considered to be the next frontier for ROP epidemics as a result of increasing economic development and expanding neonatal care [1]

Ethiopia, the second most populous nation in Africa, has a preterm (<37 weeks of gestation) birth rate of 10% and a low birth weight rate (babies born<2,500g) of 20%. Every year 320,000 babies are born preterm. [16]

However, the prevalence of ROP and what proportion of blindness is due to ROP in countries like Ethiopia is not known. SO information gathered may be helpful to prepare base line information for developing effective programs aiming at prevention, diagnosis and treatment of ROP, to prepare cost effective screening program. It might also be useful to other researchers as a reference material.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Magnitude of ROP

Multicenter report from North America of newborns with a gestational age (GA) of 22 to 28 weeks and BWs of 401 to 1500 g gives an overall ROP (any stage) prevalence of 59% with a 16% were of severe ROP[17]

Studies done in Indonesia ROP was identified in only 5 of 479 (1.1%) cases.[18] in other study at a tertiary care center in Telangana show that Incidence of ROP was found to be 66 of 2868, demonstrating an incidence of 2.3% [19] .Study conducted in Bangladeshi also show (4.4%) five of hundred fourteen infants screened diagnosed with ROP.[20]

In a hospital based study conducted in Iran, ROP was found in 4 0f 45 (8.5%) OF premature babies[21]

In a hospital-based cross-sectional study of Brazil, ROP was found about104 of 407 (25.5%) and from this stage I accounts58%, followed by stage II (22.5%).[4] In another study conducted at Brazil the prevalence of ROP was 25.5% (104) .Based on the criteria of The International Classification for Retinopathy of Prematurity (ICROP, 1984/1987), the disease reached stages 1, 2, and 3 in 11.3% (46), 8.4% (34), and 5.4% (22), respectively. One infant developed the disease up to stage 4 (partial retinal detachment), and one progressed to stage 5 (complete retinal detachment, resulting in 0.2% overall prevalence for ROP-induced blindness)[22]

Studies done in Egypt reveal the following magnitude about ROP, In 2012 Hakeem published a study of 172 infants within a two-year prospective report found ROP in 19.2% of studied infants from these 18 (54.5%) cases stage 1, 9 (27.3%) cases stage 2, and 6 (18.2%) cases stage 3. None of the studied neonates presented ROP at stages 4 or 5 [23]

Two studies in Alexandria, Egypt by Nassar (2016) and Bedda (2014) reported a ROP prevalence of 36.5% (GA < 2500 g).The latter study confirmed cases of ROP occurring outside of UK or AAP criteria for BW and GA: 26 patients had GA >32 weeks and 30 patients had BW >1500 respectively. [24, 25]

A study done in Rwanda revel that the overall prevalence was 22 of 148 (14.9%) for any stage of ROP, stage I was 9 (40.9%), stage II 12 (54.6%), and only 1 (4.5%) infant had ROP stage III [26]

Prospective hospital-based study conducted by Omar et al. in 2012–2013 in Sudan demonstrated a prevalence of 34 of 92 (37%) from those, 12 (35.3%) of them developed stage 3 ROP. Seven (20.3%) neonates diagnosed as stage 2, and 13 (37.7%) had stage 1.[27]

In another study conducted in South Africa ROP was diagnosed in 40/135 infants (29.6%); 8 (5.9%) had CSROP. No infant had stage 4 or 5 ROP. Stage 3 ROP occurred in only one infant with a BW >1 250 g. [28]

In a hospital based retrospective review in Kenya, ROP was found about 43/103 (41.7%).and from this Majority of these had Stage 1 or 2 ROP in Zone II, which spontaneously regressed with follow up. Nine infants were diagnosed with vision-threatening ROP(any Zone I disease or Stage 2/3 disease in Zone II with plus disease) [15]

An institutional based cross-sectional retrospective study was conducted on 301 samples
of the pediatrics out-patient eye clinic medical records, at Minilik II referral hospital, from March to April2020.The prevalence of ROP among infants in this study showed 39(13%). Of these, more than half (56.4%) were Zone II + Stage 1, followed by Zone II + stage-2, and Stage-5; 12.8% and 10.2% respectively[7]. In another retrospective study conducted in Addis Ababa WGGA eye center ROP was present in 35.5% of infants [16]

2.2. Associated factor of ROP

There are several factors that may make an individual more likely to develop ROP.A prospective hospital base study done in southwestern **Germany** to study risk factors of ROP, birth weight, gestational age, ventilation therapy of more than 7 days, necrotizing enterocolitis, many blood transfusions and maternal pre-eclampsia were factors that were all highly significantly associated with ROP. As the gestational age decreased, the incidence of ROP increased (P = 0.001). Birth weight of ROP babies ranged from 628 gm to 1650 g with a mean of 1160 (±230) g. The incidence of ROP

in infants ≤1250 gm was 55.1% and >1250 was 16%. On multivariate analysis the higher incidence of risk factors such as RDS, blood transfusion, apnea, low birth weight and low gestational age (prematurity) were independent and significant determinants of ROP (P-value < 0.05 for all) while anemia requiring blood transfusion and apnea were significant risk factors for severe ROP. [29]

