"CORRELATION OF RELATIVE RISK OF RETINOPATHY OF PREMATURITY AND EARLY POSTNATAL WEIGHT GAIN AMONG ROP AND NON ROP BABIES"

By

DR. SHAIK RAHEEMUNNISA,M.B.B.S

Dissertation submitted to

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IN
OPHTHALMOLOGY

Under the guidance of

DR. HANUMANTHAPPA B.O

M.B.B.S., M.S.

Under the co-guidance of

DR. BEERE GOWDA Y.C

M.B.B.S., M.D.

DEPARTMENT OF OPHTHALMOLOGY

SRI DEVARAJ URS MEDICAL

COLLEGE, TAMAKA, KOLAR.

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DR.B.O. HANUMANTHAPPA
M.B.B.S.,M.S
Professor, Department of Ophthalmology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

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Date:

Place: Kolar

Signature of Co-Guide

DR.BEERE GOWDA Y.C

M.B.B.S., M.D

Professor,

Department of PAEDIATRICS

Sri Devaraj Urs Medical College

Tamaka, Kolar.

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DR.MANJULA T R.
Professor and HOD
Department of Ophthalmology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Date
Place: Kolar

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Sri Devaraj Urs Medical College,
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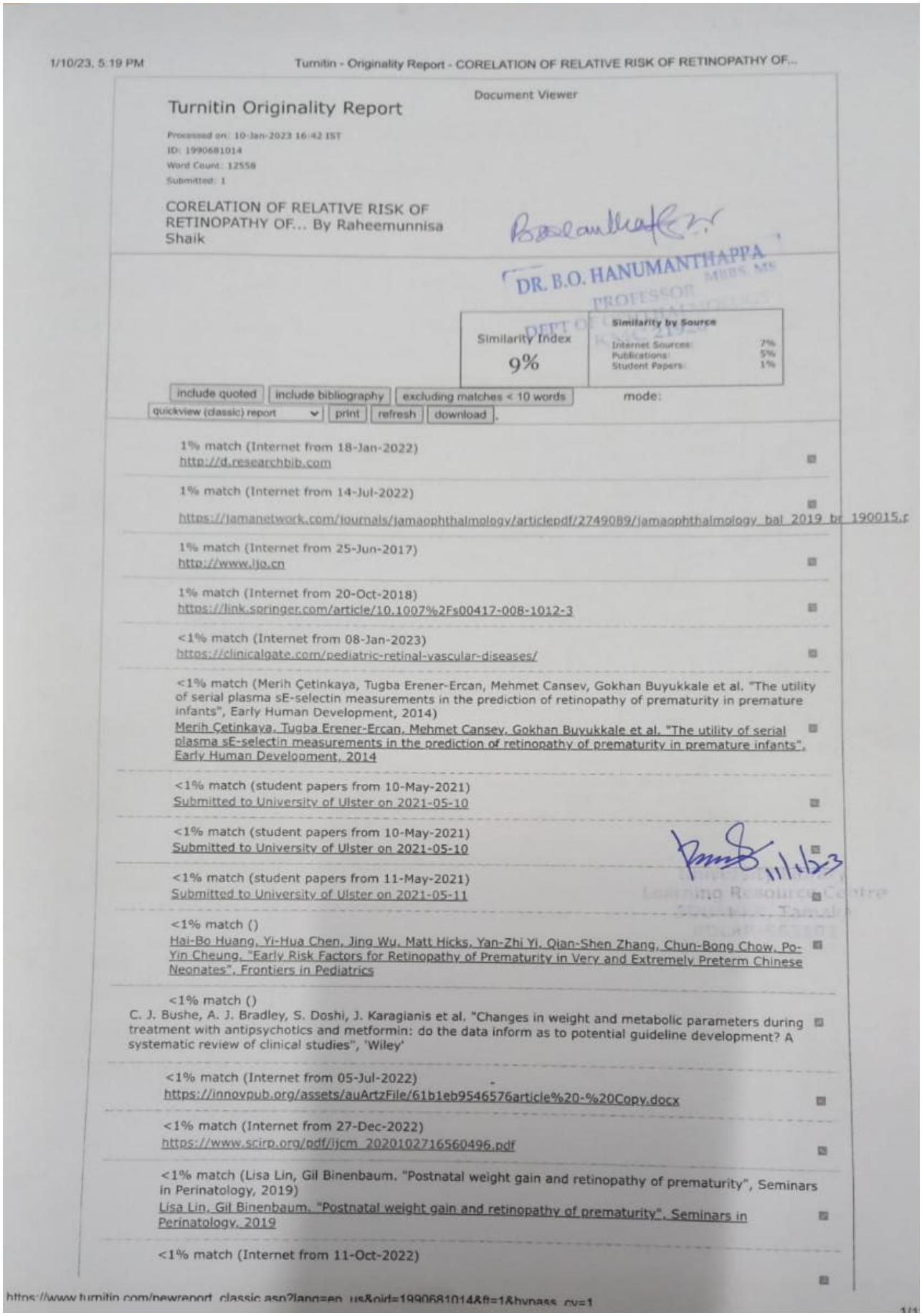

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ABSTRACT:

Introduction: The most common reason that preterm children go blind is due to a disorder known as retinopathy of prematurity (ROP), which occurs due to disruption of the normal development of the vasculature in the retina. Significant risk factors include premature delivery and a low birth weight. The clinical profile of ROP varies considerably between industrialized countries and poor countries. Several investigations have revealed that the clinical profile of severe ROP in developing countries like India is different from that in western countries. The identification of risk variables is helpful for screening potentially vulnerable newborns and for more efficiently allocating treatment. One of the risk factors is a slow or insufficient postnatal weight gain. In India, a possible risk factor is low postnatal weight gain which has only been the subject of a very few number of research studies. The purpose of this present study is to evaluate whether or not there is a connection between postnatal weight gain and the risk of Retinopathy of Prematurity in premature infants who were born in or around the area of Kolar in India.

Methods: A total of 123 premature LBW babies < 2500g, gestational age < 34 weeks and if >34 weeks suggested by pediatrician are screened for ROP at 4-5 weeks of chronological age in B.L.J Hospital and Research Centre between January 2021 to June 2022. Preterm are divided into ROP group and non ROP group according to presence or absence of ROP changes in the fundus. Assessment of the Weight gain and weight gain proportion is done at 4-5 weeks, when the babies came for ROP Screening.

Results & Conclusion: 5.3% of patients were found to have AP ROP, 7.3% of patients were found to have stage 1 ROP, 19.5% of patients were found to have stage 2 ROP, and 3.3% of patients were found to have stage 3 ROP. In 90.7% of patients, there was no evidence of ROP. There were 50.4% males and 49.6% females in the sample. Patients who had ROP had a mean gestational age of 30.00 +/- 2.17 weeks, while patients who did not have ROP had a mean gestational age of 32.76 +/- 1.90 weeks. It was statistically significant that the ROP group had a mean birth weight of 1413.17 g, whereas the non-ROP group had a mean birth weight of 1588.44 g. The p value was 0.006. The ROP group had a mean weight gain of 44.87 gms, while the non-ROP group gained 280.67 gms, and the difference was statistically significant (p = 0.001). The ROP group had a mean weight gain of 316.96 gms and the non-ROP group had 2 mean weight gain of 883.19 gms, and the p value for this comparison was 0.001. There was a statistically significant difference in the mean relative weight gain at the fourth week between the ROP group and the non-ROP group, which was 0.03 grammes for the ROP group and 0.17 grammes for the non-ROP group. At the sixth week, the ROP group had a mean relative weight gain of 0.23 g., whereas the non-ROP group gained 0.44 g, and the difference was statistically significant (p = 0.001). Both body weight during birth and age were independent risk factors for ROP. According to the findings of this study, one of the most significant risk factors for the development of retinopathy of prematurity is a modest postnatal weight gain at the early postnatal period. (ROP).

1

DR. B.O. HANUMANTHAPPA
MBBS, MS
PROFESSOR
DEPT OF OPHTHALMOLOGY
KMC 21920

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LIST OF ABBREVATIONS

ROP	Retinopathy of prematurity
RLF	Retrolental fibroplasia
VEGF	Vascular endothelial growth factor
BW	Birth Weight
GA	Gestational Age
LBW	Low Birth Weight
VLBW	Very Low Birth Weight
ELBW	Extreme Low Birth Weight
IDO	Indirect Ophthalmoscope
PPV	Pars plana Vitrectomy
VH	Vitreous Hemorrhage
TRD	Tractional Retinal Detachment
GDM	Gestational diabetes mellitus
RDS	Respiratory Distress Syndrome
IVH	Intra ventricular hemorrhage
ICROP	International classification of Retinopathy of Prematurity
WG	Weight Gain
PMA	Post Menstrual Age
WGA	Weight Gain Acceleration
WGR	Weight Gain Rate

ABSTRACT

Introduction :

The most common reason that preterm children suffer from blindness is due to a disorder known as retinopathy of prematurity (ROP), which occurs due to disruption of the normal development of the vasculature in the retina. Significant risk factors include premature delivery and low birth weight. The clinical profile of ROP varies considerably between industrialised countries and poor countries. Several investigations have revealed that the clinical profile of severe ROP in developing countries like India is different from that in western countries. The identification of risk variables is helpful for screening potentially vulnerable newborns and for more efficiently allocating resources. One of the risk factors is a slow or insufficient postnatal weight gain. In India, a possible risk factor is poor postnatal weight gain which has only been the subject of a very few number of research studies. The purpose of this present study is to evaluate whether or not there is a connection between postnatal weight gain and the risk of Retinopathy of Prematurity in premature infants who were born in or around the area of Kolar in India.

Methods

A total of 123 premature LBW babies < 2500g; gestational age < 34 weeks and if >34 weeks suggested by pediatrician are screened for ROP at 4, 6 weeks of chronological age at R.L.J Hospital and Research Centre between January 2021 to June 2022. Preterms are divided into ROP group and non ROP group according to presence or absence of ROP changes in the fundus. Assessment of the weight and weight gain is done at 4, 6 weeks, when the babies came for ROP Screening

Results

3.3% of babies were found to have AP ROP, 7.3% of babies were found to have stage 1 ROP, 19.5% of babies were found to have stage 2 ROP, and 3.3% of babies were found to have stage 3 ROP. In 66.7% of babies, there was no evidence of ROP. There were 50.4% males and 49.6% females in the sample. Babies who had ROP had a mean gestational age of 30.90 +/- 2.17 weeks, while babies who did not have ROP had a mean gestational age of 32.76 +/- 1.90 weeks. It was statistically significant that the ROP group had a mean birth weight of 1413.17 g, whereas the non-ROP group had a mean birth weight of 1588.44 g. The p value was 0.008. The ROP group had a mean weight gain of 46.97 gms while the non-ROP group gained 280.87 gms, and the difference was statistically significant ($p = 0.001$). The ROP group had a mean weight gain of 316.56 gms and the non-ROP group had a mean weight gain of 683.19 gms, and the p value for this comparison was 0.001. There was a statistically significant difference in the mean relative weight gain at the fourth week between the ROP group and the non-ROP group, which was 0.03 gramms for the ROP group and 0.17 grams for the non-ROP group. At the sixth week, the ROP group had a mean relative weight gain of 0.23 g., whereas the non-ROP group gained 0.44 g, and the difference was statistically significant ($p = 0.001$). Both body weight during birth and age were independent risk factors for ROP. According to the findings of this study, one of the most significant risk factors for the development of retinopathy of prematurity is a “poor postnatal weight gain” in the early postnatal period. (ROP).

Keywords: Retinopathy of prematurity, postnatal weight gain, risk factors, low birth weight, preterm

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INTRODUCTION

INTRODUCTION

Retinopathy of prematurity is a complex condition, which is the major cause of blindness that affects the development of retinal vessels in preterm infants. Significant risk factors include premature delivery and LBW. There are a variety of other risk factors that are linked to ROP.

ROP is a complicated disease process that may be triggered in preterm newborns by a lack of full retinal vascularization. Development of the blood vessels in the retina starts about week 16 of pregnancy and moves outward from the optic disc toward the periphery of the retina. Because the retinal vasculature is completely grown in term children, retinopathy of prematurity (ROP) cannot arise in these babies. However, ROP may occur in preterm infants because the development of the retina is incomplete. Ischemia of the retina may occur if the young retina lacks retinal vessels, which can cause the condition. Vitreous haemorrhage, tractional retinal detachment, and eventual blindness are all potential outcomes of the disease's progression[1].

ROP may be avoided by screening infants at high risk for the condition. It is of the utmost significance to diagnose and treat ROP, and one of the first steps in doing so is identifying high-risk newborns and conducting repeated retinal exams. The clinical profile of ROP varies considerably between industrialized countries and poor countries. Several investigations have revealed that the clinical profile of severe ROP in developing countries like India is different from that in western countries[2].

One of these developing nations is India. The majority of the scientific literature is based on study carried out in different nations, which have varying racial compositions, geographic layouts, and NICU environments. Since retinal testing involves expertise, specific equipment, and a tight follow-up schedule, all of which pose a barrier to access in rural locations and cities alike, it may be difficult to get these services in any location. The identification of risk variables is helpful for screening potentially vulnerable newborns and for more efficiently allocating resources. One of the risk factors is a slow or insufficient post-natal weight gain.[3]

In India, only few number of research studies are present on slow or insufficient postnatal weight gain as a possible risk factor of ROP. The purpose of this present study is to evaluate if there is any connection between the risk of Retinopathy of Prematurity and postnatal weight gain in premature infants who were born in or around the area of Kolar in India.

AIMS & OBJECTIVES

AIMS & OBJECTIVES

AIM

- To assess and correlate the relative risk of Retinopathy of prematurity and early postnatal weight gain in preterms in and around kolar.

OBJECTIVES

- To measure the weight gain in ROP babies and non ROP babies.
- To analyse the poor weight gain as a risk for progression of ROP.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORY

In Boston in February of 1941, two premature infants, each approximately 1 Kg in weight, were born with nystagmus, almost flat anterior chambers, grayish red reflexes, and gray membranes with blood vessels on the back surface of lens in both eyes. These infants were at the forefront of a blindness epidemic that extended over the next 15 years. This became to be known as the retrolental fibroplasia (RLF) epidemic, in reference to the scar tissue that developed behind the lens[4].

From 1942 through 1945, Terry[4-9] followed infants with RLF and reported on 117 who had the new pathology. The term RLF, according to Silverman originated in 1944 with Dr.Harry Messenger, a Boston Ophthalmologist. Terry theorized that the problem derived from the persistence and overgrowth of components of the embryonic hyaloid vascular system. It was he who first raised the possibility of extreme prematurity itself as being responsible for the malady.

In 1946, Reese and Payne observed RLF in both premature and full-term infants. In 1948 and 1949, Owens and Owens[10-12] first described RLF In serial stages of (1) dilated and tortuous retinal blood vessles, (2) retinal elevation more peripherally, (3) further elevated retina with a membrane at the edge of the field, and (4) complete retrolental membrane with blood vessels over the totally detached retina. They stated that RLF was a postnatal vascular retinopathy with neovascularization and its secondary complications.

The “Oxygen Era” in 1952 Crosse and Evans in England suggested that freely used oxygen was responsible for RLF. Patz et al and Patz[13] in the first of the controlled studies in 1952, alternately assigned infants weighing less than 1600gm at birth to receive either “high oxygen” (65% to 70% oxygen for 4-7 weeks) or “low oxygen” (<40% oxygen for 24 hours to 2 weeks). After one year, 60% of the surviving newborns in the high oxygen group had RLF, but only 6% of the surviving infants in the low oxygen group had RLF. In the second year, 12 (20%) of 60 infants in the high oxygen group had RLF, compared with one (<1%) of 60 receiving low oxygen. Thus discrimination was made for duration and concentration of oxygen used.

The Pediatric Advisory Committee to the Cooperative Study of Oxygen made their recommendation in April of 1954 that the newborns should only get oxygen when it was absolutely necessary, and even then, the concentrations should not surpass 40%.
From 1953 to 1955, a controlled multicenter nursery cooperative study of oxygen levels in premature neonates was undertaken[14]. The cooperative study did not find that the extent of RLF correlated with the percentage of oxygen supplementation per se.

Kinsey did note, however, a strong relationship between the duration of oxygen therapy over several weeks and RLF. There were thirty five cases of cicatricial RLF among infants who were part of the oxygen restricted group in the comparative oxygen study, but there were only twelve cases among infants who were part of the usual (50% oxygen for 8 days) groups. In addition, numerous surprising discoveries were made, such as the fact that cicatricial RLF occurred three times more frequently in twins and multiple birth newborns than it did in singletons.

However, on average, singleton children were exposed to oxygen for longer periods of time and were born at a lower gestational age than multiple birth infants were. In contrast to the findings of Bedrossion[15], it did not appear that the rate of oxygen removal played a key role in the vascular alterations that occurred during RLF.

Lucey and Dangman[16] cited reports on 159 infants who had not received oxygen therapy and still developed RLF. These hyperoxic cases challenge the dogma that RLF is a unique response of the premature infant retina to excess oxygen. It has been suggested that perhaps some full-term infants are born with premature retinal development, leading to a process comparable to that in premature infants.

Although other workers were not able to prove the efficacy of the 40% oxygen directive clinically, because of its timing, method of publication, and ostensible clinical validity, it was to achieve clinical acceptance that set the standard for neonatal care. Curiously, while this standard was in effect RLF decreased significantly. However, the “less than 40% only” policy of oxygen treatment was reinforced by the knowledge that malpractice suits for RLF were increasing. At the same time, however, total elimination of RLF could not be achieved. The possibility was accepted that 21% oxygen in ordinary room air can produce RLF.

