

Dry Eye



Daffodil
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University

Thesis On

Survey on Dry Eye patients among Farmgate area

Submitted To

The Department of Pharmacy,
Faculty of Allied Health Sciences,
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In the partial fulfillment of the requirements for the degree of Masters of Pharmacy

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APPROVAL

This Thesis Survey on Dry Eye patients among Farmgate area, submitted to the Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Masters of Pharmacy and approved as to its style and contents.

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ABSTRACT

Dry eyes are a very prevalent ailment that can affect as many as 337 million individuals throughout the world. Tears can be inadequate and unstable for many reasons. Dry eyes may occur if anyone don't produce enough tears or if they produce poor-quality tears. Dry eye disease is a common condition that occurs when the tears aren't able to provide adequate lubrication for eyes.

This survey was carried out to learn people's perspectives on dry eyes as well as the ways in which it influences their lives. The survey was conducted at the Ispahani Islamia Eye Institute and Hospital, Dhaka, and it was cross-sectional research that relied only on participants' physical responses. The questionnaire begins with a review, followed by 18 questions that are completely relevant to the topic at hand. There was a total of 125 patients that participated in this research. The duration of this survey is from August to October.

This study included respondents whose ages range from 20 to 40 years old (26%), respondents whose ages range from 40 to 60 years old (42%), and respondents whose ages are under 20 years old (35%). Around 10% of respondents to this survey believe that thyroid disorders are to blame for dry eyes, while 9% believe that aging is to blame, 34% believe that vitamin A deficiency is to blame, 4% believe that rheumatoid arthritis is to blame, 26% believe that allergic eye disease is to blame, and 17% believe Sjogren's Syndrome is to blame.

DECLARATION

I, at this moment, announce that I am carrying out this Thesis study under the supervision of “Ms. Aklima Akter,” Assistant Professor, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, Impartial Compliance with the Masters of Pharmacy Degree Requirement (M. Pharm). This project, I declare, is my original work. I also state that neither this project nor any part thereof has been submitted for the Masters’ award or any degree elsewhere.

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Author

Afifa Nawer

DEDICATION

I dedicate this work to my parents and my teachers and my friends.

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Chapter One: Introduction

Dry Eye

The eyes are the most obvious and important components of the visual system. They provide organisms with the ability to see, as well as the ability to take in and make sense of visual information. In addition, they permit some photo response functions independent of the organism's ability to see. The light is detected by the eyes, which subsequently causes the neurons to be stimulated by electrochemical impulses (neurons). The vision is a complex optical system that, in higher organisms, collects light from its surroundings, controls the intensity of this light with a diaphragm, focuses this light through an adjustable assembly of lenses to form an image, converts this image into a set of electrical signals, and then transmits these signals to the brain

through complex neural pathways connecting the eye via the optic nerve to the visual cortex and other brain areas. Ten distinct types of watches are capable of high resolution, and around 96% of animal species feature a sophisticated optical system. [1] Molluscs, chordates, and arthropods all have eyes that are capable of producing high-resolution images of their surroundings. The most basic eyes, also known as pit eyes, are eye spots that may be placed inside of a pit to reduce the angle of light that enters and affects the eye spot. Because of this, the organism is able to calculate the direction from which the light is entering the body. Retinal photosensitive ganglion cells in eyes with increased complexity send signals via the retinohypothalamic tract to the suprachiasmatic nuclei to affect circadian adjustment and to the pretectal region to govern the pupillary light response. Both of these processes take place in the periphery of the brain. The brain is the locus for both of these processes to take place. [2]

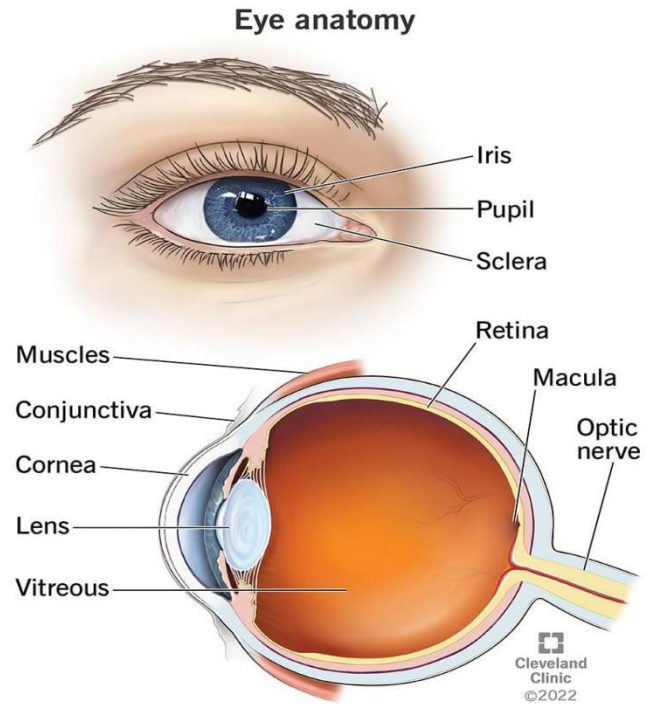


Fig 01: Eye [Courtesy Google]

Overview

The discerning eyes can distinguish between colours and shapes. The ability to see with both eyes is essential for many animals, particularly carnivores, to have accurate depth perception. The eyes of animals like rabbits and horses, which only have one look, are arranged in such a way as to provide them with the widest possible field of vision. During the Cambrian explosion, which occurred around 600 million years ago, the first organisms to possess proto-eyes arose. Only six of the main species out of 35 lack the adaptations necessary to produce sophisticated eyes, meaning that almost all animals, or 96%, have eyes. [3] The cellular mechanism that underlies vision was already in place in the animal kingdom's most recent common ancestor. In most vertebrates and certain molluscs, the back of the eye has a layer of cells that are sensitive to light. This layer is called the retina. Cone cells, which are responsible for colour vision, and rod cells, which are responsible for low-light contrast perception, are located in the retina. These cells are responsible for receiving light and converting it into neural impulses, which are then sent to the brain through the optic nerve. Eyes that have a spherical form often contain vitreous humour, a focusing lens, and vitreous fluid. Irides are also present in these eyes. When there is an adequate amount of light, the muscles that surround the iris constrict the pupil, causing the iris to dilate so that more light can enter the eye. The majority of cephalopods, fish, amphibians, and snakes employ a telescopic lens, similar to that of a camera, to alter the focus of their eyes. [5-6] The complex eyes of arthropods, which are made up of many essential aspects, may either form a fragmented image or numerous other pictures with each regard, depending on the particulars of the anatomy of the creature. Every sensing unit has its lens array and photoreceptor cells (s). It is possible to have a peripheral vision that encompasses the complete 360 degrees thanks to the hexagonal arrangement of as many as 28,000 of these sensors in particular eyes. Creatures who have compound eyes can detect even the most minute of motions. Numerous species of Strepsiptera have compound eyes, each of which has a retina capable of forming an image. The information from both eyes is combined in the brain to produce a picture with a higher resolution. The hyperspectral vision system of the mantis shrimp makes it the animal with the most advanced colour vision system. This makes the mantis shrimp the animal with the most complex colour vision system. [7] The sophisticated eyes of ancient trilobites were very forward-looking for their period. Calcite crystals with a transparent appearance were employed to manufacture their lenses. This is a significant exception from most other arthropods, which all have soft eyes. Trilobite eyes may contain

anything from a single lens to hundreds of lenses, depending on the species. Eyes typically only have a single lens throughout their whole. The eyesight of a jumping spider is composed of both its huge, central eyes and its numerous smaller, peripheral eyes. The large eyes have a more limited range of view than the periphery eyes. The rudimentary eyes (stemmata) of some insect larvae, such as caterpillars, exhibit a resolution of up to 4 degrees of arc, polarization sensitivity, and maybe a factor of 1,000 or more increase in absolute sensitivity at night. [8-10] Ocelli are the most basic kind of eye, and they may be found in various creatures, including certain snails. Even though they possess photoreceptor cells, they are unable to receive an image since they do not include a lens. Living species situated close to deep-sea vents have evolved specialized eyes that enable them to detect the infrared light emitted by the vents. This allows them to escape being killed by excessive exposure to sunlight. [11]

1.2.Types

There are ten different eye configurations, and all human optical image-capturing technology may be found in nature with the exception of zoom and Fresnel lenses. "Simple eyes" have one concave photoreceptive surface, whereas "complex eyes" have numerous lenses that are arranged on a convex surface. "Simple" does not imply "simple." Practically every eye type is capable of adjusting to new actions or environments. The mechanics of compound eyes prevent them from resolving angles greater than 1° . It is advantageous for creatures that live in the dark to have superposition eyes since these eyes are more sensitive. Ciliated photoreceptor cells, which are seen in vertebrates, and rhabdomeric photoreceptor cells are responsible for dividing the eye into two groups. Photosensitive cells are used by several animals to entrain their circadian cycles. [12]

Simple eyes

The development of lens-bearing eyes has occurred at least seven times in vertebrates, cephalopods, annelids, crustaceans, and cubozoa. Simple eyes are the most frequent kind of eye. [13]

Pit eyes

Eighty-five per cent of all known species have what are called "simple eyes." The length of their 100 μ m cells is indicative of their size. The directionality of an electromagnetic wave may be enhanced by placing a reflecting layer underneath the receptor cells, decreasing the size of the aperture, or incorporating a refractory material into the pit. Like other vertebrates, pit vipers have eyes sensitive to optical wavelengths, but they also have specialized structures called pits that can detect thermal infrared (see infrared sensing in snakes). Transient receptor potential (TRP) channels, not photoreceptors, are present in the pit organs. Photoreceptors are G-protein coupled receptors instead of transient receptor potential (TRP) receptors. [14]

Spherical lens eye

The lenses of certain annelids and gastropods only have to bend light in one direction. Focus length is decreased and a more crisp image is presented to the retina by using materials with a high refractive index that decreases toward the edges. This allows for a flatter lens, which reduces spherical aberration, and a larger aperture for a given image quality, allowing for more light to enter the camera. Focus length is cut in half from 4 times the lens radius to 2.5 radii due to non-homogeneity. Due to evolutionary pressure, no aquatic organisms have developed homogeneous lenses. [15] The sharp image produced by this eye fades as the head is moved. Stabilizing eye muscles are present in most of these eyes, minimizing the need for constant adjusting of the eyes when the head is moved. Because the focal point of insect ocelli is often located below the retina, pictures produced by them are blurry. Ocelli, the eyes of arthropods, are pit-shaped and blur the image across the retina, making them sensitive to rapid changes in illumination. Information is sent quickly to the brain because of large nerve bundles. By zooming in, the sun's rays would be focused on a smaller number of sensors, perhaps destroying them, while shielding them would reduce their sensitivity (because light, especially UV light which is absorbed by vegetation, usually comes from above). [16]

Multiple lenses

The outer surface has a parabolic shape, which helps to reduce the effects of spherical aberration while also allowing for the generation of a clear image. Another kind of copepod, *Copilia*, has eyes that are composed of two lenses, much like a telescope. The use of alternative constructs is unusual

and not well understood. Multiple lenses are visible in the eyes of certain hunters such as eagles and jumping spiders, both of which have a refractive cornea. These hunters have a negative lens, which magnifies the perceived picture by up to fifty percent over the receptor cells, thereby increasing their optical resolution.