A study conducted at Asan Medical Centre, Seoul, Korea reveal that a gestational age (GA) of less than 28 weeks and birth weight (BW) of less than 1000 g were the most significant risk factors. Ventilator care for ≥48 h, apnea, and use of surfactant independently increased the incidence of ROP. Furthermore, frequent apneic attacks increased the progression of pre-threshold ROP to threshold ROP. [30]

ROP was observed in babies with supplemental oxygen exposure (p<0.001), BW less than 1.5 kg (p=0.019), confirmed neonatal sepsis (p=0.001), nasogastric tube feeding (p=0.03) and poor pupillary dilation (0.032). A reduced risk of ROP was observed in boys (p=0.004) and after delivery by caesarean section (p=0.019).[4]

Study in Egypt show that birth weight (P<0.03), gestational age (P<0.03), and receiving total parenteral nutrition (i'<0.01) were associated with ROP [22]

In a hospital-based cross-sectional study done in Taiwan show that Birth weight ≤ 1000 g, intraventricular hemorrhage, sepsis, and use of glucocorticoid or dopamine were risk factors associated with higher incidence of ROP.[31]Similar study was done in Egypt revealed that ROP was associated with, GA (P = 0.000), sepsis (P = 0.004), oxygen therapy (P = 0.018), and frequency of blood transfusions (P = 0.030). [23]

In An institutional based cross-sectional retrospective study at Minilik II referral hospital, Birth weight, oxygen therapy and sepsis were the factors significantly associated with ROP [AOR= 39.28;

95% CI: 3.204- 481.658], [AOR= 5.317; 95% CI: 1.009- 28.019] and [AOR=9.805; 95% CI: 1.592- 60.388] respectively. [7]

2.3. Conceptual frame work

The variables statistically significant with ROP are developed from literatures and books and grouped and displayed as follows

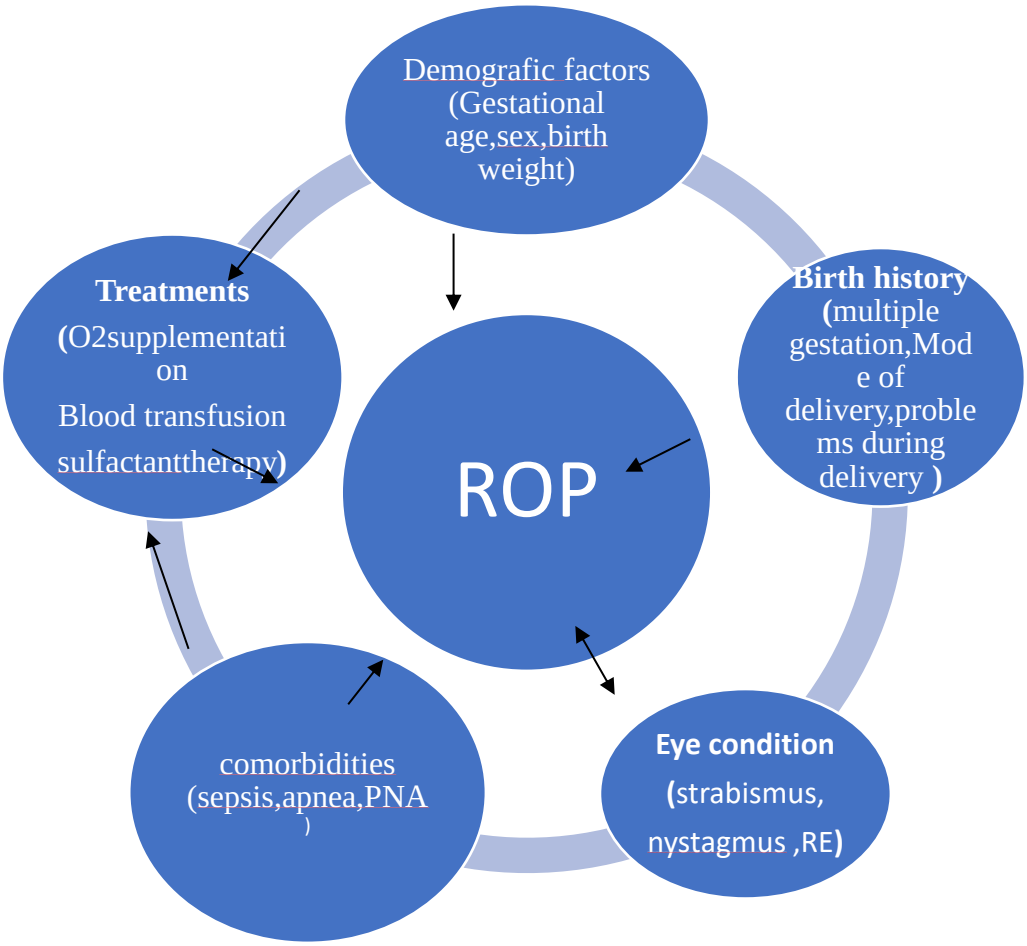


Figure 1: Developed conceptual frame work after reviewing different literatures

CHAPTER THREE

3. OBJECTIVES

3.1 General objectives

- To determine the magnitude of retinopathy of prematurity and associated risk factors among neonates attending Jimma Medical Center South-West Ethiopia 2021