In 1982 Kalina and Karr[17] reported 2 decades of experience at the University of Washington with RLF in infants <2 kg. The incidence of ROP or RLF in surviving neonates from 1960 through 1967 was 14%. From 1968 through 1980, 20% of 140 infants developed cicatricial disease.

Most of these neonates retained useful vision, however in most of these eyes cicatricial RLF was mild and regression occurred spontaneously. Careful oxygen monitoring was thought to be a major factor in the favourable visual outcomes. Oxygen levels and durations were not specified.

Infants born prematurely and/or with low birthweight are more likely to develop retinopathy of prematurity (ROP). Having a morbidity that affects other systems of the body is another risk factor (for example: anaemia, sepsis and low vitamin E levels).

Early exposure to high ambient oxygen concentrations appears to be a crucial risk factor in ROP, although the specific causation of ROP is not completely understood. The significance of oxygen consumption as a key risk factor has decreased as a result of the development of new tools for monitoring oxygen levels in premature newborns. Hyperoxia, which is present during the early stages of ROP development, inhibits the creation of new blood vessels, while later on, retinal hypoxia encourages the growth of abnormal blood vessels.

Before the fourth month of gestation, the retina does not have any blood vessels. During this time, vascular complexes begin to form from the optic disc hyaloid vessels towards the periphery. Following eight months of gestation, the nasal retina should have completed vascularization, and the temporal periphery should have done so at least one month after delivery.

Vascular endothelial growth factor, often known as VEGF, is thought to play an important role in the vasculization process. This theory has been supported by a number of studies. In developing countries, there has been an increase in the incidence of ROP in recent years, which corresponds to the establishment of intensive neonatal treatment regimens in premature babies who previously would not have survived. This rise in the incidence of ROP in developing countries has been attributed to intensive neonatal treatment regimens.[18]

INCIDENCE AND PREVALENCE

In babies born with a low birth weight, the frequency of ROP ranges from 38 to 51.9% in India. Around 26 million babies are born alive every year in our country, and of those, around 8.7% have a birth weight of less than 2000 gramms. According to these findings, there are about 2 million babies who are at risk for ROP.[19]

ROP has been listed as one of the leading causes of blindness in both middle and high income countries by the "Vision 2020 project" of the World Health Organization (WHO). There is an 89% chance of getting ROP in neoonate between the ages of 24 and 27 weeks of gestation. The risk of ROP decreases in proportion to the increasing gestational age. ROP has a 90% incidence in BW that is less than 750 gramms. The risk of ROP decreases in proportion to an individual's body weight. ROP can be found in up to 90 percent of newborns born with a low birth weight who are given oxygen therapy.

The prevalence of serious vision impairment as a result of ROP was 0% in African countries, according to a survey that was done by blind schools, whereas it was 38.6% in Cuba. Due to poor neonatal services Babies who are born in African countries with a low birth weight have a considerably reduced probability of surviving long enough to develop ROP since infant mortality rates in these countries are much higher. The recent outbreak of ROP is mostly a reason for concern in less developed nations. The reason for this is that neonatal care facilities that provide more extensive treatment for premature newborns are helping newborns survive; yet, neonatal services have not yet reached an appropriate level of care where infants can receive unmonitored supplementation of oxygen.

"NORMAL RETINAL STRUCTURE AND VASCULAR SYSTEM"

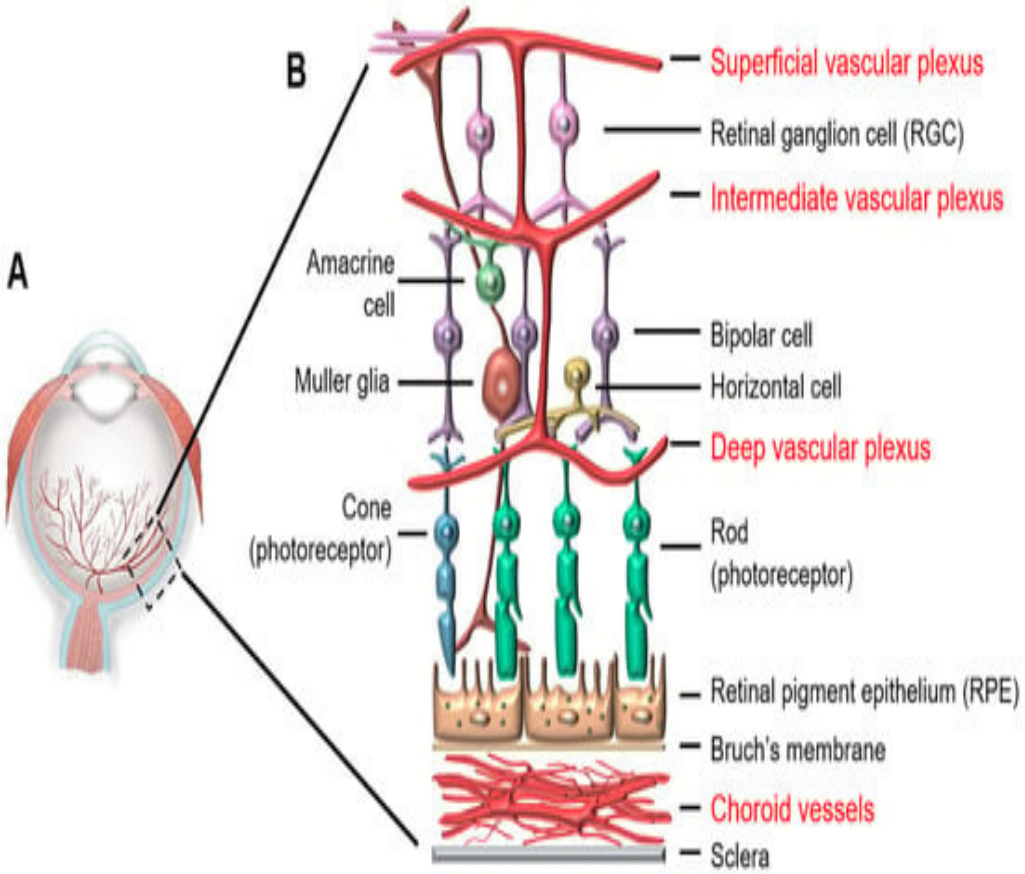

Fig : "Retinal structure and vascular systems: (**A**) Eye structure and (**B**) Retinal structure and vascular systems. The retina is supplied by two vascular systems: retinal and choroidal vasculatures. The retinal vasculature comprises three layers, including the superficial, intermediate and deep plexuses that are interconnected and supply the upper half of the retina. The bottom half of the retina is avascular, relying on the diffusion from the retinal and choroidal vessels".

Until 4th month of gestation	No blood vessels in Retina
4th month of gestation	Vascular complexes begin to form from the optic disc hyaloid vessels towards the periphery
Till 8th month- of gestation	nasal retina should have completed vascularization
At least one month after delivery	Temporal periphery vascularization is completed

Table A - Normal Retinal Vascularization

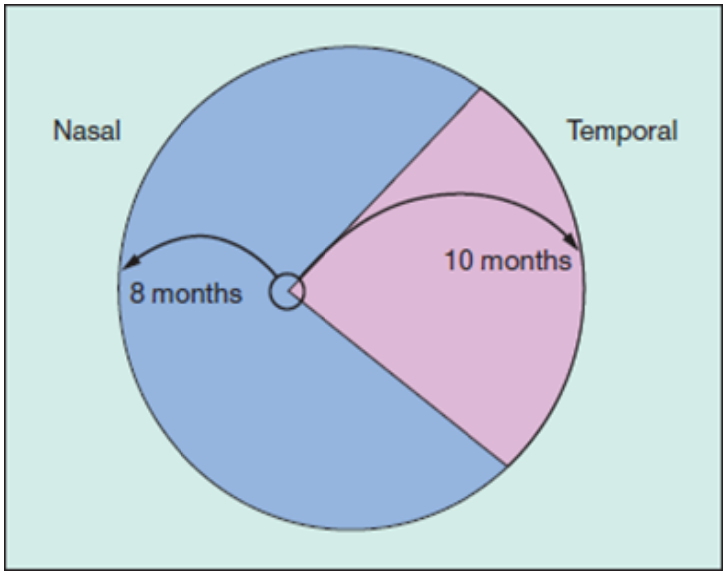

Fig showing schematical representation of retinal vessels development

A newer classification has been proposed recently, which delineate five subgroups of diabetes formulated on six biomedical markers (including beta-cell function and insulin resistance) and the complicationsrisks.[25]

Pathogenesis[20]

Since Terry originally characterised retinopathy of prematurity in 1942, there has been a significant paradigm shift in our understanding of the condition. The delivery of supplemental oxygen was for a long time regarded to be the single most important component that caused the condition; however, this view has since changed, and it is now merely considered to be a risk factor. Both a low birth weight and a decreased gestational age are now regarded to be main causal factors in this condition.

The important hypothesis described are:

(1) The Classical theory

(2) Spindle cell theory

1. The Classical Theory

Ashton and Patz have out the hypothesis that the conventional pathophysiology of ROP[21]. In accordance with this view, which was once commonly accepted, the delivery of additional oxygen was thought to be the primary factor in causing the condition in question. An increase in arterial PO2 generates a vasoconstriction in the retina, which in turn leads to vascular closure. If the vasoconstriction is allowed to continue, later irreversible vascular occlusion will take place. When a newborn is exposed to room air for the first time, endothelial cell proliferation occurs adjacent to closed capillaries, which ultimately results in neovascularization.

The subsequent extension of this neovascularization could reach the vitreous, which would result in haemorrhage that would eventually progress to fibrosis and would cause vitreous traction and retinal detachment.

2. Spindle Cell Theory

This theory, which was introduced by Kretzer et al[22], postulates that spindle cell injury causes the production of retinal and vitreal neovascularization. When a baby is born prematurely, the peripheral retina is often avascular and very thin. Following birth, the spindle cells are subjected to a hyperoxic environment as a result of enhanced oxygen diffusion through this retina from the choroidal vasculature. Free radicals of oxygen have been shown to have cytotoxic properties. They assault damaged spindle cells, which have a weaker anti-oxidative defence mechanism than healthy cells. When these aberrant spindle cells are evacuated from the hypoxic environment of the uterus, which occurs during birth, they cease their migratory and canalization processes. Vardhan AR[22] state that the gap junction surface area between spindle cells exposed to hypoxic environment is increased which plays a significant role in the genesis of ROP. Instead they begin active protein synthesis. Once they are connected by gap junctions, spindle cells lose their natural ability to migrate or canalise and can no longer divide. At the boundary between the vascular and avascular retina, "active spindle cells" are thought to release an angiogenic substance that encourages vasoproliferation. Using ultrastructural data, they postulated that increases oxygen tension triggered formation of gap junctions between adjacent mesenchymal cells within first four days of life. These increased gap junctions formed between mesenchymal cells halted normal vascularisation and triggered neovascularisation which became evident 8-12 weeks later.

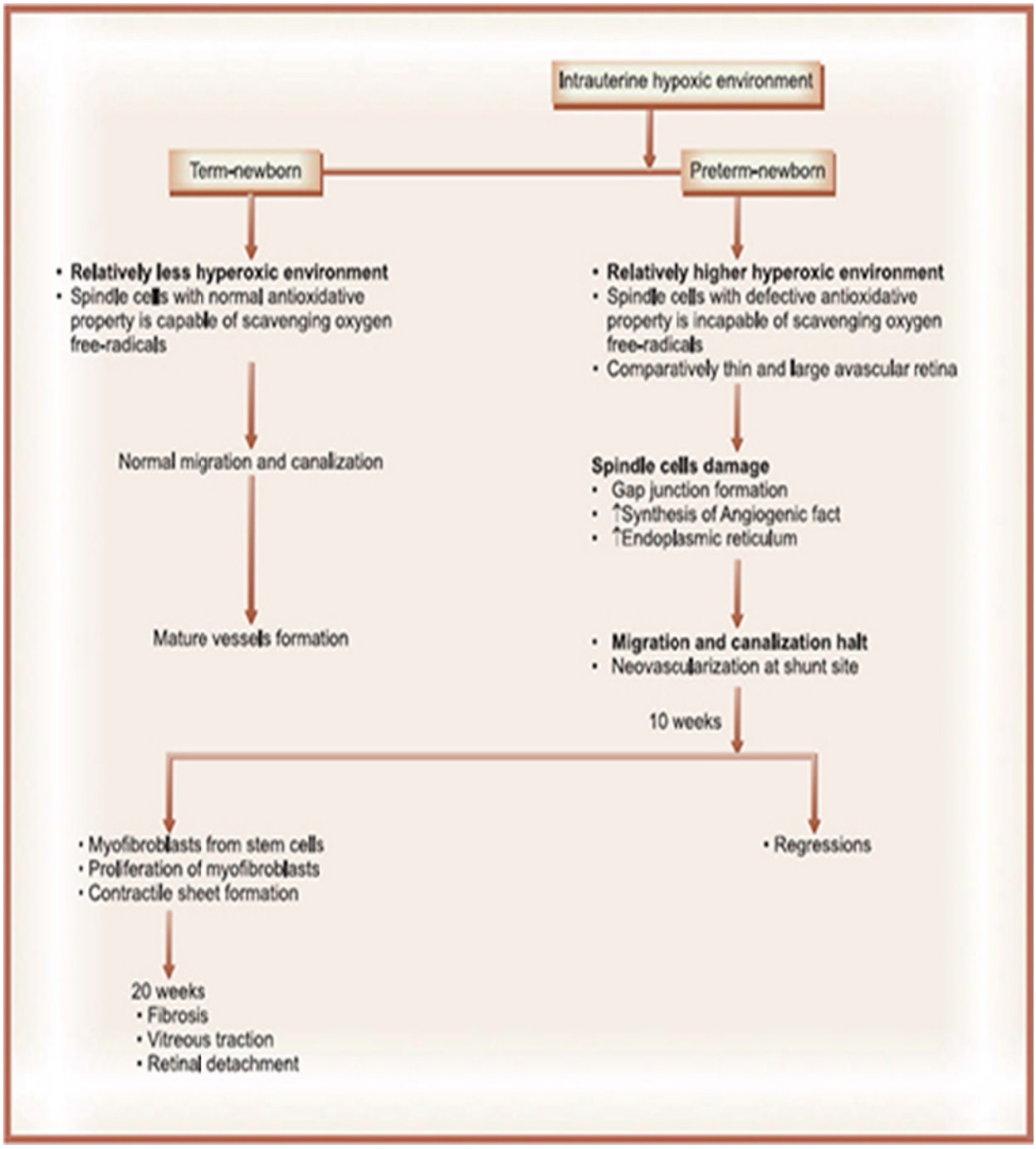

Fig schematic representation of course of spindle cell theory

Growth Factors in ROP

Vasoformative variables play a critical role in the correct development of Retinal Vasculature. [23] There have been several vasoformative factors described, but vascular endothelial growth factor (VEGF) was one of the first to be found and cloned. VEGF is made in the area that is anterior to the vascular system. In order for the retina to expand, there must be a sufficient amount of VEGF. The expression of VEGF is reduced when it is exposed to the hyperoxic state, which leads to vaso-obliteration when the avascular zone is bigger. This induces hypoxia and ischaemia in nonperfused area if injury is maintained. This again promotes VEGF production and neovascularisation. ROP will regress over time if there is a reduction in the synthesis of VEGF. The severity of ROP will increase if VEGF production increases or continues. The modulation of these parameters could be advantageous clinically. To account for ophthalmoscopic observations

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Flynn and coworkers[23] postulated the following sequences.

1. When the vascular endothelium is most vulnerable, right after it has just finished differentiating from the surrounding mesenchyme to create the basic capillary meshwork, it is susceptible to damage from toxic chemicals that have not yet been discovered.
2. Through the few arterial channels that are still there, the two types of tissue, the mesenchyme and the adult arteries and veins, are joined together. The survival of these veins is what makes up the vascular response to damage, and it forms a structure called the mesenchymal arteriovenous shunt. This structure takes the place of the capillary bed that was destroyed.

3. A line of demarcation is created by the mesenchymal arteriovenous shunt between the vascular retina and the avascular retina. It is nourished by mature arteries and veins, and it is made up of basic mesenchymal cells as well as maturing endothelial cells. In this part of the shunt, there is no evidence of capillaries being present. This lesion is diagnostic for a condition known as ROP. It has certain characteristics. The more posterior the location and more the circumference of developing vasculature involved, the more severe the prognosis. An apparent quiescent stage develops after the injury when all vascular development in the eye ceases. This may last days to weeks. As the tissues that make up the shunt begin to thicken, the structure, which was initially greyish white, begins to turn pink and eventually salmon red. The cells that are housed within the shunt divide and mature into normal capillary endothelium as they progress through the process. After that, they proceed to create primitive endothelial tubes and send out a brush border of capillaries, both of which grow anteriorly into the avascular retina. This stage of regression is one that he noticed in over ninety percent of patients, and it depicts that stage.

