A Dissertation on

A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL

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DECLARATION

I hereby declare that this dissertation entitled "**A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL**" is a bonafide and genuine research work carried out by me under the guidance of DR.S.PADMANABAN,M.S,D.O, Associate Professor, Department of Ophthalmology, Coimbatore Medical College & Hospital, Coimbatore.

This is submitted to The Tamil Nadu Dr.M.G.R. Medical University, Chennai in partial fulfillment of regulations required for the M.S Ophthalmology, Branch III Degree Examination to be held in May 2020.

Date:

Place: **DR SUGUNA C**

CERTIFICATE BY THE GUIDE

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GUIDE,

DEPARTMENT OF OPHTHALMOLOGY

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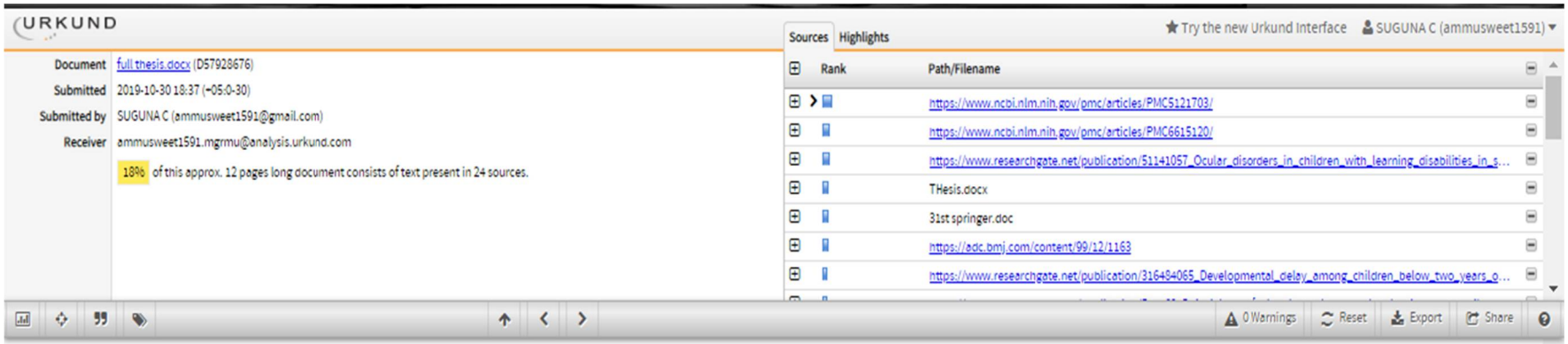

A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERITARY CARE HOSPITAL
INTRODUCTION One of the most common disabling and handicapping condition in the children are the visual disorders. In the developing countries the childhood blindness is a global problem. The prevalence of childhood blindness in high income and middle income countries are 0.3-0.4/1000 children and 0.2-0.7/1000 children respectively. Similarly in low and very low income countries the prevalence of childhood blindness are about 1.2/1000 children and 0.9/children. The prevalence of blind children in the world is about 1.4 million. (1) Visual development is a highly complex maturation process. It involves structural and functional changes in the eye. The children with developmental delay have poor fixation due to the delay in the maturation of the visual system. (2) Geographical locations, socioeconomic status and health care facilities are the factors that determine the incidence of childhood blindness. (1) Corneal abnormalities, childhood cataract, anomalies of the globe, retinal diseases, refractive errors, strabismus and amblyopia are the causes of childhood blindness. (3) The incidence of ocular disorder is more in children with developmental delay. (4)The condition in which a child is failed to meet expected development in the physical, social, emotional, intellectual, speech, language and adaptive development is known as developmental delay. (5) It is classified as mild, moderate and severe. A developmental quotient of 55-69 is considered as mild, 40-54 as moderate and <40 as severe. (6) Preterm children, low birth weight, genetic/congenital anomalies and children suffered from brain injury are at high risk of developing visual disorders. (4) The cause of global developmental delay can be prenatal, perinatal, postnatal or undetermined. In 62% of children the cause of developmental delay is undetermined. (5) The prevalence of developmental delay in the children is about 10%. (2) The most commonly encountered clinical presentation is the refractory errors. (7) Due to lack of child's ability to identify the poor vision the refractory errors in the children are usually unnoticed. The incomplete development of the visual pathway can caused due to the lack of prolonged good vision. (7) In children with developmental delay the prevalence of visual impairment, refractive errors and strabismus are high. (8) According to the WHO worldwide around 5% children of 14 years and below is identified with some type of moderate to severe disabilities. The prevalence of developmental delay in India is about 1.5- 2.5% in children of less than 2 years of age. (7) In children under 5 years of age 2.5% is the prevalence of developmental delay. The prevalence of visual impairment in children with developmental delay ranges between 15-40%. (9) Identification of the cause of ocular manifestation in children with developmental delay helps to improve the quality of life. The present study was conducted to determine the ocular manifestations in children with global developmental delay.

NEED OF THE STUDY Majority of the cases are unnoticed and can lead to an inevasible condition. The strategies regarding increasing

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EC Reg No. ECR/892/Inst/TN/2016
Telephone No: 0422 – 2574375/76
Fax : 0422 – 2574377

CERTIFICATE OF APPROVAL

To
Dr.Suguna C
Post Graduate,
Department of Ophthalmology,
Coimbatore Medical College & Hospital,
Coimbatore -18.

Dear Dr.Suguna C

The Institutional Ethics Committee of Coimbatore Medical College, reviewed and discussed your application for approval of the proposal entitled **"A Clinical Study of Ocular Manifestations in Children with Global Developmental Delay in a Tertiary Care Hospital."**No.043/2017.

The following members of Ethics Committee were present in the meeting held on 23.11.2017.conducted at MM - II Seminar Hall, Coimbatore Medical College Hospital Coimbatore-18.

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10	Dr.N.Paramasivan MD., Professor of Pharmacology, Sri Ramakrishna Dental College, Coimbatore	Basic Medical Scientist
11	Mrs.A.Sharmila BA., BL., Advocate	Legal Expert
12	Dr.K.P.Sampath Kumar M.Pharm, Ph.D., Asst. Prof. of Pharmacy, CMC, Cbe	Scientific Member
13	Dr.G.Vani Ganesh M.Sc.,Ph.D., Tutor in Medical Surgical Nursing, CMCH, Cbe	Scientific Member
14	Mr.V. Balasubramani MA,MA,MBA,LLB,M.Phil,PG.D.M, DLLAL, Chief Executive, Avinashilingam JSS Self Finance Courses, Cbe	Social Worker
15	Mr.V.A.Shahul Hameed, +2	Lay-Person

We approve the Proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL HUMAN ETHICS COMMITTE
COIMBATORE MEDICAL COLLEGE
COIMBATORE - 641 014.

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Date:

Place:

Dr SUGUNA C

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ABBREVIATIONS

fch	-	Female child
mch	-	Male child
PIH	-	Pregnancy Induced Hypertension
IUGR	-	Intrauterine Growth Retardation
LBW	-	Low Birth Weight
Visual acuity (CSM)	-	central, steady, maintenance of fixation of target reflex

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INTRODUCTION

One of the most common disabling and handicapping condition in the children are the visual disorders. In the developing countries the childhood blindness is a global problem. The prevalence of childhood blindness in high income and middle income countries are 0.3-0.4/1000 children and 0.2-0.7/1000 children respectively. Similarly in low and very low income countries the prevalence of childhood blindness are about 1.2/1000 children and 0.9/children. The prevalence of blind children in the world is about 1.4 million. (1)

Developmental delay is defined as significant delay in two or more developmental domains such as gross motor, vision and fine motor, speech, hearing and language, personal/social. It is significant when there is a delay of two or more SD from the mean in two or more domains of development.

Visual development is a highly complex maturation process. It involves structural and functional changes in the eye. The children with developmental delay have poor fixation due to the delay in the maturation of the visual system. (2) Geographical locations, socioeconomic status and health care facilities are the factors that determine the incidence of childhood blindness. (1) Corneal abnormalities, childhood cataract, anomalies of the globe, retinal

diseases, refractive errors, strabismus and amblyopia are the causes of childhood blindness. (3)

The incidence of ocular disorder is more in children with developmental delay. (4)The condition in which a child is failed to meet expected development in the physical, social, emotional, intellectual, speech, language and adaptive development is known as developmental delay.(5) It is classified as mild, moderate and severe. A developmental quotient of 55-69 is considered as mild, 40-54 as moderate and <40 as severe. (6)

Preterm children, low birth weight, genetic/congenital anomalies and children suffered from brain injury are at high risk of developing visual disorders. (4) The cause of global developmental delay can be prenatal, perinatal, postnatal or undetermined. In 62% of children the cause of developmental delay is undetermined.(5) The prevalence of developmental delay in the children is about 10%.(2)

The most commonly encountered clinical presentation is the refractory errors.(7) Due to lack of child's ability to identify the poor vision the refractory errors in the children are usually unnoticed. The incomplete development of the visual pathway can caused due to the lack of prolonged good vision. (7) In children with developmental

delay the prevalence of visual impairment, refractive errors and strabismus are high.(8)

According to the WHO worldwide around 5% children of 14 years and below is identified with some type of moderate to severe disabilities. The prevalence of developmental delay in India is about 1.5- 2.5% in children of less than 2 years of age. (7) In children under 5 years of age 2.5% is the prevalence of developmental delay. The prevalence of visual impairment in children with developmental delay ranges between 15-40%. (9) Identification of the cause of ocular manifestation in children with developmental delay helps to improve the quality of life. The present study was conducted to determine the ocular manifestations in children with global developmental delay.

NEED OF THE STUDY

Majority of the cases are unnoticed and can lead to an inevasible condition. The strategies regarding increasing awareness, mandatory ocular examination should be encouraged in order to reduce lack of awareness and sensitization among the parents and teachers. The prevalence of ocular manifestation in children with developmental delay is more as compared to normal children. It indicates the importance of routine ophthalmologic examination in children with developmental delay.

REVIEW OF LITERATURE

1. DEVELOPMENTAL DELAY AMONG CHILDREN: A BRIEF DESCRIPTION

Worldwide the developmental delay is a major public health care problem. Global developmental delay is one of the most common condition in pediatric population. (10) When a person exhibits a significant delay in the acquisition of milestones or in one or more domains of development leads to developmental delay. Gross motor, fine motor, speech and language, cognitive and socio-economic are the five domains of development.(11)

Global developmental delay is defined as the delay in two or more developmental domains. Genetic or acquired biological factors are the most causes of mental retardation. (12) The complex interaction between the internal constitutional factors and the external environmental factors is used to determine the developmental status in children. (13) The prevalence of developmental delay is high in the low income and middle income countries. (14) Developmental delay mostly occur in the early childhood.(11) Developmental delay involves mental retardation and intellectual functioning.

2.GLOBAL BURDEN

More than 200 million children around the world under the age of 5 years is identified with cognitive and socio-economical developmental delay. (14) Globally, the developmental delay is exhibited by 180-200 million children under the age of 5 years per annum. (11) The prevalence of global developmental delay ranges between 1-3%.(10, 15) Worldwide the prevalence of developmental disabilities among the children in the year 2016 was 52.9 million. The prevalence of male children with developmental delay was about 54% in the year 2016. (16)

3.INDIAN BURDEN

Globally, the children with disabilities are high in India with 65 million followed by Nigeria and china with 16 million and 15 million. (14) Nearly 10% of children in the early childhood itself is affected by developmental delay in India. (13) In children under the age of 2 years 1.5%-2.5% is the prevalence of developmental delay. (11)

Around 86% of total prevalence accounts for developing countries and 8% for developed countries. (11) In low income and middle income countries the prevalence of children developmental disabilities was high. (16)

4.COMMON ETHIOLOGIES OF DEVELOPMENTAL DELAY

The genetic and structural brain abnormalities are the most common cause of developmental delay.(10) Early gestation age, twin status, nutrient intake and low socio-economic status are the factors associated with the developmental delay in children. (13)

Causes of developmental delay in children (17)

Prenatal intrinsic category:

- genetic causes
- central nervous system malfunction
- metabolic causes

Prenatal extrinsic category:

- teratogenic / toxins
- infections

Perinatal category:

- asphyxia
- prematurity
- neonatal complications

Postnatal category:

- psychosocial environment
- infections
- trauma
- toxins

Poverty, malnutrition, lack of appropriate care and child abuse are the social factors that influence the developmental delay in children. Infective diseases, chronic malnutrition, iodine deficiency, iron deficiency, anemia, malaria, low birth weight, pre-term birth, exposure to lead or arsenic are the biological risk factors associated with the developmental delay.(14) Cerebral visual impairment, optic atophy, retinal dystrophies and structural eye anomalies are the etiologies of visual impairment in children with developmental delay. (4)

Parenting, cognitive stimulation, caregiver sensitivity and responsiveness to the child are the psychological factors related to developmental delay. (14) Bhattacharya, T., et al.(11) conducted a cross sectional study in which gender, birth weight, maternal education and place of delivery are associated with the developmental delay in children. In a cross sectional study conducted in a population of 200 children by Vora, H., et al. (18) in which preterm, IUGR, respiratory

distress, sepsis and seizure in neonatal period are related to the occurrence of developmental delay.

Nielsen, L. S., et al.(19) performed a study in 1126 children with developmental delay in which the prenatal, perinatal and postnatal were the aetiology of visual impairment 54, 29 and 7 children respectively. In a study conducted by Shevell, M.I., et al. (20) in a population of 71 children the cerebral dysgenesis, hypoxic ischemic encephalopathy, toxic exposure and chromosomal abnormalities are the causes for the global developmental delay in the study population.

Chromosomal and non-chromosomal genetic conditions, metabolic disorders, adverse events during gestation are the main prenatal causes of developmental delay. Environmental factors are the major contributing factor for mild retardation. (12) Puri, S., et al. (21) performed a study in Nepal in which visual impairment, conjunctivitis, blepharitis, chalazion and ectropion are the ocular disorders indentified in the study population.

Cerebral palsy (41.4%), Hypoxic ischemic encephalopathy (13.8%), Brain dysgenesis (13%) and Genetic disorders (13%) are the causes of developmental delay in the study performed by Fayyazi, A., et al.(22). Joshi, M., et al.(23) performed a study in which Cerebral palsy (64%), Down syndrome (22%), Autism (7%) and Intellectual

disability (4.5%) are the etiologies in children with the developmental delay.

5.OCULAR DISEASES/ EYE DISEASE AMONG CHILDREN WITH DEVELOPMENTAL DELAY

A study in 125 children was performed by Solomon, C. B., et al.(24) in which the most common ocular findings was the refractive errors with 51.2%. The optic atrophy, strabismus and CVI were the other ocular findings with 21.6%, 18.4% and 11.2% respectively.

Kwor, S., et al. (25) conducted a study in 260 children in which severe visual impairment, refractive errors, squint and organic ocular diseases are the ocular defects in children with mental deficiency. A study conducted by Wu, H.J., et al. (26) in 41 children the optic atrophy and strabismus are the most common ocular abnormalities. The ocular problems was identified in 48.7% of children with a history of perinatal insult. Afifi, H.H., et al.(27) performed a study in 90 children in which refractive error, conjunctivitis, strabismus, cataract, nystagmus and optic nerve dysplasia are the common ocular findings with 41%, 20%, 14%, 6%, 3% and 2% respectively.

Various ocular disorders identified in different studies

Studies	Ocular disorders
Sandfeld, N., et al. (28)	Hyperopia (15.3%) Myopia (10.8%) Astigmatism (20.6%) Esotropia (14.9%) Exotropia (10.3%) Mixed types (1.6%)
Dinukumar, A., et al. (29)	Refractive error (37.34%) Strabismus (14.45%) Nystagmus (14.45%) Cataract (4.81%) Disc pallor (2.4%) Retinal detachment (2.4%) Microphthalmos (1.2%) Congenital glucoma (1.2%) Coloboma (1.2%)

Gogate, P., et al. (30)	Refractive errors (27.3%) Strabismus (15.8%) Nystagmus (6.8%) Optic atrophy (6.5%) Congenital disorders (2.5%)
Joshi, R. S., et al. (23)	Refractive errors (20.75%) Strabismus (10.37%)
Tsao, W. S., et al.(31)	Refractive errors (35.4%)
Puri, S., et al.(21, 32)	Refractive errors (40%) Strabismus (17%)
Vora, U., et al.(32)	Refractive errors (58.5%) Hyperopia (18.6%) Myopia (24.3%) Astigmatism (27.1%)

6.ISSUES IN THE DIAGNOSIS OF OCULAR MANIFESTATION IN CHILDREN WITH DEVELOPMENTAL DELAY

Children with developmental delay are at high risk of developing ocular disorders. Particular strategies for assessment, intervention and protocols for the examination of these children should be introduced. (33) Health status, educational attainment and well being are low in children with developmental delay or other disabilities.(16) The causes of global developmental delay is undetermined in 62% of children due to difficulties in the diagnosis.(34) The diagnostic evaluations are usually exhaustive, expensive and invasive especially if the cause of developmental delay is genetic. (5)

Algethami, M. R., et al. conducted a cross sectional study in 30 special need school children. The aim of the study was to determine the current status of vision screening services in special educational needs schools. During the study period questionnaire was circulated for the collection of data. The study results revealed that 77% was the response rate in the study. The eye glasses was weared by 10.8% of children. The lack of vision screening services was noticed in 60.9% of schools. The optical, non-optical, or high-technology low-vision aids

was used by less than 2.7% of children. The lack of training to work with and support students with visual impairments was reported by 78.3% of children. The present study concluded the need of screening programs in special need schools.

