

INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA**INTRAOCULAR PRESSURE LOWERING
ACTIVITY OF *JASMINUM
AURICULATUM* IN EXPERIMENTAL
ANIMALS INDUCED GLAUCOMA**

P. Hasanthi Lakshmi¹, H.G. Raghavendra²,
Department of Pharmacology, CES College of
pharmacy, Kurnool.

ABSTRACT:

Glaucoma termed as a cluster of heterogenous disorders that cause blindness due to damage of cells in retinal ganglionic region and harm to the nerves present in optic region. It leads to loss of vision and visual impairment widely throughout world. There are several medications currently available for glaucoma treatment but have certain drawbacks. From the phytochemical screening ethanolic extract of *JASMINUM AURICULATUM* contains glycosides, alkaloids, tannins, steroids, educing sugars, saponins and terpenoids. The brief outcomes of the current study in JAEE administered rabbits pretreated with water and steroids shown decrease in IOP and show decrease in glutamate and increase in catalase and SOD antioxidant parameters compared to disease and normal control groups.

KEYWORDS:

Glaucoma, JAEE (*JASMINUM AURICULATUM* Ethanolic Extract), SOD, Glutamate.

INTRODUCTION:

Glaucoma termed as a cluster of heterogenous disorders that cause blindness due to damage of cells in retinal ganglionic region and harm to the nerves present in optic region. It leads to loss of vision and visual impairment widely throughout world. ^[1] The raised pressure, known as intraocular pressure, may cause harm to the nerves present in optic region, which are responsible for transmitting images to eye. If damage persist, glaucoma might cause loss of eye sight. With no medical therapy, glaucoma ought to blindness within few years. Most people suffering with glaucoma have no previous symptoms or pain. Severe eye pain, redness, and blurred vision, is a symptom of an angle-closure attack. This is acute severity were iris swells and cause obstruction of trabecular meshwork. If subjected to narrow angle glaucoma, mostly causes minor attack in the dark, because pupil opens in dim light, making smaller angle. In mild attack, haloes around objects may be seen and lite blurred sight, but there is no pain.

Currently available drugs for glaucoma are Pilocarpine, Physostigmine, Echothiopate, Epinephrine, Apraclonidine, Dipivefrin, Timolol, Metoprolol, Acetazolamide, Methazolamide, Latanoprost. Timolol- is Firstline drug and prescribed antiglaucoma

INTRAOCCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

agents, in OAG forms and hypertension in ocular region.

Beneath 51% in developed countries are believed that they have sight-threatening glaucoma. Glaucoma is major foremost symptom of blindness irreversibly in US. The No. of people at risk in developing glaucoma in US are increasing as the population of elders grows disproportionately. The prevalence of glaucoma in India is calculable to be 2.6% and the prevalence in Africa has been calculable to be as high as 5.3% in South Africa and 4.2% in Tanzania. In contrast, the Rotterdam Study studying OAG in Netherlands estimated a prevalence of 1.1%. The OAG prevalence in US is 1.86%, affecting over 2.22 million population overages of 40's. One amongst the most reliable hazardous for glaucoma is age. Over 90% of all patients with glaucoma suffering are 55 years old. [2-6]

India is one amongst the world's 12th biodiversity zones with the availability of over 45 thousand diverse plant species, though 50% plants are utilized for their medical values. Ayurveda, Siddha, Unani, and Folk medicines are the indigenous medicinal systems in India. Moreover 8,000 herbal medicines have been present in Ayurveda. The Rigveda documented 67 plants with medicinal value, Yajurveda 81 specimens, Atharvaveda 290 specimens, Charak

Samhita and Sushruta Samhita had discussed potentials and uses of 1100 and 1270 specimens predominantly utilized in classical formulations.[7]

PLANT PROFILE:

Jasminum Auriculatum belongs to *Oleaceae* family is one amongst the famous plant drug in ayurveda, unani, tibbi, siddha, allopathic, naturopathic, and home remedies. This is generally recognized as Juhi which is a flower with awesome fragrance. This species is rare but it requires a special attention.