3.2 Specific objectives

- To describe the prevalence of retinopathy of prematurity among neonates admitted to Jimma Medical Center
- To determine risk factors associated with retinopathy of prematurity in neonates admitted to Jimma Medical Center

CHAPTER FOUR

4. METHODS

4.1 Study area

The study was conducted in Jimma Medical center. Currently it is the only teaching and referral hospital in the southwestern part of the country, providing service for approximately 15,000 inpatient, 160,000 outpatient attendants,11,000 emergency cases and 4,500 deliveries in a year coming from catchment population of about 15million people. The study was conducted on preterm neonates discharged from neonatal intensive care unit and on follow up at HRIC.

4.2 Study period

The study was conducted from Feb1 –July 30, 2021

4.3 Study design and Sampling

Institution based prospective longitudinal study design was carried out among neonates who were treated and recovered prematurity after admission to neonatal intensive care unit, and coming to HRIC clinic of Jimma Medical center.

Using single population proportion formula final

- $N=Z_{1-\alpha/2}^{2} P(1-P)/d^{2}$
- Z-α/2- is the standard normal variable with 95% accuracy and 5% margin of error and its Value equals to 1.96
- P-proportion based on previous studies
- d^{2}- absolute error or precision
- $(1.96)^{2}\ 0.13(1-0.13)/\ (0.05)^{2}=173.79=174$

All consecutive subjects during data collection time were included because we could not find the calculated amount in our study time

4.4 Population

4.4.1Source population

All preterm (<37wks) neonates discharged from neonatal intensive care unit and on follow up at HRIC.

4.4.2 Study subject

All preterm (<37wks) neonates discharged from neonatal intensive care unit and on follow up at HRIC who fulfilled inclusion criteria

4.5 Inclusion and Exclusion criteria

4.5.1 Inclusion criteria

Those preterm neonates for whom care givers' gave their consent to the study.

4.5.2 Exclusion criteria

Those preterm neonates whose care givers' did not give their consent to the study

4.6 Study variables

4.6.1 Dependent variables

ROP

4.6.2 Independent variables

Age
Sex
Mode of delivery
Birth weight
Gestational age at birth
Problem during pregnancy and delivery (APH, preeclampsia, chorioaminionitis)
HMD
Sepsis
Apnea
PNA
Ocular conditions; strabismus, nystagmus, Refractive errors
O2 supplementation

4.7 Data collection tool

Data was collected using structured interviewer administered questionnaire and chart review used to assess the risk factors. The ICROP staging criteria of ROP screening/examination procedure was followed. The risk factors were assessed by

pediatric residents and both ophthalmic examination and Fundoscopic examination were conducted by pediatric ophthalmologist. Data was collected by a trained person.

4.8 Data quality

Quality of the data collected was maintained by training the data collectors on the objective of the study and the questionnaire were checked daily for completeness by Principal investigator.

4.9 Data processing and analysis

The collected data was coded and entered in to Epi data version 4.3.1 and finally exported to SPSS version 20 for further analysis. Descriptive statistical analysis was applied to express the finding and bi variate logistic regression analysis was applied to determine factors associated with ROP. A p-value of <0.05 was declared as statistically significant by multi-variate logistic regression. Finally, the finding of the study was reported by using tables, figures and narrations.

4.10 Operational definitions

- Preterm; infant that is born before 37completed weeks of gestation.
- Low birth weight; babies with a birth weight of less than 2500gm regardless of gestational age
- Strabismus was defined as heterotopia of ≥10Δ magnitude at distance or near fixation either vertically or horizontally.
- Retinopathy of prematurity; retinal vascularization abnormality which occur in preterm infant, staged by ICROP

Location	Zone 1	**Circle with optic nerve at canter and a radius of twice the distance from optic nerve to macula**
	Zone 2	From edge of Zone I to the nasal ora serrate nasally and equator temporally
	Zone 3	Lateral most crescent shaped area from Zone II to ora-serrata temporally
Severity	**Stage 1**	Presence of thin white demarcation line separating the vascular from vascular retina
	Stage 2	The line becomes prominent because of lifting of retina to form a ridge having height and width
	Stage 3	Presence of extra retinal fibro-vascular proliferation with abnormal vessels and fibrous tissue arising from the ridge and extending into vitreous
	Stage 4	Partial retinal detachment; not involving macula (4A) or involving macula (4B)
	Stage 5	Complete retinal detachment
Extent		Extent of involvement of the retina as expressed as clock hours (30 degree sectors)
Pre Plus disease		Vascular abnormalities of the posterior pole that are insufficient for the diagnosis of plus disease but that demonstrate more arterial tortuosity and more venous dilatation than normal
plus disease		Presence of dilatation and tortuosity of posterior retinal vessels. Associated with vitreous haze, pupillary rigidity

4.11 Ethical considerations

The study was approved and letter of ethical clearance was obtained by ethical review board committee of Jimma University, institute of health. Letter of support was also collected from JMC and Jimma University, department of pediatrics and ophthalmology to data collection. Oral consent was obtained from participants and their information was handled confidentially. All study was conducted according to

the declaration of Helsinki and Covid 19 prevention strategy was followed during data collection time.

