# CHAPTER I
## INTRODUCTION

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1.1. Introduction

The human eye is an organ which allows us to observe and learn more about the surrounding world. Our eyes are used in almost every activity we perform like reading, writing, working, watching television and in countless other ways.

Soon after the birth, babies are capable of developing the skill of perception through eyes. However, their vision will be indistinct and requires constant exercise to develop acuity that too within a very short time frame. The visual acuity development will be virtually complete by the time the baby attains school age. Immediately after its birth, a child will not be able to coordinate the eye movements. Further, their eyes will undergo minor misalignments which may occur repeatedly over few months, might not be a cause for concern. In addition, the child should master gazing technique during this course of time. However, a major cause for concern should be one eye’s constant deviation from the direction of the other’s and should be treated at the earliest by ophthalmologist as reported by Ocampo VVD, Foster CS (2007).

One of the common visual problems faced by young children is having crossed eye condition resulting from an eye muscle irregularities which makes one of the eyes farsighted than the other, a disorder which is called as strabismus. This imbalance forces the normal eye to work hard to cope with the functions of farsighted eye, which if left untreated leads to its loss of vision deliberated by Toronto (1969).

Strabismus is a condition wherein both the eyes are not properly aligned with each other. It involves lack of coordination between the extra ocular muscles that does not bring the view of each eye to the same point that affects binocular vision and depth perception reported by William K. Pope (2014).
When children are enrolled in Anganwadi/Nursery/Preparatory schools, there is a great need to identify and intervene children with eye defects particularly children having strabismic eyes have to be identified at their early age. The objective of the study is screening, identification and intervention of children with strabismus through vision therapy and visual efficiency training which enhanced the researcher to identify the children with strabismus as early as possible and provide them the relevant intervention programmes.

This chapter presents the information related to types of strabismus, causes, effects of strabismus, need for early identification, rationale of the study, need and importance of the study, statement of the problem, objectives of the study, hypothesis of the study, scope and delimitations of the study and organization of the thesis.

1.2 Common types of strabismus

According to Strabismus.com (2010), strabismus may be classified according to the direction in which the eye turns. If the eyes turn inwards, it is Esotropic Strabismus which is the most common type of Strabismus. The signs and symptoms of Esotropic Strabismus are usually visible by 6 months and the condition will worsen only with age.
1.2.1 Esotropic Eyes

Strabismus develops in farsighted children, after 6 months of age. Since it relies upon the degree of accommodation, it necessitates the farsighted child to bring an object into focus, it is termed as accommodative. In some children, an over-convergence of the eyes is necessitates to bring an object in focus. This over-convergence is called as accommodative esotropia which is usually corrected by the usage of eyeglasses.

1.2.2 Exotropic Eyes

Eyes that turn outwards, away from the nose, is Exotropic Strabismus where the degree of turn in eyes is typically greater in children as they focus on more distant objects and focusing on close objects forces in convergence of the eyes. Bright sunlight tends to make exotropic children more squint and this can be
benefited from wearing eyeglasses or prisms whereas in some cases, the children may also require surgery to correct the misalignment.

1.2.3 Hypertropic and Hypotropic Eyes

Hypertropic Strabismus is characterized by a vertical misalignment where an eye turns up or down in relation to the other eye. Hypertropic Strabismus may exist along with other types of Strabismus. In Vertical strabismus the visual axis of the squinting eye deviates in the vertical plane (hypertropia or hypotropia).

1.2.4 Congenital and Acquired Strabismus

Strabismus may be classified according to the time when the condition gets onset. When strabismus is developed during the period of infancy, it is known as congenital. When strabismus is developed during the period of adult, it is called acquired. Early treatment of Strabismus or Amblyopia greatly reduces the chance of developing depth perception problems.

1.2.5 Pseudostrabismus

Pseudostrabismus is a false appearance of Strabismus. Sometimes strabismus may be falsely anticipated when the child has flat, wide bridge of the nose and a small fold of skin in the corner of the eye that makes the eyes to appear turning inward (esotropic). Pseudostrabismus is typically found among infants and children. As the child grows, the system of Pseudostrabismus disappears since the bridge of the nose tends to narrows and eliminates any folds in the corner of their eyes. Pseudo Strabismus may be differentiated from Strabismus as early as 6 to 9 months.

