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ORIGINAL ARTICLE

Increase in Intra-Ocular Pressure after Intravitreal Triamcinolone Acetonide in Non-Diabetics and Diabetic Patients

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ABSTRACT

Objective: The objective of this research study was to find out the occurrence of raised IOP (Intra-ocular Pressure) following IVTA (Intra-vitreal Triamcinolone Acetonide) in the patients of diabetes and non-diabetics subjects suffering from different chorio-retinal complications.

Methodology: This study was conducted in Benazir Bhutto Shaheed Teaching Hospital Abbottabad and the duration of this study was from May 2019 to April 2021. Total 237 eyes of one hundred and eighty patients were recruited with ninety patients in groups: diabetics & non-diabetics patient groups, in need of IVTA. We injected the IVTA 4.0mg/0.10 milliliter and measured the IOP at 7 days, one month, 3 months and 6 months in the patients of both groups.

Results: In the group of diabetics, there were 47.80% (n: 43) males and 52.20% (n: 47) female patients, whereas in the group of non-diabetics, there were 62.20% (n: 56) male and 37.80% (n: 34) female patients. The average age of the patients in the 1st group was 52.21±9.60 years and in the patients of 2nd group was 51.13±10.75 years. Average pre-operative IOP was approximately 3.60±2.80mmHg and 14.10±2.40mmHg in first and second group correspondingly. In the patients of first group, average IOP with standard deviation was 16.40±4.90mmHg, 14.60±3.60mmHg, 17.60±9.70mmHg and 15.50±7.09mmHg at 7 days, one month, 3 months and 6 months after the injection. Whereas in the patients of second group, average IOP with standard deviation was 14.80±3.33mmHg, 15.90±4.2mmHg, 15.50±4.20 mmHg and 14.10±3.20mmHg at 7 days, one month, 3 months and 6 months during the follow up period. We observed an increase in one hundred and seventeen eyes (49.0%) in the patients of both groups, with 65.0% (n: 78) eyes in first group and 33.0% (n: 39) eyes in the patients of second group.

Conclusions: After injecting the IVTA, there was a clear high rise in the level of IOP in the patients of diabetes as compared to the patients who were non-diabetics.

Keywords: IVTA, IOP, complications, injection, standard deviation, average, mmHg, treatment.

INTRODUCTION

Different research works [1-5] stated that there is high rate of occurrence of increased IOP and glaucoma in the patients of DM (Diabetes Mellitus). But there is no established link in pathogenesis of glaucoma andDM. Precise reasons for the increased level are not known. Rohen [6] in his research investigated four hundred trabeculectomy samples of glaucomatous eyes and discovered the similar results which are also verified by some other works [7]. There is believe that there is high concentration of glucose in the aqueous humor of the patients suffering from diabetes. Davies [8] in his research work investigated the concentration of glucose in the aqueous of fifty-six patients who underwent surgical intervention for cataract. The average level of aqueous glucose was 3.20(mM (Millimolar) in the patients without diabetes in comparison with the 7.80 mM in the patients of diabetes. Some other research studies also found that increased level of glucose in the aqueous causes the rise in level of fibronectin synthesis [9,10].IVTA is a synthetic glucocorticoid which is utilized intravitreally for the treatment of different ocular complications like CME (Cystoid Macular Edema) after the surgical intervention for cataract [11], macular edema because of retinal vascular states, like DR (Diabetic Retinopathy) [12], CRVO (Central Retinal Vein Occlusion) [13], BRVO (Branch Retinal Vein Occlusion) [14] and presence of macular edema because of inflammatory states like birdshot retinal-choroidopathy and uveitis [15].

The most frequent occurring complication after IVTA is increased IOP in this particular literature [16,17]. To prove the findings that the patients of diabetes are more prone to increased IOP as compared to the non-diabetics, we performed this research study to find out the rate of prevalence of IOP increase after IVTA in the patients of diabetes as compared to the patients without diabetes who were all suffering from some retinal pathologies.