4.12 Dissemination of findings

Report of the analysis result was presented and submitted to the department of pediatrics and child health. Publication in scientific journal and online dissemination will be considered.

CHAPTER FIVE

5. RESULTS

5.1. Characteristics of neonates admitted to NICU, JUMC, 2021.

A total of 71 infants were included in this study. This study revealed that the minimum and maximum age of the study participants was 26days and 60days respectively. More than half 43 (60.6%) of the study participants were males.

Twenty eight (39.4%) of the study participants were born between 32-34 weeks followed by 26 (36.4%) were born between 34-36 weeks and the remaining 17(24%) were between 30-32 weeks. In this study there was no infant screened for ROP below 30 weeks GA. Two-third 47 (66.7%) of study participants had birth weight between 1500-2500 gm and this study revealed that 22 neonates are less than 1500gm and only two neonate had birth weight more than 2500gm. The mean birth weight was 1726.86gm and the minimum and maximum were 1105gm and 2650gm respectively. Forty four (62.0%) of study participants were singleton and the rest 27 (38.0%) of study participants were twins of which 14 (51.9%) were twin B.

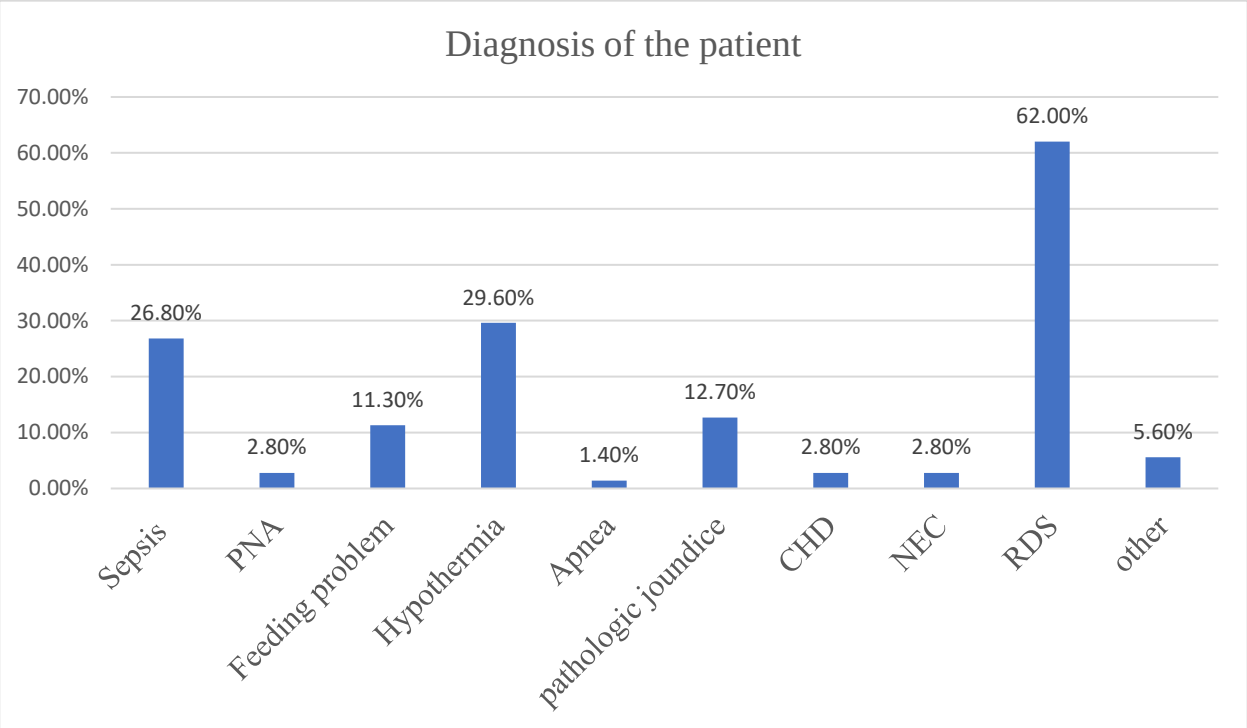
In this study twelve (16.9%) of neonates mother was not having problem during pregnancy. Among the identified problems occurred during pregnancy preeclampsia was the highest frequently mentioned problems and slightly more than three-fourth of neonates were delivered by spontaneous vaginal delivery. Additionally, 11 (11.5%) of study participants had a problem during birth (Table 1).