The primitive cells that are confined within the shunt start to proliferate as the situation worsens, and eventually they are able to penetrate the internal restricting barrier and spread throughout the body. Because of this, they will start to develop not just within the vitreous body but also on the surface of the retina. Flynn stated: “It is this lack of differentiation and destructive proliferation of cells and their invasion into spaces and tissues where they do not belong that is the chief event in the process of membrane proliferation leading to traction detachment.” [24]

Histopathological correlation of different stages of ROP was described by Garner taking into account the observations of Flynn and Foos. [20]

STAGE 1: The demarcation line. In the eye's retina, this is the white line that denotes the boundary between the vascular retina and the avascular retina. According to Garner, it is made up of an anterior vanguard zone that is created by a hyperplastic mass of spindle-shaped (mesenchymal) cells. This is how it gets its name. These cells are the progenitors of differentiated vascular endothelium and provide that function in the body.This zone undergoes thickening and widening and is devoid of functioning capillaries. The rearguard zone of endothelial cells is the source of subsequent neovascularisation (vasoproliferation).

STAGE 2: Ridge- The demarcation line becomes pink in colour, increases in height and width, and extends upward out of the plane of the retina as it goes through a process that causes it to grow taller, wider, and more volumetrically. The proliferation of endothelial cells and the organisation of vascular channels into recognisable patterns are said to be reflected in the ridge, which, according to Garner, is a reflection of both processes. On the basis of their angiographic investigation, Flynn et al.[23] revealed that these channels release fluorescein.

STAGE 3: A ridge that extends beyond the retina and is accompanied by growth. Blood vessels that are attached to the back of the ridge continue on into the vitreous and run in a direction that is perpendicular to the plane of the retina. This allows the blood vessels to deliver oxygen and nutrients to the retina.

According to Foos, the histological study of these new vessels reveals that they have a placoid, polypoid, or pedunculated look. The placoid pattern is the most prevalent since it coincides with future retinal detachment. Polypoid appearances are also possible. Their genesis can be traced back to the cells that compose the endothelium. Foos also observed condensation of vitreous body over the ridge, and he hypothesised that this phenomenon is connected with the depolymerization of hyaloronic acids and the collapse of the collagen frame.

According to the 2005 **International Classification of Retinopathy of Prematurity, the clinical manifestations of ROP are described as follows: (ICROP).** [20]

LOCATION

Concentric zones centered on the optic disc are described

- The imaginary circumference of Zone I is denoted by a circle, the radius of which is equal to two times the length of the line that extends from the disc to the centre of the macula. This circle is considered to be the boundary of Zone I. If there is any portion of the optic nerve head that can be viewed through the use of a binocular indirect lens with a 28-dioptre value, only zone I will be seen.

- Zone II extends concentrically from the margin of zone I, with a radius that spans from the centre of the disc to the nasal ora serrata.

- Zone III is composed of a residual temporal crescent that can be found anterior to zoneII.

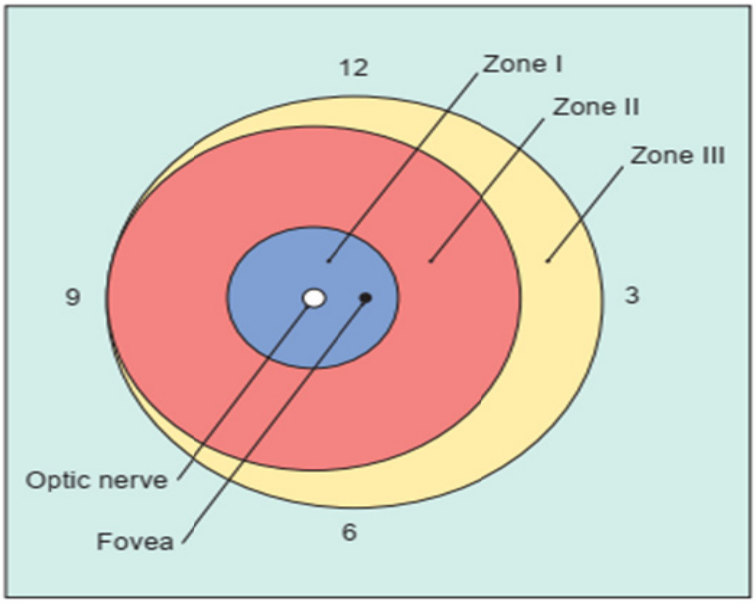


Fig. *Grading of retinopathy of prematurity according to location*

STAGING[20]

This explains the aberrant vascular response that occurs at the confluence of the juvenile avascular peripheral retina and the mature vascularized posterior retina. The most severe symptom is used to assess the stage of the disease for the eye as a whole.

The **demarcation line for Stage 1**is a slender, flat, tortuous, gray-white line that runs almost parallel to the ora serrata. The temporal periphery is where you will notice it most prominently.The vessels that are heading up to the line have an irregular branching pattern known as "arcading."

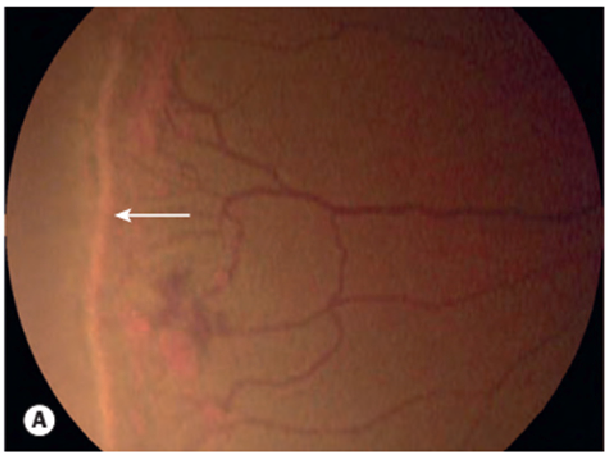


Fig : “stage 1 ROP- DEMARCATION LINE”

The **second stage**, known as the ridge, develops in the area around the demarcation line. It is three-dimensional, with height and width, and it rises above the retinal plane. It's possible to spot several neovascular tufts behind the ridge, in addition to blood vessels that enter the ridge itself.

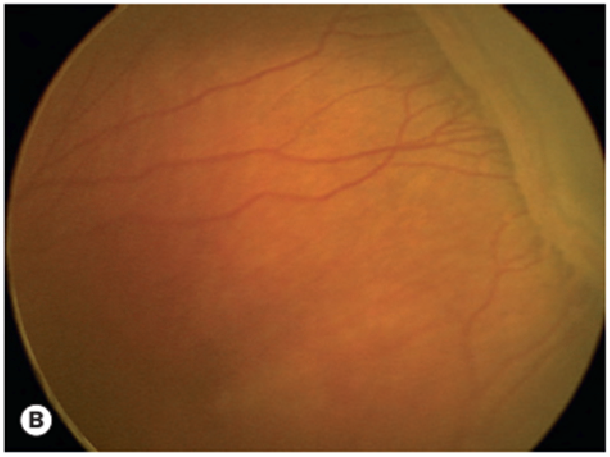


Fig : “stage 2 ROP – RIDGE”

The **extraretinal fibrovascular proliferation** that characterises **Stage 3** reaches all the way into the vitreous from the ridge. The appearance of the ridge, which is continuous with the posterior face of the ridge, becomes more ragged as the proliferation becomes more extensive as a result of Stage 3, which is continuous with the ridge's posterior aspect. It is possible to categorise the severity of stage 3 into mild, moderate, and severe categories depending on the amount of extraretinal fibrous tissue that has infiltrated the vitreous. The post-conceptual age of 35 weeks is the time when there is the greatest risk of developing this stage.

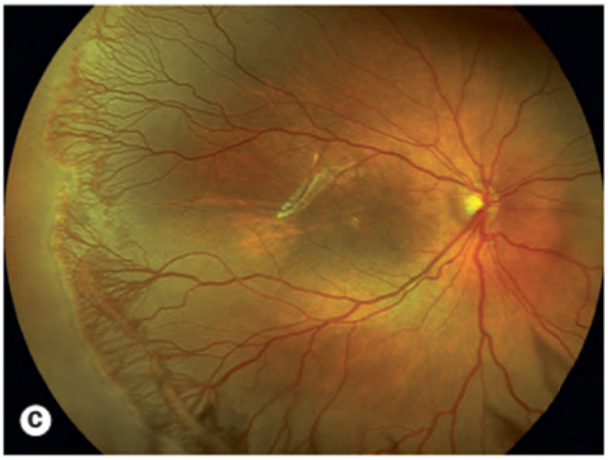


Fig stage 3 ROP – Extraretinal fibrovascular proliferation

Extrafoveal and foveal stages of stage 4 (partial retinal detachment) are distinguished from one another (**stage 4B**). The separation can be described as being generally concave and oriented circumferentially. In cases when the condition is progressive, the fibrous tissue continues to contract, leading to an increase in the height of the detachment as well as its extension anteriorly and posteriorly.

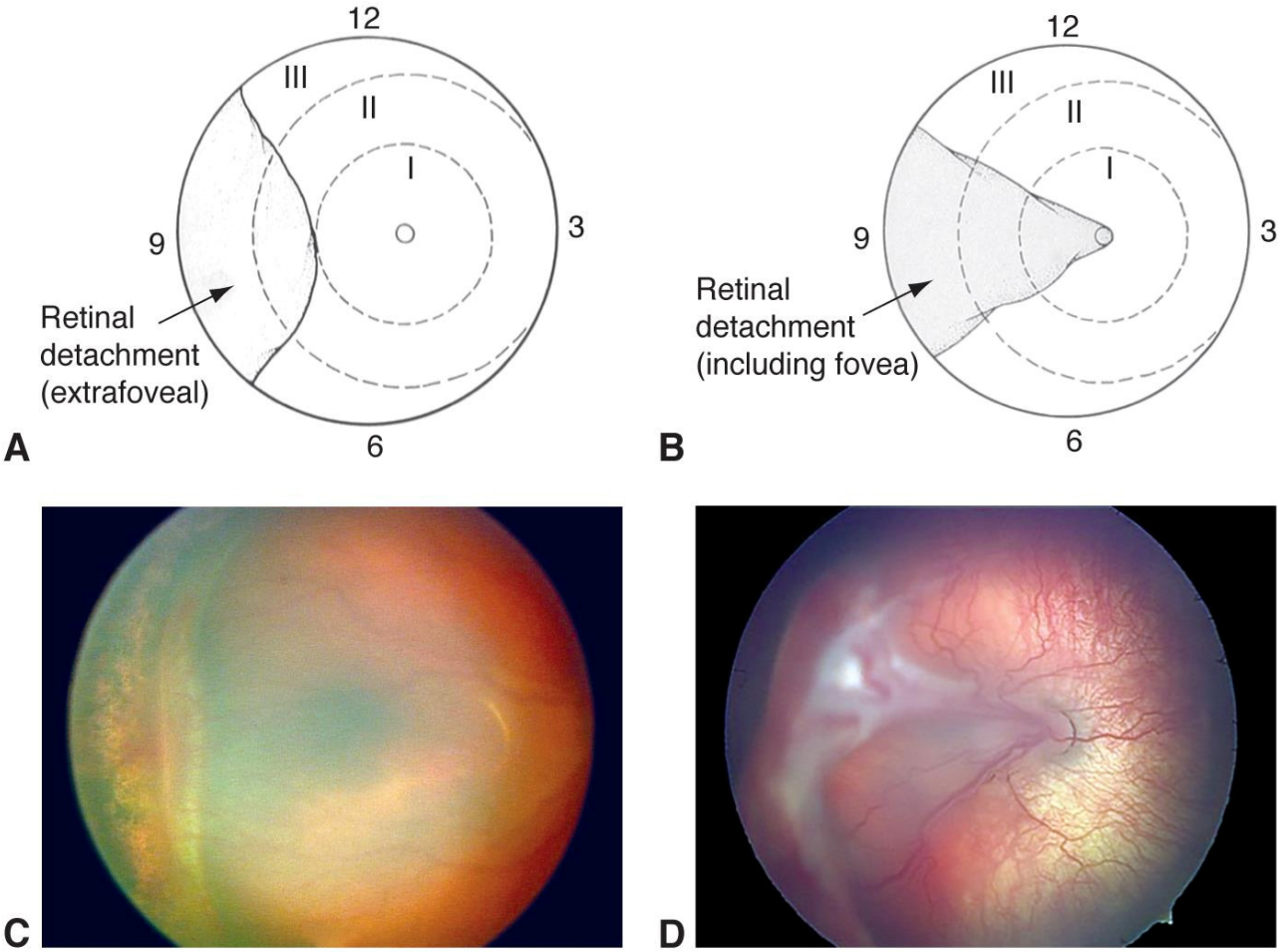


Fig – Stage 4A and stage 4B ROP; A,B – schematic diagram ; C,D fundus picture of stage 4A and stage 4B

Retinal detachment in its entirety is referred to as **stage 5** of the disease.

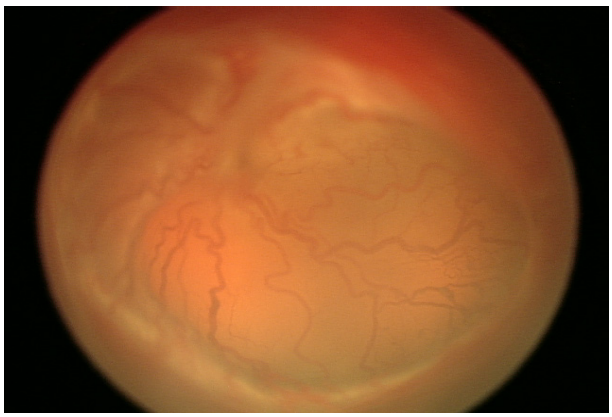


Fig : stage 5 – Total retinal detachment

'Plus' disease" is characterised by the dilatation and tortuosity of blood vessels that involve at least two quadrants of the posterior fundus. This disease has a tendency to progress and denotes a trend toward progression. Vitreous haze and a failure of the pupil to dilate are two additional characteristics of this condition. The ailment known as "pre-plus" is also described.

Aggressive posterior disease, sometimes known as "rush disease," is quite rare; yet, if left untreated, it will typically advance to stage 5, sometimes within only a few days. It is distinguished by its position toward the back of the eye, the prominence of plus illness, and the ill-defined nature of the retinopathy it causes.

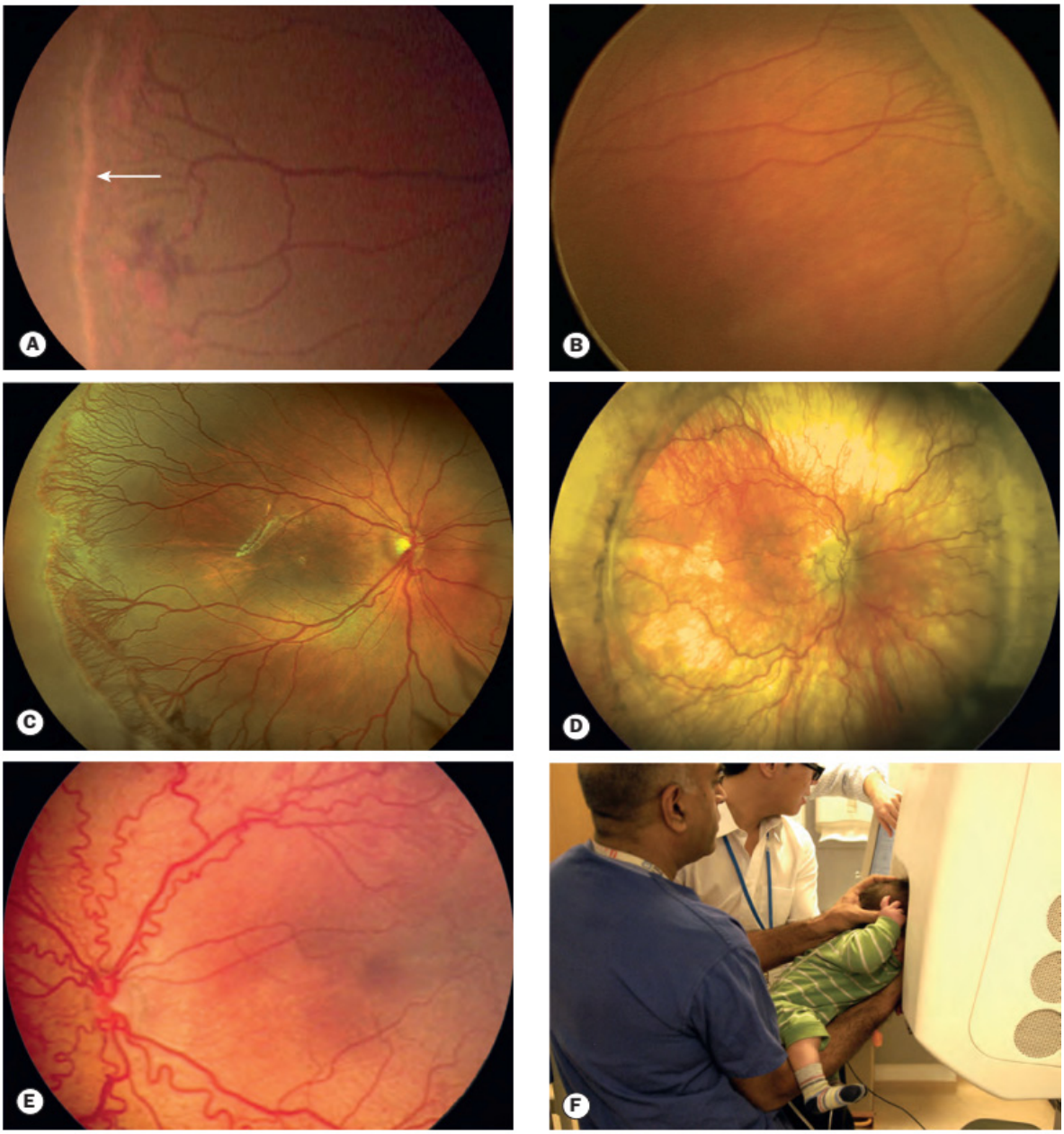


Fig. "*Staging of active retinopathy of prematurity.* (A) *Stage 1 – demarcation line;* (B) *stage 2 – ridge;* (C) *stage 3 – ridge with extraretinal vascular proliferation;* (D) *stage 4A – partial extrafoveal retinal detachment;* (E) *'plus' disease;* (F) *method of imaging a baby"*

Fig : above figure shows Ret Cam examination

TYPE[20]

The ETROP clinical study has led to the revision of treatment guidelines at the majority of healthcare facilities. The idea of a "threshold disease," which was originally used as the criterion for therapy, has been supplanted due to the fact that early intervention results in better outcomes. The results of treatment are variable and dependent on the severity of the disease; thirty percent of patients with ROP in the high-risk zone I will have an unfavourable visual outcome.

