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Matric number: 18/mhs02/014

Course Title: Physiologic

Course code: PHS 212

EYE DEFECTS:

**NEAR SIGHTEDNESS**

Near-sightedness, also known as short-sightedness and myopia, is an eye disorder where light focuses in front of, instead of on, the retina.This causes distant objects to be blurry while close objects appear normal.Other symptoms may include headaches and eye strain.Severe near-sightedness is associated with an increased risk of retinal detachment, cataracts, and glaucoma.

The underlying cause is believed to be a combination of genetic and environmental factors. Risk factors include doing work that involves focusing on close objects, greater time spent indoors, and a family history of the condition. It is also associated with a high socioeconomic class. The underlying mechanism involves the length of the eyeball growing too long or less commonly the lens being too strong.It is a type of refractive error.Diagnosis is by eye examination.

Tentative evidence indicates that the risk of near-sightedness can be decreased by having young children spend more time outside.This may be related to natural light exposure.Near-sightedness can be corrected with eyeglasses, contact lenses, or surgery. Eyeglasses are the easiest and safest method of correction.Contact lenses can provide a wider field of vision, but are associated with a risk of infection. Refractive surgery permanently changes the shape of the cornea.

Near-sightedness is the most common eye problem and is estimated to affect 1.5 billion people (22% of the population).Rates vary significantly in different areas of the world.Rates among adults are between 15% to 49%. Rates are similar in females and males. Among children, it affects 1% of rural Nepalese, 4% of South Africans, 12% of Americans, and 37% in some large Chinese cities.Rates have increased since the 1950s.Uncorrected near-sightedness is one of the most common causes of vision impairment globally along with cataracts, macular degeneration, and vitamin A deficiency.

**SIGNS AND SYMPTOMS**

A myopic individual can see clearly out to a certain distance (called far point), but everything further becomes blurry. If the extent of the myopia is great enough, even standard reading distances can be affected. Upon routine examination of the eyes, the vast majority of myopic eyes appear structurally identical to nonmyopic eyes.

Onset is often in school children, with worsening between the ages of 8 and 15.

**CAUSES**

-Genetics:

A risk for myopia may be inherited from one's parents. Genetic linkage studies have identified 18 possible loci on 15 different chromosomes that are associated with myopia, but none of these loci is part of the candidate genes that cause myopia. Instead of a simple one-gene locus controlling the onset of myopia, a complex interaction of many mutated proteins acting in concert may be the cause. Instead of myopia being caused by a defect in a structural protein, defects in the control of these structural proteins might be the actual cause of myopia.] A collaboration of all myopia studies worldwide identified 16 new loci for refractive error in individuals of European ancestry, of which 8 were shared with Asians. The new loci include candidate genes with functions in neurotransmission, ion transport, retinoic acid metabolism, extracellular matrix remodeling and eye development. The carriers of the high-risk genes have a tenfold increased risk of myopia.

Human population studies suggest that contribution of genetic factors accounts for 60–90% of variance in refraction.However, the currently identified variants account for only a small fraction of myopia cases, suggesting the existence of a large number of yet unidentified low-frequency or small-effect variants, which underlie the majority of myopia cases.

-Environmental Factor:

Environmental factors which increase the risk of nearsightedness include insufficient light exposure, low physical activity, near work, and increased year of education.

One hypothesis is that a lack of normal visual stimuli causes improper development of the eyeball. Under this hypothesis, "normal" refers to the environmental stimuli that the eyeball evolved to. Modern humans who spend most of their time indoors, in dimly or fluorescently lit buildings which may contribute to the development of myopia.

People, and children especially, who spend more time doing physical exercise and outdoor play have lower rates of myopia, suggesting the increased magnitude and complexity of the visual stimuli encountered during these types of activities decrease myopic progression. There is preliminary evidence that the protective effect of outdoor activities on the development of myopia is due, at least in part, to the effect of long hours of exposure to daylight on the production and the release of retinal dopamine.

The near work hypothesis, also referred to as the "use-abuse theory" states that spending time involved in near work strains the intraocular and extraocular muscles. Some studies support the hypothesis, while other studies do not.While an association is present, it is not clearly causal.

Nearsightedness is also more common in children with diabetes, Childhood arthritis, uveitis, and systemic lupus erythematosus.

-**Prevention/Treatment:**

Some suggest that more time spent outdoors during childhood is effective for prevention.