1.3 Causes of strabismus

1.3.1 Brain Disorder

According to Ferreira (2002) Strabismus may be caused by either a brain disorder where the brain has trouble in coordinating the eyes or a muscle disorder where the direction or power of one or more eye muscles fails to function properly. The occurrence of strabismus is equal in both male and female. Approximately 30% of persons with strabismus are through heredity but they are concordant for the type of strabismus (e.g., esotropia or exotropia). Strabismus may also be an
indication of a lesion on the Oculomotor-IIIrd nerve, Trochlear-IVth nerve or Abducens-VIth nerve known as Cranial Nerves. This causes failure of innervations in the eye muscles, which leads to changes in the positioning of the eye.

1.3.2 Premature Birth

Strabismus may result from several factors, it may be due to blow on the head, prematurity or heredity. It may be also caused due to malfunctioning of the muscles which help the movement of the eyes and compel the eyes to focus differently by sending different images to the brain. When the child grows, he/she learns to ignore the image from one eye which shows different images and the result is that it fails to grow as strong as the eye on which he or she is depending explained in Strabismus Medical Dictionary (2003).

1.3.3 Heredity Factor

Ferreira et al., (2002) revealed that a family history of Strabismus, which results from farsightedness, eye tumors, diabetes, cataracts and any other disease that cause loss of vision are contributing factors in the development of Strabismus. Neurological conditions like premature birth, brain tumors cerebral palsy, hydrocephalus and down syndrome also contribute to acquired (adult) Strabismus, but Congenital (child) Strabismus is caused by various factors, which need not be neurological disorders. Untreated or unsuccessfully treated congenital strabismus may also develop acquired strabismus.

1.3.4 Angle of Deviation

According to About Floaters (2015) although small angle strabismus is less severe in terms of misalignment, it causes troublesome symptoms, particularly when it occurs intermittently or during switching from eye to another eye. It usually leads to symptoms like eyestrain, headaches, difficulty reading, jumpy vision etc. Cases of constant small angle strabismus that are unilateral usually lead to amblyopia (lazy eye) in the affected eye. Both forms of the conditions lead to significant social, emotional, and mental challenges.
1.4 Effects of strabismus

The normal alignment of both eyes during childhood allows the brain to fuse the two pictures into a single 3-dimensional image. Strabismus or abnormal alignment can block this normal binocular development and cause amblyopia or reduced vision in one eye. If vision is reduced, the brain of the child will only learn to recognize the stronger image and ignore the weaker image of the amblyopic eye. This will eventually cause a loss of depth perception and, if not treated before 7 years of age, can result in permanent visual impairment in the affected eye reported by Prabha's eye clinic & Research centre (2010).

In order to perceive the space around us our two eyes must look at the same direction which gives almost identical images to be generated in each eye. These two images then get fused together in the brain which will form a single three-dimensional visual scene. In a squint eye, the difference between the two images caused by the misalignment is too great where the brain finds difficulty to converge them and the final result is irritating double vision. The juvenile brain responds to double images by simply suppressing the image arriving from the deviant eye. If strabismus develops in an adult, the patient will often experience double vision because the brain has been trained to receive images from both eyes stated by McNeer, K.W et al., (1997).

Strabismus affects one’s self-image and confidence. Some people may experience difficulties in a variety of areas like daily living, such as reading and writing, work-related problems; social interactions like ability to communicate, personal relationships and interactions where there must be a eye contact that may lead to embarrassment deliberated by Children's Eye Foundation (2013).

Stefania Margherita Mojon-Azzi et al., (2010) conducted a study on 'Strabismus and discrimination in children' which dealt with the children with strabismus who were invited to social functions. The main objective of the study was to determine the social acceptance of children with strabismus by their peers and to determine the age at which the negative impact of strabismus on psychosocial interactions emerges. The study suggested that, children aged 6 years or older with a visible squint seem to be less likely to be accepted by their peer group. This happens because the negative attitude on strabismus appears to
emerge at approximately the age of 6 years, corrective surgery for strabismus should be performed before this age.