- **Type 1.** Treatment is now recommended within 72 hours for type 1 disease.
  - Any ROP stage in zone I when accompanied by plus disease.
  - Stage 3 to any extent within zone I.
  - Stage 2 or 3 in zone II, together with plus disease.
- **Type 2** disease requires observation.
  - Stage 1 or 2 in the absence of plus disease in zone I.
  - Stage 3 ROP within zone II without plus disease.

RISK FACTORS OF ROP[20]

ROP has been repeatedly linked to low birth weight, low glycemic index at birth, and the use of oxygen supplementation, despite the fact that other factors that may contribute to the development of ROP have been hypothesised.

Oxygen

Role of oxygen: The significance of oxygen levels in the advancement of ROP lies with the choroidal circulation, which is unable to autoregulate as a reaction to changes in O2 tension. This renders the choroidal circulation vulnerable to the effects of ROP. Therefore, in conditions where there is an abundance of oxygen in the blood, these arteries are unable to constrict, but the vessels in the retina are able to do so. Because of this, there is a transfer of oxygen from the choroidal circulation to the retinal circulation, which causes the arteries in the retina to become constricted to the point where they are obliterated. As a consequence of this, there is also a transfer of oxygen from the choroidal circulation to the retinal circulation. Alternate theory suggests that the damage caused by reactive O2 species, in particular superoxide dismutase, may be greater than the available defence mechanisms, which take the form of antioxidant enzymes such as alpha-tocopherol. This theory is supported by the fact that superoxide dismutase is the enzyme that is responsible for the majority of the damage.

In addition, hyperoxic circumstances prevent the formation and maturity of spindle cells, which leads to abnormalities in the normal process of retinal vasculogenesis and migration. Researchers have found that chronic anaemia in moms may act as a protective factor against the development of retinopathy of prematurity (ROP) in babies who have been treated with oxygen treatment.

These findings come from a few different research. Although it was discovered that large fluctuations in O2 saturation levels may affect the development of ROP and progression, studies have demonstrated that continued supplementation of O2 to infants who have developed "moderate ROP" does not decrease the ROP incidence or progression to "threshold ROP." This is in spite of the fact that it was discovered that significant shifts in the levels of oxygen saturation can potentially influence the evolution of ROP. [25-27]

In today's cutting-edge neonatal critical care facilities, the quantity of oxygen saturation is measured and kept at a controlled level. This eliminates the risk that something like this might occur.

Genetic factors

At the beginning of the 1990s, researchers came up with a concept suggesting that genetic variables could perhaps play a part in the progression of ROP. The realisation that the rate of occurrence of ROP varied among different ethnic groups served as the impetus for the conception of this theory. This racial variability lends credibility to the concept that nutritional, societal, and genetic variables all play a part in the development of ROP. ROP stands for racial obesity predisposition.

Recent clinical and experimental research employing genetic method in monozygotic twins has indicated that there is a significant genetic inclination for the development of ROP. The United States of America served as the location for these investigations. [28,29]

Studies have shown that the advanced stages of ROP are characterised by mutations in three genes (Norrin, Frizzled 4, and Lrp5) that are involved in the molecular pathways that signal growth. These genes are named as Norrin, Frizzled 4, and Lrp5. [30-32] This explains why some children with ROP continue progress to a more severe stage despite receiving prompt treatment, whilst other infants with ROP have spontaneous reversal despite receiving the same treatment as the first group of infants.

Birthweight and Gestational age.

Both the occurrence of ROP and the severity of the condition have been shown to have inverse relationships with birth weight and gestational age, with the former serving as a more accurate predictor.[23]

Carbon dioxide

In the laboratory animal, the induction of either respiratory or metabolic acidosis by hypercapnia or acetazolamide, respectively, leads to the development of retinal neovascularization. In humans, acidosis has been linked to the development of ROP, although hypercapnia has not been connected with the disease.[23].

Antioxidants and vitamin E

The presence of hyperoxia in the extrauterine environment leads to the generation of free oxygen radicals, which in turn restricts the migration of spindle cells and promotes them to create angiogenic factors that are responsible for ROP. It has been hypothesised that vitamin E can prevent the damage caused by free radicals, and it is on this premise that vitamin E treatment for ROP is based. An animal model has demonstrated that there is, without a doubt, a suppressing impact. When compared to either an adult or a baby born full term, preterm neonates have significantly lower levels of the naturally occurring antioxidant vitamin E, which plays a crucial role in ensuring the continued integrity of the cell.

In the late 1940s, Owens and Owens[23] were the ones who first proposed using vitamin E, and decades later, Johnson et al were the ones who revived the idea.

In clinical experiments conducted in the 1980s, it was discovered that vitamin E, despite the fact that it does not appear to diminish the occurrence of ROP, may lower the severity of the condition.

The Institute of medicine of the National Academy of Sciences came to the conclusion in 1986 that there was no clear benefit to using vitamin E as a preventative measure against ROP. [24]

Light

In the initial reports of this ailment written by Terry[23], an early exposure to light was mentioned as a possible cause of the condition. Studies carried by by Hepner et al. and Locke and Reese did not produce any evidence that was supportive. It was hypothesised that ROP could be caused by light because it was thought to damage retinal tissues, which would then produce free radicals. The study by Glass et al. that found lowering the amount of light in neonatal units could reduce the incidence and severity of retinopathy of prematurity reawakened people's interest in light. According to the findings of the LIGHT –ROP study, a decrease in the level of ambient exposure does not affect the frequency of ROP.[21,23]

Surfactant

In extremely premature newborns, the administration of this drug has resulted in a reduction in the overall death rate as well as the severity of respiratory distress syndrome and chronic lung disease. According to the findings of studies, there is no discernible difference between infants who were treated and those who were not.[20]

Blood Transfusions

Transfused blood to premature infants contains adult haemoglobin since these babies were born too soon. Because the latter binds oxygen with a lower degree of avidity than foetal haemoglobin does, the oxygen dissociation curve is changed in such a way that more oxygen is supplied up, which makes the situation relatively hypoxic. It is not entirely known at this time whether frequent blood transfusions are an independent risk factor for ROP or simply another symptom of a neonate who is in very poor health.

Steroids[20]

It has been claimed that prenatal steroids offer protection against the development of ROP, however there has been no such benefit documented with administration of steroids after birth.

Multiple birth

Although having multiple babies does not in and of itself increase the risk of developing ROP, and concordant twins behave similarly, it has been reported that the smaller baby of discordant twins has a greater risk of developing this condition. This is the case even though concordant twins behave similarly.

Standard of care

Infants born in large tertiary referral neonatal units have been reported to have a lower incidence4 and severity of ROP. This has been attributed by Darlow et al.to the better quality of care they provide. [20]

Multivariate analyses identified the following as independent risk factors for the ROP development.[34]

- low IGF-1,
- poor postnatal weight gain,
- hyperglycemia,
- blood transfusions,
- surfactant therapy and
- artificial ventilation for more than 7 days.

Other risk factors include

- systemic infections
- intraventricular hemorrhage
- bronchopulmonary dysplasia
- patent ductus arteriosus.

Screening

Formal criteria can differ, and risk factors and screening criteria determined in one nation might not necessarily be applicable in another. In general, infants who are delivered prior to or at thirty–thirty two weeks gestational age or who weigh less than 1500 g should be checked for retinopathy of prematurity (ROP).

Screening may also be necessary if other premature newborns have severe illnesses. IDO with a lens of 28D or a 2.2 pan fundoscopic lens with depression of sclera, or a Ret Cam / wide-field retinal camera with cautious check, are the techniques that are required for this. Screening should start between 4 and 7 weeks after the baby was born. After that, the infant will have follow-up examinations at regular intervals of one week to three weeks, depending on the severity of the condition, and this process will continue until the retinal vascularization reaches zone III.

A combination of 0.5% cyclopentolate and 2.5% phenylephrine can be used to successfully dilate the pupils of a preterm child. After the topical anaesthetic has been injected topically, a newborn eyelid speculum will be inserted. During and after the examination, it is a good idea to monitor the infant, particularly for apnea. About ten percent of the infants who are screened need therapy.

Children who have ROP have a higher risk of developing refractive errors, strabismus, and amblyopia; therefore, they need to be monitored over the long term. Imaging methods have advanced to the point where it is now possible to examine very young infants. [20]

Treatment[20]

• Because the visual and anatomical outcomes of laser ablation of avascular peripheral retina are superior to those of cryotherapy, laser ablation has virtually supplanted cryotherapy.

• **Intravitreal anti-VEGF agents.** The findings of the BEAT-ROP research, also known as Bevacizumab Eliminates the Angiogenic Threat of ROP, have resulted in a shift in the way ROP is now being treated. Bevacizumab is a potential therapy option for ROP; however, the most effective dosing schedule has not yet been determined. The disease in zone I has a better chance of responding than the sickness in zone II.

One potential benefit is that the destruction that is generally associated with laser treatment can be avoided, allowing normal development of the retina to take place. On the other hand, it is unknown whether this age group may experience systemic issues or long-term repercussions. In particular, there is an accumulation of evidence suggesting that the condition can return after treatment with antiVEGF drugs has been discontinued.

• When it comes to the anatomical and optical outcomes, PPV (Pars plana Vitrectomy) for TRD (Tractional Retinal Detachment) in which macula is not involved can be performed effectively with a success rate of 90%. Even with a successful reattachment of the anatomical structures, in stages 4B (60percent) and stage 5 (20 percent), the outcome of vision is often unsatisfactory.

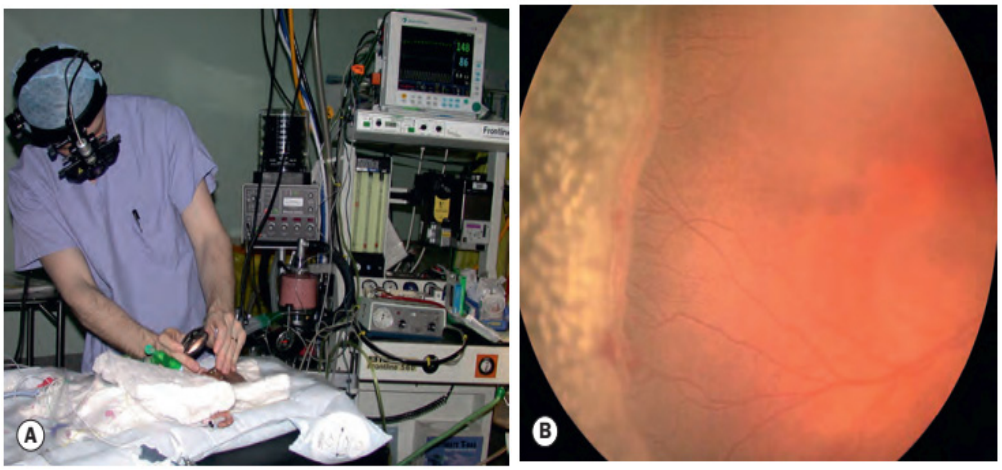


Fig. *Treatment of ROP.* (A) *Headmounted binocular IDO guided laser photocoagulation;* (B) *fundus picture after laser photocoagulation (for type 1 disease)*

LITERATURE FROM PREVIOUS STUDIES

A study was conducted by Huang HB et al., (2019)[35] to investigate the incidence and risk factors of ROP in very and extremely preterm neonates (28+0-32+0 weeks gestation, and 28+0 weeks gestation, respectively), as well as the predictive factors for ROP in the early hours after birth and while hospitalised. During the course of the research, there were a total of 529 premature newborns admitted to our neonatal critical care unit; of them, 120 (or 23%) were born at a gestational age of less than 32 weeks. Thirteen (11%) of the newborns did not survive. ROP was present in 23 (21%) of the 107 survivors, and five (22%) of these survivors were treated with laser and/or medicinal therapy for severe ROP. Infants diagnosed with ROP had lower mean blood pressure in the first 12 and 24 hours after delivery, respectively, as compared to survivors who did not have ROP. Using multivariate modelling, they found that gestation age, mean blood pressure in the first 12 hours after birth, total days of blood gases pH 7.2, and hospital duration of stay were all independent risk factors for ROP.

A study was carried out by Bal S et al., (2019) [36] to investigate whether or not quicker WGA during a later postnatal period is connected with an increased risk of severe ROP rather than a reduced chance of the condition. The average (standard deviation) birth weight of the 6835 newborns that were included in the study was 1086 (357) g, and the average (standard deviation) gestational age was 27.9 (2.5) weeks. Up until roughly the 80th percentile of WGA, there was an increased risk of severe ROP associated with rising late WGA. After taking into account factors such as birth weight and gestational age, it was found that there was no correlation between late WGA and severe ROP in infants who were in the lowest early WGR tertile.

However, among infants who were in the moderate and highest early WGR tertiles, the moderate WGA tertiles had the highest risk of developing ROP.

Quantifying the risk that newborns may require therapy for retinopathy 0f prematurity was objective of research done by Gonski S and colleagues (2019) [37] carried out. They created a risk prediction model to identify children who needed treatment for ROP among those newborns who were evaluated for ROP during 2006–2015 and had BW < 1500 grams or a GA < 30 wks. They tested the model on a separate newborn cohort that was released from the hospital in 2016. 75,821 newborns met the criteria for inclusion, and 2,306 of them (3%) were given treatment for ROP. Infants who did not have any of the following risk factor combinations were less likely to have ROP: they did not require oxygen or ventilation support on day 28 postnatal age, they did not have a history of necrotizing enterocolitis, and they did not have an intraventricular haemorrhage. When their model was used on the 6127 newborns who were discharged from the hospital in 2016, it had a sensitivity of 97.9%, a specificity of 63.3%, a positive predictive value of 4.0%, and a negative predictive value of 99.9%.

A study was carried out by Li Y et al., (2019) [38] in order to investigate the connection of postnatal weight gain and the onset of Retinopathy of prematurity in premature newborns living in the southwestern Ontario region. ROP was related with more weight-gain from birth to the 1st day 0f full enteral feeding, a lengthy duration from birth to Full Enteral Feed, and a long duration from Full Enteral Feed to transfer or till discharge. Low weight gain from day seven to day twenty eight was also associated with Retinopathy Of Prematurity.

Even after taking into account GA and BW, the lengths of time from birth to Full Enteral Feed and from Full Enteral Feed to till transferring or discharging baby remained statistically significant. After adjusting for congenital anomalies, surgical ligation for PDA (Patent Ductus Arteriosus) and bronchopulmonary dysplasia, a multivariable logistic regression analysis revealed that only risk factor of Retinopathy Of Prematurity was the time spent in the evaluation of infant unitil before transferred or discharged.
Infants who fulfil ROP screening recommendations on basis of BW and GA are subjected to regular screening by specialists for the purposes of detection and management, as mentioned in Lin L et al., (2019) [39]. On the other hand, fewer than 10% of those affected require therapy, and fewer than 50% develop ROP.

Researchers have found that a slow post-natal weight-gain is a strongly associated with Retinopathy Of Prematurity. As a result, weight gain measures have been incorporated into the development of more specific criteria for ROP screening. In order to make use of clinical prediction models, one must first do a major development study, then validation studies that are tailored to risk groups, finally continuing impact surveillance, with adjustments made needed.

Largest data set was used to develop Post-natal Growth and ROP (G-ROP) modified screening criteria and it provides the strongest model which can be used clinically. Among many prediction models that included weight gains that are used to improve the standard of ROP screening, this screening criteria was designed to be the most accurate. Before being used in clinical practise, the generalizability of these amended criteria will be evaluated based on the results of a G-ROP validation study that was just just finished.

A study was carried out by VanderVeen DK et al., (2013) [40] with the objective of determining the dietary and weight gain restrictions that are connected with the severity of ROP in extremely pre-term neonates. 1180 newborns who were 28 weeks gestational age at delivery and had ROP examination results were categorised and examined according to their weekly intake of total calorie, protein, carbohydrate and fat quartrile, and their rate of growth between seven postnatal day and twenty eight day. ROP was classified into No ROP, mild type, Type 1, or Type 2 ROP, also by location of Retinopathy Of Prematurity severity including stage 3 ROP, zone 1 disease, and dilated and tortuous vessels (plus disease). The severity of ROP was compared to the associations between dietary consumption and ROP severity.

Infants whose intake of lipids, total calories, and carbs fell into the lowest quartile were found to be at a greater risk for developing Type 1 ROP. The development of ROP in zone 1 was linked with having an intake of lipids or total calories in less percentage, and progression of ROP in stage 3 was connected with having an intake of complete calories in the lowest quartile. A lower growth velocity, as measured by its position in the lowest quartile, was related to high risk of any form of Retinopathy 0f Prematurity, including ROP type 1.