Table 1 Characteristics of neonates screened for ROP, JUMC, 2021 (n=71)

Variables	Categories	Number	Percent (%)
Sex	Male	43	60.6
	Female	28	39.4
Type of pregnancy	Singleton	44	62.0
	Twin	27	38.0
Birth weight	<1000gm	0	0.0
	1000-1500gm	23	32.4
	1500gm-2500gm	47	66.7
	>2500gm	1	1.4
Status of twin (n=27)	Twin A	13	48.1
	Twin B	14	51.9
Problem during pregnancy	Yes	12	16.9
	No	59	83.1
Types of problems during pregnancy (n=12)	Preeclampsia/Eclampsia	8	66.6
	APH	2	16.7
	PROM	1	8.3
	Choroaminitis	1	8.3
Mode of delivery	SVD	55	77.5
	C/S	15	21.1
	Instrumental delivery	1	1.4
Problem during Birth	Yes	11	11.5
	No	60	84.5
Types of problem during birth (n=11)	Fast breathing	2	18.2
	PPH	1	9.1
	Eclampsia	2	18.2
	Prolonged labor	3	27.2
	Fetal tachycardia	1	9.1
	Bradycardia	2	18.2
Gestational age in week	28-30	0	0
	30-32	17	23.9
	32-34	28	39.4
	34-36	26	36.6

5.2. Systemic diagnosis of the patient

The majority of the study participants were diagnosed with RDS 44(62%) followed by hypothermia 21(29.6%) and sepsis 19 (26.8%). Slightly more than three-fourth 54 (76.1%) of neonates took supplemental oxygen on average 7 days with minimum and maximum of 1 to 28 days respectively (Figure 2).



Others includes: caput succedaneum, hypoglycemia, jaundice and preterm care

Figure 2: Common admission diagnosis of preterm neonates screened for ROP, JUMC, 2021

5.3. General ophthalmic physical examination finding

According to this study all the study participants had no a developmental problem until the day of ophthalmic evaluation and only 1 (1.4%) of study participant had family history of eye disease. Regarding to general appearance of eye 2 (2.8%) of study participants had nystagmus and only 1(1.4%) of study participant had squint, the rest majority 68 (95.8%) of them had normal eye appearance.

The adnexa, eyelid, eyelashes and conjunctiva of the majority of respondents were normal and 2 (2.8%) had moderate papillae. One (1.4%) of study participant had KPS cornea. This study also revealed that all study participants had normal morphology of lens. One (1.4%) of individual's Iris had Heterochromia. This study also revealed that

the majority 67 (94.4%) of study participants had round pupil. Regarding to pupil regularity the majority 66 (93.0) of study participant's pupil had light reaction and 1 (1.4%) study participant pupil near reaction. In this study among neonates admitted to NICU no one reported as having leukocooria (Table 2).

Table 2: General physical finding of eye examination JUMC, 2021 (n=71)

Variables	Categories	Frequency(n=212)	Percent (%)
Eye disease in the family	Yes	1	1.4
	No	70	98.6
General appearance of eye	Normal	68	95.8
	Squint	1	1.4
	Nystagmus	2	2.8
IOP (OD)	Soft	71	100.0
IOD (OS)	Soft	71	100.0
Adnexa	Normal	69	97.2
	Moderate papillae	2	2.8
Cornea	Normal	69	97.2
	KPS	2	2.8
Iris	Normal	70	98.6
	Heterochromia	1	1.4
Pupil	Regular and reactive	71	100.0
	None reactive	0	0.00

5.4. Prevalence of ROP among neonates admitted NICU

In this study the prevalence of retinopathy of prematurity among neonates was 2(2.8%) [CI 0-7.3] (Figure3). Regarding to the extent of the disease both neonates having ROP was found at zone 2 and regarding to the stage of the disease both were found at stage 1. The infants having ROP were discordant in sex. In this study both neonates having ROP, the birth weight was between 1000-1500 gm. In the same way both neonates having ROP were born between 30-32 weeks of gestational age. The

result of this study revealed that; both neonates who had ROP were not having indication for treatment, no need further treatment and they improved and discharged from follow up.