Dinukumar, A., et al. (29) conducted across sectional study 83 children. The purpose of the study was to determine the visual function of children with disabilities and also to identify the preventable and treatable ocular co-morbidities. The picture chart, Snellen tumbling chart or Cardiff preferential looking cards, and complete ocular examination were used to determine the distant visual acuities. The study results revealed that the ocular disorders was identified in 54 children. Thirty one children was identified with refractive errors. The strabismus and nystagmus were present in 12 children while disc pallor and retinal detachment in 2 children each. Four children was present with cataract. One children each was identified with microphthalmos, congenital glaucoma and coloboma. Spectacles was used by only two of the 31 students with refractive errors. Thirteen of 35 children who were not cooperative for visual acuity assessment had more than one ocular abnormality. The present study concluded that the poor communication and poor cooperation of children with disability are the major reason of their delayed diagnosis.

Ezeh, E. I., et al. (35) performed a cross sectional study in 161 children The aim of the study was to assess the visual status of children with special needs. During the study period questionnaire was used to collect the data from the caregivers. The visual acuity, refraction, ocular alignment and motility tests and funduscopy were performed. The Statistical Package for the Social Sciences version 20 was used for the data analysis. The study results revealed that 91.5% was the response rate on the examination with 1.2:1 as male-to-female ratio. The age range of the participants was 5-17 year. The mean age of the subjects was 12.9± 3.3 years with >/= 13 years as the modal age group. The visual impairment was identified in 12.4% of children. The refractive error was noticed in 12.4%. The odd ratio for children with learning disability and developmental disability were 3.28 and 1.90 respectively. They had high occurrence of visual impairment. The visual status was assessed in 6.8% of children in the past itself. The present study concluded that the prevalence of visual impairment is high in the special needs children .

Giliyar, S. K., et al. (9) conducted a study in 36 children. The objective of the study was to evaluate the vision in children with delayed development or cerebral palsy. The visual status of the children was determined using central steady maintenance method. The

dilated refraction & fundus examination were also performed. The nystagmus, squint, roving eye movements were the clinical findings observed and photographed. The study results revealed that the majority of the children were males followed by females. The developmental delay and cerebral palsy children were identified with an abnormal birth history in 16% and 17%. The squint and horizontal nystagmus were noticed in 16% and 12.5% of children with developmental delay. The fundus abnormalities, squint and horizontal nystagmus were presented in 66%, 50% and 16% of children with cerebral palsy. The central steady maintenance was good in 8% of developmental delayed children whereas 15% in cerebral palsy children. The study concluded that the importance of rehabilitation program in children with delayed development and cerebral Palsy.

Gogate, P., et al. (30) performed a study in 664 participants. The purpose of the study was evaluate and treat ocular disorders in children with learning disabilities. During the study period intelligence quotient and medical histories of the children were collected. The kay pictures or Snellen's tumbling E chart were used to assess the distant visual acuities. SPSS and the Chi-square test were used for the data analysis. The study results revealed that 61.4% of the subjects were

males. The moderate-to-severe learning disabilities were identified in 60% with a mean IQ of 45.4. The ocular disorder was noticed in 45.3% of the subjects. The uncorrected refractive error, strabismus, nystagmus, optic atrophy and congenital anomalies were identified in 27.3%, 15.8%, 6.8%,6.5% and 2.5% respectively. The spectacles was used by 12 of the 143 students with refractive errors. The ocular problems was identified in 48.7% of children with a history of perinatal insult. Children with a history of epilepsy, Down's syndrome, and cerebral palsy were also at the risk of ocular disorders. The study concluded various ocular disorders in in children with learning disabilities.

Joshi, M., et al. (23) conducted a cross sectional observational study in 112 children with developmental delay. The objective of the study was to determine the ocular disorders in children with developmental delay. Visual acuity testing using Snellen's charts, Log MAR charts, cycloplegic refraction, torchlight and slit-lamp evaluation and dilated fundus examination were used for the ophthalmic evaluation. The study results revealed that 7.8 years ± 2.4 SD was the mean age of the population. The cerebral palsy, Down syndrome, autism, intellectual disability were the aetiology of developmental delay with 64%, 22%, 7% and 4.5% respectively. The congenital

hypothyroidism and ataxia telangiectasia were observed in 1 case each. The prevalence of ocular disorders was 84.8%. The ocular disorders was more in girls with 87% followed by boys with 83%. The most common ocular disorder was refractive error with 79.5% followed by strabismus with 46.4%. The common refractive error was astigmatism with 44.6%. The refractive error was divided into myopic astigmatism, hyperopic astigmatism and mixed astigmatism with 19.6%, 13.8% and 11.2% respectively. Simple hyperopia and simple myopia were observed in 21.9% and 12.1% respectively. The predominance of exotropia was more in children with 52% as compared to esotropia with 48%. The optic atrophy, nystagmus, epicanthal folds, cataract, mongoloid slant, ptosis, telecanthus, conjunctival telangiectasia and blepharitis were the other ocular abnormalities. The optic atrophy was noticed in 10% of children with cerebral palsy whereas cataract was identified in 25% of children with down syndrome. The study concluded the need of early diagnosis and intervention in children with disabilities.

Joshi, R. S., et al. (36) performed a study in 241 children. The purpose of the study was to determine the ocular disorders in children with mental retardation. During the study period ocular examination was performed in children. According to the intelligent quotient the

ocular problems were identified and categorized. The study results revealed that 51.45% of children was noticed with ocular problems. The common ocular problems were strabismus and refractive error with 10.37% and 20.75% respectively. There was an association found between the severity of mental retardation and ocular problems were observed in the study. The study concluded the various ocular problems encountered in children with developmental delay.

Kaur, G., et al. (37) performed a study in 404 children. The objective of the study was to determine the visual function, ocular status of children with disabilities and to identify the preventable and treatable causes of visual impairment. During the study period cycloplegic retinoscopy and refraction were performed. Cerebral palsy, Hearing impairment, Attention Deficit Hyperactive Disorder, Autism, Down syndrome and mental retardation were the various disabilities identified in the study population with 12.1%, 35.3%, 3.7%, 12.8% and 27.2% respectively. The study results revealed that 43% of children was observed with ocular disorders. The refractive errors and strabismus were the common ocular disorders with 23% and 18.1% respectively. Spectacles was prescribed in 23% of children. Further evaluation was preferred in 9.2% of children. The present study

concluded the importance of awareness regarding ocular examination in children.

Nielsen, L. S., et al. (19) performed a cross sectional study in 1126 children. The objective of the study was to identify the prevalence, diagnoses and aetiologies of visual impairment in children with developmental delay. The capture-recapture method was used to determine the number of children with developmental delay. The study results revealed that 10.5% was identified with the visual impairment. An IQ <or= 50 was noticed in 22.4% of students. The cerebral visual impairment, optic atrophy, retinal dystrophies and congenital nystagmus were the diagnosis in the study population. The prenatal, perinatal and postnatal were the aetiology of visual impairment in 54, 29 and 7 children respectively. The study concluded the prevalence of ocular disorders in children with developmental delay.

Puri, S., et al. (21) conducted a study in children with intellectual disability . The aim of the study was to evaluate the oculo-visual characteristics and the burden of visual impairment in children with intellectual disability. The case history, presenting distance visual acuity, cycloplegic refraction, binocular vision examination, contrast sensitivity and anterior and posterior segment evaluation were recorded

for ophthalmic examination. The study results revealed that the refractive errors and strabismus were the most common visual disorders with 40% and 17% respectively. The refractive errors without any correction was observed in 95% of children. The visual impairment was noticed in 25% with severe visula impairment in 3% of children. The conjunctivitis, blepharitis, chalazion and ectropion were the other ocular disorders. The study concluded the importance of early detection and management of visual disorders in children with disabilities.

Reena, A., et al. (2) performed a cross sectional study in 150 children with developmental delay. The objective of the study was to determine various ocular manifestations, treatable causes of visual handicap and the associated antenatal and perinatal factors in children with developmental delay .During the study period systemic examination and assessment of refraction were carried out. Statistical methods were performed for the data analysis. The study results revealed that 64% of children was identified with ocular manifestations. The major causes of visual impairment were the refractive errors, Stabismus and Optic Atrophy with 41.3%, 40% and 9.3% respectively. Refractive errors, Squint, Cataract and Retinopathy of Prematurity were the major treatable causes with 41.3%, 40%, 2.6%

and 4% respectively. The study concluded the ocular manifestations in children with developmental delay.

Sandfeld Nielsen, L., et al. (28) performed a study in 923 children. The objective of the study was to identify the prevalence of refractive errors, strabismus and reduced contrast sensitivity in children with developmental delay and to assess the number of examinations required to optimally support children. The prevalence of hyperopia, myopia and astigmatism were 15.3%, 10.8% and 20.6% respectively. Strabismus was noticed in 26.8% of children. The esotropia, exotropia and mixed types were identified with 14.9%, 20.6% and 1.6% respectively. There was a correlation between refractive error, strabismus and low IQ. Similarly there was a correlation between reduced contrast sensitivity, age, visual acuity and level of IQ. The study concluded the prevalence of various ocular disorders in children with developmental delay.

Smitha, K., et al. (38) performed a study in 100 children. The aim of the study was to determine the visual acuity and refractive status in children with global developmental delay and also to study the effect of early correction of refractive errors on vision and developmental quotient. The ocular complaints, status of visual acuity,

and type of refractive error were evaluated. Based on cycloplegic retinoscopy the glasses was prescribed. During the study period etiological diagnosis and DQ were recorded. Chi-square test was used for the statistical analysis. the prevalence of mild and severe global developmental delay in children were 43% and 50% respectively. Social behavior improvement showed by 71% of children. The children with moderate intellectual disability group after refractive error correction was observed with more improvement in DQ. Improvement was more in the severe group children of 2.5 years and above. The present study concluded that the spectacles therapy is a simple and cost effective therapy in ocular disorder children with developmental delay.

Solomon, C. B., et al. (24) conducted a descriptive study in 125 children with developmental delay. The purpose of the study was to determine the prevalence, diagnoses & aetiology of ocular abnormalities in children with developmental delay. During the study period associated antenatal, perinatal and postnatal factors were studied. The oculo visual anomalies was assessed by ophthalmic examination. The statistical methods was used for the data analysis. The study results revealed that 75.2% of children was identified with ocular manifestations. The most common ocular findings was the

refractive errors with 51.2%. The optic atrophy, strabismus and CVI were the other ocular findings with 21.6%, 18.4% and 11.2% respectively. There was a correlation between antenatal factors, CVI, cataract, and vision abnormalities in the newborn. There was a statistically significant relation was observed between perinatal, postnatal factors, optic atrophy, nystagmus and poor vision in the newborn . The study concluded various causes of developmental delay in the children.

Thomas, M., et al. performed a retrospective study in 418 children. The purpose of the study was to determine various ocular ailments in children with developmental problems. During the study period socio-demographic details, systemic ailments, ocular examination and correlations were recorded and analyzed. The study results revealed that the history of consanguinity was identified in 17.9%. The pre term children in the study population was 17.2%. The developmental delay was identified in 57.4% of children whereas speech and language problem in 71.8%. The main ocular disorder was the refractive error with 53.35%. The hyperopia was the most common refractive error. Anisometropia, Squint and nystagmus were noticed in 4.31%, 4.55% and 2.6% respectively. The xerophthalmia was observed in 0.25% of children only. In developing countries the main

cause of blindness was the vitamin A deficiency. The study concluded that the quality of life can be improved with the early diagnosis and intervention.

Tsao, W. S., et al. (31) conducted a study in 241 students. The aim of the study was to determine the ocular and visual status in children with developmental delay. During the study period medical records and disability types were recorded. The study results revealed that refractive errors was identified in 35.4% of subjects. High myopia and moderate hypermetropia were observed in 20 eyes and 16 eyes respectively. The spectacles was prescribed in 34.8% of the participants in order to correct the vision. The suitable corrective spectacles was weared by 6.2% subjects. The ocular disorders was identified in 22.5% of participants. The prevalence of ocular disorders in high in the multiple disability group with 32.9% as compared to simple intellectual disability group with 19.6%. The study concluded that regular ophthalmic examination should be performed in children with developmental disabilities.

Vora, U., et al. (32) performed a cohort study. The aim of the study was to determine the refractive status and visual function of children with special needs and to compared them with healthy 1(st) grade school students. The contrast charts was used to test the contrast sensitivity. During the study period the cycloplegic refraction, ocular movement, alignment, and anterior segment were assessed. the study results revealed that 58.5% and 2.9% were the prevalence of refractive error and normal healthy first grade students The risk of refractive error was high in children with special needs as compared to normal healthy first grade students. In group I hyperopia, myopia and astigmatism were identified with 18.6%, 24.3%, and 27.1%, respectively. The defective near vision was noticed in 6 children. The refractive error was observed in 80% of children with Down syndrome. The contrast sensitivity was decreased in 50% of children with developmental disorder. The study concluded prevalence of ocular disorders in children with disabilities.

Welinder, L. G. et al. (39) performed a study in 502 children. The objective of the study was to evaluate the visual abilities of students with severe developmental delay. The study results revealed that the visual impairment was identified in 11% of students. Legal blindness was noticed in 3% of children. The visual acuities was low in

students with preferential looking systems as compared to students tested with ortho types. Due to the visual impairment they had problems of participating in the colour and form tests. The study concluded the need of awareness and early diagnosis of visual impairment in the children with developmental delay.

Woodhouse, J. M., et al. (40) The purpose of the study was to determine the current status of vision screening and eye care in special schools. During the study period full eye examinations were performed in the children. The study was conducted in three phases. The vision screening was patchy and inconsistent among the 39 schools in the first phase. The previous eye examination was not reported in 42% of students during the phase 2. The low vision was identified in 17% of the pupils in the five schools. The first-time or updated spectacle prescription was needed in 50% of students. The ocular abnormality was observed in 51% of students. The school-based eye examinations was more successful as compared to clinic-based or practice-based examinations which was reported by the school staff and parents in the phase 3 of the study.

Lacunae in literature:

Studies on the cause and epidemiology of pediatric ocular injury is carried out mostly in the developed countries. There is lack of studies that promote the awareness of ocular disorders in children with developmental delay. Poor communication was a major lacunae in most of the studies. The prevalence of disabilities in children is high in the developing countries so more studies should be conducted in the developing countries.

DESIGN, METHODOLOGY AND TECHNIQUES

Study design

It is a hospital based prospective cross- sectional study

Setting

Study was conducted at the Department of Ophthalmology, Coimbatore Medical College Hospital, Coimbatore.

Duration of the study

One year period – from December 2017 to January 2018

Study population

Children with Global Developmental Delay attending the Department of Ophthalmology in Coimbatore medical college hospital were included in the study based on selection criteria.

A minimum of 100 children will be included in the study.

Inclusion criteria

All children with delayed milestones from 6 months to 6 years attending the department of ophthalmology

All children with Delayed Milestones from 6 months to 6 years referred from the Department of Pediatrics to Ophthal Department

Exclusion criteria

- Children who have undergone treatment and ocular surgeries for ophthalmic abnormalities
- Children who are terminally ill
- Children whose parents not willing for the study

STUDY METHODS / METHODOLOGY

After explaining to the Parent/Legal Guardian about the ocular disorders that can occur in their children and obtaining consent from the legal guardian/parent of the children selected for study.

Data are collected using structured questionnaire for each child separately. General Examination was done in consultation with paediatrician.

Clinical Examination includes

1. Oblique Examination with torch light
2. Visual Acuity
3. Slit lamp Examination
4. Refraction including Objective and Subjective Correction and Post mydriatic testing
5. Fundus Examination

OBJECTIVES OF THE STUDY

1. To describe the various ocular disorders in children with developmental delay and their prevalence
2. To search for treatable causes of visual disorders in children with delayed milestones.
3. To study the antenatal, perinatal and postnatal factors which may be contributing.
4. To emphasize the importance of detailed ophthalmic examination in children with developmental delay.

STATISTICAL ANALYSIS :

Visual Acuity, Myopia, Hypermetropia, Astigmatism Were considered as primary outcome variables. Age, Gender Were considered as Secondary outcome variables.

Descriptive analysis: Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram, pie diagram and box plots.

RESULTS

A total of 100 subjects were included in the analysis.