A study was carried out by Wang ZH et al., (2009) [41] with the purpose of determining whether or not a very low birth weight (VLBW) preterm baby's low gain of weight from day of delivery to four and six weeks of life can be used in prediction of Retinopathy of Prematurity.

The overall cohort had a mean GA of 29.56 wks, with a 1.44wks standard deviation, and a mean birth weight of 1270.58 grams, with a standard deviation of 176.18 grams.

ROP infants had a considerably reduced proportion of WG at 4 weeks postnatal compared to healthy newborns. There was no significant difference in the WG % at 6 weeks between the ROP group and the no ROP group.

In logistic analysis, Poor Weight Gain didn't emerge as a independent risk factor after including all other major risk factors for ROP. The value of 0.591 was found to be the ROC area. In the case of ROP, the optimal discriminative threshold was found to be 18% of the proportional Weight Gain at the 4th wk compared to Birth Weight. The values for specificity and sensitivity are 50% and 67.3%, respectively.

It was hypothesised in Hellstrom A et al. (2009) [42] that taking into account postnatal weight gain would make it possible to detect high risk infants for a vision-threatening condition called ROP earlier with greater specificity. No alarm was sounded for 127 out of 353 children, which is 36 percent; following postmenstrual week 32, alarms were sounded for 40 percent of the children.

There was not even a single instance of treatment requiring Retinopathy 0f prematurity in any of infants. 41% of infants in the remaining 24% of the group who were alarmed at low risk or high risk on or prior to 32 post-menstrual wks showed proliferative changes in retinopathy of prematurity, and 29 percentage of these children required treatment for sight-threatening illness. The average amount of time that passed between the initial alert and treatment was 9 weeks.

Filho JBF et al., (2009) [43] conducted a study to predict the development of severe ROP by examining weight gain from birth to 6 weeks of life among VLBW (very low birth weight) preterm infants. This research was published in the Journal of the American Medical Association (VLBW). The overall cohort has a mean GA of 29.6 wks (with a standard deviation of 1.9 weeks) and a mean body weight of 1,124 grams (with a standard deviation of 239.5 grams).

When corrected for BW and for any stage of intraventricular haemorrhage, the low Weight Gain fraction from the BW was <51.2%, assessed at six weeks age, indicated OR 3.007 for severe ROP. This was after logistic regression was performed, and at six wks age it was measured. Value of ROC curve's area under the curve was 0.63. The findings for specificity and sensitivity were 62.6% and 66.3%, respectively, when the discriminative cutoff was set at 51.2% of the WG proportion. The positive-predictive-value was 10 %, and negative-predictive-value was 94%.

A study was carried out by Wallace DK et al., (2000) [44] with the objective of determining whether or not there is a correlation between stage of ROP and post-natal weight-gain. In the first six wks of life, babies who were diagnosed with severe ROP (stage 3 or above) has an average of 10.9 g/kg gain per day, whereas whom were diagnosed with mild or no ROP an average of 9.6 g/kg gain per day. There was a correlation between post-natal weight-gain and the Retinopathy of Prematurity severity, as determined by multiple regression analysis, which took into account gestational age, birth weight and nine other reported risk-factors. Stepwise regression revealed that there were four factors that were linked with the severity of ROP. These factors were the GA, the rate of post-natal weight-gain, Culture proven sepsis and volume of blood transfused.

MATERIAL & METHODS

MATERIALS AND METHODS:

STUDY AREA: R.L.J Hospital and Research Centre attached to Sri Devaraj URS Medical College.

STUDY POPULATION: A total of 123 premature LBW babies < 2500g; gestational age < 34 weeks and if >34 weeks suggested by paediatrician are screened for ROP at R.L.J Hospital and Research Centre between January 2021 to June 2022 after obtaining approval from Institutional ethics committee.

STUDY DESIGN: Prospective cohort study

Sample Size: 123

Sample size is calculated based on mean difference in weight gain at 4 weeks as reported in study done by Wang ZH et al., considering allocation ratio of 1:2 with 7% absolute error with power of 80% assuming the average standard deviation for weight gain as 13.05g[41].

The estimated sample size was 41 ROP and 82 non ROP

Formula: N master 2.0 (software for calculation of sample size)

TIME FRAME TO ADDRESS THE STUDY: January 2021 to June 2022

INCLUSION CRITERIA:

- Gestational age < 34 weeks and if>34 weeks suggested by paediatrician.
- Preterms having birth weight < 2500g.
- Retinopathy of prematurity of any stage in either eye.
- ROP detected at 1st/2nd examination

EXCLUSION CRITERIA:

- Babies having congenital anomalies
- who failed to thrive or lost to follow-up or died.
- Home delivered babies whose birth weight is unknown.
- Babies having weight loss more than expected norms.

METHODOLOGY:

Preterms having gestational age < 34weeks and low birth weight < 2500g and older preterms suggested by paediatrician at NICU of the hospital are screened for ROP at 4, 6 weeks of chronological age.

After informed consent was taken, the demographic details and birth history that is birth weight and gestational age at which the baby was born which was determined by using the date of women's recent menstrual period, or with assistance of first-trimester sonography where the date of women's most recent menstrual period was unknown. These details were noted and by using weighing scale the current weight of the infant at fourth week and sixth week was noted when the baby comes for screening.

The anterior segment of the eye was examined, screening is done by first pupil dilatation with Tropplus which contain Tropicamide 0.8% + phenylephrine 5% which is diluted to tropicamide 0.4% + phenylephrine 2.5% and this solution was injected topically into eye three times at 15 min interval between each instillation. As a precaution any surplus eyedrops were removed with sterile cotton and the mother is warned not to feed the baby right before the examination for the fear that infant would throw up or aspirate any food or liquid that was consumed.

After 45 min examination is done by using RETCAM, topical anaesthetic used is proparacaine 0.5%. sterile lid speculum of size 3 inches is used to evert the eyelids. The RETCAM procedure was carried out with extreme caution in order to avoid exerting excessive amount of force on the globe. If the initial assessment didn't reveal any signs of ROP, the baby is re-examined after two wks until the point where vascularization is complete. If ROP was found, the retinal examinations were carried out weekly basis for stage 1 and stage 2 of the condition, and more frequently for other stages until the condition began to resolve or necessary treatment given and followed up.

Preterms are divided into ROP group and non ROP group according to presence or absence of ROP changes in the fundus. Consent is taken to allow frequent examinations in any stage of ROP infants. Staging is done according to International Classification of ROP.

Assessment of the Weight and weight gain is done at 4, 6 weeks, when the babies came for ROP Screening. Babies having weight loss more than expected norms are excluded.

Table B- Parameter of assessment

Parameter of Assessment	**Baseline**	**Assessment 1**	**Assessment 2**
Weight of Preterm baby	At birth	At 4^{th} week	At 6^{th} week
Fundus change	--	ROP +/-	ROP +/-

Statistical Analysis:

Excel for Microsoft Windows was used to enter the data, and the Statistical Package for Social Sciences (SPSS) was installed on a Windows computer to do the statistical analysis. In order to investigate the distribution of a number of categorical and quantitative variables, a descriptive statistical analysis was carried out. In order to summarise categorical data, we used n (percent), while quantitative variables were summarised using mean standard deviation. All of the findings were laid out in tabular format and are also depicted graphically using either a bar diagram or a pie diagram, depending on the circumstance. To determine statistical-significance, T test was used between the two groups, and to examine the categorical variables, Chi square test was used. Statistical significance is presumed to exist when the P value is less than 0.05.

Ethical Issues

1. The infant's parent in the trial were given an explanation of the study's aims as well as its methodology.
2. From every infant's parent who was willing to take part in it, consent was taken prior.
3. The provision to withdraw from participation in the study was left unrestrictedly available to participants.
4. During each and every step of the research project, strict secrecy was upheld with regard to the information pertaining to the babies.

RESULTS

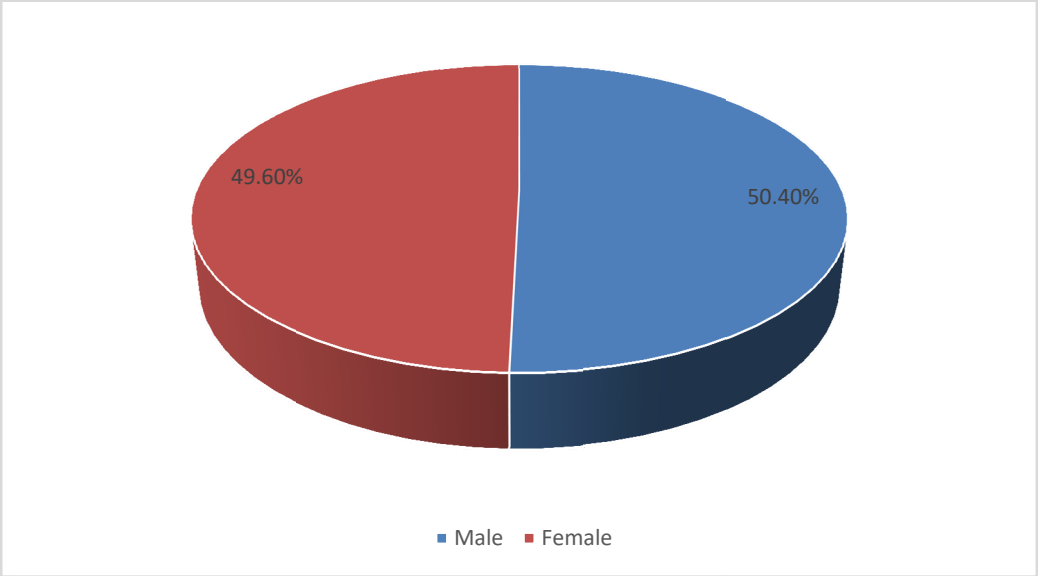
RESULTS

RESULTS & OBSERVATIONS

Table-1: Distribution of Infants based on the gender

		Frequency(n)	%
GENDER	Male babies	62	50.4%
	Female babies	61	49.6%
	Total	123	100.0%

Male babies 50.4% and female babies 49.6%.

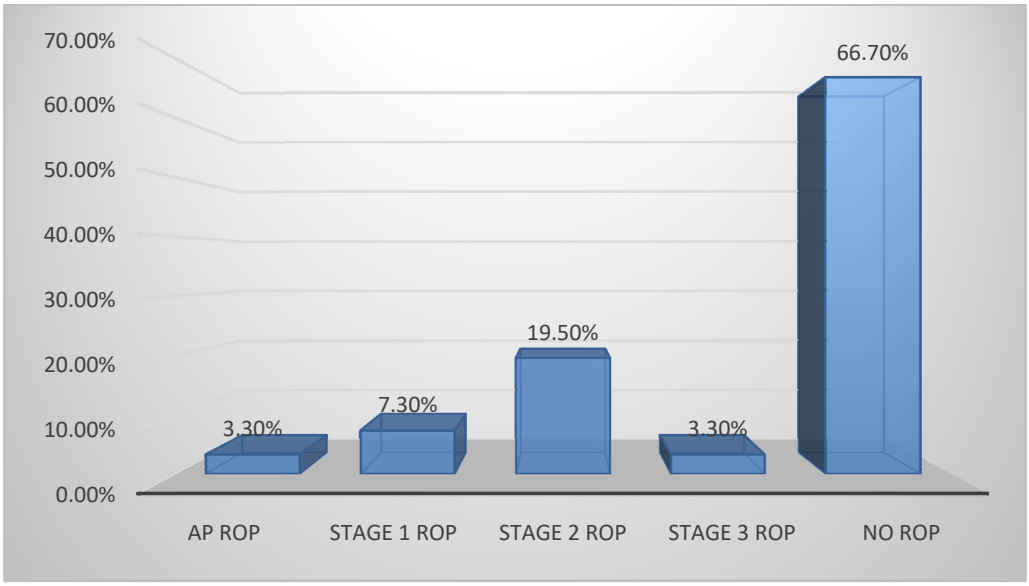


Graph-1 : Distribution of infants based on gender

Table-2: Distribution of infants based on ROP and stages of ROP.

		Frequency (n)	Percentage %
DIAGNOSIS	AP ROP	4	3.3%
	STAGE 1 ROP	9	7.3%
	STAGE 2 ROP	24	19.5%
	STAGE 3 ROP	4	3.3%
	NO ROP	82	66.7%
	Total	123	100.0%

AP ROP was present in 3.3% babies, stage 1 ROP was present in 7.3% babies, stage 2 ROP was present in 19.5% babies, stage 3 ROP was present in 3.3% babies. ROP was absent in 66.7% babies.



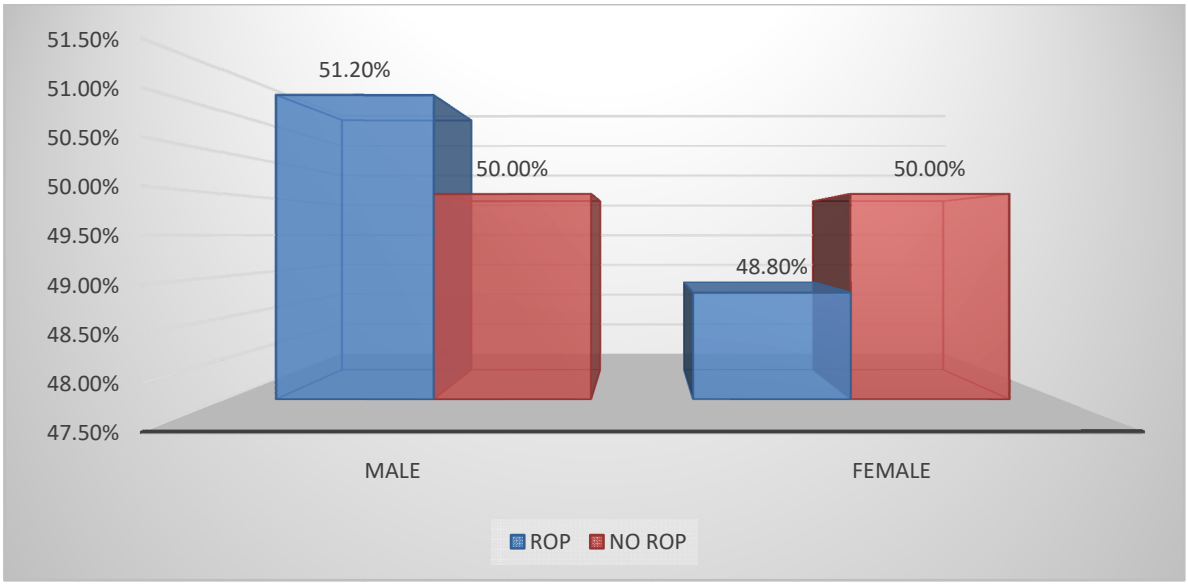
Graph-2 : Distribution of infants on basis of diagnosis

Table-3: Distribution of INFANTS based on the gender and diagnosis

			ROP		Total
			ROP	NO ROP	
GENDER	Male babies	n	21	41	62
		%	51.2%	50.0%	50.4%
	Female babies	n	20	41	61
		%	48.8%	50.0%	49.6%
Total		n	41	82	123
		%	100.0%	100.0%	100.0%

Chi-Square: 0.016, P value: 0.52, Statistically not significant

Among Infants with ROP, male babies were 51.2% and female babies were 48.8%. Among infants without ROP, male babies were 50% and female babies were 50%. Association is not found to be significant statistically.



Graph -3 : Distribution of Infants on basis of gender and diagnosis

Table-4: Mean gestational age among ROP and non-ROP

	ROP		NO ROP		T-Test	P-Value
	Mean	SD	Mean	SD		
GA	30.90	2.177	32.76	1.902	-4.85	0.001

Among babies with ROP and without ROP; mean gestational age was 30.90 +/- 2.17 and 32.76 +/- 1.90 weeks respectively.

Table 5: Descriptive statistics

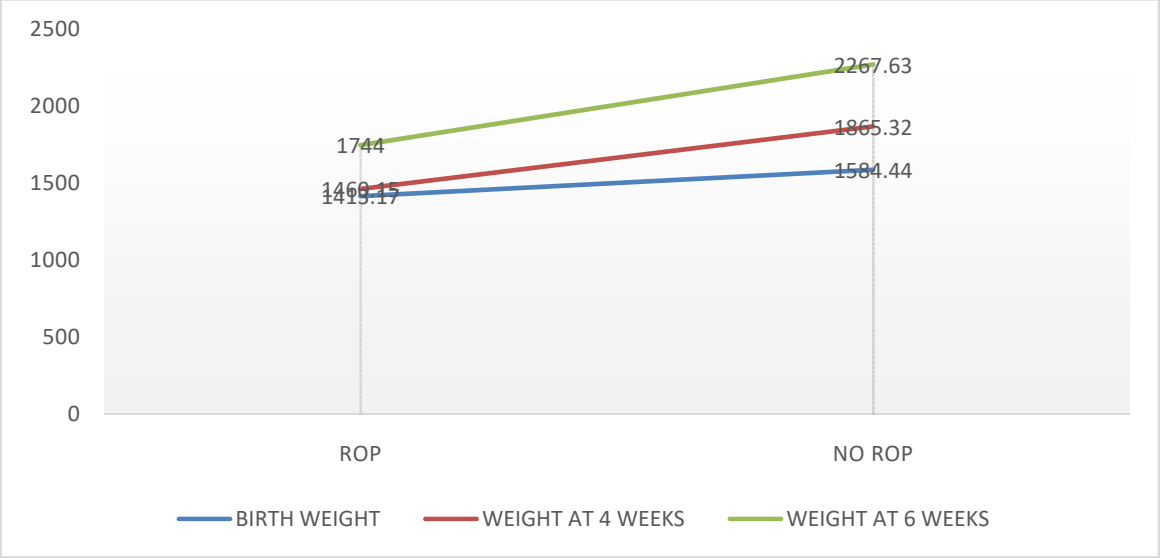
Parameter	Mean	Std. Deviation
Birth weight	1527.35	339.63
Weight at 4 weeks	1730.26	451.10
Weight at 6 weeks	2098.86	529.03
Weight Gain till 4 Weeks from BW	202.91	246.37
Weight Gain till 6 Weeks from BW	565.02	365.07
Relative- weight-gain at 4^{th} week	0.12	0.15
Relative-weight-gain at 6^{th} week	0.37	0.25

- Mean birth weight was 1527.35 +/- 339.63 gms.
- Mean Weight at 4 weeks was 1730.26 +/- 451.10 gms.
- Mean Weight at 6 weeks was 2098.86 +/- 529.03 gms.
- Mean Weight Gain till 4 Weeks from BW was 202.91 +/- 246.37 gms.
- Mean Weight Gain till 6 Weeks from BW was 565.02 +/- 365.07 gms.
- Mean Relative weight gain at 4^{th} week was 0.12 +/- 0.15 gms.
- Mean Relative weight gain at 6^{th} week was 0.37 +/- 0.25 gms.