Jasminum Auriculatum is a traditional folk medicinal plant of India used in ophthalmic diseases (Orient Longman, Indian medicinal plants) but there are no scientific proofs of *Jasminum Auriculatum* flowers having reducing effect of pressure in intraocular region in glaucoma induced experimental model. Thus, this *Jasminum Auriculatum* flowers have been selected to lower the pressure in intraocular region in experimentally induced glaucoma.



Fig-1: *Jasminum Auriculatum*

INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

Chemical constituents:

Earlier reports showed *Jasminum Auriculatum* Vahl., contains nutrients like alcohol, benzoylacetate, d-mannitol, hentriacontane, hydrocarbons, inositol, jasmone, linalool, linoleic acid, lupeol, methyl anthranilate, palmitic acid, sorbitol, stearic acid, triacontanol, wax.[8]

MATERIALS AND METHODS:

Plant material collection:

Jasminum Auriculatum Vahl flowers procured from the native areas in Kurnool neighborhood, Andhra Pradesh. Plant has been detected and authenticated (Voucher no: GDNH501) by the botanist Dr. K. Omkar, M.Sc. Ph.D., Botany Department, PSC & KVSC Govt. College, Nandyal-518502, Kurnool district, Andhra Pradesh. Then the flowers collected were cleansed by soaking in water, were shade dried, then dried flowers were grinded to get coarse powder of flowers and powder was sieved by sieve no.22 and preserved in a cleaned container.

Drugs and chemicals:

Prednisolone acetate ophthalmic suspension USP (Allergan Laboratories) was accustomed to induce ocular hypertension. Proparacaine hydrochloride ophthalmic solution USP 0.5% (Appasamy ocular devices pvt., LTD) was used as local anesthetic in the eyes throughout IOP measurements. Timolol maleate

eye drops 0.5 % (Sun Pharma laboratories ltd) was preferred as anti-glaucoma drug for reference.

Study design:

The grouping of animals and treatment protocol is similar for both water loading and steroid loading models, in this each group includes of 5 rabbits of either gender were used:

Table: 1 Treatment schedule scheme

S. No	GROUPS	TREATMENT	PURPOSE
1.	Group-I	Normal Control	Serves as normal group
2.	Group-II	Prednisolone acetate	Serves as disease control
3.	Group-III	Timolol 0.25%	Serves as standard
4.	Group-IV	Ethanollic extract 200mg/kg	Serves as ethanollic extract low dose
5.	Group-V	Ethanollic extract 400mg/kg	Serves as ethanollic extract high dose
6.	Group-VI	Aqueous extract 200mg/kg	Serves as aqueous extract low dose
7.	Group-VII	Aqueous extract 400mg/kg	Serves as a aqueous extract high dose

Histopathological Examination:

The animals have been killed by overdose of xylazine 4.3mg/kg and ketamine 25mg/kg i.v. eye ball was excised and placed in 10% formalin solution and given for histopathological examination.

Statistical Analysis:

Overall values have been mentioned as mean $\pm$ S.E.M and were applied utilizing Graph pad prism 5.03 for windows. One way ANOVA followed by the Tukey posttest was utilized to

INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

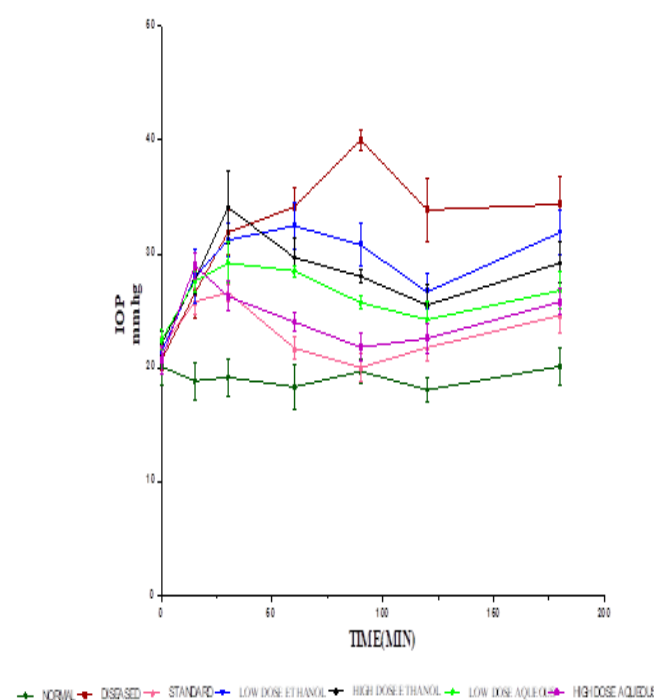
estimate statistical significance between various groups. Difference was taken statistically significant when $p < 0.05$.