Table 1: Descriptive analysis of age in years in study population (N=100)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Age In Years	2.34 ± 1.32	2.00	0.70	6.00	2.08	2.61

Table 2: Descriptive analysis of gender in the study population (N=100)

Gender	Frequency	Percentages
Male	60	60.0%
Female	40	40.0%

Figure 1: Pie chart of gender in the study population (N=100)

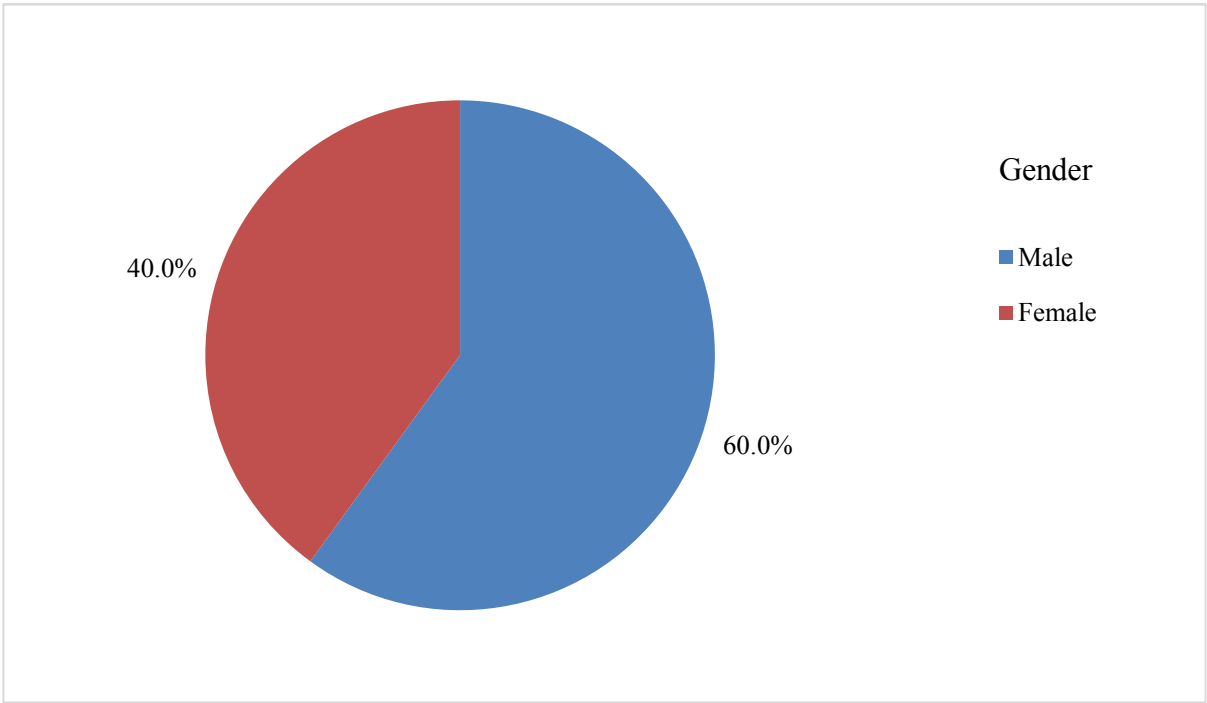


Table 3: Descriptive analysis of antenatal history in the study population (N=100)

Parameters	Frequency	Percentages
PIH		
Yes	27	27.0%
No	73	73.0%
Gestational Diabetes		
Yes	12	12.0%
No	88	88.0%
H/O IUGR		
Yes	17	17.0%
No	83	83.0%
Others		
Fever	9	9.0%
Difficult labour	2	2.0%
H/O Anemia	1	1.0%
Prolonged labour	2	2.0%
No antenatal complications	86	86.0%

Figure 2: Pie chart of PIH in the study population (N=100)

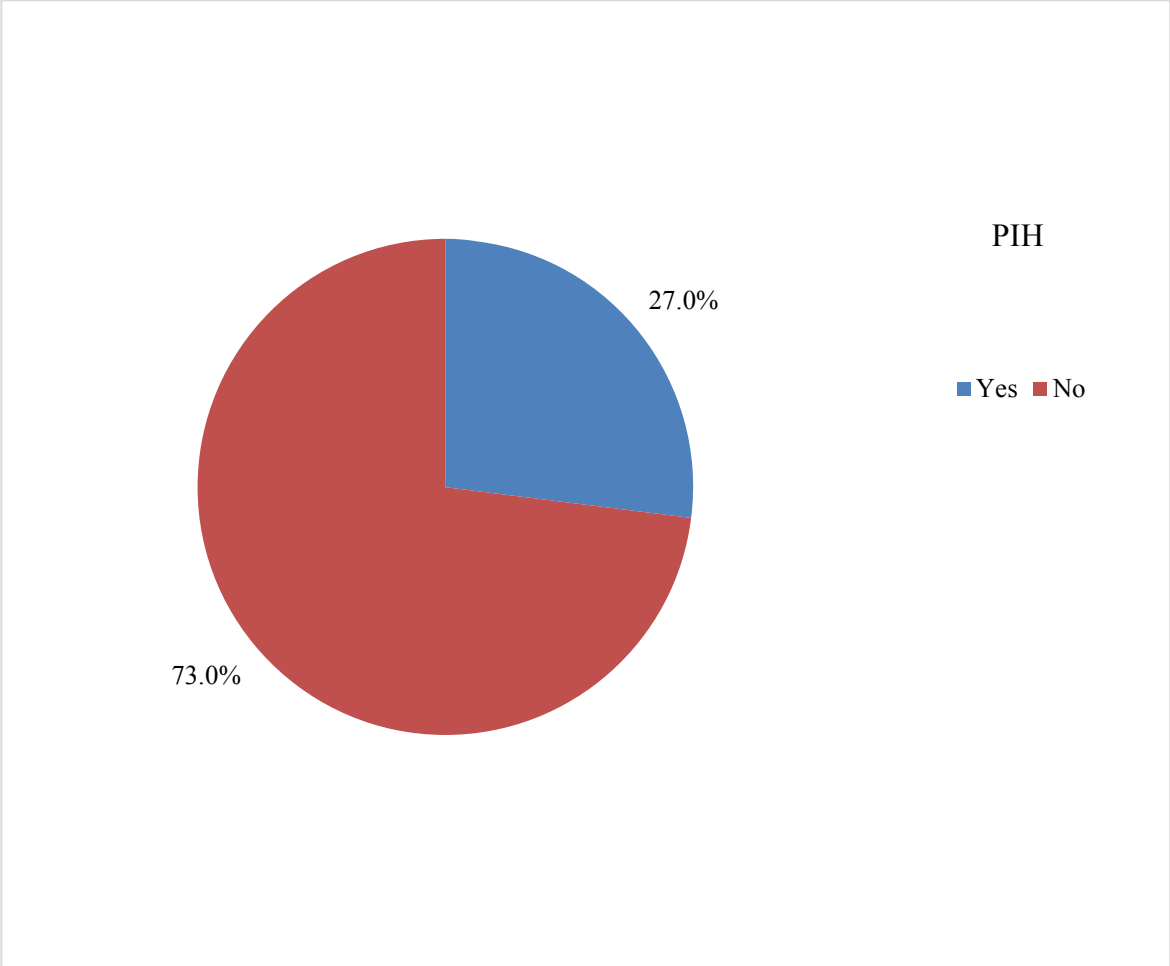


Figure 3: Pie chart of gestational diabetes in the study population (N=100)

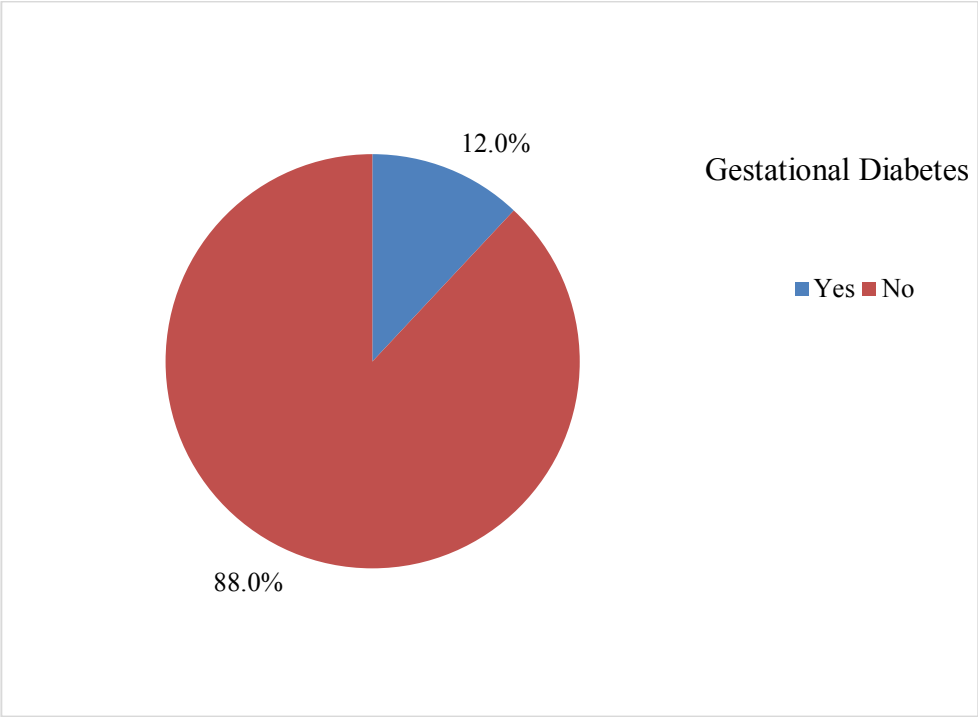


Figure 4: Pie chart of h/o IUGR in the study population (N=100)

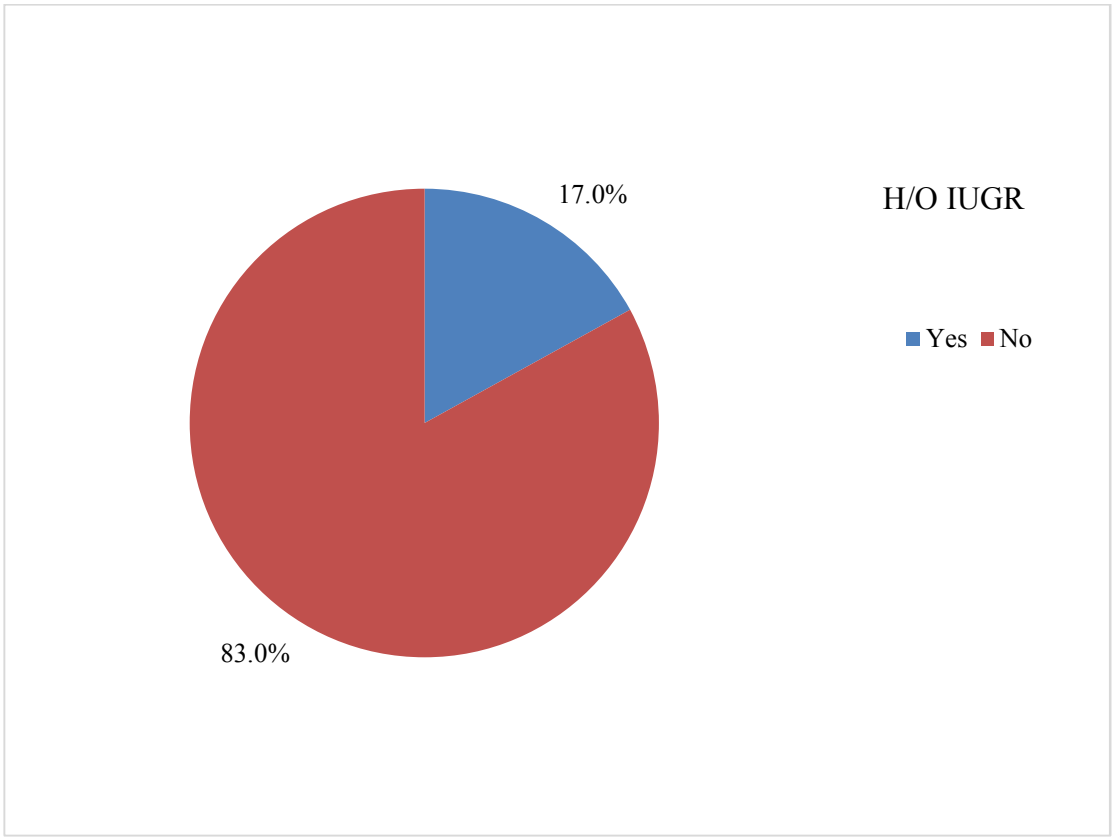


Figure 5: Bar chart of other antenatal complications in the study population (N=100)

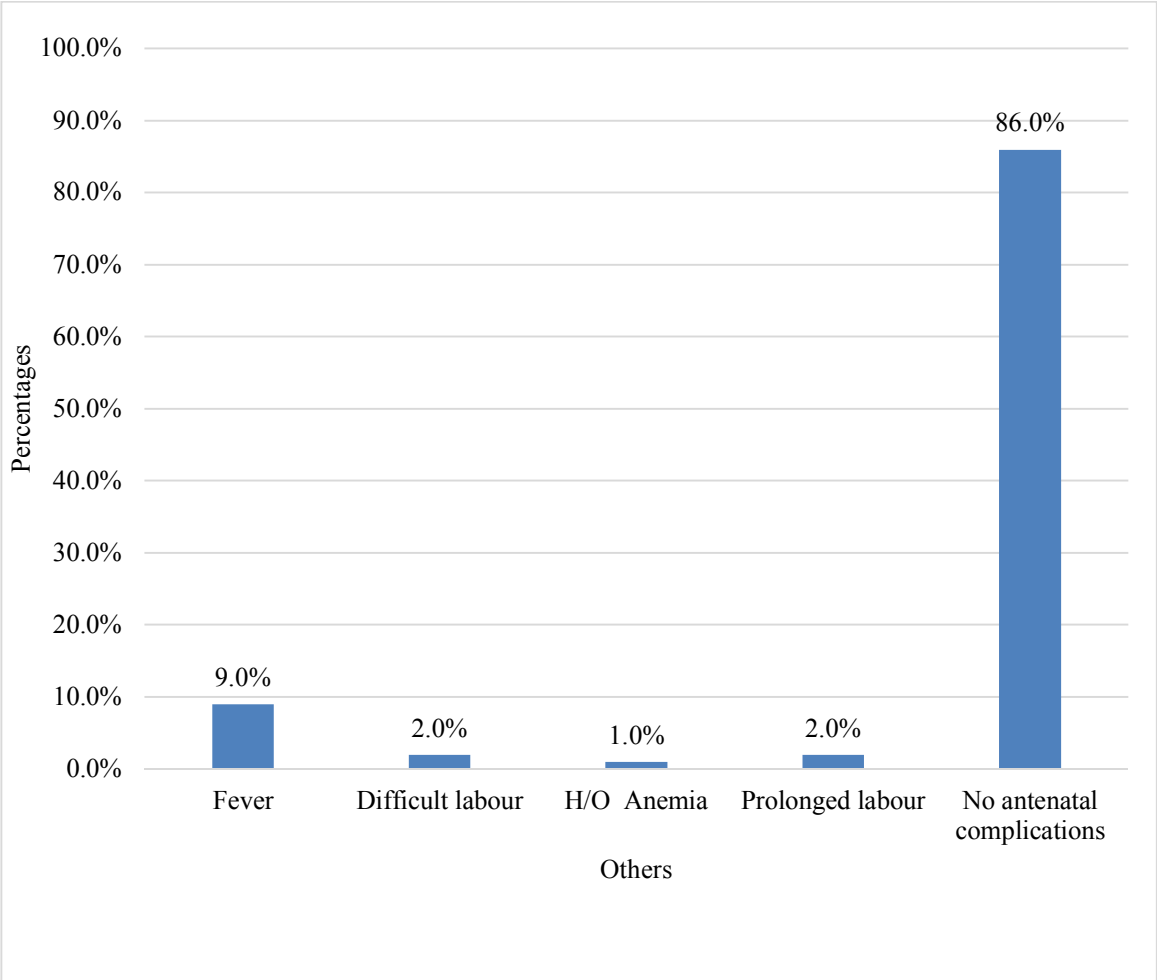


Table 4: Descriptive analysis of birth asphyxia in the study population (N=100)

Parameters	Frequency	Percentages
Birth Asphyxia		
Yes	38	38.0%
No	62	62.0%
Seizures		
Yes	26	26.0%
No	74	74.0%
LBW		
Yes	16	16.0%
No	84	84.0%
Prematurity		
Yes	13	13.0%
No	87	87.0%
Others		
Fever	2	2.0%
Sepsis	2	2.0%
Hypoglycemia	3	3.0%
Late onset sepsis	1	1.0%
No perinatal complications	92	92.0%

Figure 6: Pie chart of birth asphyxia in the study population (N=100)

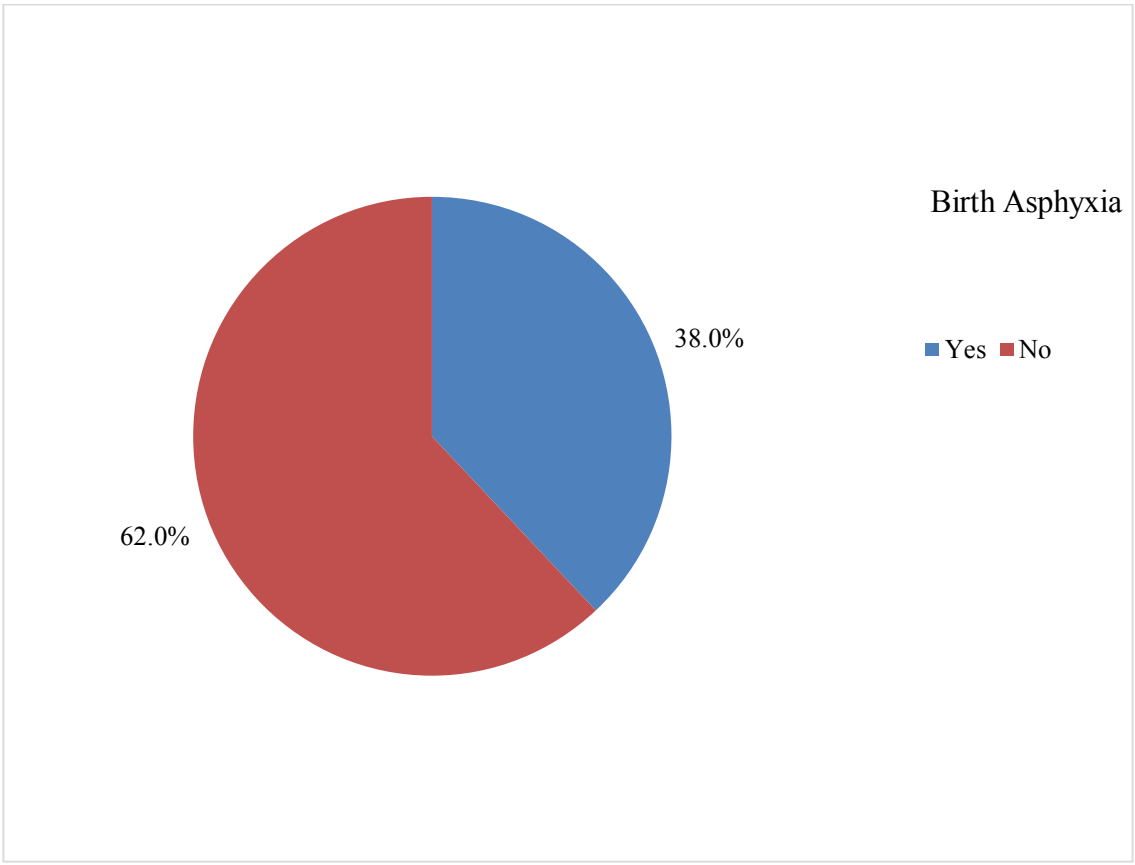


Figure 7: Pie chart of seizures in the study population (N=100)

