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EFFECT OF AVASTIN AND PAN RETINAL PHOTOCOAGULATION ON INTRAOCULAR PRESSURE IN DIABETIC RETINOPATHY

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ABSTRACT

Purpose: *To assess and compare the effect of intra vitreal avastin and pan retinal photo coagulation on intra ocular pressure in proliferative and non-proliferative diabetic retinopathy patients.*

Methodology: *A Quasi experimental study was conducted at Madina Teaching Hospital Faisalabad. A Non-Probability purposive sampling technique was used. The study was conducted from September 2021 to June 2022. 30 diabetic retinopathy patients of both genders and age ranges from 15 years to onwards were included. Self-designed proforma was used. Intra ocular pressure was recorded by using Gold man applanation tonometer technique. Patients were divided into two groups. One group was treated with intra vitreal avastin and other group was treated with pan retinal photo coagulation therapy. Intra ocular pressure was recorded at base line, immediately within 30 minutes after therapy, at 3rd day and after 1 week. Statistical analysis was done by using repeated measure ANNOVA and independent sample t-test.*

Results: *The intra ocular pressure was raised after intra vitreal avastin and pan retinal photo coagulation therapy with a p<0.05 (p=0.00). In comparison of effect of intra vitreal avastin and pan retinal photo coagulation on intra ocular pressure at the base line p>0.05 (p=0.661) was non-significant, at first follow up p<0.05 (p=0.00) was significant, at second follow up p>0.05 (p=0.070) was non-significant, and at third follow up p>0.05 (p=0.729) with a mean value at base line was 15.0867, 15.4667, at first follow up was 22.8667, 18.8000, at second follow was 18.9133, 17.1133 and at third follow up was 15.3867, 15.6933 respectively.*

Conclusion: *There was an impermanent rise in intra ocular pressure after application of avastin and laser which returns to its base line value at 3rd follow up. In comparison of both therapies, pan retinal photo coagulation is considered to be safer.*

Keywords: *Avastin, Diabetic Mellitus, Diabetic Retinopathy*

INTRODUCTION

A metabolic condition which contains untimely raise of blood glucose points is known as diabetes mellitus. Ancient civilizations of Greek, Egyptian and Indian revealed urine with sweetness in it. It is considered as the common disease of chronic category not even in the country but also worldwide. It is ranked at 7th position in foremost source of death, in US (1). Utmost complication related to diabetes mellitus is diabetic retinopathy. It's a micro vascular disease. Among the all it is one of the foremost cause of loss related to vision mostly in under developed countries. Clinically a person is said to be diabetic retinopathy patient when abnormalities appear in the light sensitive part of eye at vascular level (2). According to the Early Treatment Diabetic Retinopathy following are its stages. Broadly they are non-proliferative diabetic retinopathy, proliferative diabetic retinopathy, diabetic maculopathy and advanced diabetic eye diseases (3). One of the complications of diabetic retinopathy is diabetic macular edema. It occurs due to the fluid that is gathered in the region of macula because of leakage of blood vessels in that region (4).

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Following are the treatment options for the diabetic retinopathy: anti-inflammatory therapy, intra vitreal steroids, non-steroidal anti-inflammatory drugs, anti angiogenic therapy, laser treatment and other therapeutic agents such as Alpha-lipoic acid, cardiolipin- targeting peptide, lutein ARA 290 and darapladib. Pars plana vitrectomy is a surgical option for treating diabetic retinopathy (5). Laser photo coagulation and vascular endothelial growth factor inhibitor are used in treating proliferative diabetic retinopathy along with clinically significant macular edema (6). First and foremost treatment includes the focal or grid laser and pan retinal photo coagulation. Eventually, a study shows that due to risk of macular scars and fibrosis of retina the usefulness of laser photo coagulation of grid type decreases (7). Its purpose is to bring the neo vascularization level at lower stage (8). After getting laser shots of pan retinal photo-coagulation therapy, the intra ocular pressure becomes rise. The reason behind this effect is the pro inflammation of the choroid due to the shots of the laser that is applied on the retina for treating the diabetic retinopathy and other retinal vascular diseases (9). Anti VEGF is now for most treatment option for the macular edema that is caused due to diabetes. Although its results are positive but not all patients acknowledged to this therapy. It is also of great importance in those cases that does not respond to laser photo coagulation (10). There are varieties of vascular endothelial growth factor inhibitors some of them are Ranibizumab, bevacizumab, pegaptanib (11). Mainly there are two reasons for rise in intra ocular pressure after application of intra vitreal avastin injection. One is the drug volume and other one is the reflex of vitreous. Reflux by vitreous is an important factor for this acute and transient rise in intra ocular pressure (12). The objective of this study was to assess the effect of intra vitreal avastin on intraocular pressure in diabetic retinopathy, to assess the effect of pan retinal photocoagulation on intraocular pressure in diabetic retinopathy and to compare the effect of intra vitreal avastin and pan retinal photocoagulation on intraocular pressure.