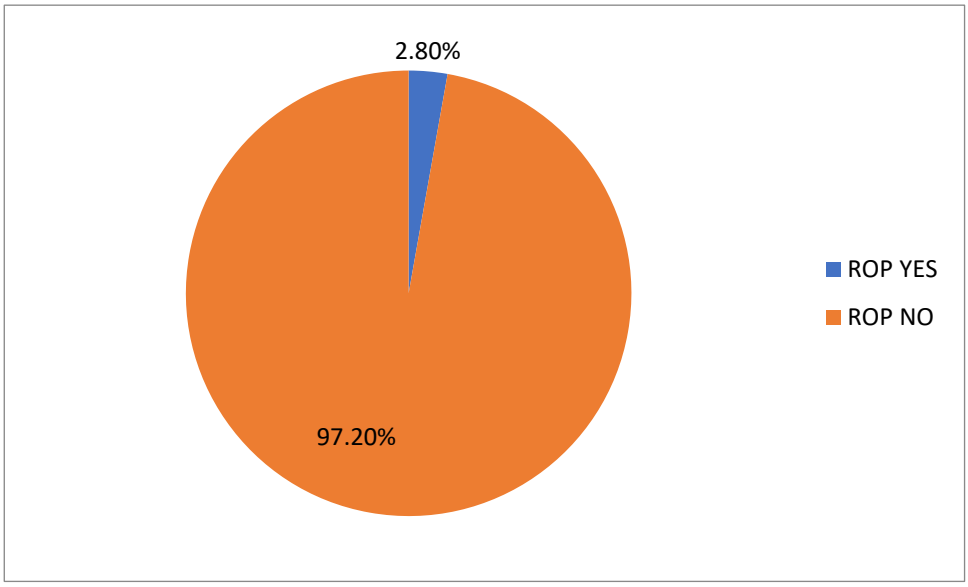


Figure 3: Prevalence of ROP among preterm neonates, JUMC, 2021

5.5. Factor associated with ROP among neonates admitted NICU

In the bi-variate analysis by SPSS, P value for all variable was >=0.47. Based on that, we conclude no statistically significant association between dependent and independent variable in our study.

Table 3: Binary logistic regression showing the effect of different factors on ROP among preterm neonates in JUMC, 2021 (n=71)

Variables	Categories	ROP		P value
		Had ROP (%)	Normal (%)	
Sex	Male	1(2.3)	42(97.7)	0.758
	Female	1(3.6)	27(96.4)	
Type of pregnancy	Single	2(4.5)	42(95.5)	0.998
	Twin	0(0)	27(100)	
Gestational age	28-30	0(0.0)	(00.0)	1.00
	30-32	2(11.8)	15(88.2)	0.999
	32-34	0(0.0)	28(100.0)	1.00
	34-36	0(0.0)	26(100.0)	1.00
Problem during pregnancy	Yes	0(0.0)	12(100.0)	0.999
	No	2(3.4)	57(96.6)	
RDS	Yes	2(4.5)	42(95.5)	0.998
	No	0(0.0)	27(100.0)	
Mode of delivery	SVD	2 (3.6)	53 (99.4)	0.999
	C/S	0(0.00)	15 (100.0)	1.00
	Instrumental	0(0.0)	1(100.0)	1.00
Sepsis	Yes	1(5.3)	18(94.7)	0.470
	No	1(1.9)	51(98.1)	
PNA	Yes	2(50.00)	2(50.00)	
	No	0(0.0)	67(100.00)	
Birth weight (gm)	<1000	0(0.0)	0(0.0)	1.00
	1000-1500	2 (8.7)	21 (91.3)	0.997
	1500-2500	0 (0.0)	47 (100.0)	1.00
	>2500	0 (0.0)	1 (100.0)	1.00
Duration of oxygen therapy (Mean day) (n=54)	≤7.65 day	0(0.0)	35(100.0)	0.998
	>7.65 day	2(10.5)	17(89.5)	
Strabismus	Yes	0(0.0)	1(100.00)	1.00
	No	0(0.0)	70(100.00)	
Nystagmus	Yes	0(0.00)	2(100.00)	1.00
	No	0(0.0)	69(100.00)	

CHAPTER SIX

6. DISCUSSION

ROP is a sight treating ophthalmic problem in young children. An understanding of the prevalence of ROP and the factors associated adds a new knowledge about the risk factors of ROP, leading to better understanding and management of the condition.

The overall prevalence of ROP in this study was 2.8% (95% CI: 0%-7.3%).This prevalence is almost comparable with study done in Bangladeshi five of hundred fourteen infants screened (4.4%)[20]and in other study at a tertiary care center in Telangana show that Incidence of ROP was found to be 66 of 2868, demonstrating an incidence of 2.3% [19] This similarities can be due to similarities in economic status and level of neonatal care.

However, the prevalence found in this study is lower than many study conducted in different countries. In a hospital-based cross-sectional study of Brazil, ROP was found about 104 of 407 (25.5%) [4] Studies done in Egypt , in 2012 Hakeem published a study of 172 infants within a two-year prospective report found ROP in 33(19.2%) of studied infants. [23] A study done in Rwanda show that the overall prevalence was 22 of 148 (14.9%) [26] Prospective hospital-based study conducted by Omar et al. in 2012–2013 in Sudan demonstrated a prevalence of 34 of 92 (37%).[27] In another study conducted in South Africa ROP was diagnosed in 40/135 infants (29.6%). [28] In a hospital based retrospective review in Kenya also ROP was found about 43/103 (41.7%). [15]

The discrepancy may be due to the differences in economic status, ethnicity, genetics, practice setting, screening programs, and level of perinatal care at the respective institutions.

We don't have neonate screened for ROP with GA less than 30 and birth weight less than 1000gm, so critically ill neonates either have died or do not come for examination. This may contribute for the lower prevalence of ROP at our hospital.