Refractive cornea

The vitreous fluid of the vast majority of mammals, birds, reptiles, terrestrial vertebrates, spiders, and insect larvae has a higher refractive index than air. Lenses do not have a spherical shape. Lens tissue may be corrected in refractive corneas by using either an inhomogeneous lens material known as a Luneburg lens or an aspheric shape. Vision beyond the plane of focus is diminished when the lens is flattened. Therefore, animals that have a wide range of vision often have eyes that have an inhomogeneous lens. There is not much of a difference in the refractive index between the vitreous fluid and the water that is all around it when it comes to water. Consequently, animals that have returned to the water, such as penguins and seals, have lost their highly curved cornea and have reverted to having eyesight dependent on lenses. Some divers make use of a cornea with a powerful focusing ability.

Reflector eyes

An alternative to using a lens is to line the inside of the eye with "mirrors," which then reflect the image such that it focuses on a particular point in the middle of the retina. These eyes have pupils that reflect the image of the organism. Reflector eyes are used by scallops. Pecten scallops have reflector eyes that may be as large as 100 millimeters in size all-around their shells. At least one kind of vertebrate, known as the spookfish, has eyes that are equipped with reflecting optics, which allows them to concentrate light. The light that comes from above is focused by a lens, while the light that comes from below is focused by a curved mirror comprised of multiple layers of microscopic reflecting plates made of guanine crystals. Each of the spookfish's two eyes receives light from both above and below. [17]

Ocular complex

The image that is seen is a compilation of data received from several ommatidia, which are considered to be independent "eye units." These ommatidia are located on a convex surface and point in slightly varying directions. Compound eyes have a broad field of vision and the ability to

detect both rapid movement and the polarization of light. [18] Diffraction, which is caused by the lenses' small size, is what limits the resolution (assuming that they do not function as phased arrays). The only solution for this is to increase both the lens size and the number of lenses. [19] The result of using superposition eyes to make a picture is a single image that is right-side up, whereas using apposition eyes results in numerous pictures that are upside down. [20] Compound eyes may be found in a wide variety of animals, including arthropods, annelids, and several bivalved molluscs. [21] Compound eyes of arthropods are expanded with the addition of ommatidia. [22]

Apposition eyes

Apposition eyes are the most common kind of eye, and it's possible that these eyes eventually developed into sophisticated eyes. Even though they may have arisen independently several times within this phylum, they can be found in each and every family of arthropods. Annelids and bivalves both have eyes that are positioned in apposition. This kind of eye may be found in the horseshoe crab *Limulus*, and it's possible that other chelicerates have simplified the complex eyes they formerly had. Apposition eyes, which aggregate the information received from both sets of eyes in the brain, get one piece of data from each individual eye.

There are three different types of superposition eyes:

Superposition on a parabolic surface, refraction, and reflection

Each lens takes in light in a direction that is perpendicular to its axis and then reflects that light in the same direction. An picture is formed by the rhabdoms' tips at a distance equal to half the eye's radius. This type of compound eye, which has a minimum size below which effective superposition cannot occur, is typically found in nocturnal insects. This is due to the fact that it can generate images that are up to one thousand times brighter than those produced by eyes that function in a similar fashion but have a lower resolution. In the eyes of arthropods like mayflies, which have something called a parabolic superposition complex, the parabolic surfaces of each facet guide light from a reflector to a sensor array. Only decapod crustaceans with long bodies, such as shrimp, prawns, crayfish, and lobsters, have eyes that reflect superposition images. [23]

Superposition parabolically

This form of eye combines the concepts of superposition and apposition in that it utilizes a parabolic mirror to both refract and focus light.

Other

Many of these eyelets come together to form the strepsipteran compound eye, which functions similarly to the "schizochroal" compound eyes of trilobites. Due to the fact that the aperture of an eyelet is larger than that of a compound eye's facets, this structure makes it easier to see in dim light. [24] Insects that are adept fliers, such as flies or honey bees, or insects that are good at capturing prey, such as praying mantises or dragonflies, have specific zones of ommatidia grouped into a fovea region for acute vision. The acute zone is characterized by eyes that are flatter and larger facets overall. The resolution is improved because the flattening makes it possible for more ommatidia to receive light from a single spot. The black region that seems to perpetually gaze at the observer is called a pseudopupil, and it may be seen on the sophisticated eyes of insects. The ommatidia that are "head-on" to the light source absorb it, while those that are offset to one side reflect it. [25-26] The single lens compound eye is a transitional form of the multi-lens compound eye that may be found in a few different kinds of insects. After that comes the mysid shrimp known as *Dioptromyia paucispinosa*. This shows an image in the correct orientation on a customized retina. It is a complicated eye that has a simple eye inside it. In this kind of eye, the appearance of a compound eye is simulated by a cluster of numerous ommatidia on each side of the head. [27]

Nutrients

The inner layer, which covers the vitreous body and is transparent as well as continuous with the retinal nerve tissue, The outer layer is densely pigmented, maintains continuity with the retinal pigment epithelium, and includes cells that are responsible for dilating blood vessels. The vitreous is a transparent, colorless, gelatinous substance that is located between the lens and the retina in the human eye. It is produced by the cells in the retina. It is similar to the cornea, but it contains few cells (mostly phagocytes that remove unwanted cellular debris in the visual field and the hyalocytes of Balazs of the vitreous surface, which reprocess the hyaluronic acid), no blood vessels, and 98–99% water (compared to 75% in the cornea). Additionally, it contains salts, sugars,

vitrosin (a type of collagen), a network of collagen type II fibers with the mu Despite having nothing in the way of substantive information, it manages to retain the eye. [28]

1.3. Dry eye

Dry eye syndrome (DES) is the medical name for dry eyes; this condition is sometimes referred to as keratoconjunctivitis sicca (KCS). Other typical symptoms include eye fatigue, irritation, redness, and discharge from the eye. [28] It is conceivable that you may also experience a blurring of your vision. The intensity of the symptoms and the frequency with which they appear might vary greatly, ranging from mild and occasional to persistent. Scarring of the cornea may occur if certain conditions are not addressed .To put it another way, dry eye may occur either when the eye does not produce enough tears or when the tears evaporate too quickly, causing the eye to become dry.The wearing of contact lenses, problems with the meibomian glands,[29] pregnancy, Sjogren syndrome, a deficiency in vitamin A, a deficiency in omega-3 fatty acid, LASIK surgery, and the use of certain medications such as antihistamines, some blood pressure medication, hormone replacement therapy, and antidepressants can all cause this condition. Another possible cause of the sickness is chronic conjunctivitis, which may be brought on by factors like prolonged exposure to cigarette smoke or an infection in the eye. The patient's symptoms are used as a starting point for the diagnosis, and more testing may be carried out if necessary. [30] The underlying cause needs to serve as the point of departure for the treatment plan. Artificial tears are often the first line of defense in the fight to ease the symptoms of dry eye. Wearing glasses that completely encircle the face and sit snugly on it may help prevent tears from exiting the eye. Altering one's medication or stopping taking it altogether is one potential remedy. In some circumstances, eyedrops containing ciclosporin or steroids may be used. Steroid medication may also be applied. Lacrimal plugs are still another option; they prevent tears from escaping via the drainage holes in the eyelids. Dry eye syndrome may prevent people from using contact lenses in certain situations. When it comes to problems that may affect the eyes, dry eye syndrome is among the most common.It depends on the size of the sample that was utilized, but the proportion of people who are impacted fluctuates anywhere from 5% to 34% .[31-32] It is possible that over seventy percent of the older population will be impacted by this. [33] In China, around 17% of the population is affected by this condition.[34] Keratoconjunctivitis sicca is the medical term for dry corneas and conjunctivae, and it comes from the Latin. [35].

Dry Eye

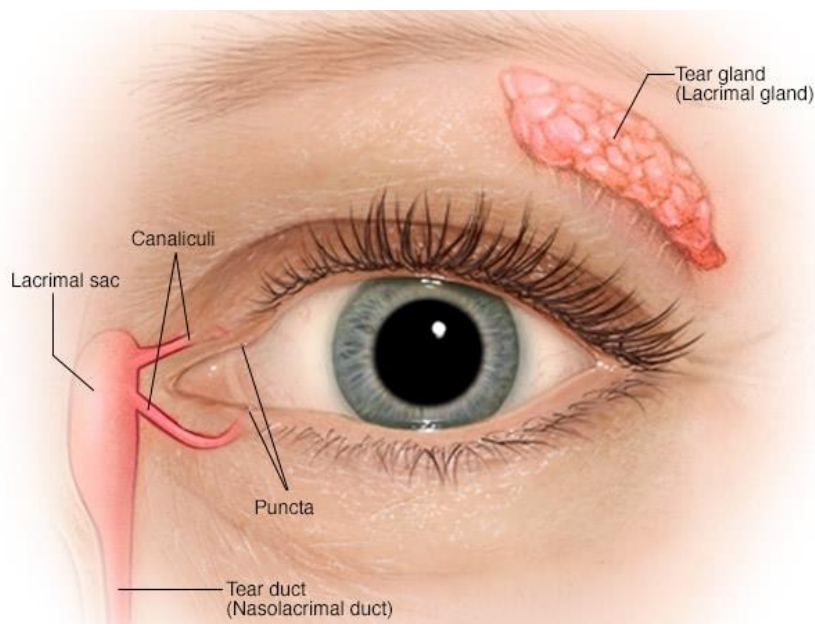


Fig 02: Dry eye

1.4. Pathophysiology

Having dry eyes for an extended period of time may cause the surface of the eyes to develop very fine abrasions. When the condition has progressed to an advanced stage, the epithelium goes through pathologic alterations, namely squamous metaplasia and the loss of goblet cells. [36] Corneal surface thickening, corneal erosion, punctate keratopathy, epithelial defects, corneal ulceration (both sterile and infectious), corneal neovascularization, corneal scarring, corneal thinning, and even corneal perforation might be the outcome of more severe occurrences of this condition. [37] A lack of lacritin monomer might be another aspect that contributes to the condition. The active form of lacritin, known as lacritin monomer, has been shown to decrease specifically in patients with blepharitis, aqueous deficient dry eye, Sjogren syndrome dry eye, and dry eye associated to contact lenses. [38]