METHODOLOGY

A Quasi experimental study was used. Study was conducted at Department of Ophthalmology in Madina Teaching Hospital Faisalabad. The time duration of this study was from September 2021 to June 2022. Non probability purposive sampling technique was applied in this study. The total numbers of proliferative and non-proliferative diabetic retinopathy patients were 30. Sample size was calculated by using Raosoft calculator. They were divided into two groups having 15 patients each. Both genders were included. Age ranges from 15 years onwards were included. Patients with non-proliferative and proliferative type of diabetic retinopathy were included. All the other diseases of retina, optic nerve, uveal track, vitreous, lazy eye and dry eye syndrome were excluded. Systemic diseases such as multiple sclerosis, rheumatoid arthritis, temporal artheritis, sarcoidosis, dermatomyositis, ankylosing spondylitis and ehlers-danlos syndrome were excluded. Diagnosed glaucoma patients were excluded. Steroid users were excluded. Gold man applanation tonometer (Haag-Streit) was used for intra ocular pressure recording. Intra vitreal avastin injection of 1.25mg/0.05mL was used. Pan retinal photo coagulation (ZEISS) was used for laser therapy. Self-designed proforma was used in this study.

Informed as well as written consent was taken from all the patients. Elaborated history followed by visual acuity measurement that was taken with the help of visual acuity chart based on Log MAR criteria. Detailed eye examination was done with the help of slit lamp examination technique. The patients were divided into two groups. All patients were anesthetized with alkane eye drops with an interval of 5 to 10 minutes for 4 to 5 times in that eye which was to be treated. Alkane is usually used for anaesthetizing the eye in order to carry various eye procedures that are instant in nature. It has temporary effect. At the base line, intra ocular pressure was measured with the help of Gold maan applanation tonometer. Dark room was the first step that was followed by oral consent. The whole procedure was briefly explained to the patient. The patient was asked to sit comfortably in front of the slit lamp. Fluorescein dye eye drops was instilled into the eye whose pressure was to be measured. Patient was instructed to rest its chin on a chin rest pad and attached the forehead with the forehead band. Canthus was aligned. The patient was instructed to look at a target placed along with the slit lamp. Calibration was done, the entire zero were aligned. The magnification was adjusted to 10X and the illumination was adjusted to maximum. The nob was bringing closer to the patient eye. It mildly applied the pressure on the surface of cornea and the intra ocular pressure was measured. Three measurements were taken and the average was recorded. The data was recorded on a self-design proforma. The normal range of intra ocular pressure is 10-21mmHg. The patient will considered to be a suspect of glaucoma, if its reading falls in range 21-26 mmHg. Monitoring becomes necessary if the value reaches above 26 mmHg.

Intra vitreal avastin was applied. First of all alkane eye drops were instilled as discussed above. The next step is to clean the eye with the help of anti-septic. The purpose behind is to avoid all infections. Hold and open the eye with

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the help of specula. Avastin was injected with the help of needle that is exactly thin. It was an infusion process. The injection was injected intra vitreally. The bandage was applied to the eye.

While performing pan retinal photo coagulation, the first step was to instill the mydriatics eye drop with an interval of 5 minutes for at least 30 minutes. Vision became blurry. The mode of action of mydriatic is to dilate the pupil by relaxing the iris muscles in order to visualize the light sensitive part of retina. It also causes blurring of the vision by relaxing the sphincter muscles that are responsible for focusing at an object. The patient was asked to sit in front of laser attached slit lamp. The chin of the patient was placed at the chin rest. A contact lens was used in order to focus the laser beam on the specific part of the retina. It was attached on the cornea with the help of coupling agent. Laser sots were applied.

Second reading of intra ocular pressure was recorded within 30 minutes after getting both treatments. Patient was counseled to visit at 3rd day and after 1 week. Intra ocular pressure was measured at second and third follows up. Data analysis was done on the statistical package for the social sciences (SPSS) Version 20.0 by using repeated measure ANNOVA and independent sample t-test.