RESULTS:

Water loading model:

Comparing with all groups aqueous extracts of flowers of *Jasminum Auriculatum* show more significant effect in reducing intraocular pressure induced by water loaded mechanism. Ethanolic extracts of flowers show good effects in reducing intraocular pressure in water loaded mechanism.

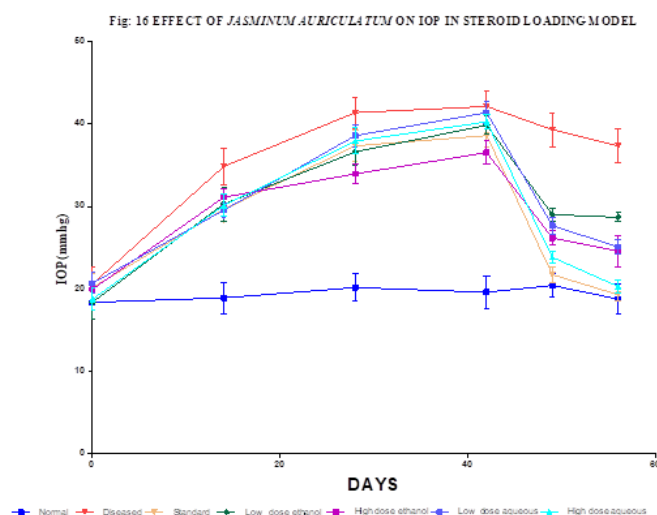
Fig-2: Effect of *Jasminum Auriculatum* on IOP in water loading model



Steroid loading model:

Comparing with all groups aqueous extracts of flowers of *Jasminum Auriculatum* show more significant effect in reducing intraocular pressure induced by steroid loaded mechanism. Ethanolic extracts of flowers show good effects in reducing intraocular pressure in steroid loaded mechanism.

Fig-3: Effect of *Jasminum Auriculatum* on IOP in steroid loading model



Antioxidant Studies:

Comparing with all group's glutamate levels get raised in diseased condition but catalase and SOD levels were decreased in diseased group. Comparing with all groups aqueous extract of *Jasminum Auriculatum* showed significant reduction of glutamate and raise in SOD and catalase levels in antioxidant estimations. Ethanolic extract of *Jasminum Auriculatum*

INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

showed good effects in antioxidant estimations i.e., reduction of glutamate and raise in SOD and catalase levels.

Table:2 Antioxidant estimations

Groups	Treatment	Antioxidant parameters		
		Glutamate	Catalase	SOD
I	Normal	2.14	7.93	3.98
II	Disease control	6.32	2.01	0.93
III	Standard	3.12	6.03	3.15
IV	Low dose ethanol	5.95	2.32	1.01
V	High dose ethanol	4.35	4.01	2.47
VI	Low dose aqueous	4.01	3.14	2.22
VII	High dose aqueous	3.52	5.93	2.97

Histopathological studies:

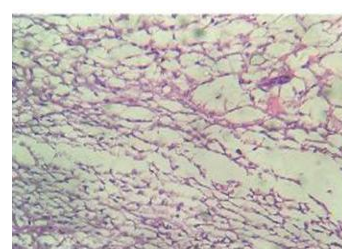
Histopathological considerations of eyes were done to study trabecular meshwork, optic nerve head, and retinal cells by 100x power lens under inverted microscope using eosin and hematoxylin stain. Under histopathology examination, TM section of normal control animals exposed open passage for AH drainage.