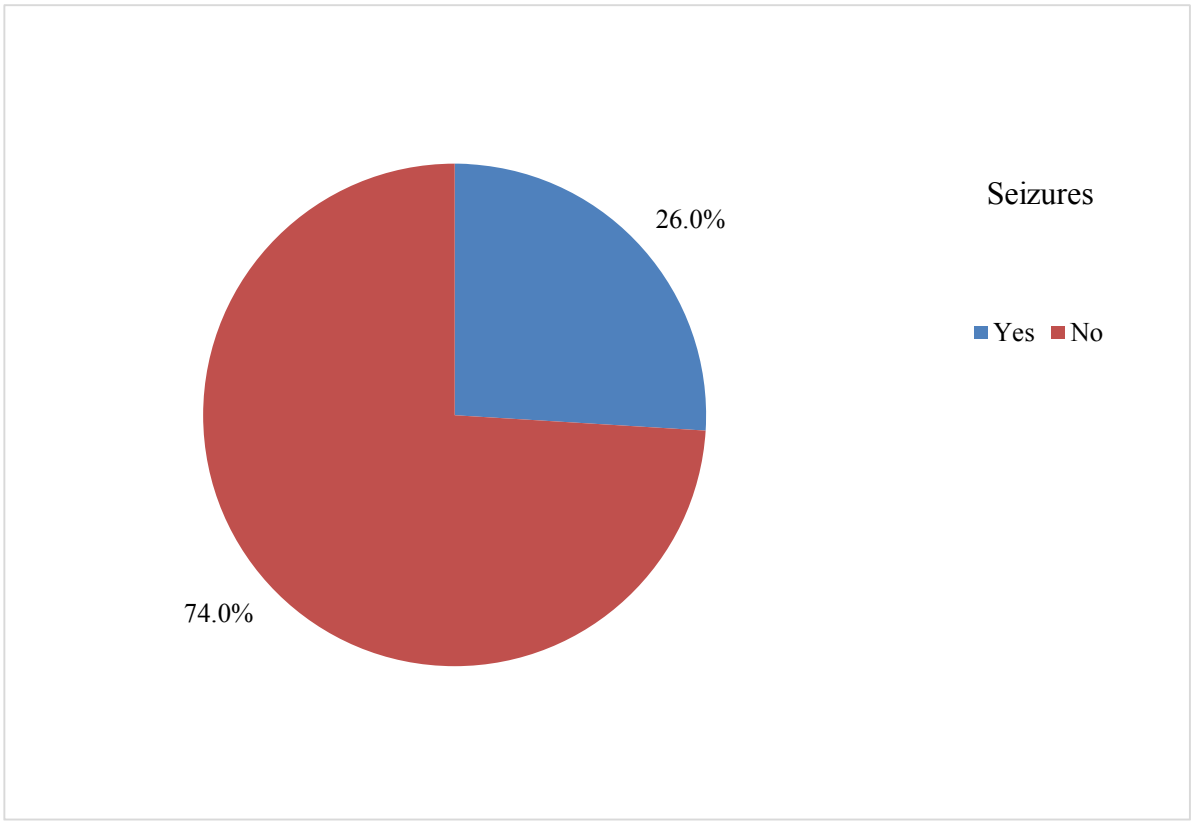


Figure 8: Pie chart of LBW in the study population (N=100)

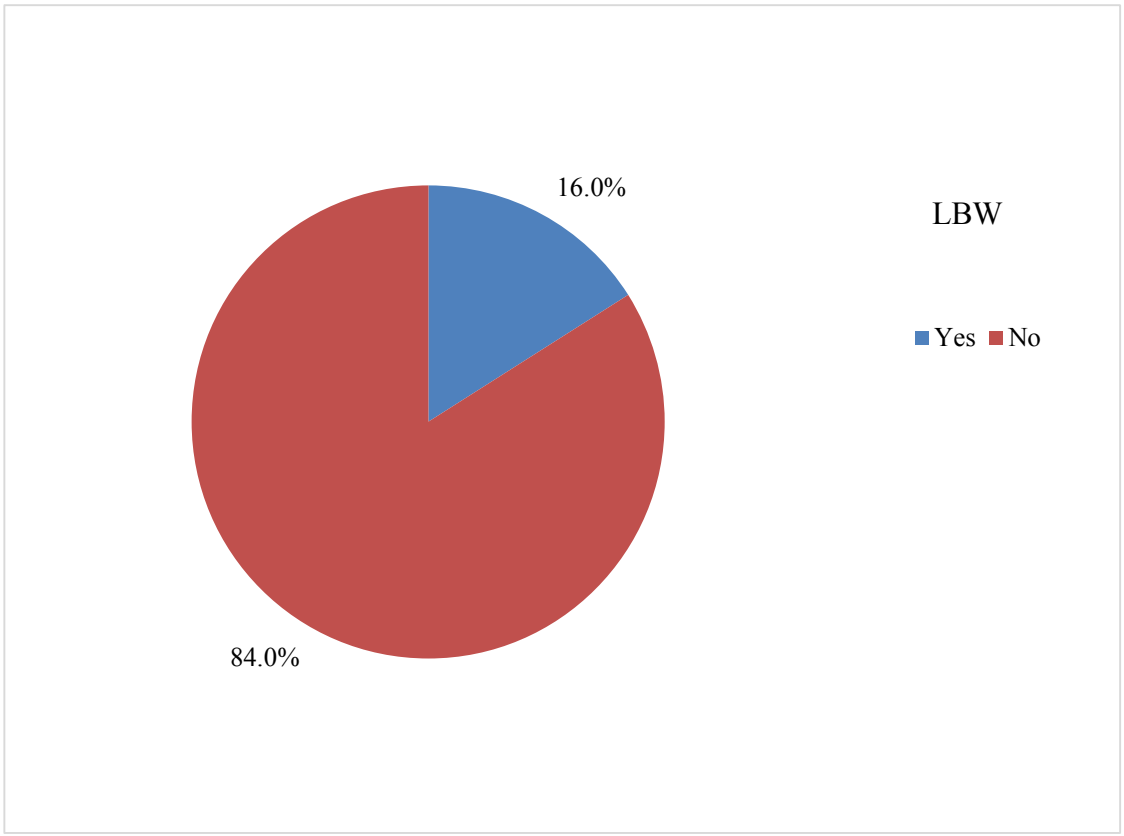


Figure 9: Pie chart of prematurity in the study population (N=100)

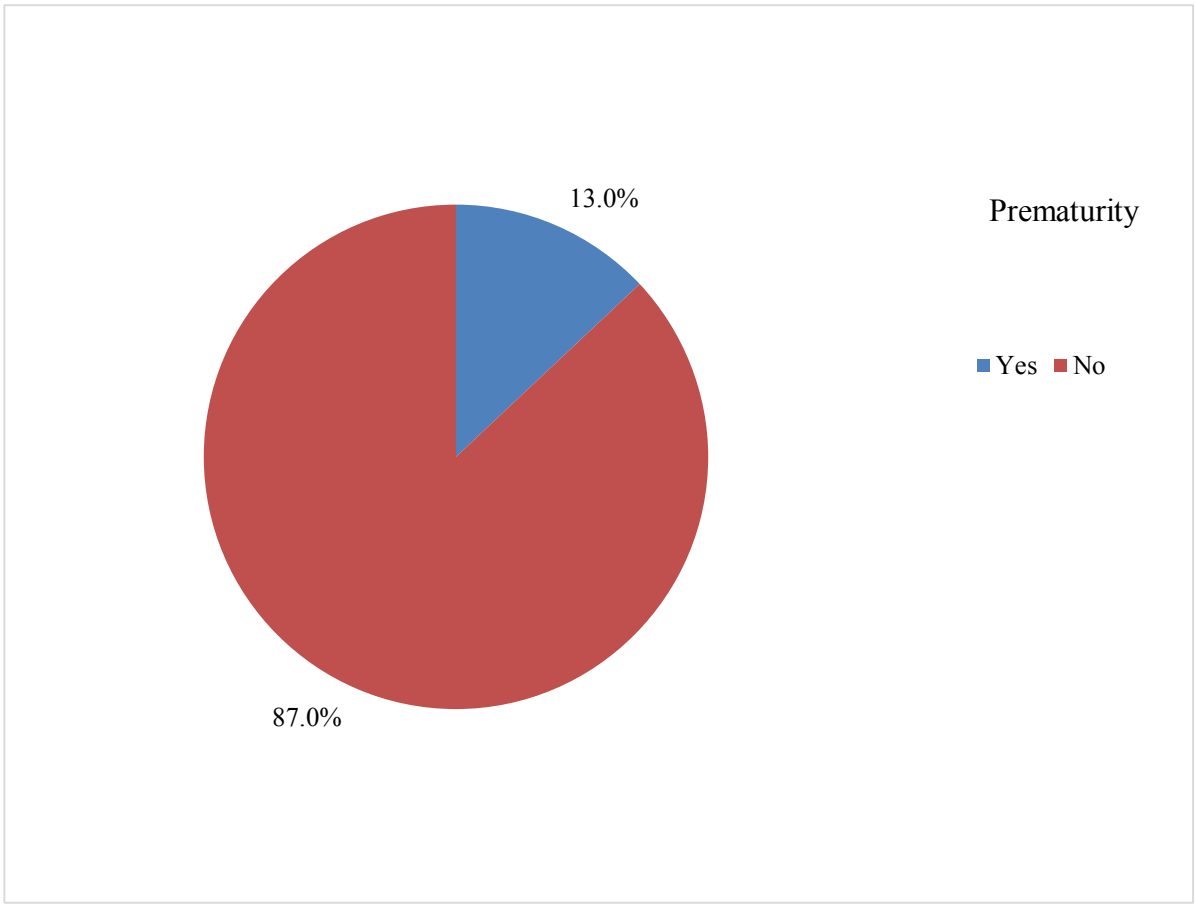


Figure 10: Bar chart of other perinatal complications in the study population (N=100)

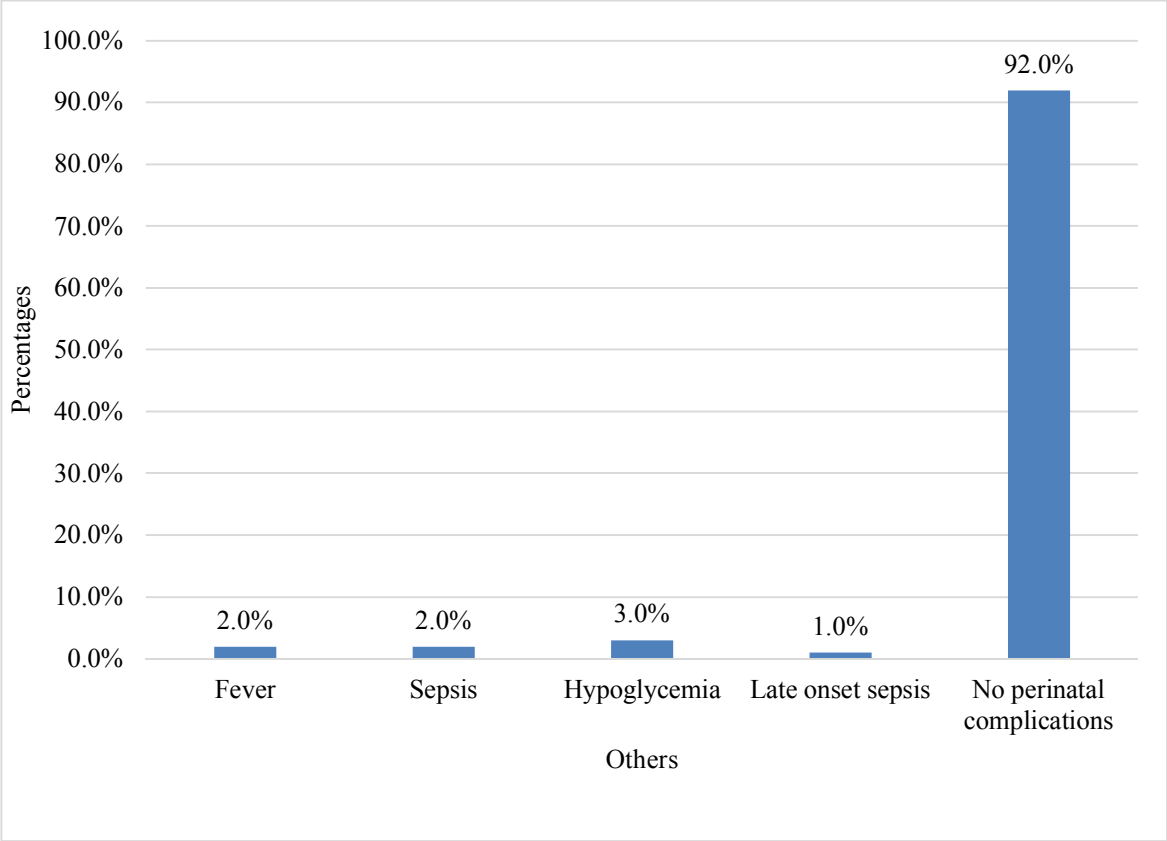


Table 5: Descriptive analysis of visual acuity (CSM) in the study population (N=100)

Visual Acuity (CSM)	Frequency	Percentages
Present	67	67.0%
Absent	33	33.0%

Figure 11: Pie chart of visual acuity (CSM) in the study population (N=100)

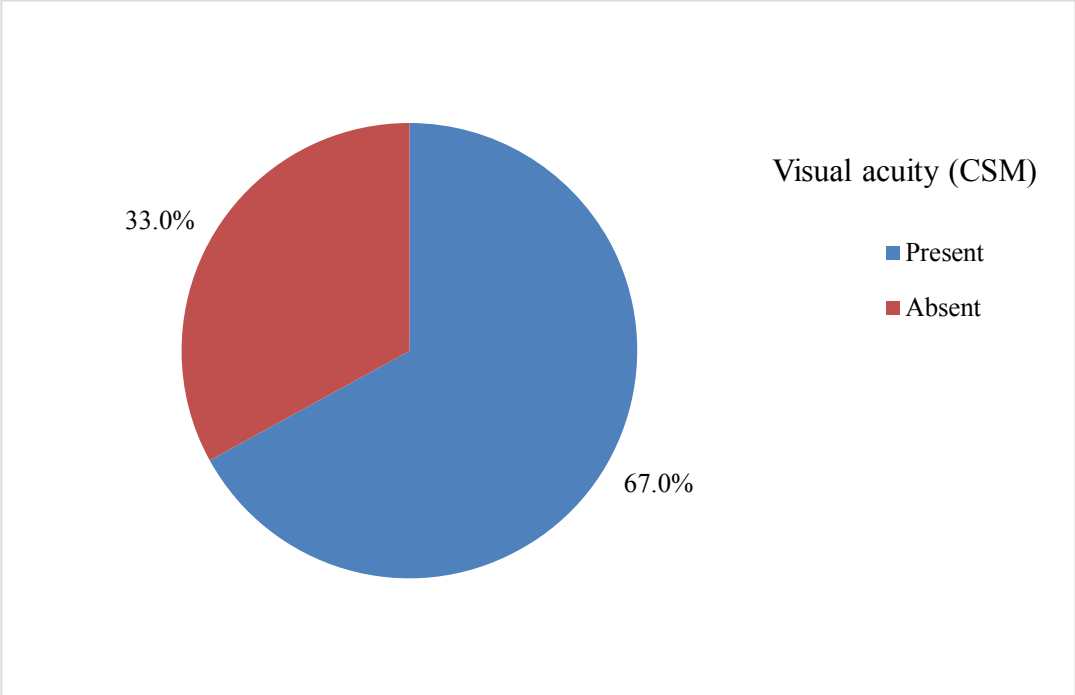


Table 6: Descriptive analysis of ocular deviation in the study population (N=100)

Parameters	Frequency	Percentages
Esotropia		
Present	14	14.0%
Absent	86	86.0%
Exotropia		
Present	18	18.0%
Absent	82	82.0%

Figure 12: Pie chart of Esotropia in the study population (N=100)

