Comparative Efficacy of Timolol and Latanoprost on Intraocular Hypertension Among Patients Attending the Ophthalmic Clinic of Irrua Specialist Teaching Hospital, Irrua, Nigeria

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Abstract: Studies have acknowledged improved intraocular pressure results with topical pressure lowering drugs. However, paucity of literature exists among the Nigerian population and among South South inhabitants in particular. It is the aim of this study to investigate and compare the efficacy of timolol and latanoprost among patients attending the Ophthalmic Clinic of Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria. In a bid to achieve this objective, a randomized control trial was conducted from January 2014 to December 2014 involving patients with ocular hypertension. Patients were enrolled over a period of 12 weeks and followed up in 8 clinic visits over a 30 week period. A total of 104 patients completed the study (52 in timolol group and 52 in latanoprost group). The mean baseline intraocular pressures were 24.52mmHg in timolol group and 26.71mmHg in latanoprost group. Both drugs showed intraocular pressure (IOP) reducing potentials with mean percentage reduction of 34.14% (-8.37) and 40.02% (-10.69) respectively at the end of the study. Based on the results of this study, latanoprost provides better IOP lowering effect among inhabitance around Irrua and environs.

Keywords: timolol, latanoprost, intraocular hypertension.

1. Introduction

Glaucoma has been defined as eye disorder where an increase in intraocular pressure exist and leading to progressive damage to the optic nerve and subsequently loss of sight [1]. Although glaucoma is reported to be a leading cause of irreversible blindness throughout the world, worrisome, is the reported disproportionate effect amongst the black race, coupled with greater diagnosis, treatments and management challenges in black population compared to whites [2-6].

The increase in intraocular pressure has been identified as the only modifiable risk factor for the development and progression of glaucoma [7,8]. Treatment aim at intraocular pressure control therefore remains the cornerstone in glaucoma management because of its multiple risk factors, and modulating IOP is a proven strategy in reducing the risks [9]. While drugs have been effective and have played frontline role in IOP management, beta-blockers are the leading medicines in use and have shown their potentials in reducing the rate of aqueous humour production (10-12)). On the other hand, IOP reducing potentials have also been reported for prostaglandin analogues too [13-16]. Various studies have demonstrated the efficacy and safety of the common topical beta adrenergic antagonists and prostaglandin analogues in reducing IOP, however, they are not as effective in Africans as they are in Caucasians [17-21]. The implication is that there is variation in the IOP response of these drugs. However, these studies were conducted outside Nigeria and are short term in duration and majority are long time ago.

Interestingly, reports showed that topical pressure lowering drugs has remained the most popular, convenient and effective mode of treatment, prevention of progression and reduction of glaucoma blindness [7,8]. Studies of these tropical IOP lowering drugs are limited among Nigerian population and the inhabitance of South-South geopolitical zone of Nigeria in particular. Hence, this study is aimed at investigating and comparing the efficacy of timolol and latanoprost mono-therapy among ocular hypertensive patients attending the Ophthalmic Clinic of Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria. Considering the reported variation in drug response between different populations, the finding of this study will predict the response of glaucoma patients in south-south Nigeria and give a comparative overview with other population.
II. Materials and Methods

2.1 Drug of study: Timolol is a systemic beta-blockers acting as ocular hypotensive by decreasing aqueous secretion. It is the most used topical anti-glaucoma medication, highly available, affordable and with history of relatively good compliance as it is almost devoid of ocular side effects.

Latanoprost is a prostaglandin analogue and act by lowering IOP by increasing uveoscleral aqueous outflow. It is relatively a new class of anti-glaucoma drug with minimal systemic side effects but is expensive especially with reference to economic status of Nigerian inhabitance.

2.2 Methods: The study was a randomized control trial study conducted in the Ophthalmic Clinic of Irrua Specialist Teaching Hospital, Irrua, Edo State, South-South Nigeria. The study was conducted between January and December 2014.

2.3 Inclusion criteria: Ages between 10 and 80 years, both sexes, no inflammation or rubecotic glaucoma, not allergic to either of the medications, no noticeable or documented side effect to the drug of study. However, patients who are ages <10 or >80 yrs, IOP <21 or >50 mmHg, any form of surgical intervention, known allergies, requiring other IOP lowering modalities, existing infection or inflammation were excluded. In addition, patients who missed more than 2 clinic visits were also excluded.

2.4 Sample collection: Once a patient was identified as suitable, the study was explained to the patients and consent to be included in the study obtained. The study was explained to the patients and they were told they can decline and decide to be excluded from the study at any point in time without consequence on the services they received from the clinic.

Before commencement of therapy, patients’ initial IOP were measured using Goldmann’s applanation tonometer and recorded. This values served as the control value (base line value). Group A was placed on timolol maleate ophthalmic solution (0.5%) applied one drop into the lower fornix of each eye at 12-hourly interval. Group B was on latanoprost ophthalmic solution (0.005%) applied onedrop intothelower fornix of each eye once daily (in the evenings). Patients were enrolled over a period of 12 weeks in the regular clinic setting and visited during the morning (8.30am to 11.30am), afternoon (1.00pm to 2.30pm) and evening (3.00pm to 4.30pm) session. Patients for the study were followed-up in an 8 clinic visits over a 30 week period. During these periods, their IOP were measured on a two week basis between the hours of 9.00am and 11.00am to take into consideration the diurnal variations of IOP. IOP was measured and recorded during each clinic visit.