1.5. Epidemiology

Keratoconjunctivitis sicca is a condition that is rather frequent in the United States, particularly in people of advanced age. [39] Specifically, people with an age of 40 or above are at a greater risk of developing dry eyes than those with a younger age. [40] Keratoconjunctivitis sicca affects

between 10 and 20 percent of individuals. It affects between one to four million persons in the United States who are 65 years old or older. The majority of people who suffer from dry eyes do not have an autoimmune illness, despite the fact that those who suffer from autoimmune disorders are more likely to have dry eyes. There are nine times as many cases of Sjogren syndrome and the accompanying keratoconjunctivitis sicca in females as there are in males, making the female-to-male ratio 9:1. In addition, women are more likely to have milder versions of the condition known as keratoconjunctivitis sicca. [41] This is due, in part, to the fact that variations in hormone levels, such as those that occur during pregnancy, menstruation, and menopause, may cause a reduction in the amount of tears that are produced. [42] Vitamin A deficiency is a frequent contributor to malnutrition in parts of the globe where this condition is prevalent. In the United States, occurrences like these are unusual. This illness does not show any racial preferences in its incidence or severity.[43]

1.6. Symptoms

The following are examples of signs and symptoms, which will often manifest in both of your eyes:

- A feeling that might be described as stinging, burning, or scratching in the eyes
- A viscous discharge in or around the area of your eyes
- Sensitivity to the effects of light
- Eye redness
- A feeling as if there is something embedded in your eyes.
- Issues with inserting and removing contact lenses
- Difficulty experienced when driving at night
- Eyes that are constantly watering, which is a sign that your body is reacting to the discomfort caused by dry eyes.
- Vision problems or tired eyes might be the result. [44-45]

1.7. Causes

Dry eye symptoms may be caused by an unstable tear film, which can be caused by an irregularity in any one of the three layers that make up tears.

A higher rate of evaporation

Increased evaporation of the tear film is the leading contributor to dry eye syndrome, which is often brought on by a malfunction in the Meibomian glands. Meibomian glands are two sets of oil glands that border the upper and lower eyelids. They are responsible for the production of the lipid layer, which is the oily outermost layer of the tear film. Inflammation brought on by blepharitis and/or rosacea often leads to the clogging of these glands, which prevents an equal distribution of oil and may be quite uncomfortable. As a consequence, an unstable lipid layer is produced, which ultimately results in an accelerated rate of tear film evaporation. In extreme instances of meibomian gland dysfunction (MGD), the meibomian glands might atrophy and completely stop generating oil.

Low humidity

Dry eye syndrome is something that may be brought on by low humidity.[46]

Decreased tear production

Inadequate tear production, also known as lacrimal hyosecretion, has been linked to the development of keratoconjunctivitis sicca. The aqueous tear layer is disrupted, which leads to an inadequate amount of aqueous tear production (ATD). The lacrimal gland does not generate enough tears to ensure that the whole conjunctiva and cornea are always coated with a full layer of moisture at all times. People who are in good health overall are often affected by this condition. There is a correlation between becoming older and shedding less tears. This is the form that is seen in postmenopausal women the most often. In many circumstances, aqueous deficient dry eye may have no obvious cause (idiopathic). Congenital alacrima, xerophthalmia, ablation of the lacrimal gland, and sensory denervation are some of the other reasons of alacrima. In very rare instances, it may be a sign of collagen vascular disorders such as rheumatoid arthritis, granulomatosis with polyangiitis, recurrent polychondritis, and systemic lupus erythematosus. A deficit in aqueous tear production has been linked to Sjogren syndrome as well as other autoimmune illnesses. Isotretinoin, sedatives, diuretics, tricyclic antidepressants, antihypertensives, oral contraceptives, antihistamines, nasal decongestants, beta-blockers, phenothiazines, atropine, and pain relieving opiates like morphine can all cause or worsen this condition. Other drugs that can make it worse include antihistamines, nasal decongestants, oral contraceptives, [47] This disease may also be

caused by infiltration of the lacrimal glands by sarcoidosis or tumors, as well as postradiation fibrosis of the lacrimal glands. [Causes of postradiation fibrosis of the lacrimal glands]. The makeup of a person's tears, whether they have normal or dry eye, has received a lot of attention as of late. One of the proteins, lacritin, that is differently lacking or elevated in dry eye is one of just a tiny proportion of the about 1543 proteins that are found in tears. In preclinical tests with rabbits, topically applied lacritin caused increased tearing. Additionally, the topical therapy of the eyes of dry eye mice (the Aire mutant mouse model of dry eye) restored the animals's ability to weep and reduced the number of inflammatory foci in the lacrimal glands while also reducing corneal staining. [48]

Additional causes

Due to the natural decline in tear production that occurs with advancing age, one of the most prevalent reasons of dry eyes is aging. It has been postulated that many categories of drugs, both those available by prescription and those available over the counter, are substantial contributors to dry eye, particularly in older people. Dry eye is thought to be caused, in particular, by anticholinergic medicines, which also produce dry mouth. Other potential causes of dry eye include chemical or thermal burns, as well as adenoviruses in the event of an outbreak. A lot of research has come to the conclusion that diabetics have a greater chance of developing the condition. Dry eyes are a common complaint among contact lens wearers, accounting for around half of all such complaints. There are two possible causal links between the use of contact lenses and dry eye syndrome. It was often thought in the past that soft contact lenses, which are designed to float on the tear film that coats the cornea, sucked up the tears that naturally occur in the eyes. The relationship between a decline in nerve sensitivity and the production of tears is another topic of investigation in contemporary scientific studies. Because the corneal nerves that drive tear production are destroyed during the process of creating a corneal flap in LASIK and other refractive operations, dry eye may arise after these procedures or get worse after they have been performed. The dry eye that these treatments induce normally goes away within a few months, but it may sometimes be a chronic condition. People who are contemplating having refractive surgery have to take this into consideration. Keratoconjunctivitis sicca may be brought on by an eye injury or another condition that affects the eyes or eyelids, such as protruding eyes or eyelids that are hanging down. Eyelid conditions might make it difficult to blink effectively, which is essential for

the distribution of tears. Keratoconjunctivitis sicca may also be caused by abnormalities in the mucin tear layer, such as those induced by a lack of vitamin A, trachoma, diphtheric keratoconjunctivitis, mucocutaneous diseases, and some topical medicines. Those who suffer from keratoconjunctivitis sicca have levels of tear nerve growth factor in their tears that are significantly high (NGF). It is probable that the NGF on the surface of the eye has a significant role in the inflammation of the ocular surface that is linked with dry eyes. [49]

1.8. Diagnosis

Patients could get the diagnosis of "aqueous-deficient" or "hyperevaporative" if the results of specific tests fall into that category. 2007 was the year that the Dry Eye Workshop published its guidelines for diagnosis. [50] An examination with a slit light may both identify dry eyes and record any harm that may have been done to the eye. The doctor is doing a check of the edge of the eyelid as part of this checkup. The Schirmer's test is one method that may be used to ascertain the amount of moisture that is present in the surroundings of the eye. If you do this exam, you should be able to obtain a very decent picture of how bad the issue is. The Schirmer test is performed for five minutes on a piece of Whatman #41 filter paper that is five millimeters wide and thirty-five millimeters long. The test may be performed with or without anesthesia. In this test, dry eyes are indicated by a wetting depth of less than 5 millimeters, whether or not anesthesia is used. [51] The Schirmer II test, which evaluates reflex secretion, may be used to check for anomalies in the original Schirmer test. After stimulating the nasal mucosa with a cotton-tipped swab, tear production is measured using Whatman #41 filter paper so that accurate results may be obtained. After five minutes, an anomaly is detected in this examination by a wetness that is less than 15 mm. The TBUT test measures the amount of time that passes between the production of tears and their evaporation from the eye. Calculations may be made on the amount of time required for the tear to fall apart after a drop of fluorescein has been put in the tear duct. [52] Protein analysis testing is a method that may be used to ascertain the lysozyme content in tears. Lysozyme is the protein in tears that is responsible for around 20% to 40% of the total protein. [53] A lactoferrin analysis test produces findings that correspond very well with the outcomes of other tests. Ap4A is a recently discovered molecule that is ordinarily present in tears but reaches levels that are abnormally high in many different types of ocular dryness.