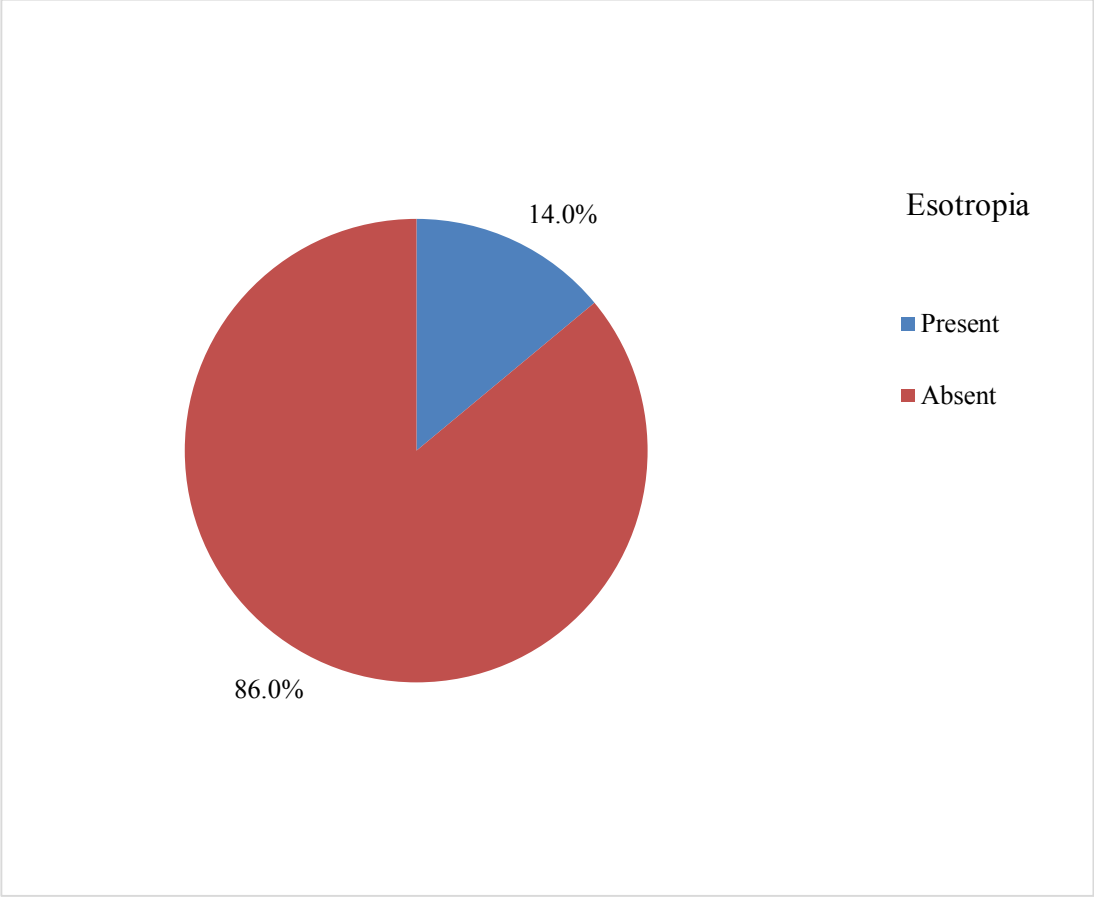


Figure 13: Pie chart of Exotropia in the study population (N=100)

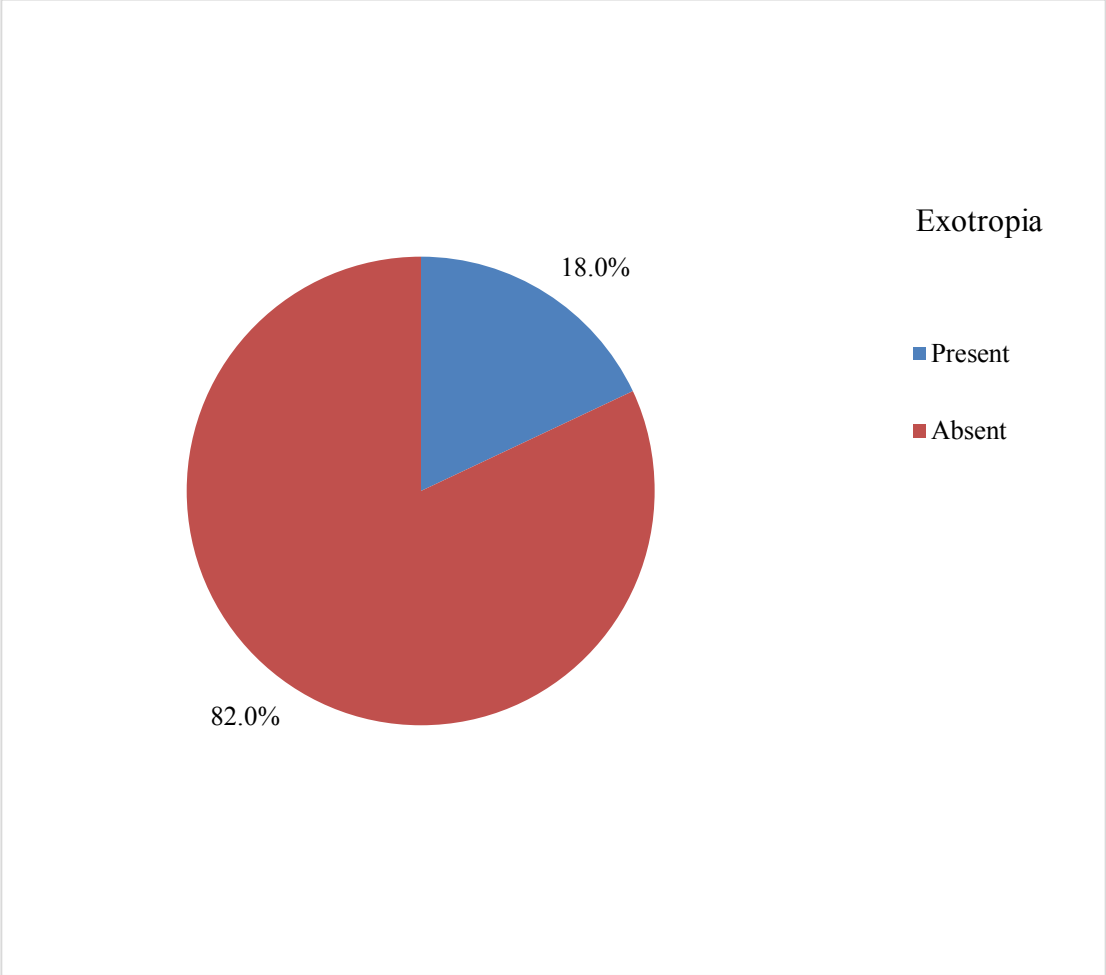


Table 7: Descriptive analysis of anterior segment in the study population (N=100)

Anterior Segment	Frequency	Percentages
Congenital cataract	5	5.0%
Floppy lid syndrome	1	1.0%
Telecanthus	5	5.0%
Epicanthus	4	4.0%
Normal	85	85.0%

Figure 14: Bar chart of anterior segment in the study population (N=100)

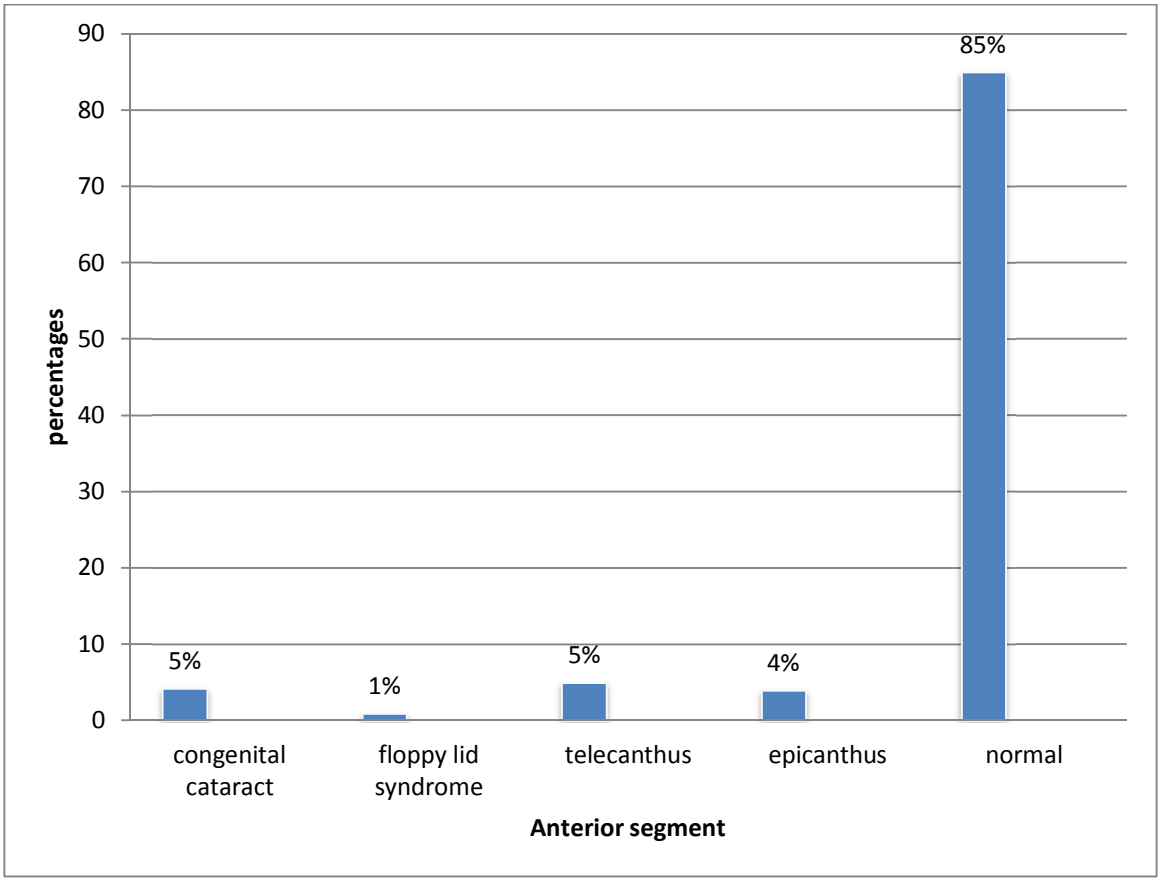


Table 8: Descriptive analysis of congenital nystagmus in the study population (N=100)

Congenital Nystagmus	Frequency	Percentages
Present	34	34.0%
Absent	66	66.0%

Figure 15: Pie chart of congenital nystagmus in the study population (N=100)

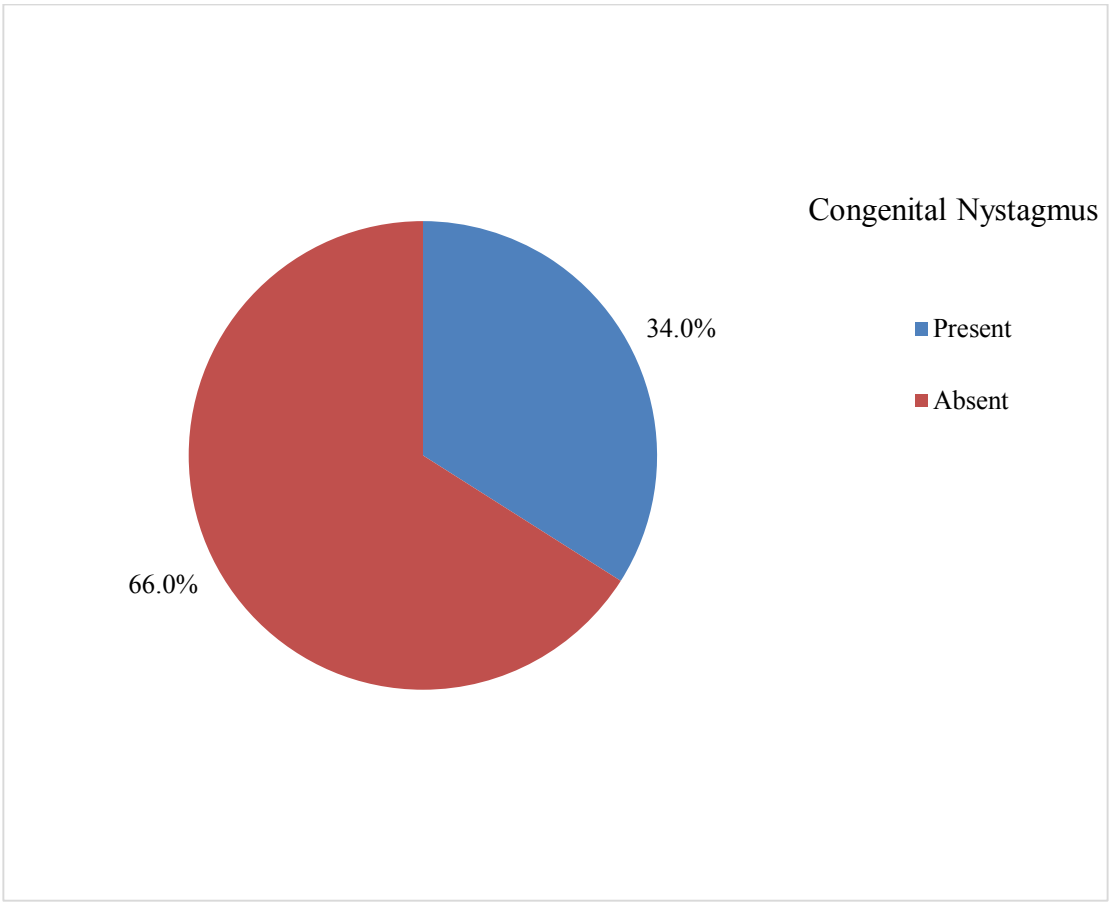


Table 9: Descriptive analysis of refractive error in the study population (N=100)

Parameters	Frequency	Percentages
Myopia		
Present	22	22.0%
Absent	78	78.0%
Hypermetropia		
Present	11	11.0%
Absent	89	89.0%
Astigmatism		
Present	7	7.0%
Absent	93	93.0%

Figure 16: Pie chart of myopia in the study population (N=100)

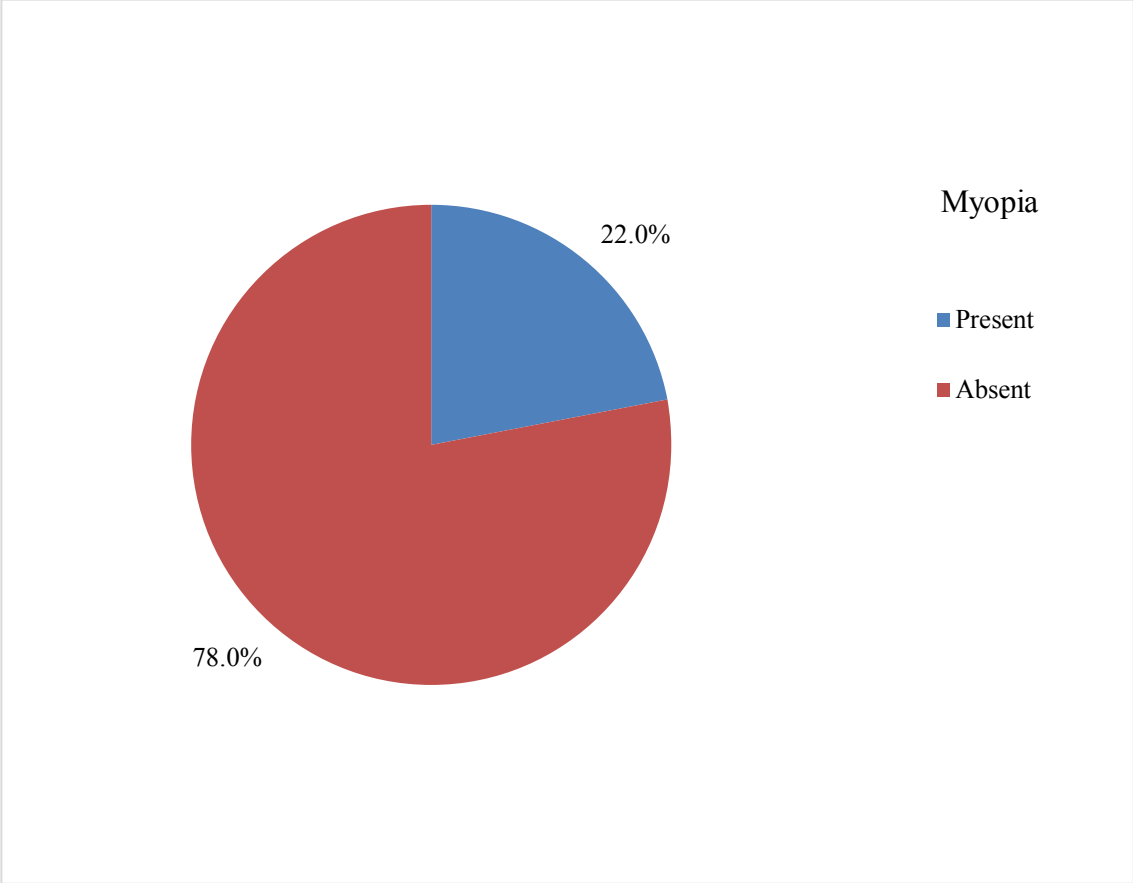


Figure 17: Pie chart of hypermetropia in the study population (N=100)