2.5 Analysis: SPSS (16.0 Version) was used for data entry and analysis. The descriptive statistics conducted and presented in suitable table.

III. Results

Table 1 shows and compares IOP reducing potentials of timolol and latanoprost among intraocular hypertensive patients attending Ophthalmic Clinic of Irrua Specialist Teaching Hospital, Irrua. The results showed high mean base line IOP in groups A (24.52mmHg) and B (26.71mmHg). Although it was higher in group B compared to group A, however, there was no significant difference in IOP between the two groups. It was also observed that both drugs have IOP reducing capacity. However, latanoprost was more potent compared to timolol. At the end of the study, latanoprost presented a 40.02% reduction in IOP while timolol presented a 34.14% reduction. At the end of the study, there was a 10.69mmHg mean reduction in baseline value of IOP in the latanoprost treated group. The timolol treated group presented an 8.37mmHg mean reduction in IOP compared to entry IOP. The greatest impact on IOP reduction capacity by the both drugs was observed at the second week post commencement of treatments. Specifically, timolol presented 3.54mmHg reduction at the end of the second week while latanoprost presented 5.11mmHg mean reduction. These mean reducing capacity became mild at 6th week, 10th week through 30th week post treatment which presented the weakest reduction.

Table 1: Comparative IOP Reducing Potentials of Timolol and Latanoprost Among the Ocular Hypertensive Patients

<table>
<thead>
<tr>
<th>Intraocular pressure (mmHg)</th>
<th>TIMOLOL</th>
<th>LATANOPROST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>2 weeks</td>
<td>56</td>
<td>24.52</td>
</tr>
<tr>
<td>6 weeks</td>
<td>56</td>
<td>18.48</td>
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<tr>
<td>10 weeks</td>
<td>54</td>
<td>17.96</td>
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<tr>
<td>14 weeks</td>
<td>56</td>
<td>17.64</td>
</tr>
<tr>
<td>18 weeks</td>
<td>52</td>
<td>16.77</td>
</tr>
<tr>
<td>22 weeks</td>
<td>56</td>
<td>16.73</td>
</tr>
<tr>
<td>26 weeks</td>
<td>56</td>
<td>16.36</td>
</tr>
</tbody>
</table>
Our results showed that timolol and latanoprost have IOP reducing potentials in Nigerian patients inhabiting the South-South geopolitical zone. Our study also indicates that latanoprost is more potent than timolol. In accordance with our finding, other studies had reported timolol to have less IOP lowering impact than latanoprost in black patients [22-24].

We also observed a negative correlation in IOP reducing potency by both drugs with time. The greatest IOP reducing impact was observed at 2nd week post treatment and this was observed to diminish progressively with time. Similar observations have been reported by several studies. For example, it was reported that the maximum IOP reducing effect of timolol is peaked at 2 hours after instillation and lasts for 24 hours by Zimmerman and Herbert[25]. Another study reported Timolol to be effective after many months of therapy but a tendency for slow rise of IOP has been observed and was termed "long term drift" [26].

We observed a -8.37mmHg (34.14%) reducing effect for timolol which is huge compared to base line IOP. In contract to our finding, a study among healthy Nigerian population by Olateju and Ajayi [27] have reported a slight IOP lowering effect of -2.33mmHg. The difference between this study and our finding may be due to the state of the participants. While we observed timolol effect in intraocular hypertensive patients, the study were 2.33mmHg reduction was reported observed normal volunteers; who are not likely to be in need of the drug.

For latanoprost, we reported a -10.69mmHg reduction at the end of the study. In line with our findings, other studies have reported similar IOP reduction potentials by latanoprost. Specifically, some of these studies have reported IOP reductions of 18-21.4% after shorter follow up periods[14-16]. A long term study however reported reduction of 20% to 30% by latanoprost in patients attending the glaucoma clinic, Norfolk and Norwich University Hospital [28].

Considering the percentage reduction in IOP (34.14% for timolol and 40.02% for latanoprost), it can be said that both drugs are effective for management of glaucoma patients. This assertion is based on the fact that a 30% reduction in intraocular pressure (IOP) can slow the rate of progressive visual field loss[29, 30]. The 30% reduction in IOP advocated by the CNTG (Group 1998a,b) was achieved in this study. Thus, indicating that timolol and latanoprost are effective for the management of glaucoma in this study area and enviror.

Conclusively, we observed that timolol and latanoprost have IOP reducing potentials. However, the impact produced by latanoprost was well sustained compared with that of timolol. These findings are found to be clinically important and might have a relative advantage in glaucoma patients, who need to have a well-sustained reduction in IOP for inhabitation in the study area and envior.

### References


Comparative efficacy of timolol and latanoprost on intraocular hypertension among patients