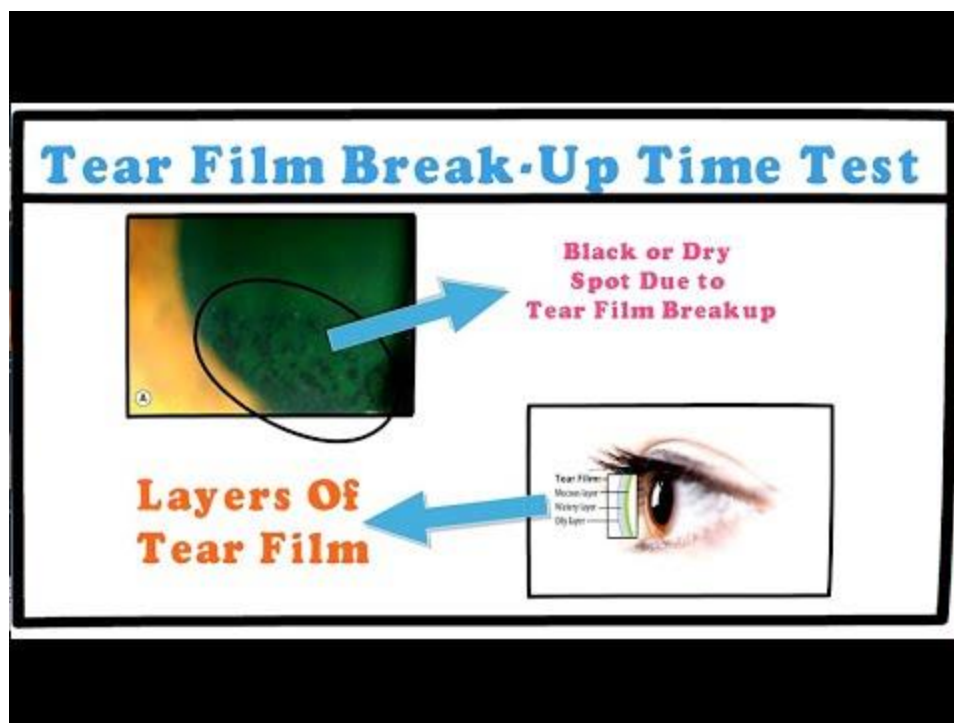


Fig 03: TBUT test

The biochemical quantification of this molecule may be accomplished via the simple collection of a tear sample and subsequent application of a conventional Schirmer test. By testing the levels of Ap4A in a patient's tear samples using this approach, we will be able to determine in an objective manner whether or not the patient suffers from dry eye syndrome.[54] An assessment of the osmolarity of the tear film has been suggested for use as a diagnostic technique for dry eye. It is possible that tear osmolarity is a more sensitive method for diagnosing and assessing the severity of dry eye when compared to corneal and conjunctival staining, tear break-up time, the Schirmer test, and meibomian gland grading. In recent years, a number of people have cast doubt on the usefulness of tear osmolarity in monitoring dry eye treatment. [55]

1.9. Risk factors

The following are some of the factors that increase the likelihood that you may have dry eyes:

- Being older than 50. As people become older, their tear production often slows down. People over the age of 50 are more likely to suffer from dry eyes.

- Being a female. It is more frequent for women than for males to develop a dry eye, particularly if they are going through hormonal transitions such as menopause, pregnancy, or the use of birth control pills.
- Consuming a diet that is deficient in either vitamin A, which can be found in liver, carrots, and broccoli, or omega-3 fatty acids, which can be found in fish, walnuts, and vegetable oils, may lead to an increased risk of developing certain diseases.

Having a history of refractive surgery or using contact lenses is a risk factor.[56]

1.10. Complications

People who have dry eyes are more likely to encounter difficulties such as the following:

- Infections of the eye. The surface of your eyes are guarded against infection by the tears that you produce. If you don't produce enough tears, you put your eyes at a greater risk of getting an infection.
- Eye surface damage has been done to both of you. If the condition is not addressed, severe dry eyes may result in eye inflammation, an abrasion of the surface of the cornea, corneal ulcers, and even loss of eyesight.
- Deterioration in the quality of life. Reading may be a challenge for those who suffer from dry eyes since it makes it more difficult to focus.[57]

1.11. Prevention

If you suffer from dry eyes, you should pay close attention to the circumstances that are most likely to be the source of your condition. Then you should look at techniques to steer clear of such circumstances in order to stop experiencing the symptoms of dry eyes. Take, for example:[58]

- It is important to keep the wind out of your eyes. It is important to avoid getting hair dryers, automobile heaters, air conditioners, or fans pointed in the direction of your eyes.
- Bring some moisture into the atmosphere. A humidifier may give moisture to the dry air indoors during the winter months.

- Think about protecting your eyes by donning a pair of wraparound sunglasses or another kind of eyewear. To protect the wearer's eyes from dust and wind, safety shields may be attached to the tops and sides of eyewear. Inquire about shield options at the store where you get your eyeglasses.
- Take eye breaks throughout extended chores. Take frequent pauses for your eyes while you are reading or engaging in any activity that needs visual attention. Put some time aside to rest with your eyes closed. Alternately, you may blink rapidly for a few seconds to assist in distributing the tears that are on your eyes more evenly.
- Always keep an eye on what's going on around you. When traveling at high altitudes, through desert environments, or even on an aircraft, the air may be quite dry. If you are going to be spending time in an atmosphere like this one, it may be good to periodically shut your eyes for a few minutes at a time. This can help prevent your tears from drying out too quickly.[59]
- Put your computer monitor at a lower level than your eyes. If the display of your computer is higher than your eyes, you will need to tilt your head back more to see it properly. Put the display of your computer below your line of sight so that you won't have to open your eyes quite as far. Because of this, the rate at which your tears evaporate in between blinks may be slowed down.
- Stop smoking and avoid smoke. If you are a smoker, you should seek the assistance of your health care practitioner in developing a plan to stop smoking that has the best chance of being successful for you. Keep your distance from smokers if you don't partake in the habit yourself. Dry eye problems might be made worse by smoking.
- Make frequent use of the fake tears. If you suffer from chronic dry eyes, you should continue to use eye drops to maintain your eyes well-lubricated even when they do not feel dry.[60]

1.12. Treatment

There are many different ways that therapy may be carried out. These may be summed up as the avoidance of elements that make the condition worse, the stimulation and replenishment of tear production, the increase in tear retention, and the treatment of eyelid inflammation and ocular inflammation. [61] Dry eyes may be made worse by smoky conditions, dust, and air conditioning,

as well as by our natural propensity to minimize the amount that we blink while we are focused on something. Simple actions like as blinking on purpose, particularly when using a computer, and giving your eyes a rest when they get fatigued are effective ways to reduce eye strain and pain. It is important to refrain from rubbing your eyes since doing so might make the irritation worse. Illnesses such as blepharitis may often co-exist, and it is possible to treat both of these conditions by paying special attention to washing the eyelids morning and night with gentle soaps and warm compresses. [62]

Environmental control

It is best to stay away from situations that are dry, drafty, and filled with smoke and dust. This includes staying away from equipment such as hair dryers, heaters, air conditioners, and fans, particularly when the blades of these machines are pointed in the direction of the eyes. When harmful environmental elements cannot be avoided, it may be good to shield one's eyes by either using eyeglasses or diverting one's look downward, such as by lowering computer displays. This may help safeguard one's vision. The use of a humidifier, particularly during the colder months, maybe beneficial since it can give moisture to the dry air found within. [63]

Rehydration

Lubrication on top of the patient's normal routine is the single most significant component of therapy for mild to severe instances. When applied every several hours, the use of artificial tears may give some momentary alleviation. It is important to do further study in order to discover if particular formulations of artificial tears are preferable than others in the treatment of dry eye. [64]

Autologous serum eye drops

When compared to artificial tears or saline, autologous serum eye drops were shown to have mixed outcomes in a study conducted by the Cochrane Collaboration in 2017.[35] When compared to artificial tears, the data from the studies that were analyzed revealed that autologous serum eye drops may have a little effect in the near term, but there is no indication of improvement after two weeks have passed. [65]

Additional possibilities

- ✓ Lubricating tear ointments may be used throughout the day, however most people choose to use them before night owing to the fact that they might cause blurry vision after application.
- ✓ They are made up of white petrolatum, mineral oil, and other lubricants of a similar kind.
- ✓ They provide both a lubricating and an emollient effect on the body.
- ✓ The procedure for application involves gently drawing down the lower eyelid and inserting a very small quantity (0.25 in) within the eye.
- ✓ The frequency of application might range from once per hour to once each day before going to bed, depending on the severity of the problem.
- ✓ It is not safe for use with contact lenses under any circumstances. It is possible to generate extra humidity by donning glasses of a specialized design that, when worn, produce a moisture chamber around the eye. [66]

Medication

Mild topical steroids or topical immunosuppressants like ciclosporin are two options for reducing inflammation that has developed as a result of tears film hypertonicity. Both of these options are topical (Restasis). Using prednisolone at a concentration of 0.1% helps bring down the elevated levels of tear NGF. In Japan, the use of diquafosol, which is an agonist of the P2Y2 purinergic receptor, has been authorized for the treatment of dry eye disease.



Fig 04: Diquafosol

Dry Eye

This medication works by encouraging the secretion of fluid and mucin from cells in the conjunctiva, as opposed to directly stimulating the lacrimal glands.[38] In 2016, the United States Food and Drug Administration gave its blessing to the use of lifitegrast as a therapy for the illness. In October 2021, the US Food and Drug Administration granted approval for the use of varenicline, marketed under the brand name Tyrvaya and manufactured by Oyster Point Pharma. [67]

Ciclosporin

An immunosuppressant may be found in the form of topical ciclosporin (topical ciclosporin A, or tCSA) 0.05% ophthalmic emulsion. The medicine brings about a reduction in the inflammation on the surface. In a study with 1200 participants, Restasis enhanced tear production in 15% of persons, whereas the placebo only raised tear production in 5% of people.[68] It should not be used in those who have a history of herpes virus infections, if the user is suffering from an eye infection, or while the user is using contact lenses. The sensation of burning is one of the most frequent adverse reactions, along with redness, discharge, watery eyes, eye discomfort, the feeling of having a foreign body in the eye, itching, stinging, and impaired vision. There is a correlation between using large dosages of ciclosporin over a prolonged period of time and an increased chance of developing cancer. In certain countries, you may purchase more affordable generic substitutes. [69]



Fig 05: Ciclosporin

Trying to save some tears

There are techniques that can make both natural and artificial tears last for a much longer period of time.[70] There are two puncta located in each eye, which are small apertures that allow tears to flow into the tear ducts. There are a few different approaches that may be used to either entirely or partly block the tear ducts. Because of this, the flow of tears into the nose is inhibited, and as a result, the eyes have access to a greater quantity of tear fluid. It is possible to obstruct drainage into either one of the puncta in each eye, or both of them. In order to prevent tears from draining, punctal plugs are put into the puncta. It is not quite apparent if punctal plugs are successful in alleviating the symptoms of dry eye syndrome. [71] Although punctal plugs are considered to be "quite safe," their usage may lead to epiphora, which is characterized by watery eyes, and, in very rare cases, significant inflammation and swelling of the tear sac, which is the location where tears drain. They are not prescribed to anybody without moderate or severe dry eye and only in cases when other medical treatments have proven insufficient. In the event that punctal plugs are ineffective, cauterization of the puncti may be carried out using either heat or electricity. First, a local anesthetic is administered, and then a hot wire is utilized to perform the thermal cauterization procedure. This causes the tissues in the drainage region to shrink and scar, which ultimately results in the closure of the tear duct. [72]