METHODOLOGY

This study was conducted in Benazir Bhutto Shaheed Teaching Hospital and the duration of this study was from May 2019 to April 2021. Ethical committee of the hospital gave the permission to conduct this research work after knowing the pros and cons of this study. We used the method of non-probability sampling for the collection of data. We calculated the sample size online with 5% error margin and 95% CI (Confidence Interval). The sample size of this research work was one hundred and eighty. We obtained the written consent from all the patients after explaining them the purpose of this research work. Total 237 eyes of one hundred and eighty patients were recruited in this research work with 119 eyes (n: 90 patients) in diabetics and 118 eyes (n: 90 patients) among non-diabetics, needing the injection of IVTA.

All the patients who were present with IOP of higher than 21.0mmHg, getting the treatment of anti-glaucoma or having the past history of surgical intervention for glaucoma or family history of the eye diseases were not included in this research work. We also excluded the patients who were under treatment from last few months.

Pre-evaluation of IVTA of the patients comprised the complete clinical history with the detection of BCVA (Best Corrected Visual Acuity), bio-microscopic investigation of the anterior segment and full fundus assessment. The establishment of the measurement of baseline IOP was performed by taking the average of 2 high values calculated at 9:00AM and at 4:00PM by Goldman Applanation Tonometer to decrease any error because of diurnal variation. All the information about the patient's treatment, diagnosis, examination and follow-up were recorded in well-organized Performa. We treated all the patients with the use of topical antibiotics as moxifloxacin 0.50%, one day before IVTA and this treatment continued for 3 days after the injection. We gave intravitreal injections in OT (Operation Theatre) under fully sterile state. We followed up the patients at 7 days, one month, 3 months and 6 months subsequently. We performed the complete ocular examination of all the patients with the IOP measurement at their every visit.

We used the SPSS V.21 for the statistical analysis of the collected information. Categorical variables were presented in percentages and frequencies including the diagnosis and gender. Ages of the patients and IOP was presented in averages and SD (Standard Deviations). We used the independent T-test for the comparison of the average IOP between the patients of both groups. We utilized the paired T-test for the complete follow up periods. We considered the P-value of less than 0.050as significant statistically.

RESULTS

180 patients were the part of this research study with 90 patients in each group. There were 47.80% males and 52.20 females in the diabetic group and there were 62.20% males and 37.80% females in the group of non-diabetics. Average age of the patients in the first group was 52.21±9.60 years and 51.13±10.75 years was the average age for the patients of the second group. Patient's distribution in accordance with their diagnosis is present in Table-1.

Table 1: Distribution of Patients According to The Diagnosis (n = 180).

Diagnosis	Diabetic (n=90)	Non-Diabetic (n=90)
DME	68 (73.4%)	0
Neovascular ARMD	2 (2.2%)	10 (9.1%)
BRVO	9 (8%)	31 (32.2%)
CRVO	11 (10.2%)	25 (25.6%)
Uveitis	0	24 (24.5%)

Data shown in frequencies and percentages n (%)
DME: Diabetic Macular Edema,
ARMD: Age related macular degeneration,
BRVO: Branch retinal vein occlusion,
CRVO: Central retinal vein occlusion.

The most common diagnosis was diabetic macular edema in the patients of first group (n: 68) whereas BRVO was the most frequent diagnosis in non-diabetics (n: 31). Average pre-operative IOP was 11.58±2.78 mmHg and 12.8±2.38 mmHg in the diabetic and non-diabetic patients accordingly. The difference among pre-operative IOP was not much significant with P value = 0.2870. In the patients of diabetes, average IOP was 14.38±4.88 mmHg, 12.58± 3.58 mmHg and 15.58±7.68 mmHg, 13.48±5.07mmHg at 7 days, one month, 3 months and 6 months after the application of injection. Whereas in the non-diabetics, average IOP was 12.78±3.1 mmHg, 13.88±2.18 mmHg, 13.48±2.18 mmHg and 12.8±3.18 mmHg at 7 days, one month, 3 months and 6 months as presented in Table-2.