The prevalence found in this study lower than study done in our country, Minilik II referral hospital, the prevalence of ROP among infants was 13% [7] and in Addis Ababa WGGA eye center ROP was present in 35.5% of screened infants. [16] The possible explanations for such differences are the studies are done retrospectively on

infants who are screened with indication for infants presented with eye complain at respective hospitals and the other possible reason may be WGGA Eye center is private where care of premature babies could be more than government health institutions so that preterm infants could survive more.

At Minilik II referral hospital, more than half (56.4%) were Zone II + Stage 1, followed by Zone II + stage-2, and Stage-5; 12.8% and 10.2% respectively[7].Our study also showed that infants who developed ROP were in zone II+ stage I. There was no stage three, four and five disease. In this description, all of the infants were found to have non-vision threatening, all of which regressed spontaneously

Among the risk factors in our study both infants who developed ROP the GA was 30-32 week, birth weight was between 1000-1500gm and duration of oxygen therapy was more than 7days(10day and 13day), this seems to be associated with ROP but not statistically significant. In study done in our country Minilik II referral hospital GA, birth weight, sepsis and duration of oxygen therapy were associated with ROP. [16] The absence of association in our study can be due to small sample size.

6.1. Strength and limitation of the study

6.1.1. Strength of the study

This is the first study on ROP for JUMC and is the first prospective study in the country; it is stepping stone for further study in the area.

6.1.2. Limitation of the study

This study has some important limitations that bear in mind while interpreting the results. Since the screening was done on preterm infants who come to the follow-up clinic this may have resulted in an underestimation of the ROP prevalence as we lost some of them out of site after discharge from NICU. The absence of some screening materials like Ret-cam can underestimate the prevalence of ROP. We suggest other study with large number of cases.

CHAPTER SEVEN

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The prevalence of ROP in this study of preterm babies is low (2.8%) and it did not progress to severe blinding disease; rather it spontaneously regressed. This show that the problem is actually happening in our set up and detecting this vision threatening case is very important to halt progression to visual loss. Since GA and birth weight seems to be associated with ROP, preventing preterm delivery may decrease the upcoming incidence of retinopathy of prematurity.

7.2. Recommendation

We recommend ophthalmology and pediatrics department to give attention on ROP detection for preterm and LBW neonates, also parents must be educated on the need of ophthalmic evaluation of their preterm and LBW babies.

As the country is growing economically, NICUs should be well equipped with standard quality equipment including less than 100% oxygen supply facility for low birth weight and preterm neonates as well as ophthalmic centers must be equipped with standard ROP screening equipment like Retcam. Neonatology ward should prepare screening protocols so that preterm and low birth weight neonates can be screened routinely.

Additionally researchers should explore more on prevalence and risk factors of ROP with large sample size.

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Consent form

Hello! My name is Dr. Zinaw, Pediatrics resident at Jimma University, Institute of health and inspired to conduct study entitled “magnitude of ROP and its risk factors among neonates admitted and discharged from NICU; A institutional based prospective longitudinal study”.

Therefore, you are kindly requested to participate in the study voluntarily by considering your participation is incredible for and it is entirely based on your willingness and your refusal doesn’t affect the service you get from us. You have the right to participate and/or refuse and you can interrupt at any point to ask questions.

Any information obtained from you and your medical records will remain confidential and needed only for study purpose. If you agree to participate in the study, please proceed with interview after signing below. Thank you!

Interviewer’s name signature _____ Date _____

Supervisor’s signature _____ Date _____

የፈቃደኝነትመጠየቂያናየመረጃገጽ

የመረጃገጽ

ሰላም! ስሜ__ዝናዉ ሲሳይ_____ ይባላል፣በጅማ ዩኒቨርሲቲ የህፃናት ህክምናእናጤናየሁለተኛድግሪ (ስፔሻሊቲ) ተማሪ ነ ኝ። ከጨቅላነት ጋር በተያያዘ የብርሃን ተቀባይ የደም ስሮች መቀንጨር (ROP) እና ተያያዥ ችግሮች ላይ ጥናት እያካሄድኩ ነው። የዚህ ጥናት ውጤት የበሽታውን መጠን ለማወቅ ያስችላል። የእርስዎ በጥናቱ ላይ ተሳትፎ በፈቃደኝነት ላይ የተመሰረተ ነው። መሳተፍ ካልፈለጉ መተው ይቻላል። የእርስዎ ስምና ግለሰባዊ መርጃ ሚስጥራዊነቱ የተጠበቀ ነው። ስለእርስዎ መረጃ ጥናቱን ከሚያካሂደው ሰው ውጭ ሌላ ሰው አያውቅም። ፈቃደኛ አለመሆንዎ በሚያገኙት ማንኛውም የጤና እርዳታ ላይ ምንም አይነት ተፅዕኖ አይኖረውም። ስለተሳትፎዎ አመሰግናለሁ።

የፈቃደኝነትቅጽ

በጥናቱ ለመሳተፍ ተስማምተዋል?