Other

- ✓ Warm compresses that may be heated in the microwave for everyday therapy.
- ✓ There is some early evidence that heating devices that attempt to unclog the oil glands in the eye may be beneficial.
- ✓ Supplements containing omega-3 fatty acids derived from fish oil, flax oil, or hemp oil are ineffective in treating symptoms.[73]

Surgery

In extreme instances of dry eyes, a procedure called tarsorrhaphy, in which the eyelids are partly sewed together, may be recommended. This narrows the palpebral fissure (the space between the eyelids), which should, in theory, result in a lower rate of tear loss. [74]

Chapter Two: Literature review

2. Literature review

2.1. JA SMITH “The epidemiology of dry eye disease” Acta Ophthalmologica Scandinavica Volume 85, Issues 240.

When our tears are unable to adequately lubricate our eyes, we get dry eye disease, a common illness. There are various reasons why tears may be insufficient and unsteady. According to extensive epidemiologic research, the incidence of dry eyes varies with age and is between 5 and 35%. The discrepancy across research is likely due in part to different operational definitions of dry eye. On the occurrence and natural history of dry eye, there is a dearth of information. The high percentage of elderly persons affected and the aging of the global population increase the relevance of dry eye for public health. On ocular and overall health, quality of life, and visual function, dry eye can have a negative effect. Dry eye has both direct and indirect expenses. Age, female sex, certain drugs and illnesses, incisional refractive surgery, dietary consumption of vital fatty acids, and disturbance in sex hormones owing to a number of reasons are major risk factors for dry eye.

2.2. Johnny L Gayton “Etiology, prevalence, and treatment of dry eye disease” Clin Ophthalmol. 2009; 3: 405–412.

The incidence, causation, and current treatments of dry eye disease are examined in this review paper, with postmenopausal women receiving specific attention. To find peer-reviewed papers about dry eye written before September 2008, a thorough literature search using Medline was carried out. The words or phrases prevalence, postmenopausal, etiology, risk factors, therapy, drugs, surgery, tear film, and quality of life were all searched in conjunction with the terms "dry eye" and "women." Prevalence rates were found in epidemiologic studies to range from 7% in the US to 33% in Taiwan and Japan. Advanced age, female sex, smoking, extremely hot or cold weather, low relative humidity, using video display devices, refractive surgery, using contact lenses, and several medicines are risk factors.

**2.3. Samantha Mc, GinnigleBSc, Shehzad A.NarooMSc, PhD “ Evaluation of Dry Eye”
Volume 57, Issue 4, July–August 2012.**

Dry eye is a typical yet challenging ailment. Dysfunction of the lacrimal glands, meibomian glands, ocular surface cells, or neural network can be brought about by both intrinsic and extrinsic sources. The interaction between the tear film and the ocular surface is where these issues would finally manifest. In certain instances, the symptoms of these issues include grittiness, pain, a burning feeling, hyperemia, and secondary epiphora. Correct therapy of dry eye requires an accurate examination of the issue. The analysis of tear creation, tear stability, and surface damage can be used to categorize techniques (including histological tests). It is crucial to consider their use, validity, dependability, compatibility, protocols, and indicators. The application of a diagnostic algorithm may result in a more precise diagnosis and course of treatment. Since symptoms and indications are not always correlated, tear film osmolarity, an objective biomarker, appears to be the greatest current indicator of a proper diagnosis.

**2.4. Santosh Khanal, Alan Tomlinson, Angus McFadyen, Charles Diaper, Kannu Ramesh
“Dry Eye Diagnosis|” Investigative Ophthalmology & Visual Science April 2008, Vol.49,
1407-1414.**

The TTR, tear evaporation, and osmolarity of the dry eye participants were noticeably different from those of the healthy normal subjects. For each element of tear physiology, distribution curves were used to calculate the cutoff values between the groups, and receiver operator characteristic (ROC) curves were used to measure the efficacy of the cutoff. When used individually as diagnostic criteria for dry eye, values of 12%/min for TTR, 33 g/m²/h for evaporation, and 317 mOsmol/L for osmolarity were shown to offer sensitivities, specificities, and overall accuracies of 80%, 72%, and 77%; 51%, 96%, and 67%; and 78, 78%, and 79%, respectively. They produced, respectively, sensitivities, specificities, and overall accuracy of 100%, 66%, and 86% (when used in parallel) and 38%, 100%, and 63% (when used in series). These three variables were included in a discriminant function analysis equation that enabled diagnosis with a sensitivity of 93%, specificity of 88%, and total accuracy of 89%.

2.5. Elisabeth M Messmer, Prof. Dr. med “The Pathophysiology, Diagnosis, and Treatment of Dry Eye Disease” Dtsch Arztebl Int. 2015 Jan; 112(5): 71–82.

The prevalence of dry eye disease (DED), which is prevalent, ranges from 5% to 34% globally. The hyperosmolarity of the tear film and inflammation of the ocular surface and lacrimal gland are some of its probable pathogenetic processes. Clinically, dry eye may be separated into two subtypes: aqueous-deficient DED, which has reduced tear production, and evaporative DED, which has increased tear evaporation (hyper evaporative DED). A comprehensive split-lamp examination, a complete patient history, and any other tests that are necessary should be part of the diagnostic diagnosis for dry eye disease. There haven't been many randomized controlled treatment studies for dry eye reported up to now. If the symptoms are minor, artificial tears of all sorts are advised. While lid hygiene is useful in the treatment of hyper evaporative dry eye, severe hyposecretory dry eye can be treated with collagen or silicon plugs that partially occlude the efferent lacrimal ducts. Corticosteroids or cyclosporine as a long-term topical anti-inflammatory therapy for moderate or severe dry eye disease A high degree of evidence has been provided by clinical trials that have examined eye drops. Omega-3 or omega-6 fatty acids as well as tetracycline compounds taken orally are also employed.

Chapter Three: Goal of This Study

3. Goal of this study

Dry eye disease is a common problem that happens when our tears aren't able to keep our eyes moist enough. There are many things that can make tears not enough or unstable. For example, dry eyes can happen if you don't make enough tears or if the tears you do make aren't very good. This study was done to achieve some of the goals listed below.

- a) To ascertain the reason for dry eyes.
- b) Understanding the dry eye management system.
- c) To determine how long one has dry eyes
- d) To determine the age group most commonly affected by dry eyes
- e) To determine the prevalence of dry eye concerns among people
- f) To see that how many people experience adverse effects from dry eye medicine

4. Methodology

4.1. Introduction:

The questionnaire begins with a review, followed by 19 questions that are completely relevant to the topic at hand. There was a total of 125 patients that participated in this research. This study was carried out at the Ispahani Islamia Eye Institute and Hospital, Dhaka.

4.2. Research Design:

This survey was carried out to learn people's perspectives on dry eyes as well as the ways in which it influences their lives. The survey was conducted at the Ispahani Islamia Eye Institute and Hospital, Dhaka, and it was cross-sectional research that relied only on participants' physical responses. The questions were created using Microsoft Word

4.3. Method of Data Analysis:

After an assortment of information, all information was checked for precision and internal consistency to deny missing or clashing data, and those were discarded. Information investigation was done through Microsoft's dominant refreshed rendition.

4.4. Ethical Considerations

Before beginning the information assortment, educated verbal permission was taken from the investigation members. The obscurity of the respondents was kept private, and study subjects were educated that they could have the option to leave the program at any.

Chapter Five: Result and Discussion

5.1. Age of respondents

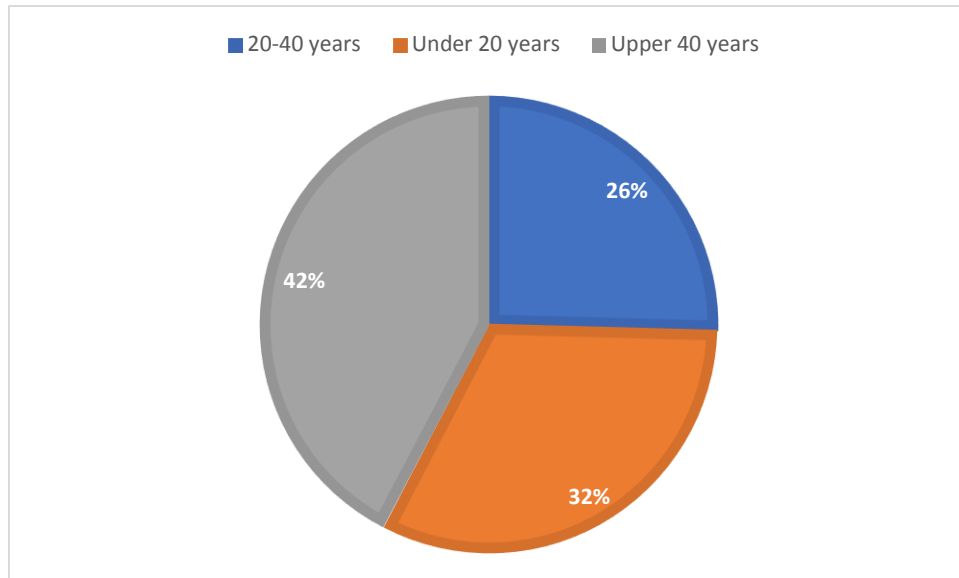


Fig 06: Age of respondents

This study included respondents whose ages range from 20 to 40 years old (26%), respondents whose ages range from 40 to 60 years old (42%), and respondents whose ages are under 20 years old (35%).