Children with strabismus tend to have a poor basic visual skills which includes the ability to use both the eyes as a team to track objects and to move across a written page. They also encounter problems in more extensive perceptual skills such as the ability to tell the difference between “b” and “d”, the ability to see the tree from far distance, and the ability to “picture” in their mind what they saw." "Vision testing can be done at any age but it should begin as early as possible (by six months). Only by early detection and treatment, vision problems such as crossed eyes and refractive errors can be controlled and prevented" reported by American Optometric Association (2014).

It is always important to remember that the eyes of a newborn are rarely aligned during birth. Most infants establish their eye alignment at 3-4 weeks of their age. Therefore strabismus in any child who is more than one month old must be taken seriously and should be evaluated by an ophthalmologist. A squint can be a cosmetic problem. Many older children and adults who have squint treated as a child having reduced self-esteem because of the way their squint looks reported by Konstandina Koklanis et al., (2006).

Therefore children should undergo vision screening either by the family doctor, pediatrician, or ophthalmologist at the time of birth, 6 months of age, 3 years of age, and preparatory school to detect their potential eye problems while they can still be treated. The next topic deals with what we have discussed above i.e., early detection of strabismus.

1.5 Need for early identification of strabismus

In order to avoid visual impairment early eye examination is of utmost importance. All eye surgeons are aware of the frustration of an adult when told about the inability to improve the vision in the lazy (amblyopic) eye. This frustration can be prevented to a great extend in majority of cases if the problem had been detected around the age of 3-4 years. It has been observed that 24 percent of adults have refractive errors as their problems were un-noticed
for a long time. This happens often when error is more in one eye than the other eye as evaluated by Blind People Association of India (2009).

According to Children Hospital Association (2003) it is normal for a newborn's eyes to move independently and at times, even cross or wandering. However, by three to four months, an infant should focus on objects and the eyes should be straight, with no turning. If the child's eyes move inward or outward, not focusing on objects, and/or the eyes seem to be crossed, we should seek medical attention. Thirty to Fifty percent of children with strabismus develop secondary vision loss (Amblyopia). The onset of strabismus is most common in children younger than 6 years of age.

According to UNICEF (2005) the following are the general symptoms that may occur from birth for children with strabismus:

- The child blinks or squints when looking at something.
- The child’s eyes are crossed.
- The child favours to see with one eye more than the other.
- One or both of the eyes turn in or out.
- The child pupils are hazy.
- The child tilts or turns his head abnormally.

1.6 Rationale of the study

The overall incidence rate of strabismus or squint eye in India is 4% to 6%. However, it goes up to 30% to 40% in premature babies. “With available new treatment modalities and advanced surgical procedures, the success rate of treating strabismus has gone up to 93%. More and more ophthalmologists are coming forward to treat squint nowadays but few years ago very few doctors only thought of entertaining such patients” reported by Dr. Kalpana Narendran (2011).

Jeevan Ladi (2011) said that parents of children with squint eye usually avoid consulting doctor since they fear their children will have to undergo a surgery. But 30% to 40% of squint eye problems can be treated with the help of glasses and medical interventions such as vision therapies.
According to Vision 2020 (2010) Strabismus is a common condition in childhood, affecting about 5% of five year olds of whom 60% have eso-deviations and 20% exo-deviations. Its estimated prevalence in childhood is 1.2% to 4.4%.

Nearly 80% of preschool age children never get an eye examination. Many "back to school" physical exams do not test for common eye disorders. Untreated eye and vision problems can interfere with most of the life experiences. The prevalence of undetected eye and vision problems among preschool age children is estimated to be 5% to 10%. Only 21% of preschool age children receive vision screening and even fewer children get a comprehensive eye examination. Failure to detect visual impairment earlier in life may have a permanent effect on long term vision outcomes, educational achievement, and self esteem. Strabismus, amblyopia and optical problems impairing visual acuity and depth perception are the most common vision disorders among children. Therefore ignorance remains as a major problem at all levels of the society, so improvements in the distribution of information and education are needed and should yield improvement reported by Castanes, M.S. University of Texas, USA, (2003).