☐ አዎተስማምቻለው ☐ አይአልተስማማሁም

በመጥይቁ ሞይው የሚፈረም፡
ከላይበመረጃገጽላይያለውንለጥናቱተሳታፊበተገቢሁኔታአንብቤማስረዳቴንበፊርማዬአረጋግጣ ላሁ።

የጠያቂው ስም፡ _____

ፊርማ፡ _____

ቀን፡_____

የተቆጣጣሪው ስምና ፊርማ፡_____

HeyyamaHirmaataa/ttuqorannookanaa

Akkamjirtuu! Ani maqaan koo Dr Zinnaw sissay, kutaa yaalumsaa fi fayyaa daa'immanii hospitaala Jimmaa keessatti barataa waggaa 3ffaa fi isaxumuraati. Daa'immanYeroonosoo hingahiin dhalataniifi rakkinainn iijaisaaniiirratti fiduirratti qorannoogaggeessuufi. Kanaaf iyyu fedhiikeessaniin irratti hirmaachuudhaanfii xaan ba'umsa qorannoo kanaaf guumaacha akka gootan kabajaan isin gaafachaa, odeeffannoon isain naaf laattan icitiin isaa akka eegamuufi akkasumas dhimma biraaf akka hin oolle isiifan mirkaneessa. Hirmaachuu diduudhaaf mirga guutuu qabdu. Diduun keessani ammoo tajaajila argattan irratti dhiibbaa tokkoyyuu hinqabu. Yoo hirmaachuuf irratti walii galtan fedhii keessanin ta'uu isaa mallattoo keessaniin nuuf mirkaneessa. Galatoomaa!

Maqaa namagaaffiigaafatuu: _____

Guyyaa: _____
Mallattoo: _____

Maqaafi mallattoo too'ataa: _____

Questionnaire of ROP

Identification and address

1. Name:
2. Age:
3. Sex:
4. Phone number:

Birth History

5. Gestational age (GA) _____ wks.
6. Birth weight in grams (if born outside, admission weight if admitted within 72 hours of birth): _____
7. Was the pregnancy singleton? Yes ☐ No ☐
8. If no to Q7, was the baby Twin A ☐ Twin B ☐
9. Was there problem during pregnancy? No ☐ Yes ☐
10. If yes specify:

    _____
    _____
    _____
11. Mode of delivery: SVD ☐ C/S ☐ Instrumental delivery ☐
12. Was there Problem during birth? No ☐ Yes ☐
13. If yes specify:

    _____
    _____
    _____
14. Diagnosis at admission:

a. RDS☐No ☐ Yes
b. Sepsis☐No ☐ Yes
c. PNA☐No ☐ Yes
d. Feeding problems ☐No ☐ Yes
e. Hypothermia☐No ☐ Yes
f. Apnea☐No ☐ Yes
g. Others ☐, specify

15. Was the baby on supplemental oxygen? No ☐ Yes ☐
16. How long was the baby on supplemental oxygen?

17. Is there any problem with the development of your child?
    No ☐ Yes ☐ specify
18. **Was there any one who had eye disease in your family? No ☐ Yes ☐ specify**

19. Ophthalmic Evaluation

General appearance:

Nystagmus: ☐

Squint: ☐

VA: OD (cs) OS (cs)

VA: OD (cc) OS (cc)

IOP: OD OS

19.Adenexae:

Eyelid:

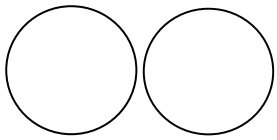
Eyelashes:

Conjunctiva: Giant papillae ☐ Moderate papillae ☐ Mild Papillae ☐ Follicles (<5) ☐ Follicles (>5) ☐

20. Cornea (haze, striae, KPs, infiltrate, ulcer, scar, edema)

Corneal size: Horizontal
Vertical

OD OS



Slit Lamp Exam

21. Lens: Dislocated ☐ Subluxated ☐

Cataract: Unilateral ☐ Bilateral ☐
Cataract morphology:

Nuclear ☐ Lamellar ☐ Sutural ☐
Lenticonus ☐ Polar ☐ Blue dot ☐
Membranous ☐ Zonular ☐ Total ☐

Leukocoria: No ☐ Yes ☐

22. Iris: Nodules ☐ NVI ☐ Heterochromia ☐

23. Pupil: Shape: Regularity: Light reaction ☐
Near reaction ☐ Posterior synchiae ☐

Fundus exam:

24. Is there ROP? No ❑ Yes ❑

25. Extent of the disease: Zone 1 ❑ Zone 2 ❑ Zone 3 ❑

26. Stage of ROP: 1❑ 2❑ 3❑ 4a❑ 4b❑ 5❑

27. Is there Plus disease? No ❑ Yes ❑

28. Other abnormalities of fundus specify:_____

29 Is there indication for treatment? No ❑ Yes ❑

30. Treatment if any: Laser ❑ Intravitreal anti VEGF❑ Surgical (PPV) ❑ other ❑

31. Follow up: Improved❑ worsened ❑ same❑

32Visual outcome: Good ❑ Bad: ❑

34Need for farther treatment: ❑No ❑ Yes

35If Yes, Specify_____