

PATTERN OF INTRAOCULAR PRESSURE IN LAGOS

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SUMMARY

Objective: To study the pattern of normal intraocular pressure (IOP) in Lagos, Nigeria.

Study Design: Prospective non-randomized uncontrolled hospital based study.

Methodology: Consecutive new patients coming into 3 different eye clinics between June and August 2001 had their IOP measured by applanation. The demographic characteristics and laterality of the IOP measured were documented. Excluded were: patients with glaucoma, ocular trauma, ocular surgery, ocular inflammation, retinal/choroidal detachment, family history of glaucoma, myopia; patients on corticosteroid or antiglaucoma therapy; patients who had had an anaesthetic administered; and patients with systemic diseases such as hypertension, diabetes and thyroid disease.

Statistical testing of significance was done using the student t-test, and level of significance was taken to be $p < 0.05$. Data analysis was done using the EPI INFO 2002 software.

Results: A total of 500 patients aged 10–84 years were included. Patients in the seventh decade constituted the majority (25.2%). Over 25% of all patients were <40 years. The mean age was 49.3 years \pm 14.2. The male to female ratio was 1.1:1. IOP range was 8–23mmHg. Mean IOP for all patients was 14.95mmHg \pm 2.55. The mean IOP in the male patients was 14.87mmHg and for the female 15.11mmHg. This difference was not statistically significant ($p > 0.05$). Fellow eye IOP difference was 1.79mmHg in males and 1.70mmHg in females, which was not statistically significant ($p > 0.1$). Mean IOP was 14.81mmHg for the right eye and 15.41mmHg for the left, and was not statistically significant ($p > 0.055$). IOP increased with age from 13.85mmHg in the second decade to 16.21mmHg in the ninth decade.

Conclusion: The IOP range and mean IOP values are

similar to those from other studies. IOP generally increased with age, tending to drop slightly after the seventh decade in males but rising steadily in females. The sex of the patient and laterality of IOP did not have a significant effect on IOP.

Key words: intraocular pressure, glaucoma, intraocular pressure distribution

INTRODUCTION

Intraocular pressure (IOP) has been the most obvious sign as well as the most manageable component of primary open angle glaucoma (POAG) during the last 100 years.¹ The course of glaucoma is often insidious and many cases may remain asymptomatic until visual field defects become prominent.² For this reason, the frequency distribution of IOP in any population is important for recognition of significantly raised IOP which will require closer evaluation.

Studies done over 3 decades ago have suggested that the IOP level is inherited as a polygenic multifactorial trait, hence racial differences may occur in the normal range.³

IOP may be influenced by several factors such as age, exercise, systemic blood pressure, Valsalva manoeuvre, forced blinking, intraocular inflammation, ocular trauma, ocular surgery, retinal or choroidal detachment, extra-ocular muscle restriction, and systemic diseases such as diabetes mellitus and thyroid disorders.^{2,7} Procedures such as retrobulbar anaesthesia, general anaesthesia, external pressure on the eyeball, topical eye drops instillation specifically; anesthetic, cycloplegic and corticosteroid drops may alter the intraocular pressure.

Early studies done on IOP in Western countries revealed the mean IOP to be 15.5mmHg with a standard deviation of 2.51mmHg.¹ Armaly,³ after studying more

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than 2000 individuals, found a slight increase in mean IOP in each decade of life above the age of 40 years, with women having a slightly higher pressure than men. Workers in Japan have found a decrease in IOP with age and have attempted to explain the opposite trend amongst Western populations by the increased prevalence with age,³ of systemic hypertension and obesity. In Asia, after controlling for the factors that can affect IOP, it was found that the distribution of IOP was slightly skewed towards higher values and IOP increased with age in both eyes in both sexes.⁴ Other studies have documented this slight increase in IOP with age up to the sixth to seventh decade before a decline.^{3,6} However, in a recent study, age was no longer significantly associated with IOP after adjusting for potential confounders (systemic hypertension, diabetes mellitus, glaucoma family history and myopia).⁷

Some studies have documented higher IOP in females which became statistically significant above the age of 40 years,^{2,4} while in others the higher IOP in females was not statistically significant.^{6,7}

The overall aim of this study is to find out the pattern of normal IOP in Lagos, Nigeria. The study sought to :

1. obtain the normal mean IOP in Nigerians
2. calculate the normal range of IOP in Nigerians
3. establish effect of age and sex on normal IOP levels

MATERIALS AND METHODS

Consecutive new patients coming into 3 different clinics in Lagos State: Guinness Eye Centre, Lagos; Lagoon Hospital, Apapa; Lagoon Hospital, Ikeja, were enrolled into the study. Informed consent was obtained from the patients. The IOP for the right and left eyes was measured with a Perkin's hand-held applanation tonometer and recorded. The examination was carried out solely by the author at about the same time daily, essentially during morning clinics. The demographic characteristics of the patients, ie, age and sex, as well as the laterality of IOP measured, were documented.

Patients with glaucoma, ocular trauma, ocular surgery, ocular inflammation, retinal/choroidal detachment, family history of glaucoma, myopia, patients on corticosteroids or anti-glaucoma therapy; patients who had had an anaesthetic administered; and patients with systemic diseases such as hypertension, diabetes and thyroid disease were excluded.

Statistical testing of significance was done using the t-test and level of significance was taken to be $p < 0.05$ at 95% confidence interval.

Data analysis was done with the EPI INFO 2002 software.

RESULTS

A total of 500 patients were included in the study. Patients in the seventh decade (60-69 years) constituted the majority with 25.2%. However, over a quarter of all patients seen were below 40 years. The age range was 10-84 years with a mean age of 49.3 years (SD 14.2 years). The male to female ratio was 1.1: 1. Table 1 shows the age and sex distribution of the patients.