Powell., C, Hatt., S.R. (2009) evaluated the effectiveness of vision screening in reducing the prevalence of amblyopia. The study reported as, Amblyopia, commonly known as "lazy eye", is the term used to describe a type of reduced vision that develops in childhood. It affects approximately 2% of children. If it is treated when the visual system is still developing, it can be reversed and normal vision restored. The cause of squint could be either an environmental factor such as blurred vision affecting a system of neuronal connections between retina and cortex that is developing during the first few months of life. Refraction acts as a mean of predicting squint or amblyopia in preschool children R. M. Ingram and C. Walker (1979).

The Royal College of Ophthalmologists (2000) conducted a research to identify possible reasons for squint occurrence. As a result, squint was found to occur based on one or multiple reasons and the study reported the details of each such possibility and necessary treatments for cure. Based on the frequency at which strabismus occurs in some families it was concluded that hereditary
predisposition might be the reason behind it. Anna., R. et al., (2002), confirm the increased prevalence of strabismus in a low-birth-weight population. Philippa M Pennefathera et al., (1999) identified causative factors which are independently related to strabismus and resulted as it may occur for the children born prematurely.

According to Stephen A. Wynn, University of IOWA, USA (2008) screening children early for detection of eye and vision problems is quite essential to prevent lifelong visual impairment. As per Lori L. Alexander, (2014) recommendation, vision examinations should begin at the age of 6 months for detecting ocular abnormality such as cataract, corneal opacity, strabismus and ptosis and recommends prompt treatment to prevent lifelong visual impairment. According to Archieves of Ophthalmoogy (2002) Atropine and patching produce improvement of similar magnitude, and both are appropriate modalities for the initial treatment of moderate amblyopia in children aged 3 to 7 years.
The clinical tests used by the ophthalmologist to identify the Strabismic condition in this study are presented below:

**Figure 1.2 Clinical tests used to identify Strabismic condition**

Common to all children with manifesting strabismus, and to some with intermittent strabismus, there is a decrease in binocular visual functions such as depth perception and stereopsis. Binocular visual function can be restored only if strabismus is successfully treated at the younger age reported by Christopher Gappy, M.D (2014).

According to Vryghem,J.C (2003) the treatment goal for strabismus is to preserve the remaining vision, to straighten the eyes, and to restore the three dimensional vision. The eye disorder occurs in about 2% of children under the age of 3 and about 3% of young adults. If amblyopia is detected in the first few years of life, treatment is often successful. If treatment is delayed until later, amblyopia or reduced vision, generally it becomes permanent. Occlusive patching of the
better seeing eye can force use of the amblyopic eye and improve vision. Depending on the causes of strabismus, the treatment involves in repositioning of the unbalanced or weakened eye muscles, removing cataract, or correcting other conditions which are responsible for the eyes to turn. After a thorough eye examination, including the detailed knowledge of the inner parts of the eye, an ophthalmologist recommends for the appropriate optical, clinical or surgical treatment.

To preserve or to restore the vision, to improve the appearance, one or more of the following steps are involved:

- To wear glasses that aid in focusing and straighten the eye(s)
- Giving patches which forces the infants and young children to use and straighten the weaker eye
- Eye drops or ointments as a substitute for patches or glasses
- Surgery to tighten, relax, or reposition eye muscles
- Injections into an overactive eye muscle so that it allows the opposite muscle to straighten the eye
- Vision training (also called eye exercises)

Figure 1.3 Clinical treatments given for children with strabismus

The preponderance of studies has found that vision-related training has no effect or even a negative effect on reading or writing skills. A study by
Dr. J. David Grisham (2001), an optometrist at the University of California, compared three groups of seventh-grade students who were undergoing intervention reading. Vision training was given to one group, another group was tutored in reading, and computer games were given to the third group. After ten weeks, the vision training group got improvement in their eye-coordination skills, but all three groups got equally progressed in reading.

This method of eye training and eye exercises - orthoptics - is carried out under competent optometric and medical supervision to correct coordination or binocular vision problems such as "crossed eyes" and amblyopic or "lazy" eyes.

Through vision therapy, people can strengthen their eye muscles, improve depth perception, improve eye control, eliminate blurry vision and able to train their eyes. Therefore the eyes can work better, look better and feel better (Appelbaum Maryland, 2014).