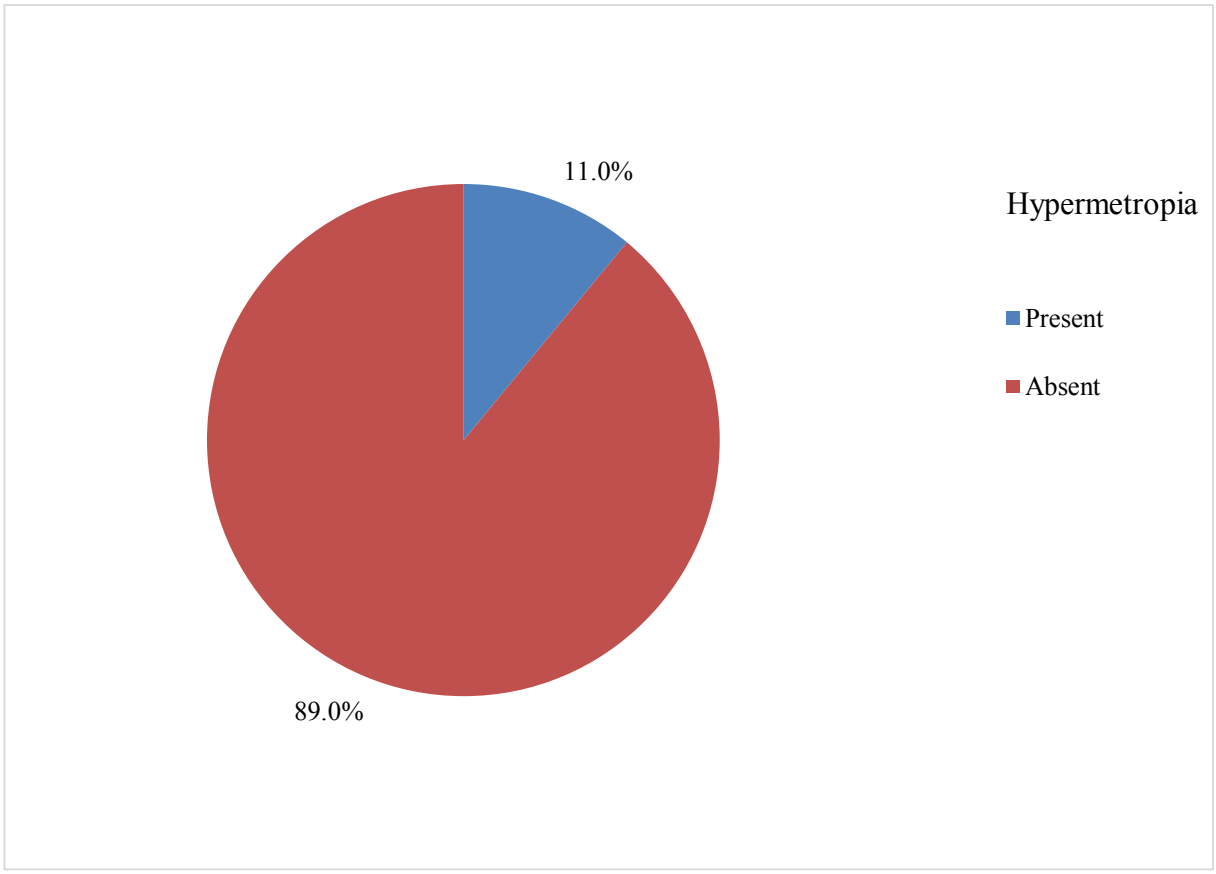


Figure 18: Pie chart of astigmatism in the study population (N=100)

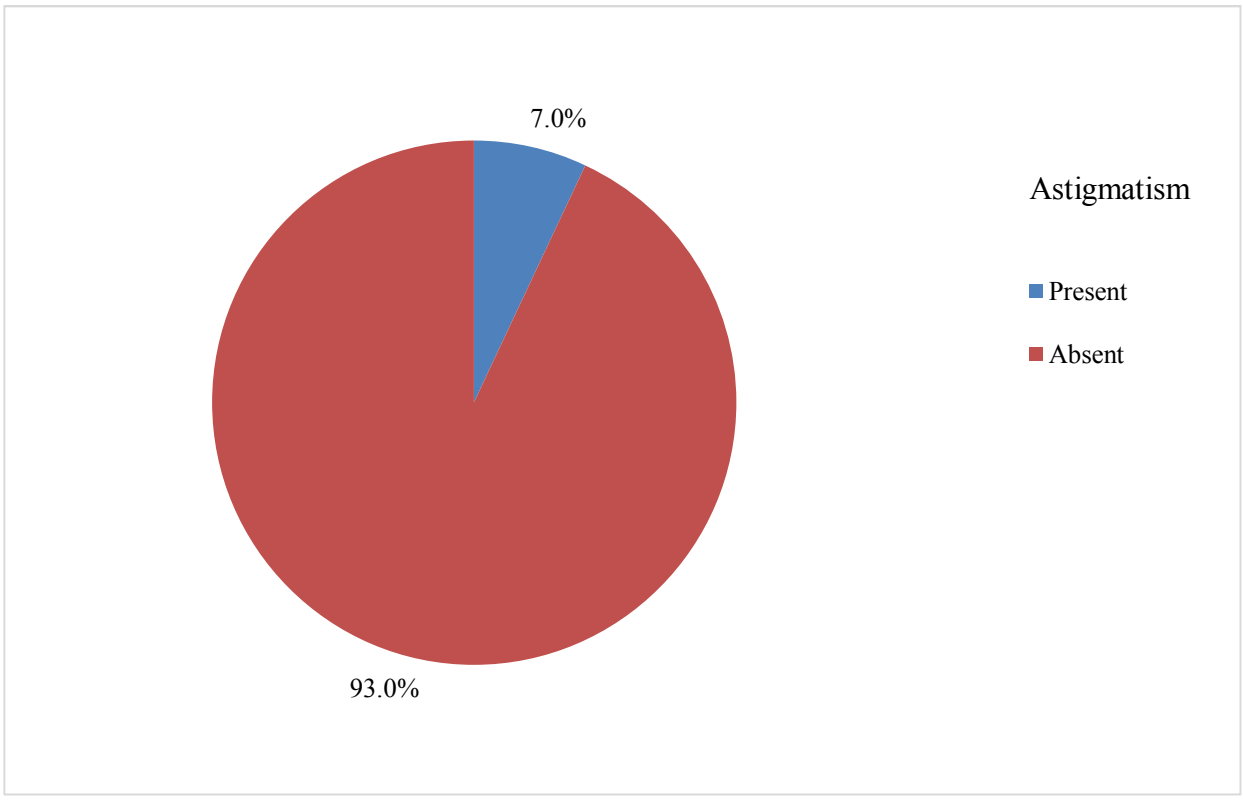
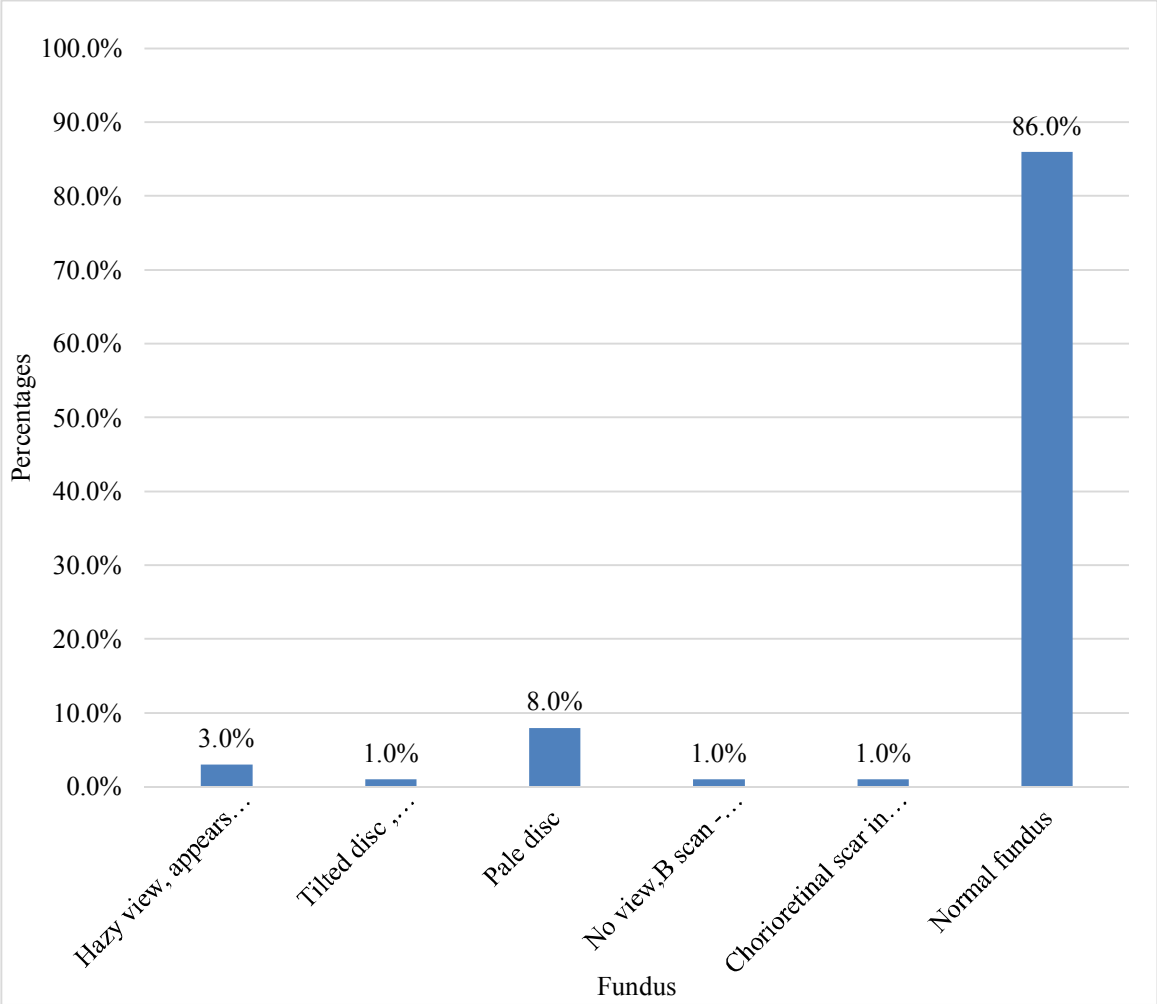


Table 10: Descriptive analysis of fundus in the study population (N=100)

Fundus	Frequency	Percentages
Hazy view, appears to be normal	3	3.0%
Tilted disc , temporal crescent	1	1.0%
Pale disc	8	8.0%
No view, B scan -microphthalmos, vitreous opacities	1	1.0%
Chorioretinal scar in both eyes	1	1.0%
Normal fundus	86	86.0%

Figure 19: Bar chart of fundus in the study population (N=100)



DISCUSSION

One of the most common condition in pediatric population is the global developmental delay. The prevalence of ocular manifestation in children with developmental delay is different from region to region. One of the reason for the high prevalence is the population growth. (36) The problems associated with their vision is mostly neglected. The present study highlights the risk of developing ocular problems in children with developmental delay. A total of 100 children was enrolled for the final analysis in the study.

In the present study the mean age of the participants was 2.34 ± 1.32 years . Wu, H.J., et al. (26) performed a study in 41 children in which the mean age of the participants was 3.53 ± 2.25 years. A cross sectional study conducted in a population of 150 children by Reena, A., et al. (2) 1.58 ± 0.9 was the mean age of the children. The mean age of the study population indicates that the signs of visual impairment develops in the childhood itself.

The number of males in the present study was more with 60% as compared to the female population. Similarly Gogate, P., et al. (30) performed a study in 664 patients in which majority of the children were males with 61.4%. In a population of 110 children Koul, R., et al.(15) conducted a study in which the predominance of male was more

with 53.6%. The gender distribution in studies can vary depending on the sample size and selection of patients.

The antenatal history of pregnancy induced hypertension, gestational diabetes mellitus, intrauterine growth retardation and history of fever were noted with 27%, 12%, 17% and 9% respectively. Whereas no antenatal complication was identified with 86% in the present study. Solomon, C.B., et al. (24) performed a study in 125 children with developmental delay in which pregnancy induced hypertension, gestational diabetes mellitus, intrauterine growth retardation and history of fever were identified with 4%, 2.4%, 76% and 4% respectively while 90% was noticed with no antenatal complications. Reena, A., et al. (2) performed a cross sectional study in 150 participants in which pregnancy induced hypertension, gestational diabetes mellitus and history of fever were presented with 3.33%, 1.33% and 3.33% respectively.

The birth asphxia, seizure, low birth weight, preterm, hypoglycemia and sepsis were noticed in the study with 38%, 26%, 16%,13%, 3% and 2% respectively. A study by Solomon, C.B., et al. (24) in a population of 125 children, birth asphxia, seizure, low birth weight, preterm, hypoglycemia and sepsis were presented with 27.2%, 8%, 32.8%, 8.8%, 0.8% and 6.4% respectively. In a cross sectional study

presented by Reena, A., et al. (2) birth asphxia, seizure and preterm were noted with 16.66%, 12.6% and 16.66% respectively.

Visual acuity was present in 61% of children in the current study population whereas absent in 33% of children. In a population of 150 children Reena, A., et al. (2) performed a cross sectional study in which 34.6% had visual impairment on assessing visual acuity. Perinatal and postnatal factors were associated with the poor vision.

Exotropia was higher with 18% as compared to esotropia in the current study. Similarly in a cross sectional observational study conducted by Joshi, M., et al.(23) in 112 children in which exotropia and esotropia were observed with 52% and 48% respectively.

Comparison of ocular deviation in various studies with the present study

Studies	Population	Percentage
Present study	100	Exotropia (18%) Esotropia (14%)
Sandfeld Nielsen, L., et al.(28)	923	Exotropia (10.3%) Esotropia (14.9%)
Solomon, C.B., et al (24)	125	Exotropia (6.4%) Esotropia (12%)
Reena, A., et al. (2)	150	Exotropia (60%) Esotropia (13%)

Congenital cataract and telecanthus were observed in the study population with 5% each followed by epicanthus with 4%. Reena, A., et al. (2) performed a cross sectional study in which 2.6% of children was noticed with the cataract. Congenital cataract can be associated with the presence of antenatal factors like gestational hypertension and pregnancy induced hypertension.

In the current study 34% of children was noticed with congenital nystagmus . Bankes, J.K., et al. (41) performed a study in 200 participants in which 7.5% of children was presented with nystagmus. A study was conducted by Joshi, R.S., et al. (36) in a population of 241 children in which the nystagmus was identified with 6.9% of children. Ophthalmic conditions like nystagmus is common in children with disabilities.

Myopia, hyperopia and astigmatism were the refractive errors identified in the study population with 22%, 11% and 7% respectively. Joshi, M., et al. (23) performed a cross sectional observational study in a population of 112 children in which astigmatism was the most common refractive error with 44.6% followed by hyperopia and myopia with 21.9% and 12.1% respectively. Refractive errors are found to be associated with developmental delay in the children.

Comparison of refractive errors in different studies

Studies	Population	Percentage
Present study	100	Hyperopia (11%) Myopia (22%) Astigmatism (7%)
Sandfeld Nielsen, L., et al. (28)	923	Hyperopia (15.3%) Myopia (10.8%) Astigmatism (20.6%)
Sasmal, N.K., et al. (42)	140	Hyperopia (8.6%) Myopia (12.9%) Astigmatism (3.6%)
Reena, A., et al. (2)	150	Hyperopia (18%%) Myopia (12%) Astigmatism (11.33%)

In the present study 86% of children was identified with normal fundus. Refractive errors and strabismus were the common ocular problems encountered in the present study. Various antenatal and neonatal factors were associated with the visual impairment in children with developmental delay.

CONCLUSION

A total of 100 children was enrolled in the study. The predominance of males was high with 60% as compared to females with a mean age ± SD of 2.34 ± 1.32 years. The antenatal history of pregnancy induced hypertension was high with 27.0% followed by intrauterine growth retardation gestational diabetes mellitus with 17% and 12% respectively. Birth Asphyxia, seizures, low birth weight and prematurity were identified with 38%, 26%, 16% and 13% respectively. Visual acuity was presented with 67%. Exotropia was high in the study population with 18% as compared with esotropia. Congenital cataract and telecanthus were identified with 5% each. Whereas congenital nystagmus with 34%. Myopia was the common most refractive error with 22% followed by hypermetropia and astigmatism with 11% and 7% respectively. The normal fundus was observed in 86% of children. Early evaluation and correction of visual problems can be done in children with developmental delay through encouraging an annual ophthalmic examination and awareness among the parents. Thereby the cause of unnecessary visual impairment can be reduced. Quality of life can also be improved with proper screening and appropriate management.

RECOMMENDATIONS AND LIMITATIONS

The study time was short which influenced the sample size obtained. Follow up is needed to identify the outcomes in the patients. Future studies can be conducted in large population to determine various complications and treatment strategies. Also to collect more data regarding various developing disabilities in children

SUMMARY

A total of 100 children were enrolled in the study. The predominance of males was high with 60% as compared to females with a mean age ± SD of 2.34 ± 1.32 years. The antenatal history of pregnancy induced hypertension was high with 27.0% followed by intrauterine growth retardation gestational diabetes mellitus with 17% and 12% respectively. Birth Asphyxia, seizures, low birth weight and prematurity were identified with 38%, 26%, 16% and 13% respectively. Visual acuity was presented with 67%. Exotropia was high in the study population with 18%as compared with esotropia. Congenital cataract and telecanthus were identified with 5% each. Whereas congenital nystagmus with34%. Myopia was the common most refractive error with 22% followed by hypermetropia and astigmatism with 11% and 7% respectively. The normal fundus was observed in 86% of children.