Under histopathology examination, TM section of normal control animals exposed open passage for AH drainage. Canal of Schlemm and TM cellularity were established to be completely disturbed in both chronic control and JAE treated

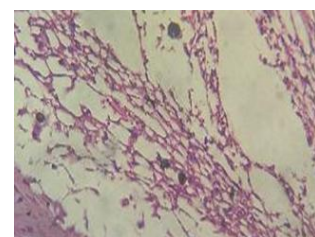
animals. ECM aggregation was seen more on surface of TM in chronic control group as compared to normal control and JAE treated eyes.

Figure:5

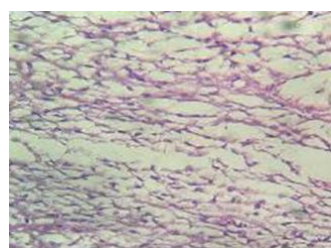
Histopathological section images of TM



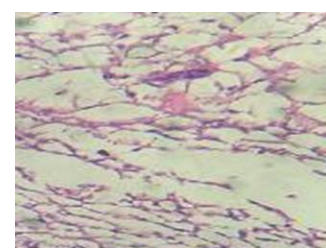
Normal



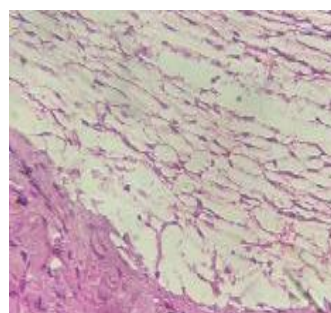
Disease control



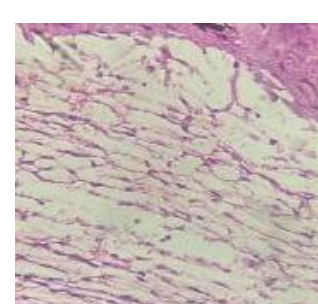
Standard



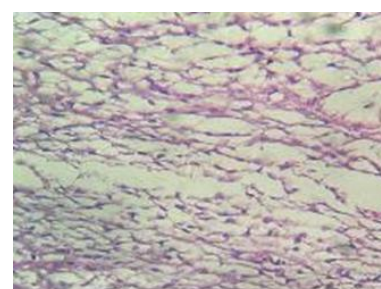
JAE (200mg/kg)



JAE (400mg/ kg)



JAE (200mg/kg)



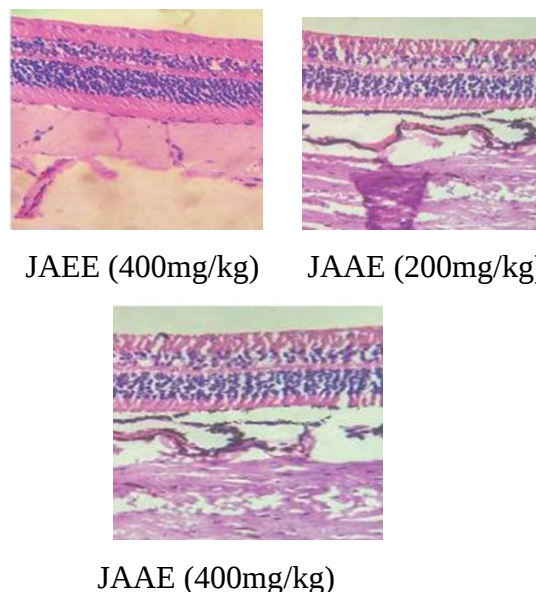
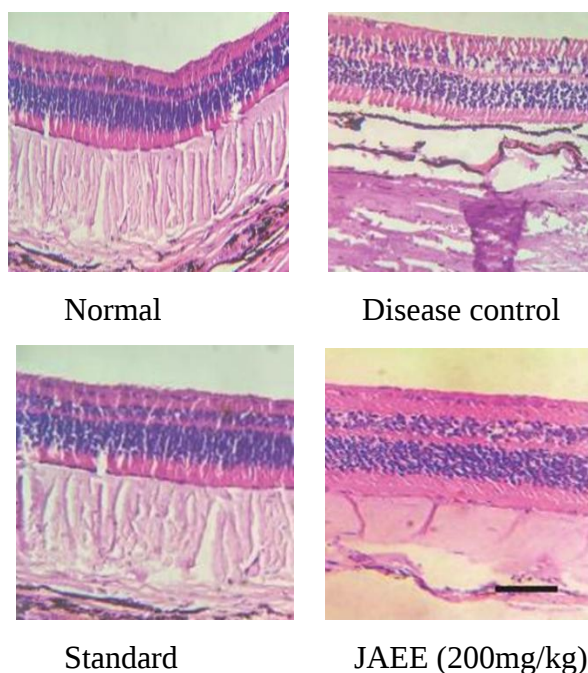
JAE (400mg/kg)

INTRAOCCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

Staining of the normal control animal's retina shown normal architecture. Retina of both chronic control and JAE treated eyes exposed rigorous loss of RGCs in the temporal region, especially in macula. The remaining structure and cellular constituents of the chronic control and JAE treated eyes stained within normal limits compared with staining pattern of normal control's retina. Chronic control group showed clear decrease in cellularity of the retina, mainly rod, cones, and polar cell degeneration; moreover, outer layer of the retina was also disturbed completely as compared to normal control animal's eye.

Figure:6

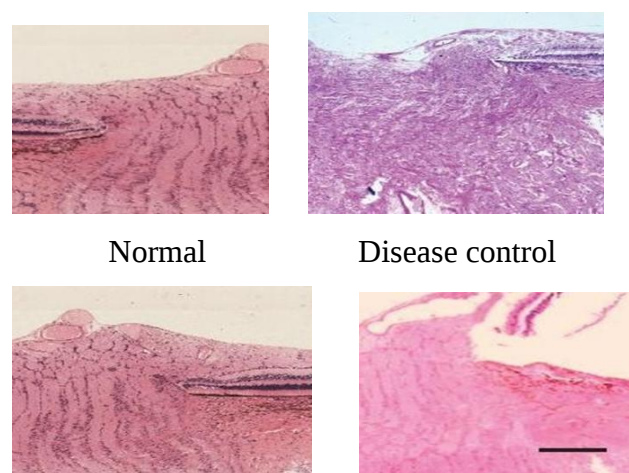
Histopathological section images of Retina



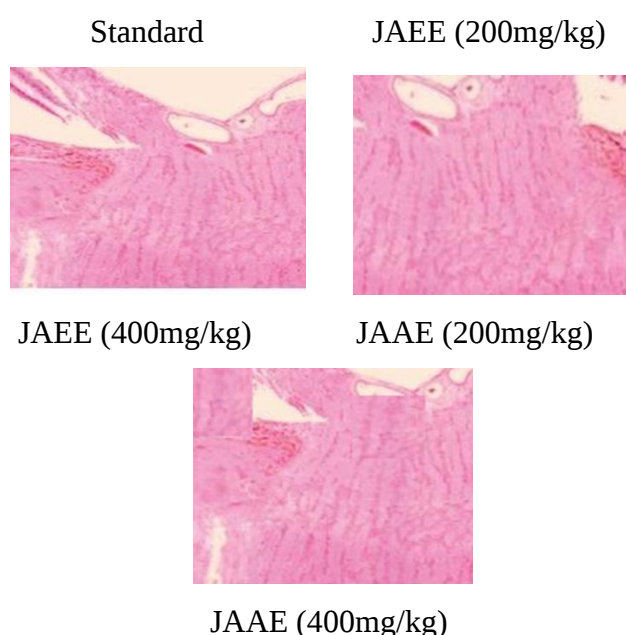
Eye of chronic control animals exhibit total change in the normal architecture of optic nerve head along with cupping and degradation of optic nerve head. However, treatment with JAE exhibits less tissue degeneration and cupping on lamina cribrosa as compared to chronic control animal's eye.