Table 6: Mean birth weight, Weight at 4 weeks & 6 weeks among ROP and non-ROP babies

Parameter	ROP		NO ROP		T Test	P Value
	Mean	SD	Mean	SD		
Birth weight	1413.17	367.78	1584.44	311.51	-2.70	0.008
Weight at 4 weeks	1460.15	379.22	1865.32	424.36	-5.16	0.001
Weight at 6 weeks	1744.00	474.69	2267.63	468.45	-5.72	0.001

- Mean birth weight in RoP group and in non-RoP group was 1413.17 and 1588.44 gms respectively with p value of 0.008 which was statistically significant.
- Mean Weight at 4 weeks in RoP and non RoP group was 1460.15 and 1865.32 gms respectively with p value of 0.001 which was statistically significant.
- Mean Weight at 6 weeks in RoP and non-RoP group was 1744 and 2267.63 gms respectively with p value of 0.001 which was statistically significant.



Graph 4: Mean birth weight, Weight at 4 weeks & 6 weeks among ROP and non-ROP infants

Table 7: Mean weight gain till 4 weeks and 6 weeks among ROP and non-ROP babies

	ROP		NO ROP		T Test	P Value
	Mean	SD	Mean	SD		
Weight Gain till 4 Weeks from BW	46.97	178.35	280.87	239.28	-5.53	0.001
Weight Gain till 6 Weeks from BW	316.56	281.23	683.19	341.30	-5.82	0.001

- Mean Weight Gain till 4 Weeks from BW in ROP and non-ROP group was 46.97 and 280.87
- gms respectively with p-value : 0.001.
- Mean Weight Gain till 6 Weeks from BW in ROP and non ROP group was 316.56 and 683.19
- gms respectively with p-value : 0.001.

Table-8: Mean Relative weight-gain till 4 weeks and 6 weeks among ROP and non-ROP babies

	ROP		NO ROP		T Test	P Value
	Mean	SD	Mean	SD		
Relative weight gain at 4th week	0.03	0.12	0.17	0.14	5.07	0.001
Relative weight gain at 6th week	0.23	0.20	0.44	0.24	4.62	0.001

- Mean Relative weight gain at 4th week in ROP and non-ROP group was 0.03 and 0.17 gms respectively; p-value of 0.001.
- Mean Relative weight-gain at 6th week in ROP and non-ROP group was 0.23 and 0.44 gms respectively with p value of 0.001.

DISCUSSION

DISCUSSION

RoP, is a vaso-proliferative condition of the retina which is recognised as one of the significant cause of blindness in children which can be prevented in both wealthy nations as well as developing countries. ROP can occur in infants as young as 24 weeks of gestation. Gilbert hypothesised that a high prevalence of ROP exists in industrialised countries among premature infants who weighed less than 1000 g when they were born.

In developing nations, however, ROP is emerging as a major cause of blindness in children due to a sharp rise in the survival rate of Very Low Birth Weight preterm children. This is due to the fact that the survival rate of VLBW preterm infants has increased dramatically in recent years. It has been estimated that the survival rate of infants with a gestational age between 27&28 week's GA at birth can reach nearly 90%. These estimates, however, vary widely from country to country.

The pathophysiology of ROP is not totally understood at this time. RoP development is also associated with many other factors related to postnatal changes that depend on systemic health of the neonate, such as sepsis, RDS, blood transfusion, IVH are also positively associated with the development of R0P. Although oxygen use, low GA and low BW are major risk factors for ROP, other factors reflecting postnatal changes in the overall health of the baby are also positively associated with the development of ROP. The criteria used for ROP screening in the current guidelines only include GA and BW, and they do not take postnatal variables into consideration. Postnatal growth factors may play a part in the development of ROP as well as the severity of the condition. Recent studies have shown that a slow postnatal weight gain may raise the risk of R0P in children.[41]

Poor postnatal weight gain in a study was not associated to be an in-dependent risk factor when other risk factors added which were significant for ROP in the univariate analysis in the logistic regression. The duration of mechanical ventilation, the body mass index, and both of these together are in-dependent riskfactors of ROP. In this model, we assume that poor post-natal Weight-Gain is significantly related with other risk factors; as a result, it lost significance when analysed using logistic regression.

Therefore, a low relative weight gain during initial 4 wks of life is a predictor for R0P, but it is not an in-dependent riskfactor. It is not practical to make use of it as a screening tool on its own; however, it can be helpful in identifying infants who have a poor post-natal development period are at a larger risk. To accurately anticipate risk of retinopathy of R0P, ophthalmologists should keep a close eye on the BW, GA, length of mechanical ventilation, and WG percentage of preterm newborns at the 4th week of life.[41]This research was carried out to investigate whether or not there is a connection between the amount of post-natal weight gain in premature newborns and the likelihood that they may develop retinopathy of prematurity later in life.

ROP

In this particular research, there were 3.3% of babies who had AP ROP, 7.3% of babies who had stage 1 ROP, 19.5% of babies who had stage 2 ROP, and 3.3% of babies who had stage 3 ROP. In 66.7% of babies, there was no evidence of ROP. In the study that was conducted by Bal S et al.[36], an amount of 868 newborns, severe ROP seen in 12.7%(type 1 ROP are 415 and type 2 ROP are 453).

According to the findings of Wang ZH et al.[41], the prevalence of any stage of ROP was found in 80 newborns. Of those 80 newborns, 67 (22.11%) of those infants had mild form of R0P, which is defined as the ROP that doesnot satisfy the requirements for treating, and 13 (4.29%) of those infants had severe ROP, which was described as that which required treatment.

Retinopathy of prematurity was identified in 23 (21%) of 107 newborns in the study that was conducted by Huang HB et al.[35] Five infants, or 4.7% of 107 and 22% of 23, were diagnosed with severe form of type I R0P and needed treatment with laser photocoagulation and/or medication. ROP was seen in fifteen (63%) and severe type I ROP was present in three (12.5%; 20% of 15) of the 24 children that survived being born extremely prematurely.

In the study conducted by Filho JBF et al.[43], severe ROP that required treatment was found in 24 of the patients (7.2%). Of these 24 patients, 23 had R0P stage-3, threshold illness, and were managed with trans-pupillary diode laser photocoagulation. Despite receiving 2 laser treatments, one infant progressed to 4^{th} stage of ROP. 1 infant reached 5^{th} stage ROP (0.3%), which was caused by irregular follow-up after discharge from the hospial. Additionally, 1 neonate, of 32 weeks Gestational Age and with a birth weight - 1.315 gramms, developed R0P of threshold stage at post-menstrual age of fourtyone wks. Both of these instances occurred after the NICU discharge.

AGE

Male babies made up 50.4% of total participants in this study, while female babies are 49.6%. Male babies made up 51.2% of those diagnosed with ROP, while female babies made up 48.8% of the total. Babies who did not have ROP were split evenly between males and girls at a rate of 50/50. It was determined that there was no statistically significant link between the two variables.

GESTATIONAL AGE

In this study, Among babies with ROP and without ROP; mean gestational age was 30.90 +/- 2.17 and 32.76 +/- 1.90 weeks respectively.

In Bal S et al.,[36] mean Gestational Age was 27.9 wks. During 34 to 38 weeks of PMA, an elevated late Weight Gain Acceleration (up to 80th percentile of WGA) was connected with an more risk of severe ROP.

In Huang HB et al.,[35] 23% born at <32 weeks' gestation. There were thirty percent extremely premature newborns born before twenty-eight weeks, and seventy percent very premature newborns born between twenty-eight and thirty-one and a half weeks of gestation. Among babies with ROP and without ROP; mean gestational age was 27.6 and 30.3 weeks respectively.

In Filho JBF et al.,[43] The GA of babies ranged from 24 - 32 wks, with 29.7 weeks serving as the mean (SD 1.9).

In Wang ZH et al.,[41] Among babies with ROP and without ROP; mean gestational age was 28.83 +/- 1.39 and 29.83 +/- 1.36 weeks correspondingly with p value of 0.001. We are of the opinion that disparate observations may be attributable to differences in the screening & detecting RoP algorithms, as well as the reporting procedures, utilised by the various centres. In addition, the management of very preterm neonates may vary from one hospital to the next depending on whether or not the facility engages in "compassionate care" for severely ill neonates of GA >28 weeks for reasons that are not related to their medical condition.

BIRTH WEIGHT

According to the findings of this research, the mean BW of neonates born with ROP is 1413.17 g, whereas the average birth weight of babies born without ROP was 1588.44 g, with a p value of 0.008 indicating a statistically significant difference.

According to Bal S et al.[36], the mean (standard deviation) BW was 1086 (357) g.

According to Huang HB et al.[35], the average BW of babies born with R0P was 988 gramms, whereas the mean BW of babies born without R0P is 1383 grammes. The difference among these two groups is significant statistically, with a p-value : 0.001.

Birth weight in all neonates was measured by Filho JBF et al.[43] and found to range anywhere from 505 to 1,500 gram, with a mean of 1,124 g (SD 239.5). A univariate analysis of babies with no ROP, mild ROP, severe ROP, and body weight at 6 weeks age revealed following significant differences: body weight (P 0.001), growth acceleration (P 0.001), weight gain (P 0.001), and weight gain proportion (P = 0.019).

According to Wang ZH et al.[41], the difference among the ROP group's mean birth weight of 1170.13 gms and the non-ROP group's mean birth weight of 1306.62 gms was a p value of 0.001 that is significant statistically.

WEIGHT AT 4 WEEKS

- The results of this study showed that the ROP group had a significantly lower mean weight at four weeks compared to the non-ROP group (1460.15 gms versus 1865.32 gms; p = 0.001; statistically significant).
- According to Wang ZH et al.[41], the average weight gain after four weeks in the ROP group was 221.13 gms, whereas the non-ROP group gained 307.30 gms. The difference among two study groups is significant statistically, with a p-value : 0.001.

WEIGHT AT 6 WEEKS

- The researchers found that the ROP group had a much lower mean weight at six weeks (1744 gms) than the non-ROP group (2267.63 gms), with a p-value : 0.001 that implies difference is statistically significant.
- In the study conducted by Filho JBF et al.[43], the infant had reached 2,200 g by the sixth week of their lives (68% of Weight Gain proportion, as determined).
- According to Wang ZH et al.[41], the statistically significant difference between the ROP group and the non-ROP group in terms of mean weight gain at 6 weeks was 487.63 and 597.91 gms, respectively. The p value for this comparison was 0.001.

WEIGHT GAIN

• According to the findings of this research, the ROP group experienced a mean weight gain of 46.97 gms over the course of four weeks, whereas the non-ROP group experienced a weight gain of 280.87 gms. The p value for this comparison was 0.001. ROP cohort had a mean weight-gain of 316.56 gms and the non-ROP cohort had a mean weight gain of 683.19 gms, and the p value for this comparison was 0.001.

• In this study, the mean relative weight gain at the fourth week in the ROP group was 0.03 gms, while the non-ROP group gained 0.17 gms. The p value for this comparison was 0.001. At the sixth week, the ROP group had a mean relative weight gain of 0.23 g., whereas the non-ROP group gained 0.44 grammes, and the difference was statistically significant ($p = 0.001$).

• According to Wang ZH et al.[41], the mean weight gain proportion at the fourth week in the ROP group and the non-ROP group was 18.89% and 13.58% respectively. This difference had a p value of 0.003, indicating that it was statistically significant. At the sixth week, the ROP group and the non-ROP group had respective proportions of mean weight gain of 42.48% and 46.43%, with a p value of 0.118, indicating that the difference was not statistically significant. At the conclusion of their fourth week of life, the relative WG of infants who were diagnosed with ROP was significantly lower than it should have been. Compared to healthy infants, newborns who were diagnosed with ROP had a significantly lower relative weight gain at the ages of four and six weeks.

• According to Huang HB et al. [35], the average rate of weight gain in the R0P cohort and the non-R0P cohort was 20.6 and 22.1 gms/day, respectively. The p value for this study was 0.24, indicating that was not statistically significant.

• In a research performed by Bal S et.al;.[36], the researchers found that with rising early Weight Gain Rate during the PMA period of 29 to 33 weeks, severe RoP rate decreased. The researchers found that 426 neonates (19percent) in the lowest Weight Gain Rate tertile (19 g/d), 286 infants (12.4percent) in the middle Weight Gain .Rate 1/3rd part (19 to 26 gramm/day), and 156 infants (6.8%) in the highest Weight Gain Rate1/3th part (> Babies who gained the least amount of weight in their first few months had the highest risk of developing severe ROP. Infants who were in the middle tertile of late Weight Gain Acceleration (-0.25 to 0.55 g/d) and were in the middle proportion of early Weight Gain Rate has major risk of RoP comparative with infants who were in the lowest late Weight Gain Acceleration tertile part. Children who were in the middle 1/3rd part of late Weight Gain Acceleratin had major R0P risk compared to neonates who were in the lowest quadrant of late Weight Gain Acceleration. This was the case even in the tertile with the highest early WGR

According to Filho JBF et al.[43], mean Gestational Age for pre-threshold form of R0P across participants was 36.3 wks with a standard deviation of 1.6 weeks, while the mean Gestational Age for threshold group was 37.9 weeks with a standard deviation of 1.7 weeks. At 6 wks age (P -0.001), Wt Gain proportion (P = 0.019), Weight Gain (P 0.001), there was a significant difference between groups of no ROP and mild form of ROP, and severe form of ROP.

• In late 20th century, Ehrenkranz et al.[45], and commonly utilised modern neonatology, in which it is believed that these babies will regain weight, around fifty percent of their body weight, after they have finished the first six weeks of their lives. Weight gain is tied with nutritional assistance after 2nd wk age, and generally speaking, newborns who are healthier gain weight more quickly than babies who are worse. Systemic morbidity also affects weight-gain in post-natal period, some of which are also related with ROP, such as IVH, sepsis, necrotizing enterocolitis or bronchopulmonary dysplasia.

• In 1995, Hall et al.,[46]documented low Weight Gain is associated with ROP severity in a birth of multiple pregnancy with identical Gestational Age and similar Birth Weight. The low WG in the postnatal period could be indicative for the development of general morbidities, some of which are also related with the development of ROP, such as sepsis, intraventricular haemorrhage, bronchopulmonary dysplasia, or necrotizing enterocolitis.

• In a study that was conducted in hindsight and published in the year 2000, Wallace et al., 44 examined postnatal WG in addition to 11 other risk factors in a sample population of 111 newborns. At the age of 6 weeks, they tested the hypothesis that a baby's WG that was less than half of the baby's birth weight indicated a higher risk for more severe forms of ROP. According to the findings of Wallace's research, two risk factors of stage3 retinol oxide pigmentation are growth arrest and inadequate relative weight-gain in the initial 6 wks of infancy.

• In past, Shaffer et al. 47 hypothesised that absolute ratio of Weight Gain in Very Low Birth Weight will be proportionate to the neonate's Birth Weight. As a result, they hypothesised that the predicted percentage of Weight Gain must be same for pre-term newborns with varying BW during similar time of life. It was not found there's a significant difference in the relative Weight gain (grams/kg/day) between the group that had ROP and the control group.

CONCLUSION

CONCLUSION

This study's findings revealed that "poor postnatal weight gain" in the early postnatal period is a factor that can anticipate risk of R0P.

It aids in R0P prediction considerably earlier in children who are at risk of getting severe ROP with poor post-natal course, with the option of blindness preventive management

It prevents unwanted stressful examination in pre-term infants those not at risk of severe ROP.

Because of this, specialists like paediatrician and ophthalmologists should take additional care and pay more concentration in newborns who have suffered a delayed postnatal weight gain in order to anticipate the condition much earlier before diagnosis.

Tests of the eye should be performed on a routine basis in order to achieve this goal.

These examinations provide early intervention and contribute to the prevention of sight-threatening problems.

SUMMARY

SUMMARY

- Retinopathy of prematurity is a complex condition, which is the major cause of blindness that affects the development of retinal vessels in preterm infants. Significant risk factors include premature delivery and a LBW. The identification of risk variables is helpful for screening potentially vulnerable newborns and for more efficiently allocating resources. One of the risk factors is a slow or insufficient postnatal weight gain.