Table 2: Mean IOP after IVTA at four different follow ups.

Post-Op IOP (mmHg)	Diabetic (n = 119 eyes)	Non-Diabetic (n = 118 eyes)	P-Values
1 Week	14.2 ± 2.7 (10 – 30)	12.6 ± 3.31 (10 – 26)	0.003
1 Month	12.4 ± 3.4 (10 – 32)	13.7 ± 4.2 (10 – 30)	0.012
3 Months	15.5 ± 7.5 (10 – 48)	13.3 ± 4.0 (10 – 30)	0.029
6 Months	13.3 ± 5.07 (10 – 42)	12.1 ± 3.2 (10 – 27)	0.047

OP: Intraocular pressure; IVTA: Intravitreal triamcinolone acetonide

P-value < 0.05 considered statistically significant

All p-values were measured using independent sample t-test

Data shown is mean IOP ± SD and range as minimum to maximum.

At seven days and 90 days follow-up, there was much high average IOP in the diabetic patients with P value= 0.0030&0.0290 respectively whereas at 30 days follow-up, there was much high average IOP in the non-diabetics with P value of 0.0120. Table-3 is describing the increased level of IOP in all the patients of diabetic and non-diabetic groups of patients in each follow-up period. The results of this research work found that 47.0% (n: 117) stated the increased IOP of more than 21.0mmHg. Among these 117 eyes, 63.0% (n: 78) were in case of diabetic patients in comparison with 31.0% (n: 39) in group of non-diabetics.

Table 3: Frequency of Raised IOP in eyes.

	Raised IOP (IOP > 21 mmHg)	
Follow ups	Diabetic (n = 119 eyes)	Non-Diabetic (n = 118 eyes)
1 Week	21 (14.4%)	7 (3.7%)
1 Month	4 (3.2%)	17 (12.2%)
3 Months	28 (21.3%)	11 (7.1%)
6 Months	25 (19%)	4 (3.2%)

Data shown in frequencies and percentages n (%)
IOP: Intraocular pressure.

DISCUSSION

One of the most important unwanted consequences of IVTA is increased IOP. Mahar & Memon [17] discovered a raised IOP in 38% eyes. There are many reasons established for the corticosteroids to be the source of IOP

increase [18]. It is the ability of corticosteroids to overwhelms the cell's phagocytic activity, permitting the extra debris to amass in trabecular meshwork [19]. The other known cause of obstruction is crystalline deposits [20]. There is also an allegation on corticosteroids to be the reason of receptor-mediated cross linkage of the network of actin-filaments [2] and impedes the aqueous outflow as a result. There is high risk of increased IOP in the patients of DM. one research work linked the increased IOP with the high rate of occurrence of diabetes mellitus [1].

Rotterdam in his research work stated the association between the DM with an increase in average IOP [2]. One other research study proved the association between DM and increased IOP & glaucoma [3]. Another research study stated that the prevalence of glaucoma was much in the patients of DM. There was presence of DM in 11.0% patients present with glaucoma in comparison with 4.88% patients who were not having glaucoma. This study also concluded that those patients who were not getting anti-glaucoma treatment stated the increased IOP at the time of their presentation [4]. Klein [5] examined more than 2000 patients of diabetes and three hundred and eighty-one non-diabetics and discovered increased IOP in the patients of diabetes mellitus. In this research work, we separated the patients in two groups of diabetics and non-diabetics to examine that if the patients with past DM history are more sensitive to acquire increased IOP as compared to the non-diabetics after the injections of IVTA. We stated a rise in IOP more than 21.0mmHg which is a limitation of this research study.

CONCLUSION

The results of this research work conclude that there was a high rate of occurrence of increased IOP in the patients of diabetes as compared to the patients who were non-diabetics after injecting IVTA. It is recommendation that the monitoring of the diabetic patients is necessary for increased IOP after injecting IVTA. Substitute medication should get consideration for better results.

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