Table 1. Age and sex distribution of patients

Age (yrs)	Male		Female		Total	
	No.	%	No.	%	No.	%
10 - 19	9	1.8	8	1.6	17	3.4
20 - 29	18	3.6	21	4.2	39	7.8
30 - 39	44	8.8	36	7.2	80	16.0
40 - 49	55	11.0	43	8.6	98	19.6
50 - 59	39	7.8	45	9.0	84	16.8
60 - 69	70	14.0	56	11.2	126	25.2
70 - 79	27	5.4	22	4.4	49	9.8
>80	6	1.2	1	0.2	7	1.4
Total	268	53.6	232	46.4	500	100.0

The mean IOP in females (15.11mmHg) was greater than that in males (14.87mmHg) but was not statistically significant ($p > 0.05$). Although the fellow eye IOP was higher in males, this was not statistically significant ($p > 0.1$). The IOP range was 8-23mmHg. The mean IOP for all patients was 14.95mmHg with standard deviation of 2.55mmHg. The mean IOP for the right eye was 14.81mmHg and for the left was 15.41mmHg. This difference was not statistically significant ($p > 0.05$). Table 2 shows the intraocular pressure parameters for both sexes.

Table 2. Intraocular pressure parameters

	Male	Female	P-value
Mean IOP(mmHg)	14.87	15.11	>0.05
Fellow Eye IOP Difference(mmHg)	1.79	1.70	>0.10

The IOP increased gradually with age from 13.85mmHg in the second decade to 16.21mmHg in the ninth decade except for a slight drop in the eighth decade. The average IOP for all patients was 14.95mmHg. Figure 1 shows the average IOP by age for all patients.

Figure 2 shows the IOP distribution by age and sex. The graph shows that IOP increases with age in both sexes but females have a higher level of mean IOP per age group, except for the second decade. This was, however, not statistically significant ($p > 0.05$).

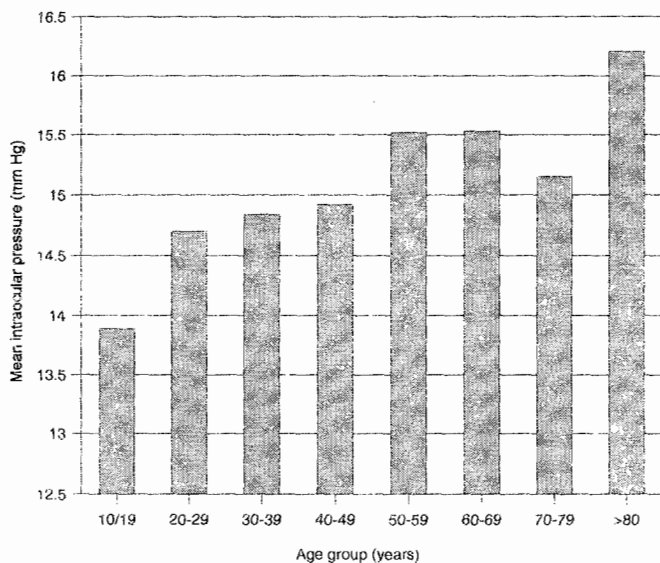


Figure 1. Age distribution of mean intraocular pressure

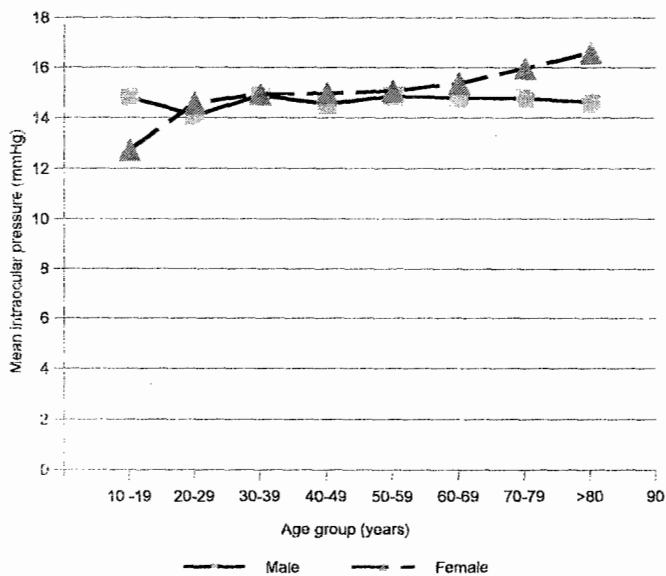


Figure 2. Age-sex distribution of mean intraocular pressure

DISCUSSION

The mean IOP for the population studied was 14.95mmHg with a standard deviation of 2.55mmHg. Working with 2SD gives a derived normal IOP range of 9.8mmHg to 20.0mmHg, and 95% of the normal population fall within this range. This is marginally lower than values obtained in other studies.^{1, 5-7} There was no significant difference between the mean IOP value in this study and those obtained in other studies in the Western world and Asia.

The fellow eye IOP differences of 1.79mmHg for males and 1.70mmHg for females are not large, which

agrees with the assertions that fellow eye IOP differences occur with greater magnitude in glaucomatous eyes (>5mmHg) as opposed to non-glaucomatous eyes (<3mmHg).^{8,9}

The mean IOP was higher for females than for males but this was not statistically significant which agrees with the findings in other studies.^{4, 6, 7} It is noteworthy, however, that while in males there was a tendency for IOP to decrease with age after the fifth decade, the opposite trend was observed in females. This supports the assertion that menopause is associated with an increase in IOP.⁴

CONCLUSION

The IOP tended to generally increase with age, dropping slightly after the seventh decade in males but rising steadily in females. The IOP range and mean IOP values obtained in this study are similar to those from other studies.

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