According to DOCSHOP (2014) strabismus treatment ranges from being as simple as correcting children’s eyesight with glasses and relatively simple vision therapy to complex squint surgery. Intermittent strabismus can be effectively handled with eye patches, spectacles and vision training. After some time, these basic treatments allow the brain to gain control over the eye movements where surgery is not required. A patch forces the child to see through the weaker eye first. But it is very important to use the patch or eyeglasses as directed by the ophthalmologist. If the eyes still face difficulty to move correctly, eye muscle surgery may be essential and thus different muscles in the eye will be made stronger or weaker.

Any eye condition that is causing poor vision in the amblyopic eye (such as cataracts) needs to be corrected. A child with a refractive error (myopia, hyperopia or astigmatism) needs glasses. Next, a patch is placed on the normal eye which forces the brain to recognize the image from the weaker eye with amblyopia. Sometimes, drops are also used to blur the vision of the normal eye instead of putting a patch on it.

Munchau A and Bhatia KP (2000) stated that children with conspicuous squint stand a better chance as they are given timely ophthalmologist treatment in
co-operation with their parents. It is quite unfortunate to realize that majority of people with barely visible or invisible deviations can only be detected by the time they already have lost one of their eyes to amblyopic or when it is too late for successful treatment. Therefore it becomes mandatory to identify symptoms such as sensitivity to light, eye tearing, one eye shut, bad mood or irritability, chronic blepharitis, head tilted to one side and clumsy movements, which are characteristic indicators of an impending or existing squint.

According to Arora, A., et al. (2005) half of the children with squint required a surgery of outer eye muscles to correct the faulty alignment. However, operating neither eliminates weak vision nor does it gives immediate improvement in spatial vision and requires further ophthalmic treatment. As a result glasses are needed for correcting refractive errors even after surgery.

In India, ophthalmologist population ratio counts 1: 25,000. Hence this issue is neglected due to treatment back lock in cataract and major eye diseases reported by Times of India (2007). Hence this situation necessitated and urges the education and rehabilitation professionals to identify the children with strabismus and children at risk for strabismus at earlier stage persay. Moreover all the reviews either from the foreign countries or from India, the main point is to identify the children with strabismus as early as possible to prevent them not to face the worsen condition of strabismus i.e., it may also lead to visual impairment. Hence a study is planned in the educational setting like anganwadi schools, using indigenous techniques and devices to identify children having symptoms of strabismus.

1.7 Need and importance of the study

Vision is closely linked to the education process. Children having problem in seeing or interpreting what they had seen will often have trouble with their schoolwork. Most of the time, children will not complain of eye or vision problems because they don't know what "normal" vision looks like. If the children performs poorly at school or exhibits a reading or learning problem, the child should be recommended for an eye examination to rule out an underlying visual cause reported by Strabismus.com (2014).
According to the Deborah P. Waber (2003) many kids have undetected learning-related vision problems and 13% of children between the ages of 9 and 13 suffer from moderate to severe convergence insufficiency (an eye teaming problem that affects the reading accomplishment), and one in four school-age children may have at least one learning-related vision problems listed below:

- Blurred near or distance vision, particularly after reading, writing or other close work
- Frequent headaches or eye strain
- Problem in changing focus from distance to near and vice versa
- Double vision, especially during or after reading
- Avoidance of reading
- Easily distracted when reading
- Poor reading comprehension
- Loss of place, repetition, and/or omission of words while reading
- Letter and word reversals
- Poor handwriting
- Hyperactivity or impulsiveness during class hours or studying time
- Poor overall school performance

If the child exhibits one or more of these signs or symptoms and is having problems in school, he/she should be taken to the comprehensive children's vision exam.

Eye sight is for a life time. About 25 percent of the population in our country belongs to school going age group. Experts all over the world are of the opinion that 90 percent of the squint can be either treated or prevented. To accomplish this gigantic task, we require educating the parents, school teachers and children. The pre-requisite in this regard is the redefinition of medical terminology in to simple language and teaching of primary health care principles to the public reported by WHO(2001). Parents must be educated about the importance of early
detection of strabismus. Any child in a family has a history of squints, then he/she should be screened by an orthoptist. If the results are positive, the child must be referred to the ophthalmologist, for details examination of the eyes, their refractive error and their movements.

Once best visual acuities have been achieved with glasses, any residual strabismic person can be treated by surgical realignment of the eyes under general anesthesia. This involves in moving the ocular muscle attachments to new positions and shortening their opponent muscles. Ideally, fusion of the two images can be established, but a more usual result is significant improvement in appearance, with good bilateral acuity but no or only little fusion.