RESULTS

The minimum and maximum age with which patients presented were 23 years and 85 years respectively. The mean value and standard deviation of the age were found to be 55.90 and ±14.660. Out of the total 30 subjects for this study, 53.3% (N=16) were male and 46.7% (N=14) were female.

Table 1: Mean value of IOP after intra vitreal avastin.

	Mean	Std. Deviation	N	Significant value
Baseline data of IOP in DR with intra vitreal avastin	15.0867	2.03956	15	0.000
IOP within 30 min of intra vitreal avastin	22.8667	1.98626	15	
IOP at 3rd day of intra vitreal avastin	18.9133	2.49481	15	
IOP after I week of intra vitreal avastin	15.3867	2.27812	15	

St.Deviation: Standard deviation, **N:** Sample Size, **Sig.:** Significance

Table 2: Mean value of intra ocular pressure after pan retinal photo coagulation therapy.

	Mean	Std. deviation	N	Sig.
Baseline data of IOP in DR patients with PRP	15.5667	2.61852	15	
IOP within 30 min of PRP	18.8000	2.76973	15	

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IOP at 3rd day of PRP	17.1133	2.72367	15	
IOP after 1 week of PRP	15.6933	2.51637	15	0.00

In comparison of effect of intra vitreal avastin and pan retinal photo coagulation on intra ocular pressure at the base line $p>0.05$ ($p=0.661$) was non-significant, at first follow up $p<0.05$ ($p=0.00$) was significant, at second follow up $p>0.05$ ($p=0.070$) was non-significant, and at third follow up $p>0.05$ ($p=0.729$) was also non-significant. The mean value of intra vitreal avastin injection and pan retinal photo coagulation therapy at base line was 15.0867, 15.4667, at first follow up was 22.8667, 18.8000, at second follow was 18.9133, 17.1133 and at third follow up was 15.3867, 15.6933. The intra ocular pressure was raised at first and second follow up as compared to the base line data and dropped at third follow up with the similar intra ocular pressure that was at base line. In comparison of both therapies the intra vitreal avastin therapy shows more raised in intra ocular pressure at different intervals as compared to pan retinal photo coagulation therapy.

DISCUSSION

Intra ocular pressure was raised after application of intra vitreal avastin injection and pan retinal photo coagulation. Intra vitreal avastin and pan retinal photo coagulation are the two keystones in treatment of diabetic retinopathy patients (13, 14). The fluctuation in intra ocular pressure was seen in patients that were pre glaucoma or having diabetic retinopathy (8). The intra ocular pressure elevates immediately after post injection and post laser treatment therapy but it is impermanent (15). Intra vitreal avastin and pan retinal photo coagulation are the two front line treatment option plans for diabetic retinopathy with less complications as compared to other treatment options such as corticosteroids, non-steroidal anti-inflammatory drugs and other therapeutic agents. Although they show a transient rise in intra ocular pressure so there was no need of medications that lower the intra ocular pressure or any paracentisis (16). In comparison to both front line treatment options, pan retinal photo coagulation therapy is safer than intra vitreal avastin injection. Weakness of this study was not to assess the effect of pan retinal photo coagulation upon macular thickness along with intra ocular pressure. Further studies should be done.

A research conducted in 2020 assessed the effect of avastin on intra ocular pressure. 180 patients were selected that were treated with avastin. The intra ocular pressure was measured at different intervals that are at base line, 5, 10, 30, 60 minutes of interval, at 1st day, 3rd day and at 7th day. They concluded that intra ocular pressure was higher immediately after the injection with $p<0.05$ ($p=-0.00$) with a mean value of 39.08 ± 9.54. it was reduced to its normal range at 3rd day (17). In present study 30 patients were selected out which 15 were treated with avastin. The intra ocular pressure was measured at base line, within 30 minutes, at 3rd day and after 1 week. The results of the present study was similar to the above mentioned study with a rise in intra ocular pressure within 30 minutes of injection having $p<0.05$ ($p=0.00$) with a mean value of 22.8667 ± 1.98626. This study concludes that the intra ocular pressure was raised after the injection with reduced down to its base line value at third follow up. This study concluded that intra ocular pressure was raised immediately after the intra vitreal avastin as well as pan retinal photo coagulation therapy but reduces to its base line value by third follow up. Although both therapies showed significant change in intra ocular pressure but intra vitreal avastin showed higher fluctuation in intra ocular pressure than laser therapy. This revealed that laser therapy is safer than intra vitreal avastin.
There was difficulty in collecting data at follow ups because patients hardly came at for it. It was difficult for the patients to afford intra vitreal avastin injection and pan retinal photo coagulation therapy as it was very costly.

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