5.2. Gender

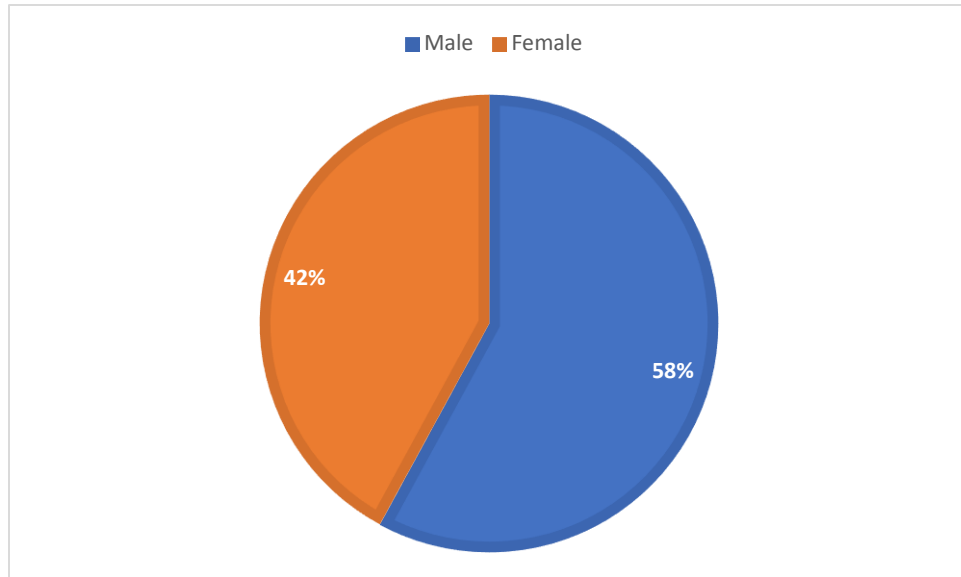


Fig 07: Gender

Approximately 42% of the respondents in this study are female, whereas 58% of the respondents are male.

5.3. Marital Status

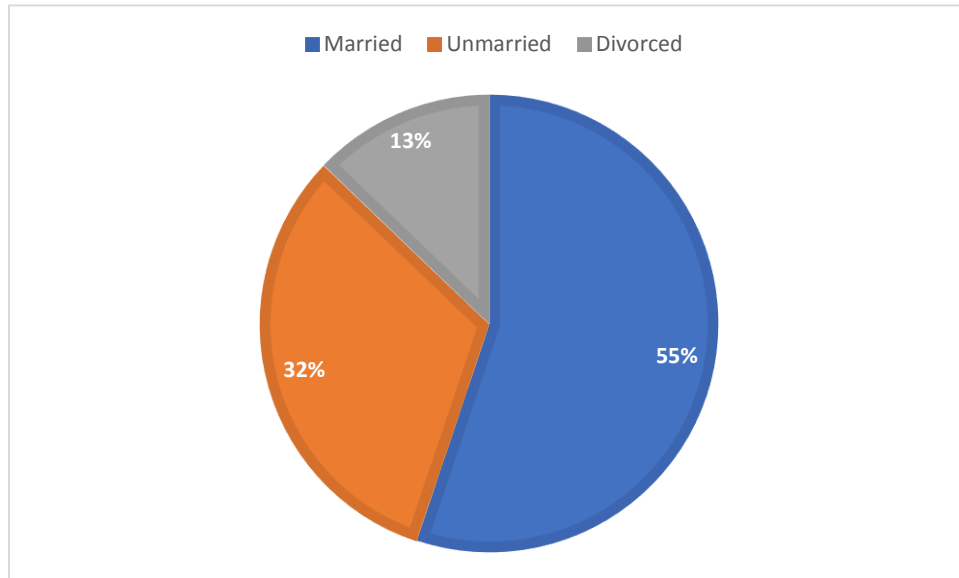


Fig 08: Marital Status

In this study, around 55% of respondents are married, 32% of respondents do not have spouses, and 13% of respondents have previously been married but are no longer together.

5.4. Occupation

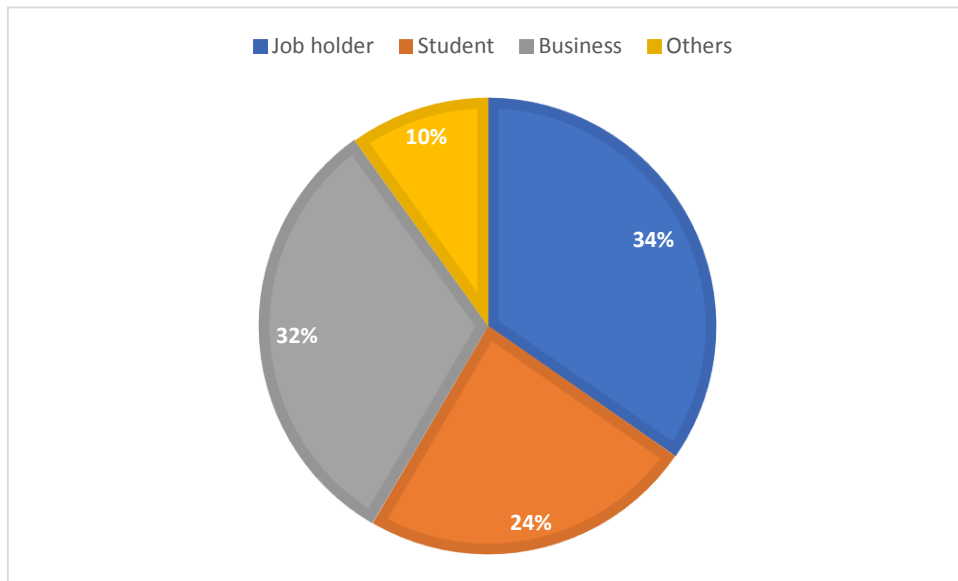


Fig 09: Occupation

In this study, around 34% of respondents are employed, 24% of respondents are students, 32% of respondents are engaged in business, and 10% of respondents are engaged in other activities.

5.5. Education Level respondents

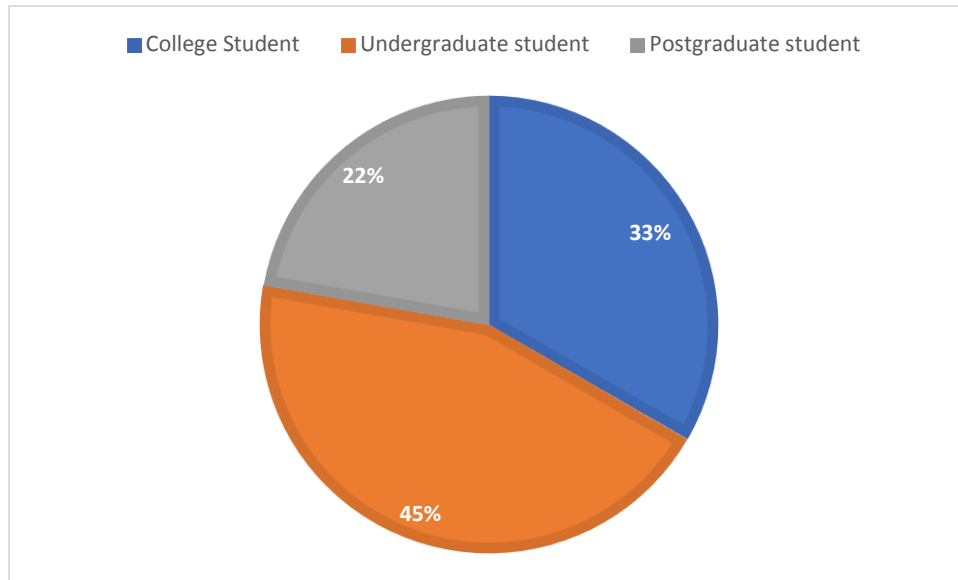


Fig 10: Education Level of respondents

In this survey according to students' response around 45% respondents are undergraduate student, 22% respondents are postgraduate students and 33% respondents are college student.

5.6. Location

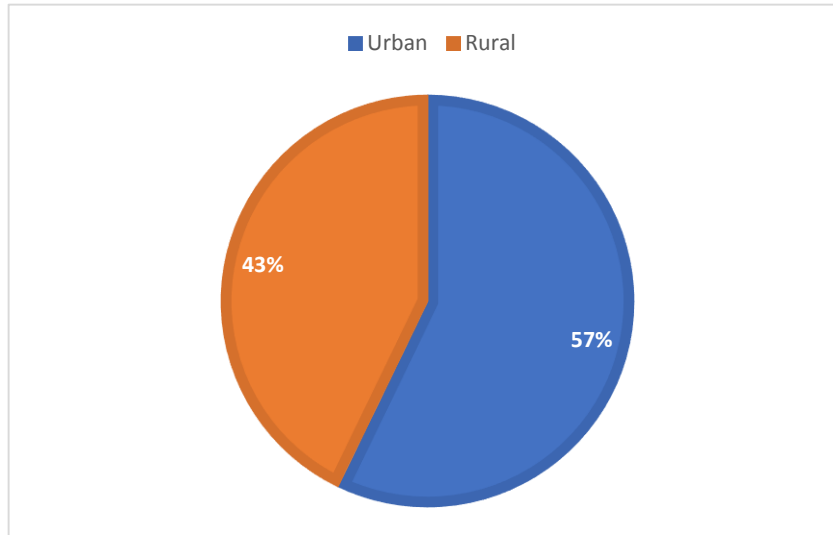


Fig 11: Location

According to the findings of this study, around 57% of respondents resided in urban areas, whilst 43% of respondents lived in rural areas.

5.7. Knowledge about dry eyes

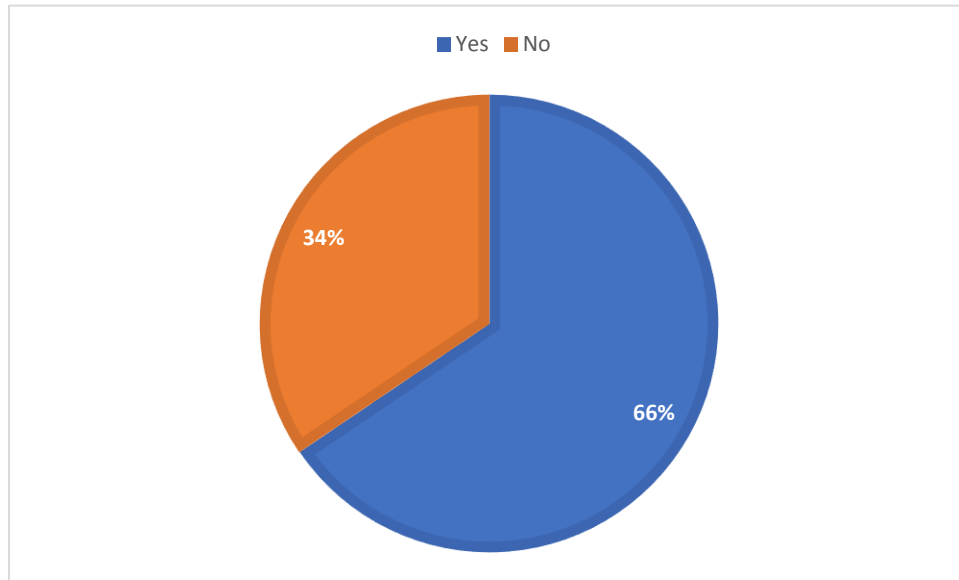


Fig 12: Knowledge about dry eyes

In this survey around 66% respondents have knowledge about dry eyes and 34% have no idea about this.