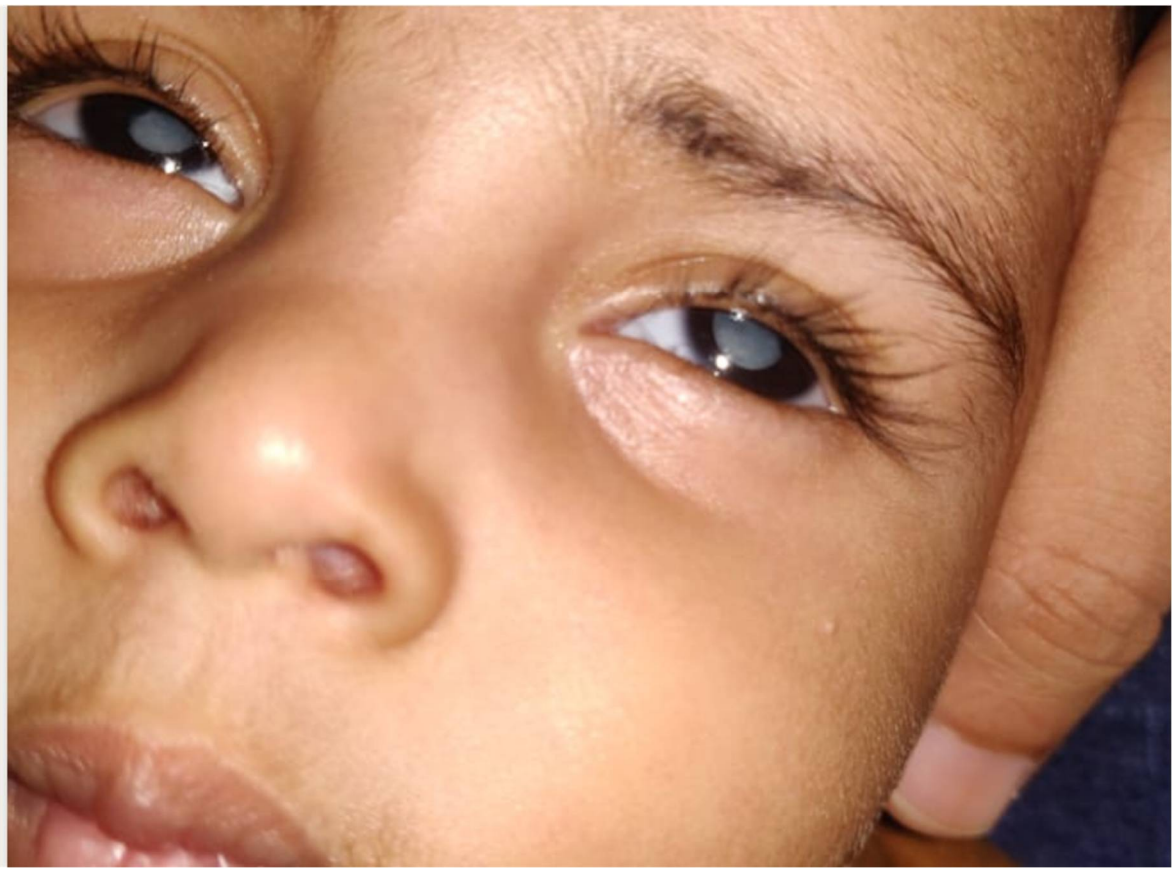
ILLUSTRATIONS

Picture 1: 1.5 yrs old developmental delay child with left eye esotropia on Hirschberg test

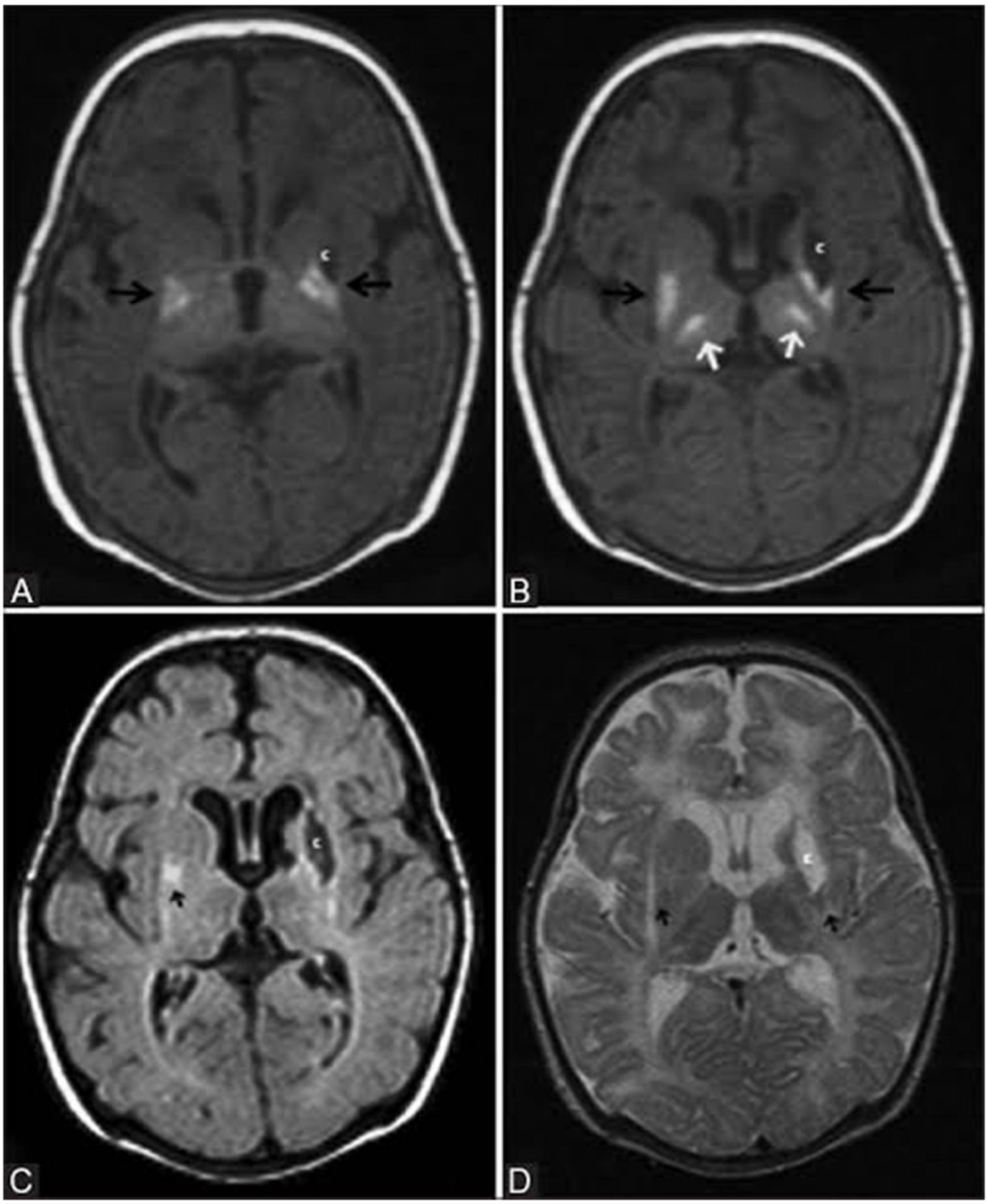
Picture 2 : Two years old developmental delay male child with left eye exotropia on Hirschberg test

Picture 3: 4 yrs old developmental delay child with myopia wearing prescribed best glasses

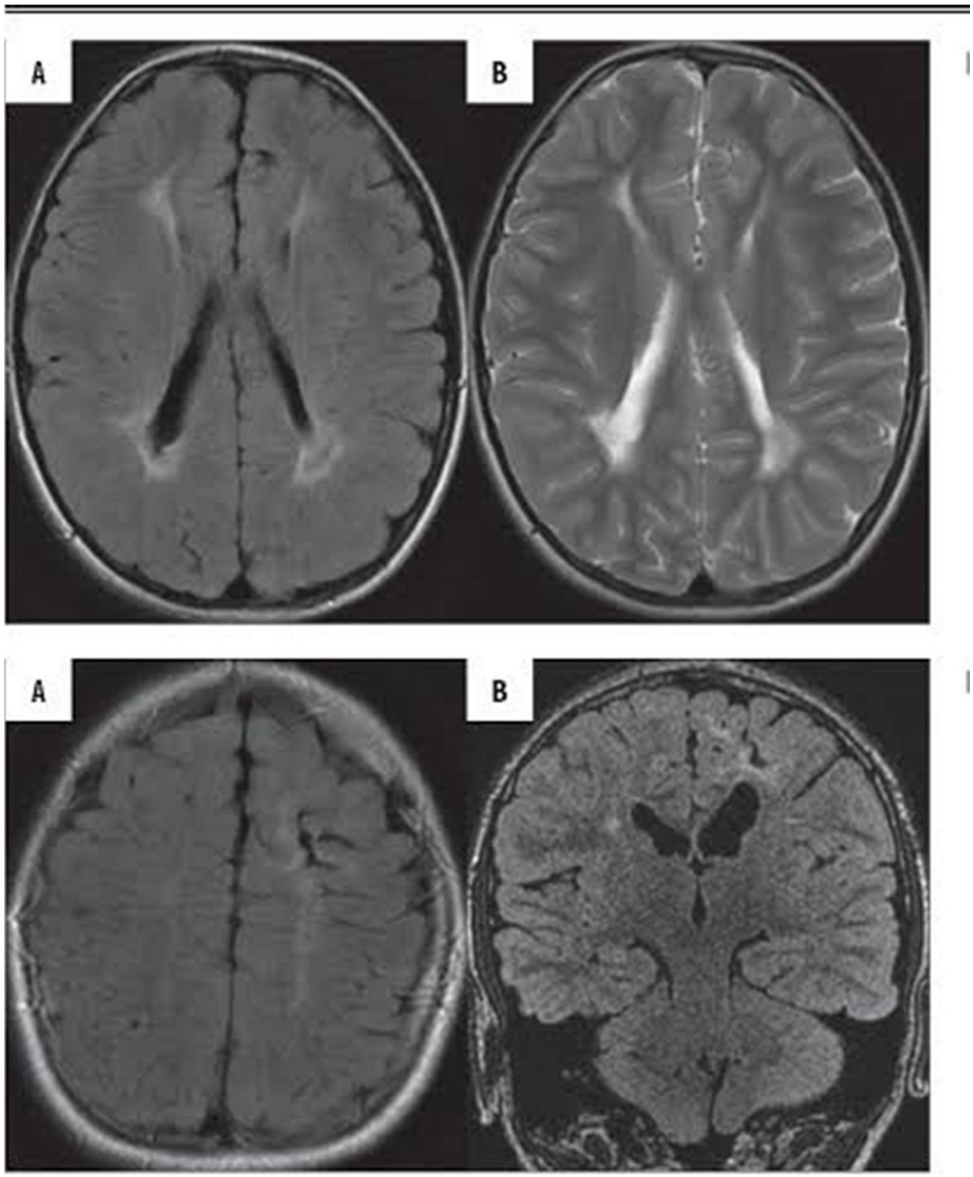
Picture 4 : 8 month old developmental delay child with congenital cataract in both eyes



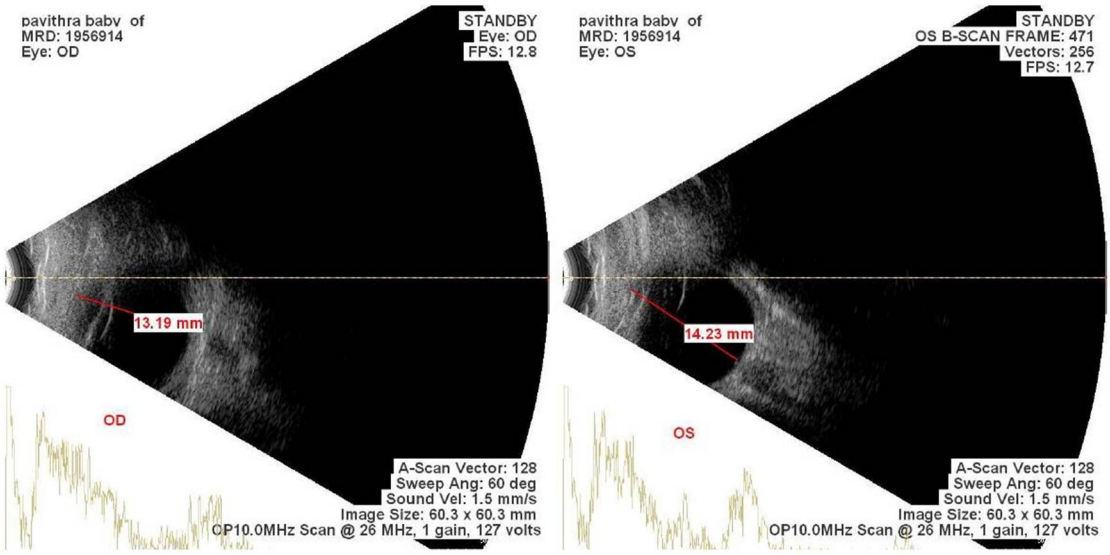
Picture 5 : MRI imaging shows hypoxic ischemic sequelae in an infant male child with subcortical lesions(white arrow heads)



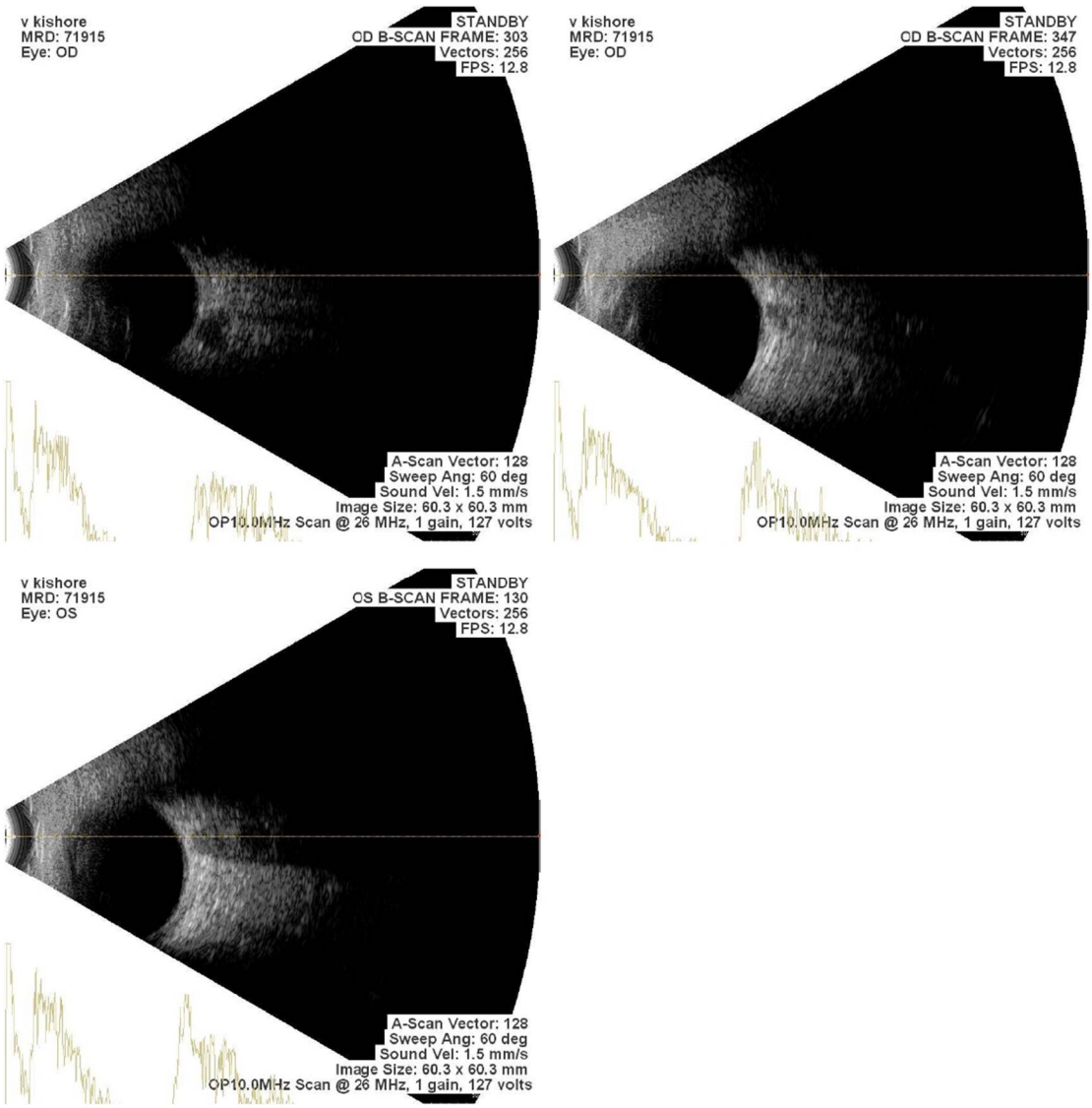
Picture 6: MRI imaging in developmental delay child with HIE sequelae showing paraventricular gliosis , white matter lesions - classic pattern of hypoxic ischemic encephalopathy



Picture 7 : B scan of a developmental delay child showing microphthalmos



Picture 8: B scan showing normal posterior segment in a developmental delay child with congenital cataract



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DATA COLLECTION TOOL

Name of the child:

Age and sex of the child :

Consanguinity of parents :

Any presenting ocular complaints for the child?

Whether the child is able to recognize the parents?

Any history of antenatal drug intake?

Any history of smoking?

Any history of threatened abortion ?

Any history of antenatal bleeding?

Any history of comorbities (hypothyroidism, infectve disorders , heart disease) whether the mother was suffering during the antenatal period ?

Any history of difficult labour?

Whether the child cried immediately after birth ?

Any history of childhood seizures ?

Whether the child was admitted in NICU ?

If yes , whether any records available with them ?

Follow up history , frequency of follow up with paediatrician and when the child was diagnosed with delayed developmental milestones?