- The current cross-sectional observational study was carried out in the Department of Ophthalmology, R.L.Jalappa. Hospital and Research Centre, attached to Sri Devaraj Urs Medical College, Tamka, Kolar between January 2021 to June 2022.
- In the present study, babies with AP ROP made up 3.3% of total, infants in stage 1 ROP made up 7.3% infants with stage 2 ROP made up 19.5% of the total, and babies with stage 3 ROP made up 3.3% of the total. In 66.7% of babies, there was no evidence of ROP.
- Male babies made up 50.4% of the total, while female babies made up 49.6%. Male babies made up 51.2% of those diagnosed with ROP, while female babies made up 48.8% of the total. Males and females made up an equal number who did not have ROP. It was determined that there was no statistically significant link between the two variables.
- Mean GA at delivery is 30.90 +/- 2.17 wks for babies diagnosed with ROP and 32.76 +/- 1.90 weeks for those not diagnosed with ROP.
- The p value of 0.008 indicated that there was a statistically significant difference between the ROP group and the non-ROP group for the average BW, which is 1413.17 & 1588.44 g, respectively.

- The ROP cohort has mean weight of 1460.15 gram at four weeks, while the non-ROP cohort had mean weight of 1865.32 g, with a p-value: 0.001.
- ROP cohort had a mean weight of 1744 g at six weeks, while the non-ROP group had a mean weight of 2267.63 g, and it is significant statistically (p = 0.001).
- ROP cohort has mean weight gain of 46.97 gms while the non-ROP cohort had a mean weight gain of 280.87 gms, and the p value for this comparison was 0.001. The ROP cohort had a mean weight gain of 316.56 gms and the non-ROP cohort has mean weight gain of 683.19 gms, and the p value for this comparison was 0.001.
- Relative mean weight gain at the fourth week in the ROP group was 0.03 gms, whereas the non-ROP group gained 0.17 gms. The p value for this comparison was 0.001. At the sixth week, the ROP group had a mean relative weight gain of 0.23 gramms, whereas the non-ROP group gained 0.44 gramms, and the difference was statistically significant (p = 0.001).
- This study's findings concluded that "poor postnatal weight gain" in the early postnatal period is a factor that can anticipate risk of R0P.

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ANNEXURES

ANNEXURE-1

CASE PROFORMA

Date : **UHID:**

Name : **IP no:**

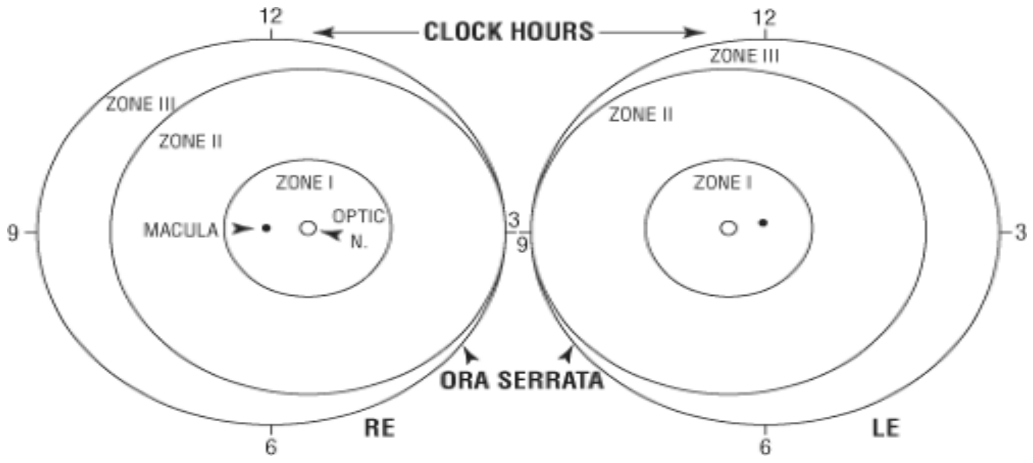
Age : **Gender**

Birth weight : **Growth at birth : AGA/SGA/LGA**

Present weight : **Gestational age at birth**

OCULAR EXAMINATION		
TESTS	**RE**	**LE**
1. BLINK REFLEX 2. ANTERIOR SEGMENT		

3. FUNDUS :



FOLLOW UP :

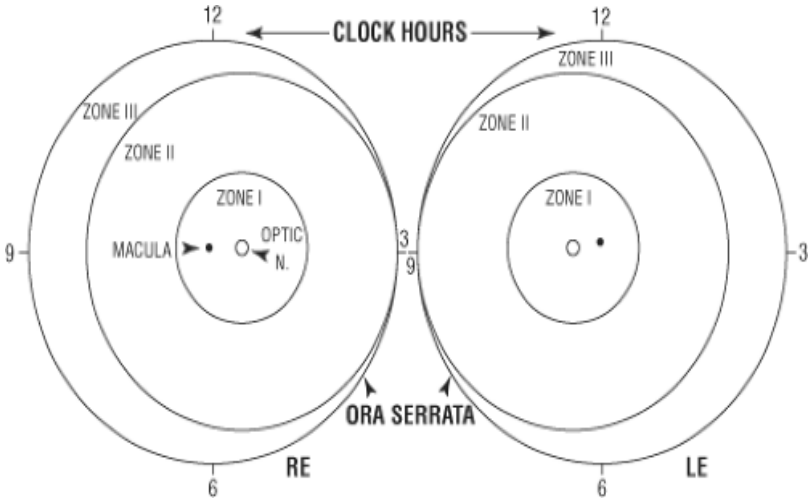
DATE:

PRESENT WEIGHT :

WEIGHT GAIN :

OCULAR EXAMINATION		
TESTS	**RE**	**LE**
1. BLINK REFLEX 2. ANTERIOR SEGMENT		

3. FUNDUS :



ANNEXURE-II

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR-563101.

INFORMED CONSENT FORM

Case no:

IP no:

TITLE:
CORRELATION OF RELATIVE RISK OF RETINOPATHY OF PREMATURITY AND EARLY POSTNATAL WEIGHT GAIN AMONG PRETERM BABIES

I, _____ parent/guardian, the undersigned, agree and allow my baby to participate in this study and authorize the collection and disclosure of personal information as outlined in this consent form.

I understand the purpose of this study, the risks like temporary decrease in heart rate and temporary cessation of breathing, the occurrence of such events will be taken care by the full NICU support staff or if required stoppage of procedure and benefits of the technique like to know the status of retinal vasculature which in turn will allow us to pick up any abnormality if present at the earliest by regular follow ups. and the confidential nature of the information that will be collected and disclosed during the study. The information collected will be used only for research.

I have had the opportunity to ask questions regarding the various aspects of this study and my questions have been answered to my satisfaction.

I agree to baby's examination with the Ret Cam.
Participation in this study does not involve any extra cost to me.

Name	Signature	Date	Time
Parent /Guardian			
Witness:			
Primary Investigator / Doctor:			

ಶ್ರೀ ದೇವರಾಜ್ ಅರ್ಸ್ ಅಕಾಡೆಮಿ ಆಫ್ ಹೈಯರ್ ಎಜುಕೇಶನ್ ಆಂಡ್ರೀಸರ್ಚ್,

ತಮಕ, ಕೋಲಾರ-563101 .

ಮಾಹಿತಿ ನೀಡಿದ ಒಪ್ಪಿಗೆ ನಮೂನೆ

ಕೇಸ್ಸಂಖ್ಯೆ:
ಐಪಿಸಂಖ್ಯೆ:

ಶೀರ್ಷಿಕೆ: ಪ್ರಸವಪೂರ್ವ ಶಿಶುಗಳಲ್ಲಿ ರೆಟಿನೋಪತಿ ಮತ್ತು ಪ್ರಸವಪೂರ್ವ ತೂಕ ಹೆಚ್ಚಳದ ಸಂಬಂಧಿತ ಅಪಾಯದ ಪರಸ್ಪರ ಸಂಬಂಧ

ನಾನು, _____ಪೋಷಕರು/ಪೋಷಕರು, ಕೆಳಗೆ ಸಹಿ ಮಾಡಿದ್ದು, ನನ್ನ ಮಗುವಿಗೆ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಒಪ್ಪಿಗೆ ಮತ್ತು ಅನುಮತಿ ನೀಡುತ್ತೇನೆ ಮತ್ತು ಈ ಸಮ್ಮತಿ ನಮೂನೆಯಲ್ಲಿ ವಿವರಿಸಿದಂತೆ ವೈಯಕ್ತಿಕ ಮಾಹಿತಿಯ ಸಂಗ್ರಹಣೆ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವಿಕೆಯನ್ನು ಅಧಿಕೃತಗೊಳಿಸುತ್ತೇನೆ.

ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವನ್ನು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ, ಹೃದಯ ಬಡಿತದಲ್ಲಿ ತಾತ್ಕಾಲಿಕ ಇಳಿಕೆ ಮತ್ತು ಉಸಿರಾಟದ ತಾತ್ಕಾಲಿಕ ನಿಲುಗಡೆಯಂತಹ ಅಪಾಯಗಳು, ಅಂತಹ ಘಟನೆಗಳ ಸಂಭವವನ್ನು ಪೂರ್ಣ NICU ಬೆಂಬಲ ಸಿಬ್ಬಂದಿ ನೋಡಿಕೊಳ್ಳುತ್ತಾರೆ ಅಥವಾ ಅಗತ್ಯವಿದ್ದರೆ ಕಾರ್ಯವಿಧಾನದ ನಿಲುಗಡೆ ಮತ್ತು ತಂತ್ರದ ಪ್ರಯೋಜನಗಳು ರೆಟಿನಾದ ನಾಳಗಳ ಸ್ಥಿತಿಯನ್ನು ತಿಳಿದುಕೊಳ್ಳಿ, ಇದು ನಿಯಮಿತವಾದ ಅನುಸರಣೆಗಳ ಮೂಲಕ ಯಾವುದೇ ಅಸಹಜತೆಯನ್ನು ಆರಂಭಿಕ ಹಂತದಲ್ಲಿ ಹೊಂದಿದ್ದರೆ ಅದನ್ನು ತೆಗೆದುಕೊಳ್ಳಲು ನಮಗೆ ಅನುಮತಿಸುತ್ತದೆ. ಮತ್ತು ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಸಂಗ್ರಹಿಸಿದ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವ ಮಾಹಿತಿಯ ಗೌಪ್ಯ ಸ್ವರೂಪ. ಸಂಗ್ರಹಿಸಿದ ಮಾಹಿತಿಯನ್ನು ಸಂಶೋಧನೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.

ಈ ಅಧ್ಯಯನದ ವಿವಿಧ ಅಂಶಗಳ ಬಗ್ಗೆ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ನನಗೆ ಅವಕಾಶವಿದೆ ಮತ್ತು ನನ್ನ ಪ್ರಶ್ನೆಗಳಿಗೆ ನನ್ನ ತೃಪ್ತಿಗೆ ಉತ್ತರಿಸಲಾಗಿದೆ.

ರೆಟ್ ಕ್ಯಾಮ್‌ನೊಂದಿಗೆ ಮಗುವಿನ ಪರೀಕ್ಷೆಗೆ ನಾನು ಒಪ್ಪುತ್ತೇನೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆಯು ನನಗೆ ಯಾವುದೇ ಹೆಚ್ಚುವರಿ ವೆಚ್ಚವನ್ನು ಒಳಗೊಂಡಿರುವುದಿಲ್ಲ.

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ಹೆಸರು	ಸಹಿ/ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ದಿನಾಂಕ	ಸಮಯ
ರೋಗಿಯಪೋಷಕರು			
ಸಾಕ್ಷಿಗಳಹೆಸರು			
ಪ್ರಾಥಮಿ ಕಸಂಶೋಧಕರು / ವೈದ್ಯರು			

ANNEXURE-III

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION ANDRESEARCH,TAMAKA,KOLAR-563101.

PATIENT INFORMATION SHEET

This information is to help you understand the purpose of the study **" CORRELATION OF RELATIVE RISK OF RETINOPATHY OF PREMATURITY AND EARLY POSTNATAL WEIGHT GAIN AMONG PRETERM BABIES"**

You are invited to take part voluntarily in this research study, it is important that you read and understand the purpose, procedure, benefits and discomforts of the study.

1. What is the purpose of this study?
2. What are the various investigations being used? Are there any associated risks?
   1. Fundus examination by RETCAM
   2. Weight measurement

Risks associated with Ret Cam are temporary decrease in heart rate and temporary cessation of breathing, the occurrence of such events will be taken care by the full NICU support staff or if required stoppage of procedure.

3. What is the benefit for me as a participant?

Participation in this research study may not change the final outcome of the study. However, patients in the future may benefit as a result of knowledge gained from this study. You will not be charged extra for any of the procedures performed during the research study. Your taking part in this study is entirely voluntary. You may refuse to take part in the study or you may stop your participation in the study at any time, without a penalty or loss of any benefits to which you were otherwise entitled before taking part in this study.

CONFIDENTIALITY

Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board. For further information/ clarification please contact, SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR - 563101 to Dr SK RAHEEMUNNISA or DR.HANUMANTHAPPA Contact no: 9492778910 or 9448322889.

ಶ್ರೀ ದೇವರಾಜ್ ಅರ್ಸ್ ಅಕಾಡೆಮಿ ಆಫ್ ಹೈಯರ್ ಎಜುಕೇಶನ್ ಆಂಡ್ರೀಸರ್ಚ್,
ತಮಕ, ಕೋಲಾರ-563101.

ರೋಗಿಯ ಮಾಹಿತಿ ಹಾಳೆ

ಈ ಮಾಹಿತಿಯು ಅಧ್ಯಯನದ ಉದ್ದೇಶವನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ನಿಮಗೆ ಸಹಾಯ ಮಾಡುತ್ತದೆ "ರೆಟಿನೋಪತಿಯ ಸಂಬಂಧಿತ ಅಪಾಯದ ಸಂಬಂಧಿತ ಅಪಾಯ ಮತ್ತು ಪ್ರಸವಪೂರ್ವ ಶಿಶುಗಳಲ್ಲಿ ಪ್ರಸವಪೂರ್ವ ತೂಕ ಹೆಚ್ಚಾಗುವುದು.

ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಪಾಲ್ಗೊಳ್ಳಲು ನಿಮ್ಮನ್ನು ಆಹ್ವಾನಿಸಲಾಗಿದೆ, ಅಧ್ಯಯನದ ಉದ್ದೇಶ, ಕಾರ್ಯವಿಧಾನ, ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಅನಾನುಕೂಲಗಳನ್ನು ನೀವು ಓದುವುದು ಮತ್ತು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು ಮುಖ್ಯವಾಗಿದೆ.

1. ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವೇನು?
2. ಯಾವ ವಿವಿಧ ತನಿಖೆಗಳನ್ನು ಬಳಸಲಾಗುತ್ತಿದೆ? ಯಾವುದೇ ಸಂಬಂಧಿತ ಅಪಾಯಗಳಿವೆಯೇ?

1. ರೆಟ್‌ಕ್ಯಾಮ್ ನಿಂದ ಫಂಡಸ್ ಪರೀಕ್ಷೆ
2. ತೂಕ ಮಾಪನ

ರೆಟ್ ಕ್ಯಾಮ್‌ಗೆ ಸಂಬಂಧಿಸಿದ ಅಪಾಯಗಳು ಹೃದಯ ಬಡಿತದಲ್ಲಿ ತಾತ್ಕಾಲಿಕ ಇಳಿಕೆ ಮತ್ತು ಉಸಿರಾಟದ ತಾತ್ಕಾಲಿಕ ನಿಲುಗಡೆ, ಅಂತಹ ಘಟನೆಗಳ ಸಂಭವವನ್ನು ಪೂರ್ಣ ಎನ್ ಐ ಸಿ ಯು ಬೆಂಬಲ ಸಿಬ್ಬಂದಿ ನೋಡಿಕೊಳ್ಳುತ್ತಾರೆ ಅಥವಾ ಅಗತ್ಯವಿದ್ದರೆ ಕಾರ್ಯವಿಧಾನವನ್ನು ನಿಲ್ಲಿಸುತ್ತಾರೆ.

3. ಭಾಗವಹಿಸುವವನಾಗಿ ನನಗೆ ಏನು ಪ್ರಯೋಜನ?

ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆಯು ಅಧ್ಯಯನದ ಅಂತಿಮ ಫಲಿತಾಂಶವನ್ನು ಬದಲಾಯಿಸದಿರಬಹುದು. ಆದಾಗ್ಯೂ, ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಜ್ಞಾನದ ಪರಿಣಾಮವಾಗಿ ಭವಿಷ್ಯದಲ್ಲಿ ರೋಗಿಗಳು ಪ್ರಯೋಜನ ಪಡೆಯಬಹುದು. ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಡೆಸಿದ ಯಾವುದೇ ಕಾರ್ಯವಿಧಾನಗಳಿಗೆ ನಿಮಗೆ ಹೆಚ್ಚುವರಿ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸುವುದು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ನೀವು ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿರಾಕರಿಸಬಹುದು ಅಥವಾ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವ ಮೊದಲು ನೀವು ಅರ್ಹರಾಗಿದ್ದ ಯಾವುದೇ ಪ್ರಯೋಜನಗಳ ದಂಡ ಅಥವಾ ನಷ್ಟವಿಲ್ಲದೆಯೇ ನೀವು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದನ್ನು ನಿಲ್ಲಿಸಬಹುದು.