5.8. Duration suffering from Dry eyes

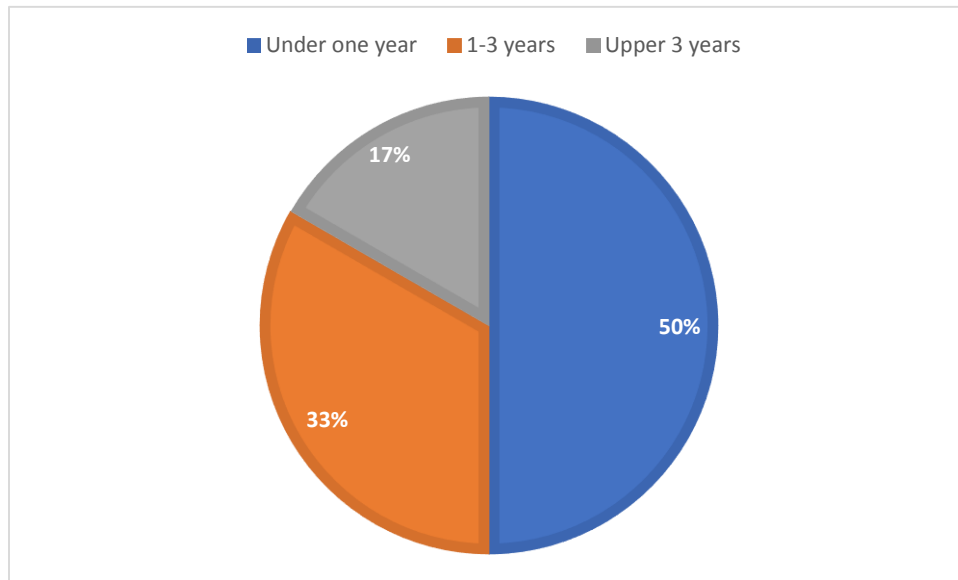


Fig 14: Duration suffering from Dry eyes

In this poll, over 50% of respondents reported having dry eyes for more than three years, 35% for one to three years, and 17% for less than a year.

5. 9. Cause of Dry eye

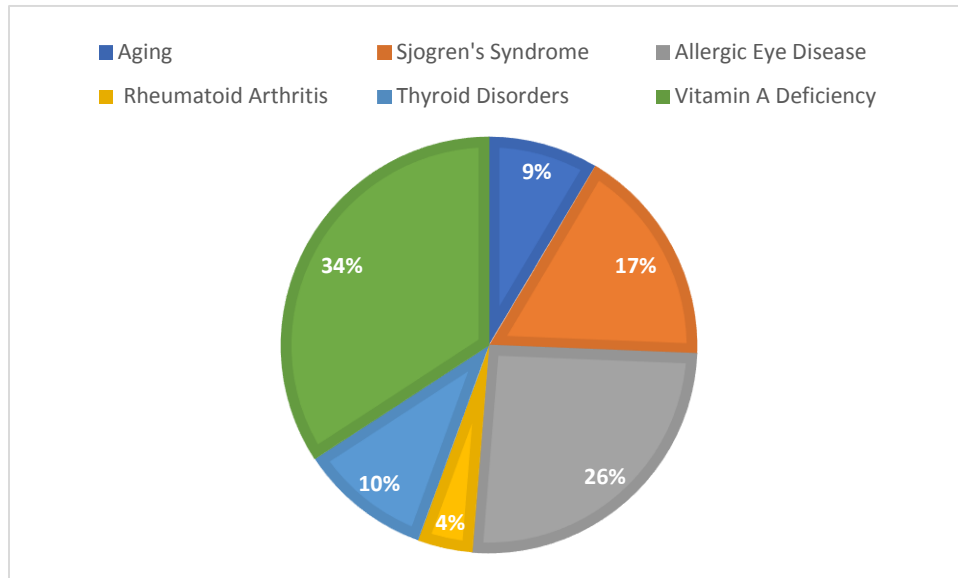


Fig 15: Cause of Dry eye

Around 10% of respondents to this survey believe that thyroid disorders are to blame for dry eyes, while 9% believe that aging is to blame, 34% believe that vitamin A deficiency is to blame, 4% believe that rheumatoid arthritis is to blame, 26% believe that allergic eye disease is to blame, and 17% believe Sjogren's Syndrome is to blame.

5.10 Knowledge of self-diagnosis Dry Eye

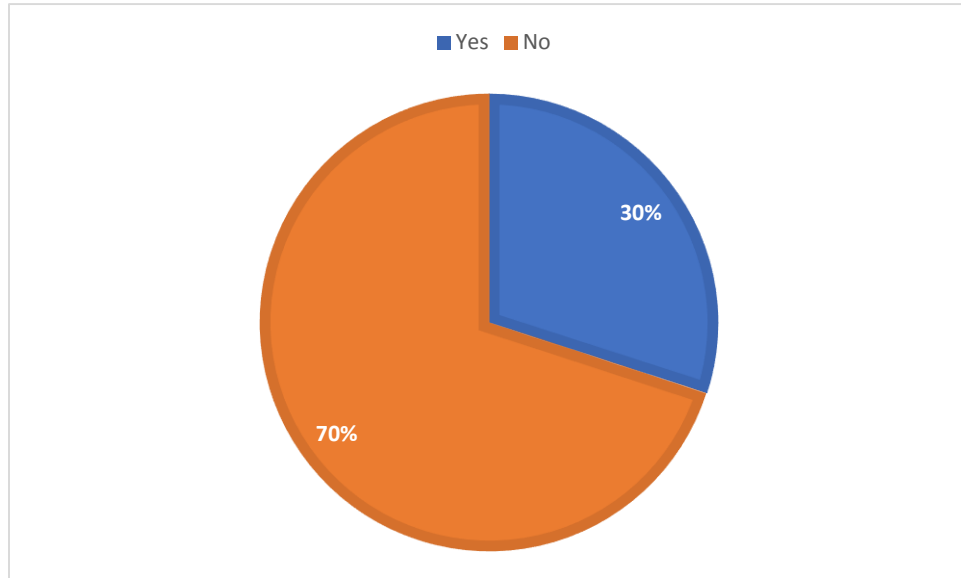


Fig 16: Knowledge of self-diagnosis Dry Eye

In this survey around 70% respondents has knowledge to self-diagnosis of dry eyes and 30% respondents has no idea about this.

5.11. Medication

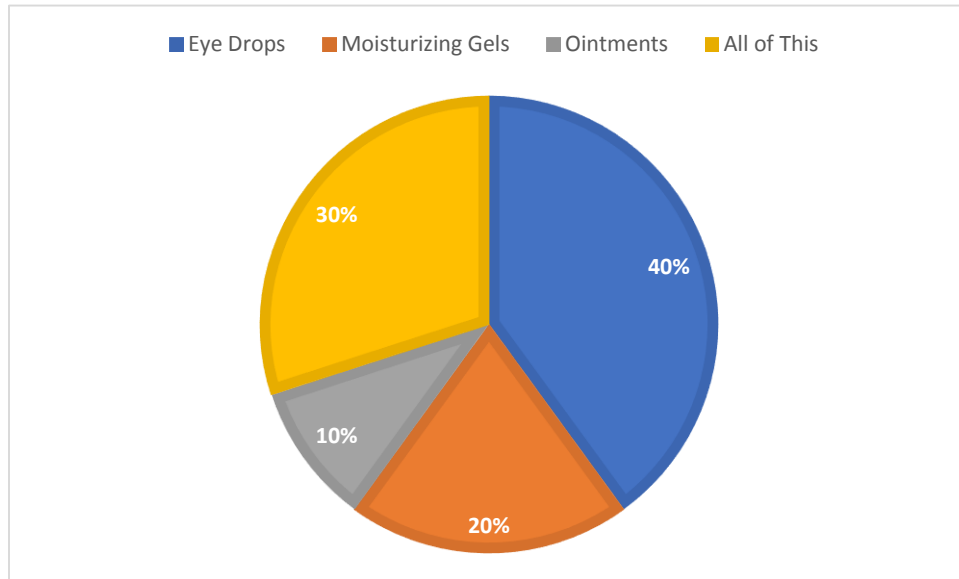


Fig 17: Medication

In this survey, about 40% of participants use eye drops to treat dry eyes, 30% take all available medications, 10% use ointments, and 20% use moisturizing gels.

5.12. Follow up doctor

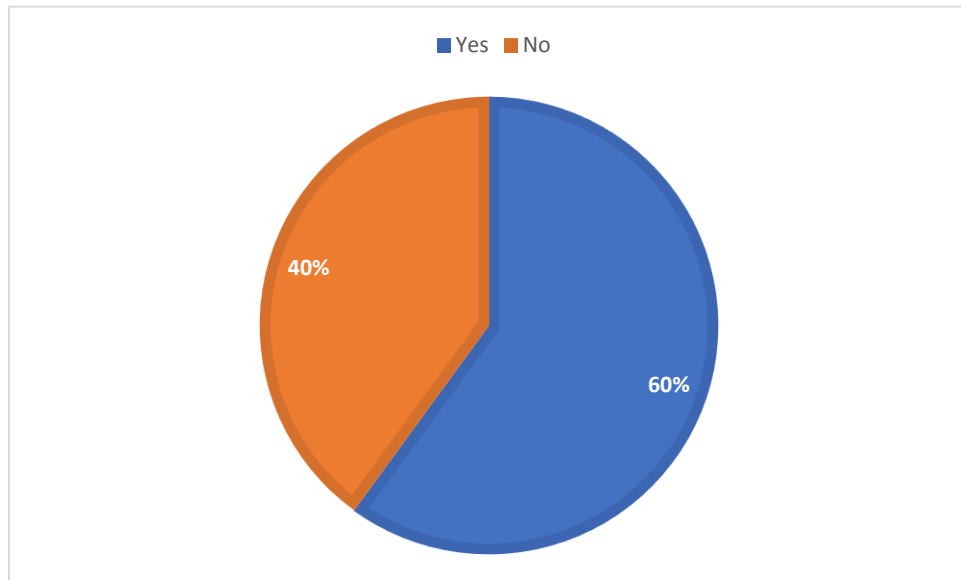


Fig 18: Follow up doctor

In this survey, over 60% of respondents had frequent doctor visits, whereas 40% are unaware of this.