Whether the child is attending the school available for specialized children ?

Any history of crossed eyes since childhood?

Any history of discharge from the child's eyes ?

Whether the child is able to reach the desired objects ?

PRIMARY SYSTEMIC EXAMINATION :

Global developmental delay- gross motor/fine motor/language/speech/cognitive/social

Co-morbidities:

Genetic syndromes:

OCULAR HISTORY &EXAMINATION

Any visual complaints:

Visual acuity:

Recognition of parents

Ability to fixate and follow the light

Fixation was central, steady and maintained

Eccentric fixation:

Nystagmus:

Microphthalmos:

Corneal abnormalities:

Cataract:

Ocular deviation:

Cyclopegic refraction:

Fundus examination:

Colobomas:

Retinal dystrophies:

ROP sequelae:

Excessive myopia:

IMAGING DETAILS (in selected cases)

CT

MRI

Any cortical visual impairment:

VEP(visually evoked potential) : (in selected cases)

CONSENT FORM

I hereby volunteer and give consent for my child to participate in this study "A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL". I was fully explained about the nature of this study by the doctor; knowing which I Mr/Ms/Mrs……. give consent for my child to volunteer in this study.

Date: Signature of the legal guardian / parent

Place:

CONSENT FORM

I Dr. SUGUNA.C is carrying out a study on the topic, "A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL".

My research project guide is Dr.S.Padmanaban M.S.,D.O

My research project is being carried out in the Department of Ophthalmology, Coimbatore Medical College Hospital, Coimbatore.

RESEARCH BEING DONE:

A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL

PURPOSE OF RESEARCH:

1. To describe the various ocular disorders in children with developmental delay and their prevalence
2. To search for treatable causes of visual disorders in children with delayed milestones.

PROCEDURE INVOLVED:

Children referred from the department of pediatrics were subjected to ocular examination including visual acuity (CSM method) , anterior segment examination , fundus, cycloplegic refraction and investigations including B-scan, MRI imaging was done in selected cases.

Child _____, aged_____ years

S/o/D/o_____, residing at_____

_____ are requested to be a participant in the research study titled "A CLINICAL STUDY OF OCULAR MANIFESTATIONS IN CHILDREN WITH GLOBAL DEVELOPMENTAL DELAY IN A TERTIARY CARE HOSPITAL " done in Government Coimbatore Medical College Hospital, Coimbatore. The child satisfy eligibility criteria as per the inclusion criteria. Legal Guardian / Parent can ask any questions or seek any clarifications on the study that might have before agreeing to participate.

DECLINATION FROM PARTICIPATION

You are hereby made aware that participation of your child in this study is purely voluntary and honorary and that you have the option and the right to decline from participation in the study.

PRIVACY AND CONFIDENTIALITY

You are hereby assured about your privacy of subject will be respected and any information about you or provided by you during the study will be kept strictly confidential.

AUTHORIZATION TO PUBLISH RESULTS

Results of the study may be published for scientific purposes and/or presented to scientific groups; however, your child will not be identified; neither will the child privacy be breached.

STATEMENT OF CONSENT

I, _____, do hereby volunteer and give consent for my child to participate in this study being conducted by Dr SUGUNA.C. I have read and understood the consent form/or it has been read and explained to me in my own language. The study has been fully explained to me and clarifications have been cleared whenever I ask questions.

Date: Signature/Left Thumb Impression of the Legal Guardian / Parent

Date: Signature and Name of witness

ஒப்புதல் படிவம்

பெயர் :

வயது : பாலினம் :

முகவரி :

அரசு கோவை மருத்துவக் கல்லூரியில் கண் மருத்துவத் துறையில் பட்ட மேற்படிப்பு பயிலும் மாணவி மரு. ச.சுகுணா அவர்கள் மேற் கொள்ளும் “முழு வளர்ச்சி தாமதம் உள்ள குழந்தைகளுக்கு ஏற்படும் கண் கோளாறுகள் பற்றிய” ஆய்வின் செய்முறை தொடர்பான அனைத்து விபரங்களையும் கேட்டு எனது சந்தேகங்களைத் தெளிவுபடுத்திக் கொண்டேன்.

நான் இந்த ஆய்வில் எனது குழந்தைக்கு பரிசோதனை செய்ய முழு மனதுடனும், சுய சிந்தனையுடனும் சம்மதிக்கிறேன்.

எனது குழந்தையின் நோய் பற்றிய இந்த ஆய்வில் எங்களது அனைத்து விபரங்களும் பாதுகாக்கப்படுவதுடன் நோய் பகுதியின் புகைப்படம் மற்றும் இதன் முடிவுகள் ஆய்விதழில் வெளியிடப்படுவதில் ஆட்சேபனை இல்லை என்பதைத் தெரிவித்துக் கொள்கிறேன். எந்த நேரத்திலும் இந்த ஆய்விலிருந்து நான் விலகிக் கொள்ள என் குழந்தைக்கு உரிமை உண்டு என்பதையும் அறிவேன்.

இடம்

தேதி

பெற்றோர்/ சட்டப்பூர்வ பாதுகாவலர் கையொப்பம்

KEY TO MASTER CHART

fch	-	Female child
mch	-	Male child
PIH	-	Pregnancy Induced Hypertension
IUGR	-	Intrauterine Growth Retardation
LBW	-	Low Birth Weight
Visual acuity (CSM)	-	central, steady, maintenance of fixation of target reflex

S.NO	AGE IN YEARS	SEX	ANTENATAL HISTORY				PERINATAL COMPLICATIONS					VISUAL ACUITY (CSM)	OCULAR DEVIATION		ANTERIOR SEGMENT	CONGENITAL NYSTAGMUS	REFRACTIVE ERROR			FUNDUS
			PIH	GESTATIONAL DIABETES	H/O IUGR	OTHERS	BIRTH ASPHYXIA	SEIZURES	LBW	PREMATURITY	OTHERS		ESOTROPIA	EXOTROPIA			MYOPIA	HYPERMETROP	ASTIGMATISM	
1	3	mch	-	-	-	-	yes	yes	-	-	-	present	-	present	normal	absent	-	-	-	pale disc
2	1	fch	-	-	-	-	yes	-	-	-	-	absent	-	-	congenital cataract	present	-	-	-	hazy view, appears tobe normal
3	2	mch	-	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
4	5	mch	-	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
5	4	mch	yes	-	-	-	-	-	-	-	-	present	-	-	normal	absent	present	-	-	tilted disc , temporal crescent
6	1	mch	-	-	-	-	-	yes	-	-	-	present	-	-	normal	absent	-	-	-	normal
7	3	mch	-	-	-	-	-	-	-	-	-	present	-	present	normal	absent	-	-	-	normal
8	2	mch	-	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
9	3	fch	-	-	-	-	yes	-	-	-	-	present	-	-	congenital cataract	absent	-	-	-	normal
10	4	mch	-	-	-	-	yes	yes	-	-	-	present	-	present	normal	absent	-	-	-	normal
11	2	fch	-	-	-	fever	-	-	yes	-	-	present	-	present	normal	absent	-	-	-	normal
12	6	fch	-	yes	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
13	3	mch	yes	-	-	-	yes	-	-	yes	-	present	present	-	normal	absent	-	present	-	normal
14	4	fch	-	-	-	-	-	-	-	-	-	present	-	present	normal	absent	-	-	-	normal
15	1	fch	-	-	yes	-	-	yes	-	-	-	present	-	-	normal	absent	present	-	-	normal
16	4	mch	yes	yes	-	-	yes	-	-	yes	-	absent	-	-	normal	absent	-	-	-	pale disc
17	4	mch	yes	-	-	-	-	yes	-	-	-	absent	-	-	normal	present	-	-	-	normal
18	1	fch	yes	-	-	-	-	yes	-	-	-	present	-	-	congenitalcataract	absent	-	-	-	normal
19	1	mch	-	-	yes	-	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
20	2	mch	-	yes	-	-	-	-	-	-	-	present	-	present	normal	absent	-	-	-	normal
21	5	mch	-	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
22	3	mch	yes	-	-	-	yes	-	-	yes	-	absent	-	-	normal	absent	-	-	-	normal
23	2	mch	-	-	-	-	-	yes	-	-	-	present	-	-	normal	absent	-	-	present	normal
24	1	fch	-	-	-	-	-	yes	-	-	-	present	-	present	normal	absent	-	-	-	normal
25	1	mch	yes	-	-	-	-	-	yes	-	-	present	present	-	normal	absent	-	-	-	normal
26	4	mch	yes	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
27	3	mch	-	-	yes	-	-	-	-	-	-	present	-	-	normal	absent	-	present	-	normal
28	9 months	fch	-	yes	-	-	-	yes	-	-	-	present	-	-	normal	absent	present	-	-	normal
29	2	mch	-	-	-	fever	-	-	-	yes	-	present	-	-	normal	absent	-	-	present	normal
30	2	mch	yes	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
31	3	mch	-	-	-	difficult labour	yes	-	-	-	late onset sepsis (meningitis)	present	-	present	normal	absent	-	-	-	pale disc
32	2	mch	-	-	-	-	-	-	-	-	-	present	-	present	normal	absent	present	-	-	normal
33	4	fch	-	-	yes	-	-	-	yes	-	-	present	-	-	normal	present	-	-	present	normal
34	3	fch	-	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	-	normal

S.NO	AGE IN YEARS	SEX	ANTENATAL HISTORY				PERINATAL COMPLICATIONS					VISUAL ACUITY (CSM)	OCULAR DEVIATION		ANTERIOR SEGMENT	CONGENITAL NYSTAGMUS	REFRACTIVE ERROR			FUNDUS
			PIH	GESTATIONAL DIABETES	H/O IUGR	OTHERS	BIRTH ASPHYXIA	SEIZURES	LBW	PREMATURITY	OTHERS		ESOTROPIA	EXOTROPIA			MYOPIA	HYPERMETROP	ASTIGMATISM	
35	1	fch	-	-	-	-	-	-	-	-	-	present	-	present	normal	absent	present	-	-	normal
36	6	mch	-	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	present	normal
37	5	fch	-	-	-	h/o anemia	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
38	1	fch	-	-	-	prolonged labour	yes	-	-	-	-	absent	-	-	congenital cataract	present	-	-	-	hazy view, appears tobe normal
39	4	mch	yes	-	-	-	-	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
40	2	fch	-	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
41	4	fch	-	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	present	-	-	normal
42	2	mch	-	-	-	-	-	yes	-	-	-	present	-	-	telecanthus	absent	-	-	-	normal
43	1	fch	-	-	yes	-	yes	-	-	-	-	present	-	-	normal	absent	-	present	-	normal
44	2	fch	-	-	-	-	-	yes	-	-	fever	present	present	-	floppy lid syndrome	absent	-	-	-	pale disc
45	2	fch	-	-	-	-	yes	yes	-	-	-	absent	-	-	congenital cataract	present	-	-	-	hazy view, appears tobe normal
46	3	mch	-	-	-	prolonged labo	yes	-	-	-	-	present	present	-	normal	absent	-	-	-	normal
47	4	mch	-	yes	-	-	-	yes	-	-	-	absent	-	-	normal	present	-	-	present	normal
48	1	fch	-	yes	-	fever	-	yes	-	-	-	present	-	-	telecanthu	absent	-	-	-	normal
49	2	mch	-	-	yes	-	-	-	-	-	hypoglycemia	absent	-	-	epicanthus	present	-	present	-	normal
50	2	fch	-	-	-	-	-	yes	-	-	-	absent	-	-	normal	present	-	-	present	normal
51	2	mch	yes	-	-	-	-	yes	-	-	-	absent	present	-	normal	present	-	present	-	normal
52	1	mch	-	-	-	fever	-	yes	-	-	-	present	-	-	normal	absent	-	-	-	normal
53	3	fch	-	-	yes	-	yes	-	-	-	-	absent	-	-	normal	present	-	-	-	pale disc
54	2	mch	-	-	-	-	-	yes	-	-	fever	absent	-	present	normal	present	present	-	-	normal
55	3	fch	-	yes	-	-	-	yes	-	yes	-	present	present	-	epicanthus	absent	-	present	-	normal
56	2	fch	-	yes	-	-	yes	-	yes	-	-	present	-	-	normal	present	-	-	-	normal
57	5	fch	yes	-	-	-	-	-	yes	yes	-	absent	-	-	normal	present	-	-	-	pale disc
58	2	mch	-	-	yes	-	-	-	-	-	-	present	-	-	normal	present	present	-	-	normal
59	1	fch	yes	-	-	-	-	-	yes	-	-	absent	present	-	epicanthus	present	-	present	-	normal
60	1	mch	-	-	-	-	yes	-	-	-	-	present	present	-	normal	present	-	-	-	normal
61	1	mch	yes	-	-	-	yes	-	-	-	-	absent	-	-	telecanthus	present	-	-	-	pale disc
62	2	mch	yes	-	-	-	-	-	yes	-	-	absent	-	present	normal	present	present	-	-	normal
63	3	fch	-	-	-	-	-	-	-	yes	-	absent	-	-	normal	present	present	-	-	no view,B scan - microphthalmos, vitreous opacities
64	1	mch	-	-	-	-	yes	-	yes	-	-	present	-	-	normal	absent	-	-	-	normal

S.NO	AGE IN YEARS	SEX	ANTENATAL HISTORY				PERINATAL COMPLICATIONS					VISUAL ACUITY (CSM)	OCULAR DEVIATION		ANTERIOR SEGMENT	CONGENITAL NYSTAGMUS	REFRACTIVE ERROR			FUNDUS
			PIH	GESTATIONAL DIABETES	H/O IUGR	OTHERS	BIRTH ASPHYXIA	SEIZURES	LBW	PREMATURITY	OTHERS		ESOTROPIA	EXOTROPIA			MYOPIA	HYPERMETROP	ASTIGMATISM	
65	9 months	mch	-	-	-	fever	-	yes	-	-	-	absent	-	-	normal	present	-	-	-	chorioretinal scarin both eyes
66	2	fch	-	-	-	-	yes	-	-	-	-	absent	-	-	telecanthus	present	-	present	-	normal
67	3	mch	-	-	-	-	-	-	-	yes	-	present	-	-	epicanthus	absent	-	-	-	normal
68	4	mch	-	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
69	3	fch	yes	-	-	-	-	-	-	-	hypoglycemia	absent	present	-	normal	present	present	-	-	normal
70	2	mch	-	-	-	-	-	-	yes	-	-	absent	present	-	normal	present	-	present	-	normal
71	1	mch	-	-	-	fever	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
72	1	mch	-	-	yes	-	-	yes	-	-	-	present	-	-	normal	present	-	-	-	normal
73	2	fch	yes	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
74	2	mch	-	yes	-	-	-	-	yes	-	-	present	-	-	normal	absent	-	-	-	normal
75	1	fch	yes	-	-	-	-	-	-	yes	-	absent	-	present	normal	absent	present	-	-	normal
76	1	mch	yes	-	-	-	yes	-	yes	-	sepsis	present	-	present	normal	absent	-	-	-	normal
77	1	fch	yes	-	-	-	-	-	-	yes	-	absent	present	-	normal	present	-	-	-	normal
78	2	mch	-	-	-	difficult labou	-	yes	-	-	-	absent	-	-	normal	present	present	-	-	normal
79	1	mch	-	-	yes	-	-	-	yes	-	-	present	-	-	normal	absent	-	-	-	normal
80	2	mch	-	yes	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
81	5	mch	yes	-	-	-	yes	-	-	-	-	absent	-	-	normal	present	present	-	-	normal
82	2	fch	-	yes	-	-	-	yes	-	-	-	present	-	present	normal	absent	-	-	-	normal
83	1	mch	-	-	-	fever	-	yes	-	-	-	present	-	present	normal	absent	-	-	-	normal
84	1	mch	yes	-	-	-	-	-	yes	-	-	absent	-	-	normal	present	present	-	-	normal
85	2	fch	-	-	yes	-	yes	-	-	-	-	absent	-	-	normal	present	-	present	-	normal
86	3	mch	yes	-	-	-	-	-	-	-	sepsis	absent	-	-	normal	present	-	-	present	normal
87	2	fch	-	-	yes	-	yes	-	-	-	-	present	present	-	normal	absent	-	-	-	normal
88	1	mch	yes	-	-	-	yes	-	-	-	-	present	present	-	telecanthus	absent	-	-	-	normal
89	7 months	fch	-	-	yes	-	-	-	yes	-	-	present	present	-	normal	absent	-	-	-	normal
90	2	mch	yes	-	-	-	-	-	-	-	hypoglycemia	present	-	present	normal	present	-	-	-	normal
91	3	fch	-	-	-	-	-	-	-	yes	-	absent	-	-	normal	present	present	-	-	normal
92	1	mch	-	-	-	fever	-	yes	-	-	-	absent	-	-	normal	absent	-	-	-	normal
93	4	mch	-	-	yes	-	-	yes	-	-	-	present	-	present	normal	absent	-	-	-	normal
94	2	mch	yes	-	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
95	1	mch	yes	-	-	-	-	-	yes	-	-	absent	-	-	normal	present	present	-	-	normal
96	2	fch	-	-	yes	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
97	5	mch	-	-	-	fever	-	-	-	yes	-	absent	-	-	normal	present	-	-	-	pale disc
98	9 months	fch	-	yes	-	-	yes	-	-	-	-	present	-	-	normal	absent	-	-	-	normal
99	3	mch	-	-	yes	-	-	-	yes	-	-	present	-	-	normal	absent	-	-	-	normal
100	1	fch	-	-	yes	-	-	-	-	yes	-	absent	-	-	normal	absent	-	present	-	normal