Early identification and treatment of the squint problem in children prevents permanent visual loss. Therefore all the children should have a thorough eye examination at least between ages 3 and 5 years. Therefore early eye examination is of utmost importance. In general, parents think that nothing can be done to improve vision in the strabismic eye. This can be reduced to a great extent in majority of cases, if it is detected around the age of 3-4 yrs. Realizing the need for the early eye examination the researcher selected this study as stated below.

1.8 Statement of the problem

The problem of the current research is stated as “Strategy for Identification of Children with Strabismus and Impact of Intervention on Visual Skills”.

Operational definitions

The operational definitions of the terms used in the study are described below.

Strategy

A method or plan chosen to bring about a desired future, such as achievement of a goal or solution to a problem (Kenneth Andrews, 2012).
Identification

Identification is defined as the act of determining who someone or what something is (Macmillan Dictionary, 2014). In this study the children with strabismus are identified.

Impact

The action of one thing having a marked effect or influence on someone or something (Merriam Webster, 2013). The impact of the following intervention programme such as vision therapy and vision efficiency training for children with strabismus are carried out in this study.

Intervention Programme (IP)

Intervention programme is developed as a solution to a particular problem. It is a multifaceted approach, tailoring intervention plans to a child’s specific needs. It makes use of one-on-one instruction and small group instruction (Norton Grubb, 1998).

The intervention programmes pertaining to the study are Vision Therapy (VT) and Visual Efficiency Training (VET) are used to promote appropriate visual responses, develop healthy vision and functional vision skills such as visual fixation, tracking, discrimination and motor co-ordination.

Vision Therapy (VT)

Vision Therapy is a series of exercises and behaviour modification drills which will help an individual to learn correct visual responses or habits. It is a mean of helping a person to develop healthy vision, undistorted and flexible enough to meet all possible needs, right from reading a book to spot a horse on the horizon (Dr.Gala’s Vision Training Programme, 2008).

In this study the researcher used 5 types of exercises namely Eye pressing, Neck exercises, Thumb pursuits, Eye tracking and Dodge ball. (The procedures are discussed in Chapter III).
Visual Efficiency Training (VET)

Visual efficiency training may include scanning of location skills, strategies to improve visual efficiency (e.g., use of appropriate lighting or wearing tinted lenses to reduce glare), and strategies which enhance a given student’s access to visual information. Students learn about their particular eye condition, its implications on access to visual information, and how to explain their visual needs to others (Alberta Education, 2014).

The children with strabismus were given series of activities starting from simple to complex visual skills.

Functional Vision Skills

The Functional vision skills provide sequential lessons from which the child can build a visual foundation and then solidify skills commensurate with his or her visual potential. Throughout the program, the child is assisted toward gradually becoming more proficient in identifying and using visual cues, from simple form discrimination to more complex visual skills such as distance and depth cues (Smith.A & O’Donnell,L.M, 1992).

In this study the children with strabismus were selected for training from the schools situated at coimbatore district and the functional vision skills included optical and perceptual skills such as visual fixation, tracking, discrimination and motor co-ordination.

Eye defects

Errors in vision of the eye are called as eye defects (WHO, 2001). In this study the researcher selected one of the eye defects namely strabismus (Squint).

Strabismus

Strabismus is a term used to describe the uncorrectable loss of vision in an eye that appears to be normal. Commonly referred to as ‘Lazy Eye’ (Larry Bickford, O.D, 1999).

The common types of strabismus are,
Esotropia
One eye is turned inwards. Commonly called as Crossed Eye.

Exotropia
One eye is turned outwards. Commonly called as Wall Eye.

Hypotropia
One eye is directed downwards.

Hypertropia
One eye is directed upwards.

Pseudostrabismus
Pseudostrabismus is a false appearance of Strabismus. Strabismus is usually falsely anticipated when the patient has a flat, wide bridge of the nose and a fold of skin in the corner of the eye that makes the eye appear to be turned inward. Pseudostrabismus is typically found in infants and children (Strabismus.com, 2010).