Figure:7

Histopathological section images of Optic nerve



INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA



DISCUSSION:

Glaucoma, indicated as the silent stealer of sight, is recorded because the 2nd foremost significant explanation for visual impairment and therefore it is known to be irreversible visual impairment cause globally. It is said to be a heterogeneous cluster of diseases ensuing from multiple contributive factors together with elevation in intraocular pressure (IOP) and vascular dysregulation. These factors mostly enhance to the primary injury during this disorder by inhibiting axoplasmic flow inside the axons of retinal ganglionic cell (RGC) at the lamina cribrosa, damaging the microcirculation in the nerves present in optic region at the lamina extent, and altering the laminar glial and connective tissue. Factors resulting to further harm persist excitotoxicity lead by glutamate or

glycine release from injured neurons and oxidative damage.

Both extracts of *Jasminum Auriculatum* flowers i.e., aqueous and ethanolic show presence of chemical constituents like Alkaloids, anthraquinones, Antioxidants, Cardiac glycosides, Essential oils, Phenols, Saponins, steroids etc. The *Jasminum Auriculatum* flowers mainly contains constituents like Indole, methyl-anthranilate, Benzyl acetate, Linalool [9,10]. Presence of these chemical constituents might be indication for producing lowering effect of intraocular pressure.

Comparing with all groups aqueous extracts of flowers show more significant effect in reducing intraocular pressure induced by both water loaded and steroid loaded mechanisms. Ethanolic extracts of flowers show good effects in reducing intraocular pressure in water loaded and steroid loaded mechanisms. Histopathological studies also shown significant protection against Steroid Loading Model.

SUMMARY AND CONCLUSION:

The summary of outcomes of the current study in the group of rabbits which were pre-treated with water and steroid and then treated with JAAE revealed the significant decrease in IOP and show decrease in glutamate and increase in catalase and SOD antioxidant parameters and

INTRAOCULAR PRESSURE LOWERING ACTIVITY OF JASMINUM AURICULATUM IN EXPERIMENTAL ANIMALS INDUCED GLAUCOMA

JAAE revealed the decrease in IOP and show decrease in glutamate and increase in catalase and SOD antioxidant parameters when compared to normal and disease control group. In histopathological studies of the eye tissue when compared with that of disease control group rabbits showed the significant decrease in RGC apoptosis.

From all test groups 400mg/kg JAAE shown prominent effect in lowering IOP whereas 400mg/kg JAAE shown good activity in lowering IOP. By means of this work *Jasminum Auriculatum* could be used for lowering IOP in glaucoma treatment.

Further studies must be conducted for isolation of active phytochemical constituents and to elucidate the mechanism of action involved in reducing IOP.

REFERENCES;

1. Gupta N, Weinreb RN. New definitions of glaucoma. *Curr Opin Ophthalmol* 1997;8:38-41.
2. Congdon N, O'Colmain B, Klaver CC, et al. Causes and prevalence of visual impairment among adults in the United States. *Arch Ophthalmol* 2004; 122:477–485. The most current assessment of the incidence of blindness in the United States.
3. Pizzarello L, Abiose A, Ffytche T, et al. VISION 2020: The Right to Sight: a global initiative to eliminate avoidable blindness. *Arch Ophthalmol* 2004; 122:615–620.
4. Quigley HA. Number of people with glaucoma worldwide. *Br J Ophthalmol* 1996; 80:389–393.
5. De Voogd S, Ikram MK, Wolfs RC, et al. Incidence of open-angle glaucoma in a general elderly population: the Rotterdam Study. *Ophthalmology* 2005; 112:1487–1493.
6. Harasymowycz PJ, Papamatheakis DG, Fansi AK, et al. Validity of screening for glaucomatous optic nerve damage using confocal scanning laser ophthalmoscopy (Heidelberg Retina Tomograph II) in high-risk populations: a pilot study. *Ophthalmology* 2005; 112:2164–2171.
7. Thomas J. Medicinal and Aromatic research in India, In UNDP, 1997, 17-27.
8. <http://www.herbopathy.in>
9. Rastogi & Mehrotra. Compendium of Indian Medicinal Plants., PID, New Delhi. 1995; Vol-4, 5: 407.
10. Singh R.P, More T.A. The Production and Perfume Potential of *Jasminum* collections. *Indian Perfum.* 1982; 26: 156-159.

Source of Support: Nil. Conflicts of Interest: None