Various methods have been employed in an attempt to decrease the progression of myopia, although studies show mixed results.Many myopia treatment studies have a number of design drawbacks: small numbers, lack of adequate control group, and failure to mask examiners from knowledge of treatments used. Among myopia specialists, mydriatic eyedrops are the most favored approach, applied by almost 75% in North America and more than 80% in Australia. Behavioral intervention (counseling to spend more time outdoors and less time with near-work) is favored by 25% of specialists, usually in addition to the medications.

Glasses and contacts

The use of reading glasses when doing close work may improve vision by reducing or eliminating the need to accommodate. Altering the use of eyeglasses between full-time, part-time, and not at all does not appear to alter myopia progression.The American Optometric Association's Clinical Practice Guidelines found evidence of effectiveness of bifocal lenses and recommends it as the method for "myopia control". In some studies, bifocal and progressive lenses have not shown differences in altering the progression of myopia.

In 2019 contact lenses to prevent the worsening of nearsightedness in children were approved for use in the United States.

Medication

Anti-muscarinic topical medications in children under 18 years of age may slow the worsening of myopia.] These treatments include pirenzepine gel, cyclopentolate eye drops, and atropine eye drops. While these treatments were shown to be effective in slowing the progression of myopia, side effects included light sensitivity and near blur.

Other methods:

Scleral reinforcement surgery is aimed to cover the thinning posterior pole with a supportive material to withstand intraocular pressure and prevent further progression of the posterior staphyloma. The strain is reduced, although damage from the pathological process cannot be reversed. By stopping the progression of the disease, vision may be maintained or improved.

Shortsightedness is corrected using a concave (curved inwards) lens which is placed in front of a myopic eye, moving the image back to the retina and making it clearer.

**FAR SIGHTEDNESS**

Far-sightedness, also known as hypermetropia, is a condition of the eye in which light is focused behind, instead of on, the retina.This results in close objects appearing blurry, while far objects may appear normal. As the condition worsens, objects at all distances may be blurry.Other symptoms may include headaches and eye strain. People may also experience accommodative dysfunction, binocular dysfunction, amblyopia, and strabismus.

The cause is an imperfection of the eyes.Often it occurs when the eyeball is too short, or the lens or cornea is misshapen.Risk factors include a family history of the condition, diabetes, certain medications, and tumors around the eye. It is a type of refractive error.Diagnosis is based on an eye exam.

Management can occur with eyeglasses, contact lenses, or surgery. Glasses are easiest while contact lenses can provide a wider field of vision.Surgery works by changing the shape of the cornea. Far-sightedness primarily affects young children, with rates of 8% at 6 years and 1% at 15 years.It then becomes more common again after the age of 40, affecting about half of people.

**Signs and symptoms**

The signs and symptoms of far-sightedness are blurry vision, headaches, and eye strain.The common symptom is eye strain. Difficulty seeing with both eyes (binocular vision) may occur, as well as difficulty with depth perception.

Complications

Far-sightedness can have rare complications such as strabismus and amblyopia. At a young age, severe far-sightedness can cause the child to have double vision as a result of "over-focusing".

**Causes**:

As hyperopia results from the visual image being focused behind the retina, it has two main causes:[

Low converging power of eye lens because of weak action of ciliary muscles

Abnormal shape of the cornea

Far-sightedness is often present from birth, but children have a very flexible eye lens, which helps to compensate.In rare instances hyperopia can be due to diabetes, and problems with the blood vessels in the retina.

**Treatments**:

Corrective lenses

The simplest form of treatment for far-sightedness is the use of corrective lenses, eyeglasses or contact lenses. Eyeglasses used to correct far-sightedness have convex lenses.

Surgery

There are also surgical treatments for far-sightedness:

Photorefractive keratectomy (PRK)

Removal of a minimal amount of the corneal surface

Laser assisted in situ keratomileusis (LASIK)

Laser eye surgery to reshape the cornea, so that glasses or contact lenses are no longer needed.

Refractive lens exchange (RLE)

A variation of cataract surgery where the natural crystalline lens is replaced with an artificial intraocular lens; the difference is the existence of abnormal ocular anatomy which causes a high refractive error.

Laser epithelial keratomileusis (LASEK)

Resembles PRK, but uses alcohol to loosen the corneal surface.