

LITERARY RESEARCH ABOUT ANATOMY OF DRISHTI MANDAL – A REVIEW ARTICLE

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ABSTRACT

Netra (Eye) is an important sense organ of our body without which one cannot see the universe. In *Sushrut Uttartantra* we found information of structure, diseases of eyes and their treatment. *Mandal*, *Patal*, and *Sandhi* are the parts of Eye as per *Sushrut Samhita*. There are various sub-parts of every above said parts. e.g. *Pakshma Mandal*, *Vartma Mandal*, *Shweta Mandal*, *Krishna Mandal* and *Drishti Mandal* are 5 parts of *Mandal*. We don't get clear idea of *Drishti Mandal* as compare to modern anatomy. Hence, we have collected the references regarding *Drishti Mandal* from *Sushrut Samhita* and modern ophthalmic anatomy. The study proved that the *Drishti Mandal* resembles with pupil.

Keywords: *Mandal*, *Drishti*, Anatomy of eye, Pupil, Iris

INTRODUCTION

Eyes are the sense organ of sight which is one of the five special senses and it is very important one than the other senses because human being is more dependable on for perception of information. In *Sushrut Samhita* anatomical description of eye is given in *Uttartantra*. Antero posterior diameter of eyeball is 2.5 *anguli*¹ and its 1/3rd is *Krushna Mandal*. *Krushna Mandal*'s 1/7th is *Drishti Mandal*². *Drishti Mandal* is 1/9th of *Krushna Mandal*³. According this it seems that eyeball is divided into two parts, first in front is 1/6th is transparent, known as *Krushna Mandal* having diameter 11.6mm and second *Drishti Mandal* having diameter approximate 2.5 to 6mm. As in modern science they consider cornea as 1/6th of eyeball. Hence to avoid the confusion regarding exact structure of

Drishti Mandal we must have needed comparative study with modern anatomy. *Drishti Mandal* is one of the parts of eye, which is to be studied as per anatomical aspect.

According to classical text *Drishti Mandal* is described, which needs to co-relate by modern anatomy.

Aim- To study anatomical aspect of *Drishti Mandal* in detail.

Objectives-

1. Study of *Drishti Mandal* according to classical text.
2. Study of *Drishti Mandal* according modern anatomical aspect.
3. Correlate above two aspects and confirm anatomy of *Drishti Mandal*.

1. *Drishti Mandal* according to Classical text –

Eye is divided into three parts according to clinical and applied anatomy- 1. *Mandal*, 2. *Sandhi* 3. *Patal*. These are 5, 6 and 6 in sub types^{4&5}.

- The word ‘*Mandal*’ sounds like ‘circles’⁶. There are 5 *Mandal*’s in the eye.
- They are *Pakshma Mandal*, *Vartma Mandal*, *Shweta Mandal*, *Krishna Mandal* and *Drishti Mandal* from external to internal. *Pakshma Mandal* is the outermost *Mandal* and the *Drishti Mandal* is the innermost *Mandal*⁷.

Drishti Mandal–

Alochakpitta is located at *Drishti* which is essential for proper vision. And *Drishti* is considered as 7th part of *Krishna Mandal*. Size of *Drishti* resembles to “*Masur Dala*” (red pea), made up with the finest parts of *Panchamahabhuta*. It gleams like a glow worm or a spark and appears like a hole from outside. It has a natural tolerance for cold and is covered by *Patalas*⁸. The coverings of *Drishti* are transparent so the light rays can travel in eyeball and vision can possible through it. The specialty of *Drishti* is that, in focused light it gets constricted and in dark it gets dialated⁹. *Drishti* can be simply considered as the functional inlet of eye.

2. Pupil according to modern anatomical aspect-

As per modern anatomy pupil cannot be considered as separate structure but it is associated with iris as a hole by which light rays passing into eyes. Iris is the anterior part of the uveal tract. It forms a circular curtain with an opening in the center, called the pupil. By adjusting the size of the pupil, it controls the amount of light entering the eye, and thus behaves like an adjustable diaphragm and the peripheral rays are cut off so that the sharp retinal image is formed. The color of the iris is determined by the number of pigment cells in its connective tissue. It is a brown, black or bluish diaphragm 12mm in diameter hanging in between cornea and the lens thereby forming the anterior and the posterior chambers. Anteriorly it is separated from cornea by aqueous humour¹⁰.