5.13. Drug used in dry eye condition

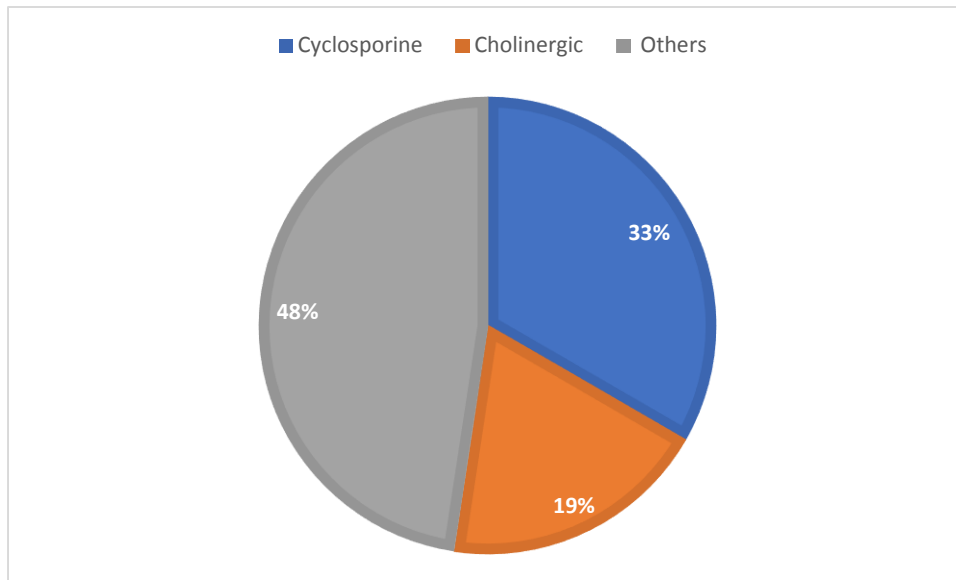


Fig 19: Drug used in dry eye condition

Approximately 33% of respondents in this poll used the cyclosporine medicine, 19% of respondents used the cholinergic drug, and 48% of respondents used other drugs.

5.14. Adverse effects from taking medication

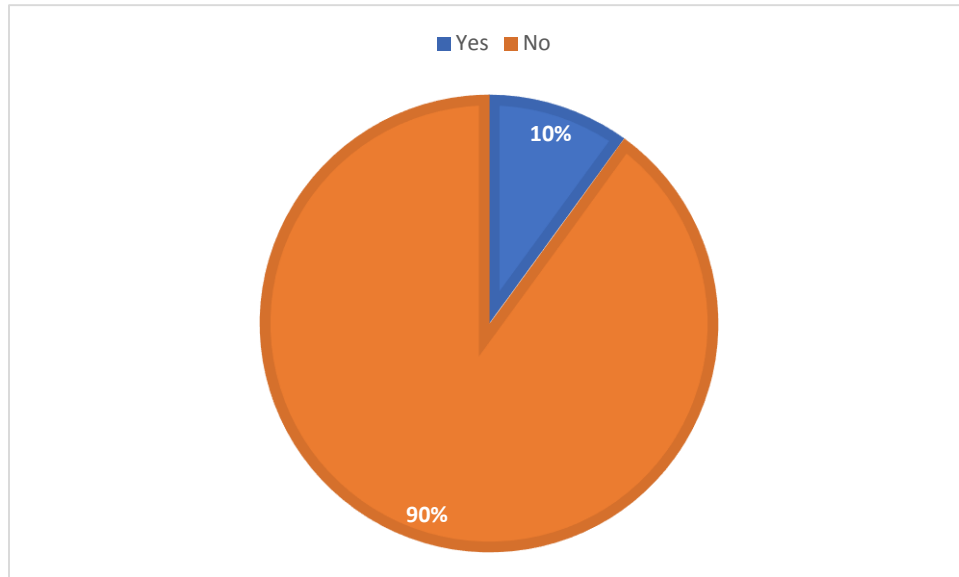


Fig 20: Adverse effects from taking medication

In this survey, around 10% of respondents had had an adverse impact after using medicine for dry eyes like irritation, vision change , whereas 90% of respondents had not experienced any issues after taking the drug.

5.15. Family history of dry eyes

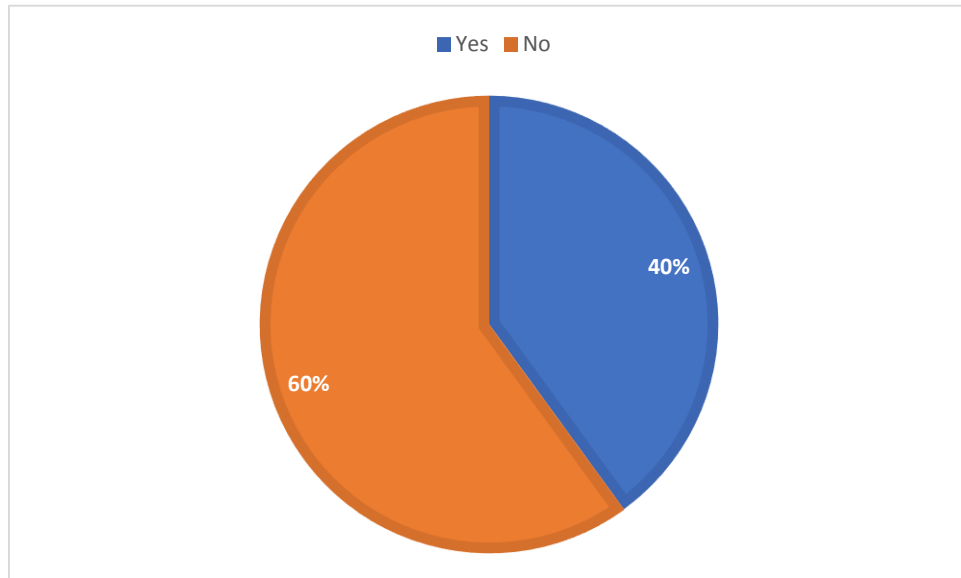


Fig 21: Family history for dry eyes

In this survey, around 60 % do not have a family history of dry eyes, and 40 % do not have a family history of dry eyes.

5.16. Dry eyes effects on life style

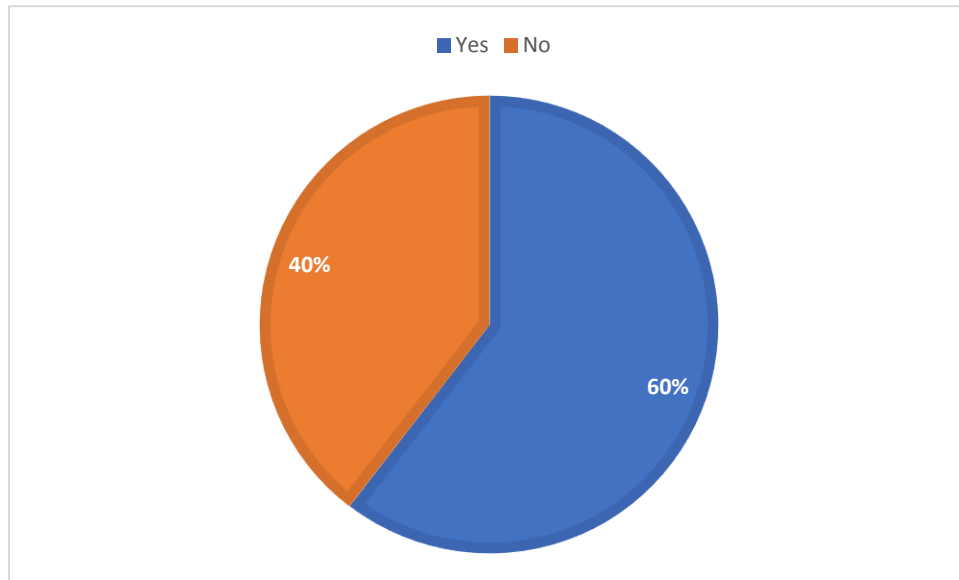


Fig 22: Dry eyes effects on life style

According to the findings of this survey, almost 60% indicated dry eyes have an influence on lifestyle, while 40% said that there is no association between the two.

Chapter Six: Conclusion

6. Conclusion

According to this survey male are suffering from dry eye problem and among students undergraduate students are facing this problem . There are many reasons of this disease like stare at a computer screen for an extended period of time without blinking, eyes may start to feel unpleasant and scratchy , vitamin A deficiency . This is due to a condition known as dry eye syndrome. In this study, a physical survey was carried out to learn more about the existing situation of dry eyes and the treatment options available. This survey will be helpful in the investigation of dry eyes and its related topics.

Chapter Seven: Reference

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8. Sample Questionaries

1. Patient Name

2. Gender

- Male
- Female

3. Marital Status

- Married
- Unmarried
- Divorced

4. Occupation

- Student
- Job Holder
- Business
- Others

5. Education Level

- College Student
- Undergraduate student
- Postgraduate student

6. Your Age

- Under 20 years old
- 20-40 years old
- Upper 40 years old

7. Location

- Rural
- Urban

8. Do you know about Dry Eye?

- Yes
- No

9. Do you ever suffer from Dry Eye?

- Yes
- No

10. How long have you had suffer from Dry Eye?

- Under one year
- 1-3 years
- Upper 3 years

11. What is the cause of Dry eye?

- Aging
- Sjogren's Syndrome
- Allergic Eye Disease
- Rheumatoid Arthritis
- Thyroid Disorders
- Vitamin A Deficiency

12. Do you know how to self-diagnosis Dry Eye?

- Yes

- No

13. Which type of medication do you take?

- Eye Drops
- Moisturizing Gels
- Ointments
- All of This

14. Do you ever follow up doctor for Dry Eye?

- Yes
- No

15. Do you take any medicine for Dry eye?

- Yes
- No

16. Which type of drug do you take for Dry eye?

- Cyclosporine
- Cholinergic
- Others

17. Do you face any adverse effects from taking medication?

- Yes
- No

18. Do you have any family history of Dry eye?

- Yes
- No