Anganwadi School
The children between 2-5 years are enrolled and their growth, supplementary feeding, immunization, distribution of vitamin A, Iron and Folic acid supplements, treating minor ailments, referring medical services were monitored (ICDS - International Child Development Services, 1995). This study was carried out for the children enrolled in anganwadi schools of coimbatore district.

1.9 Objectives of the Study
The objectives of the study were to:

- Screen children using indigenous devices and techniques and identify children with strabismus and atrisk for strabismus enrolled in anganwadi programme.
- Refer children with strabismus and atrisk for comprehensive clinical examination and treatment to help them to attain correct visual responses and develop healthy vision.
• Find out the level of strabismic condition in children and their capacity in performing functional vision skills.

• Find out the effect of intervention programme with regard to angle of deviation, fixation, discrimination, tracking, motor co-ordination skills, appearance, behaviour and complaints encountered by the children with strabismus.

• Critically analyse the relationship between appearance of the eye and complaints, complaints and behaviours, behaviours and appearance of the eye of the children with strabismus before and after intervention programme.

• Find out the relationship between refractive errors with respect to the types of strabismus.

• Find out the effect of IP on angle of deviation at 15°, 30°, 45° with respect to functional vision skills such as fixation, tracking, discrimination and motor co-ordination.

• Create awareness among teachers, parents and caretakers on the effect of strabismus and the benefits of vision therapy and visual efficiency training to overcome strabismic problem.

1.10 Hypothesis

The null hypothesis of the study were as follows:

• There is no significant relationship in the appearance, complaints and behaviours of the children with strabismus before and after Intervention Programme.

• There is no significant relationship between refractive errors and the types of children with strabismus before and after Intervention Programme.

• There is no significant relationship in the angle of deviation (15°, 30°, 45°) of the children with strabismus before and after Intervention Programme.

• There is no significant difference in the pre and post mean scores of children with strabismus with respect to visual fixation, tracking, discrimination and motor co-ordination skills.
• There is no significant difference in the pre and post mean scores of children with strabismus with respect to selected functional vision skills.

• There is no significant difference in the pre and post mean scores of children with strabismus with respect to appearance of the eye, complaints and behaviour of the children with strabismus.

• There is no significant influence of pre and post mean scores of angle of deviation at 15°, 30°, 45° with respect to visual fixation, tracking, discrimination and motor co-ordination skills.

• There is no significant influence of pre and post mean scores of angle of deviation on pre and post scores of visual fixation skill by considering the respective pretest score of visual fixation skill as co-variate.

1.11 Scope of the study

The scope of the study is very wide and are listed below. This study may,

• Promote a change in the stereotypic attitude of the society considering strabismus as the sign of luck, treatment of strabismus leads to vision loss etc.,

• Anticipate creating awareness to the public on the early identification and intervention of strabismus.

• Incorporate the intervention programme content in the current teacher training curriculum.

• Replicate the identification strategy widely.

• Guide the teachers, rehabilitation workers, parents and field workers to apply the screening techniques to identify children with strabismus at an early age.

• Ensure the need for surgery for children having worse strabismic condition.

1.12 Delimitation of the study

The delimitation of the present study are as follows:

• The samples (pre-primary children) were drawn only from the Anganwadi schools of Coimbatore district.
• Only children with strabismus were identified.
• Only two intervention programmes such as vision therapy and visual efficiency training were followed.

1.13 Organisation of the thesis

The researcher has organized the research study in to five chapters and the details of the chapters are as follows:

Chapter I : Deals with introduction proceeds with barriers encountered by the children with strabismus, conceptual framework of the study, statement of the problem, operational terms used, objectives and hypothesis proposed, scope and delimitation of the study.

Chapter II : Deals with the review of literature pertaining to the major areas related to the present research study.

Chapter III : Describes the methodology employed for the study is explained with the Research design, Sampling technique, Research tools, Implementation of Intervention Programmes (IP) such as Vision Therapy (VT) & Visual Efficiency Training (VET), Data gathering and Analysis procedures.

Chapter IV : Provides the results under three sections and made interpretations followed by discussion.

Chapter V : Includes the major findings, discussion, Effectiveness of VT & VET and further suggested research recommendations and conclusions are reported in this chapter.

The reference section presents the details of bibliography and appendices used in the study.