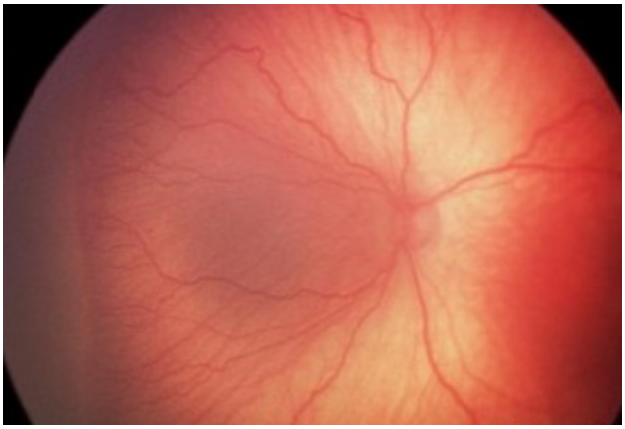
ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡುತ್ತಾರೆ ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಾಗುವಂತೆ ಮಾಡಲಾಗುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ಎಥಿಕ್ಸ್ ರಿವ್ಯೂ ಬೋರ್ಡ್ ಪರಿಶೀಲಿಸಬಹುದು. ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ/ಸ್ಪಷ್ಟೀಕರಣಕ್ಕಾಗಿ, ಶ್ರೀ ದೇವರಾಜ್ ಯುಆರ್ಎಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನೆ ಅಕಾಡೆಮಿ, ತಮಕ, ಕೋಲಾರ - 563101 ಅವರನ್ನು ಡಾ ಎಸ್ಕೆ ರಹೀಮುನ್ನಿಸಾ ಅಥವಾ ಡಾ.ಹನುಮಂತಪ್ಪ ಅಥವಾ ಡಾ.ಹನುಮಂತಪ್ಪ ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 9492778910 , 9448322889.

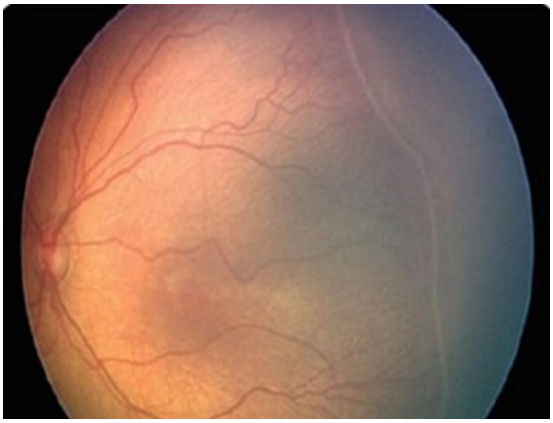
ANNEXURE-IV

PHOTOGRAPH 1: ROP SCREENING

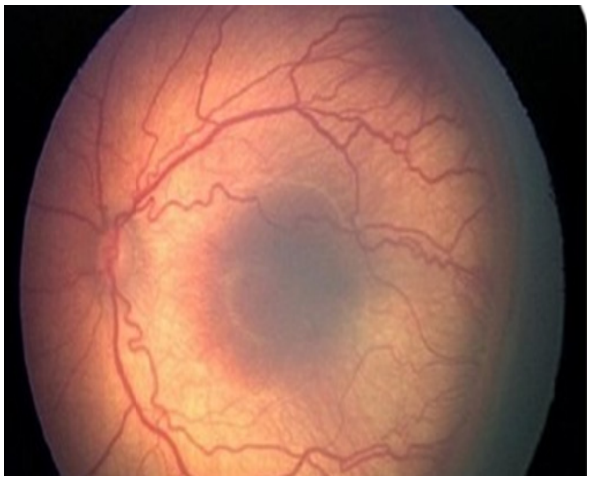
PHOTOGRAPH 2 : Ret Cam



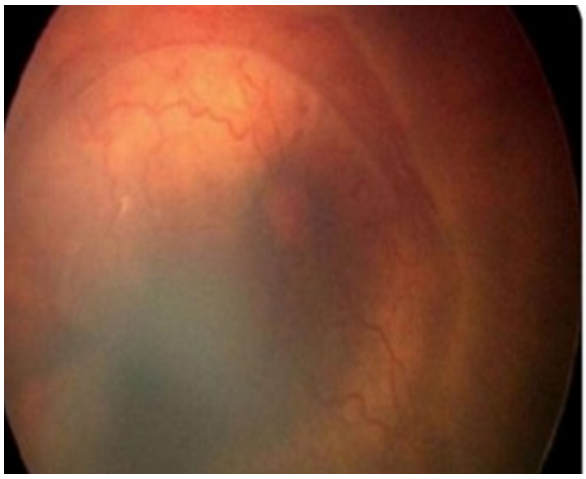
PHOTOGRAPH 3 – STAGE 1 ROP



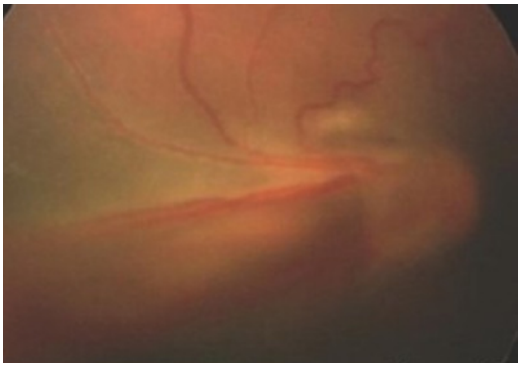
PHOTOGRAPH 4 – STAGE 2 ROP



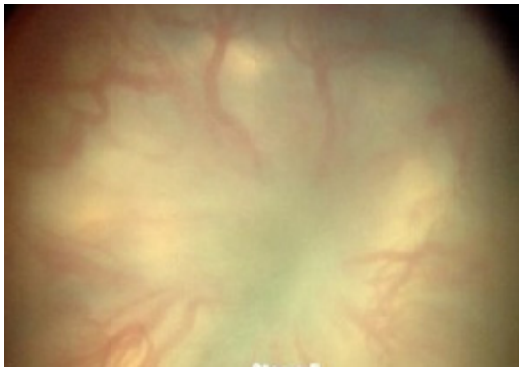
PHOTOGRAPH 5 – STAGE 3 ROP



PHOTOGRAPH 6- STAGE 4A ROP



PHOTOGRAPH 7- STAGE 4B ROP



PHOTOGRAPH 8- STAGE 5 ROP

ANNEXURE-V

Table - Summary of Key Components of International Classification of Retinopathy of Prematurity, 3rd Edition Classification

1.Zone	a. Definition of 3 retinal zones centered on the optic disc. The location of the most posterior retinal vascularization or ROP lesion denotes the zone for the eye. b. Definition of a posterior zone II region that begins at the margin between zone I and zone II and extends into zone II for 2 disc diameters.∗ c. The term *notch* is used to describe an incursion by the ROP lesion of 1–2 clock hours into a more posterior zone. The ROP zone for such eyes should be noted by the most posterior zone of retinal vascularization with the qualifier "notch" (e.g., "zone I secondary to notch").∗
2.Plus and Preplus Disease	Plus disease is defined by the appearance of dilation and tortuosity of retinal vessels, and Pre-plus disease is defined by abnormal vascular dilation, tortuosity insufficient for plus disease, or both. Recognition that retinal vascular changes in ROP represent a continuous spectrum from normal to preplus to plus disease, with sample images demonstrating this range.∗ These changes should be assessed by vessels within zone I, rather than from only vessels within the field of narrow-angle photographs and rather than from the number of quadrants of abnormality.∗
3.Stage of Acute Disease (Stages 1–3).	Stage of acute disease is defined by the appearance of a structure at the vascular–avascular juncture as stage 1 (demarcation line), stage 2 (ridge), and stage 3 (extraretinal neovascular proliferation or flat neovascularization). If more than 1 ROP stage is present, the eye is classified by the most severe stage.
4.Aggressive ROP	The term aggressive-posterior ROP was used previously to describe a severe, rapidly progressive form of ROP located in posterior zones I or II. Because of increasing recognition that this may occur beyond the posterior retina and in larger preterm infants, particularly in regions of the world with limited resources, the Committee recommends the new term aggressive ROP.∗
5.Retinal Detachment (Stages 4 and 5).	a.Stages of retinal detachment are defined as stage 4 (partial: 4A with fovea attached, 4B with fovea detached) and stage 5 (total). b.Definition of stage 5 subcategories: stage 5A, in which the optic disc is visible by ophthalmoscopy (suggesting open-funnel detachment); stage 5B, in which the optic disc is not visible because of retrolental fibrovascular tissue or closed-funnel detachment; and stage 5C, in which stage 5B is accompanied by anterior segment changes (e.g., marked anterior chamber shallowing, iridocorneolenticular adhesions, corneal opacification), suggesting closed-funnel configuration.∗ Additional descriptors of funnel configuration (e.g., open-closed) may be applied if clinically useful.

6.Extent of Disease	Defined as 12 sectors in using clock-hour designations.
7.Regression	Definition of ROP regression and its sequelae, whether spontaneous or after laser or anti–vascular endothelial growth factor treatment. Regression can be complete or incomplete. Location and extent of peripheral avascular retina (PAR) should be documented.∗
8.Reactivation	Definition and description of nomenclature representing ROP reactivation after treatment, which may include new ROP lesions and vascular changes. When reactivation of ROP stages occurs, the modifier reactivated (e.g., "reactivated stage 2") is recommended.∗
9.Long-Term Sequelae	Emphasized beyond previous versions of the ICROP, including sequelae such as late retinal detachments, PAR, macular anomalies, retinal vascular changes, and glaucoma.

ICROP = International Classification of Retinopathy of Prematurity; PAR = persistent avascular retina; ROP = retinopathy of prematurity
Each eye should be classified based on zone, plus disease, stage, and extent. If aggressive ROP is present, it should be noted.
∗ Key changes compared with previous ICROP publications.

KEY TO MASTER CHART

BIRTH WIGHT

WEIGHT (in grams) AT 4 WEEKS
WEIGHT (in grams) AT 6 WEEKS

GA – GESTATIONAL AGE

M **-**MALE

F **-**FEMALE

MASTER CHART

UHID	BIRTH WEIGHT	WEIGHT AT 4 WEEKS	WEIGHT AT 6 WEEKS	GA	DIAGNOSIS	SEX
6593	1340	1380	1580	30	SATGE 1 rop	F
6959	1100	1100	1500	28	stage 3 rop	M
6966	1260	1280	1450	28	stage 3 rop	F
7644	1400	1480	1830	32	STAGE 1 ROP	M
7722	1100	1060	1160	31	stage 2 rop	f
6575	1260	1360	1450	33	STAGE 2 ROP	M
7162	1120	1080	1440	32	STAGE 2 ROP	F
7689	1600	1680	1740	31	stage 2 rop	M
7692	1380	1500	1786	31	AP ROP	M
7688	1610	1876	2000	31	STAGE 2 ROP	F
8277	1400	1440	1780	33	stage 2 rop	F
7738	1280	1300	1720	30	STAGE 2 ROP	M
7781	1400	1460	1560	30	STAGE 1 ROP	F
7991	2420	2760	3380	34	STAGE 2 ROP	M
8072	1640	2000	2700	32	STAGE 2 ROP	M
8099	1070	1100	1800	31	AP ROP	F
8100	1800	1600	1580	30	STAGE 2 ROP	F
8101	1220	1040	1180	26	STAGE 2 ROP	M
7990	1140	960	1150	29	STAGE 2 ROP	F
8337	1860	1760	2000	34	STAGE 2 ROP	F
8354	1280	1280	1480	34	STAGE 2 ROP	M
8404	1660	1280	1600	32	STAGE 1 ROP	M
8505	1130	1240	1280	29	APROP	F
8484	1300	1360	1460	29	STAGE 1 ROP	F
8461	1480	1660	1940	31	STAGE 1 ROP	M
8565	1140	1200	1300	30	STAGE 2 ROP	M
8692	1120	1640	2200	34	STAGE 2 ROP	F
8693	1300	1580	2000	29	STAGE 1 ROP	F
8691	1280	1200	1480	29	STAGE 2 ROP	M
8872	1970	2080	2300	34	STAGE 1 ROP	F
9011	920	1140	1200	29	STAGE 2 ROP	M
7023	2700	2280	2740	34	STAGE 2 ROP	M
9310	1320	1280	1440	30	stage 2 rop	M
9420	1340	1500	1650	32	stage 3 rop	F
9393	1780	1940	2160	30	stage 2 rop	M
9390	1260	1400	1600	35	stage 2 rop	M
9201	1300	1370	1600	29	stage 2 rop	M
9202	1070	1000	1200	27	stage 2 rop	F
9269	1120	1220	1400	34	stage 3 rop	F
7050	1950	1900	2380	31	stage 1 rop	M
7235	1120	1100	1400	29	APROP	F
7344	1060	1180	2400	33	NO ROP	F
7370	1640	1800	2500	35	NO ROP	M
7371	1560	1820	2500	34	NO ROP	M
7183	1700	1800	2000	33	NO ROP	F
7341	1720	2400	2860	31	NO ROP	F
7342	1650	2400	2780	31	NO ROP	F
8102	1300	1560	2100	31	NO ROP	M

UHID	BIRTH WEIGHT	WEIGHT AT 4 WEEKS	WEIGHT AT 6 WEEKS	GA	DIAGNOSIS	SEX
7184	1320	1900	2300	34	NO ROP	F
6728	1720	2200	2660	32	NO ROP	M
9260	2060	2500	2900	30	NO ROP	M
8803	1730	2000	2400	32	NO ROP	m
6545	1930	2480	2600	36	NO ROP	F
7369	1900	2400	2700	31	NO ROP	F
6600	1100	1200	2000	32	NO ROP	M
8030	1580	2060	2120	31	NO ROP	F
8033	1560	1700	1800	31	NO ROP	M
8034	1614	2000	2300	33	NO ROP	F
8841	1060	1365	1620	33	NO ROP	m
8842	1760	2010	2500	32	NO ROP	F
8845	1600	2080	2800	35	NO ROP	M
8738	1490	1800	2300	30	NO ROP	m
6833	1580	2000	2100	33	NO ROP	M
8154	1700	2340	3020	32	NO ROP	M
8843	1580	2600	2220	33	NO ROP	M
8844	1360	1260	1520	30	NO ROP	F
7889	2980	2900	3100	34	NO ROP	M
8961	1880	2100	2580	35	NO ROP	F
8962	1460	1980	2400	34	NO ROP	F
8910	1660	2120	2440	34	NO ROP	F
8565	1140	1140	2500	30	NO ROP	M
9203	1500	1600	1850	33	NO ROP	F
7890	1820	2400	2700	34	NO ROP	F
8839	1520	1740	2160	33	NO ROP	m
7690	1400	1800	2100	31	NO ROP	M
9377	1980	2400	3000	30	NO ROP	M
9068	1100	1100	1240	33	NO ROP	F
9166	1800	2650	3320	32	NO ROP	M
6608	1200	1200	1380	31	NO ROP	M
8153	1860	2300	2600	36	NO ROP	F
8152	1860	2460	2660	36	NO ROP	M
7924	1140	1200	1700	31	NO ROP	F
7892	2480	2720	3000	36	NO ROP	F
7645	1500	1820	2145	33	NO ROP	M
7417	1480	1825	2140	31	NO ROP	F
8374	2160	2300	3000	34	NO ROP	M
7691	1540	1860	2000	32	NO ROP	F
7761	1640	2080	2800	35	NO ROP	F
9415	1400	1000	1340	30	NO ROP	M
7949	1820	1960	2500	34	NO ROP	F
6579	1780	1900	2400	33	NO ROP	F
7845	1540	1920	2840	31	NO ROP	M
8353	1580	2000	2300	34	NO ROP	M
8294	1200	1580	1980	34	NO ROP	F
8776	1580	2000	2300	36	NO ROP	M
8583	1540	2000	2620	36	NO ROP	M

UHID	BIRTH WEIGHT	WEIGHT AT 4 WEEKS	WEIGHT AT 6 WEEKS	GA	DIAGNOSIS	SEX
8552	1600	1830	2100	32	NO ROP	F
8553	1780	1780	2000	32	NO ROP	m
8155	1880	2080	2440	34	NO ROP	F
8528	1500	1700	2080	36	NO ROP	F
8485	1100	1100	2080	29	NO ROP	M
8353	1580	1826	2200	34	NO ROP	M
8252	1590	1560	1760	32	NO ROP	F
9092	1480	1560	2080	30	NO ROP	F
7760	1550	1940	2540	35	NO ROP	F
6682	1580	2020	3000	36	NO ROP	M
6812	970	1000	1060	31	NO ROP	M
7472	1400	1660	2000	33	NO ROP	F
6832	1260	1360	1341	32	NO ROP	M
6811	1370	1520	1900	30	NO ROP	M
6866	1480	1750	2000	32	NO ROP	M
6834	1920	2180	2500	33	NO ROP	F
6915	1300	1200	1500	29	NO ROP	M
6914	1400	1800	2300	32	NO ROP	F
6989	1200	1440	1600	35	NO ROP	F
6990	1625	1400	2000	35	NO ROP	F
6991	1625	1700	2100	35	NO ROP	F
7100	1400	1600	1800	33	NO ROP	F
7414	1500	2200	2520	33	NO ROP	F
7415	1880	2200	2650	33	NO ROP	M
7801	1680	1880	2000	35	NO ROP	F
7469	1560	1760	1900	30	NO ROP	M
7471	1900	2000	2400	31	NO ROP	M