The pupil is a hole located in the center of the iris of the eye that allows light to strike the retina. It appears black because light rays entering the pupil are either

absorbed by the tissues inside the eye directly, or absorbed after diffuse reflections within the eye that mostly miss exiting the narrow pupil. In optical terms, the anatomical pupil is the eye's aperture and the iris is the aperture stop. The image of the pupil as seen from outside the eye is the entrance pupil, which does not exactly correspond to the location and size of the physical pupil because it is magnified by the cornea. On the inner edge lies a prominent structure, the collarette, marking the junction of the embryonic pupillary membrane covering the embryonic pupil. The iris is a contractile structure, consisting mainly of smooth muscle, surrounding the pupil. Light enters the eye through the pupil, and the iris regulates the amount of light by controlling the size of the pupil.

The iris contains two groups of smooth muscles; a circular group called the sphincter pupillae, and a radial group called the dilator pupillae. When the sphincter pupillae contract, the iris decreases or constricts the size of the pupil. The dilator pupillae, innervated by sympathetic nerves from the superior cervical ganglion, cause the pupil to dilate when they contract. These muscles are sometimes referred to as intrinsic eye muscles.

The sensory pathway (rod or cone, bipolar, ganglion) is linked with its counterpart in the other eye by a partial crossover of each eye's fibers. This causes the effect in one eye to carry over to the other.

Effect of light

The pupil gets wider in the dark and narrower in light. When narrow, the diameter is 2 to 4 millimeters. In the dark it will be the same at first, but will approach the maximum distance for a wide pupil 3 to 8 mm. In any human age group, there is however considerable variation in maximal pupil size. For example, at the peak age of 15, the dark-adapted pupil can vary from 4 mm to 9 mm with different individuals. After 25 years of age the average pupil size decreases, though not at a steady rate. At this stage the pupils do not remain completely still, therefore may lead to oscillation, which may intensify and become known as hippus. The constriction of the pupil and near vision are closely tied. In bright light, the pupils constrict to prevent aberrations of light rays and thus at-

tain their expected acuity; in the dark this is not necessary, so it is chiefly concerned with admitting sufficient light into the eye.

When bright light is shone on the eye, light sensitive cells in the retina, including rod and cone photoreceptors and melanopsin ganglion cells, will send signals to the oculomotor nerve, specifically the parasympathetic part coming from the Edinger-Westphal nucleus, which terminates on the circular iris sphincter muscle. When this muscle contracts, it reduces the size of the pupil. This is the pupillary light reflex, which is an important test of brainstem function. Furthermore, the pupil will dilate if a person sees an object of interest¹¹.

3.Co-relation or confirm anatomy of *Drishti Mandal*-

As, we found description about *Drishti Mandal* is 'Masur Dala' (Red pea) in size, as per modern anatomy also the size of pupil resembles with it. It sparks like fireballs/sparkles, *vivarakruti* (hole) in structure through which light rays enters in the eye, in modern anatomy, same in iris pupil forms a circular curtain with an opening in the center, through which light entering the eye. As we see, *Mandal* sounds like circle, pupil also circular. As, *Drishti* is covered by coverings of *Patal*, pupil is also covered by transparent cornea. Externally *Drishti* looks like *vivarakruti* in structure, in modern anatomy pupil of iris also looks same.

As per modern anatomy pupil cannot be considered as separate structure but it is associated with iris as a hole. As, the function of *Drishti*, pupil also adjust its size while light entering in the eyeball. All this description about *Drishti Mandal* correlates with pupil of iris. So as per ancient *acharyas* all description of *Drishti* can correlate with pupil of iris.

DISCUSSION

As, *Drishti* is 'Masur Dala' (Red pea) in size which resembles with size of pupil that is 2-4mm in diameter. *Drishti Mandal* is covered by transparent *Patala* similarly pupil also covered by cornea anteriorly so that light rays can enter eye. The appearance of *Drishti Mandal* is *vivarakruti* is similar with that of pupil appears with iris as a hole. Both *Drishti Mandal* and

pupil have same function to adjust its size while light entering in the eyeball. As per above discussion and all the references regarding *Drishti Mandal* from *Sushrut Samhita* and modern ophthalmic anatomy it can be considered that function and size of *Drishti* resembles with that of pupil of the eye. So, we can correlate the *Drishti Mandal* with the iris of eye.

CONCLUSION

So, from above literary research and with references from *Sushrut Samhita* regarding *Drishti Mandal* and modern anatomy of eye it is confirmed that all description of *Drishti Mandal* can correlate with pupil of iris. Also, we can consider *Drishti* as Vision.

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