

Comparison of IOP measurements between Goldmann Applanation Tonometry and Ballistic Principle Diaton Tonometry in several groups of patients

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Purpose. To compare the intraocular pressure [IOP] between the Goldmann with Applanation Tonometry and the Ballistic Principle Diaton Tonometry above the eyelids in different groups of patients. Diaton tonometer can be used as an alternative device for the screening of population and the diagnosis of glaucoma at its early stage.

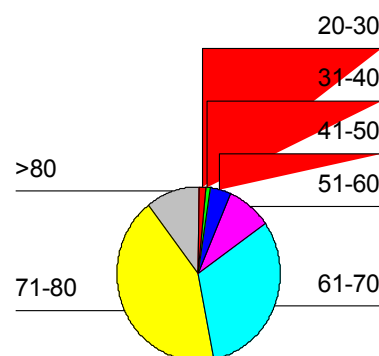
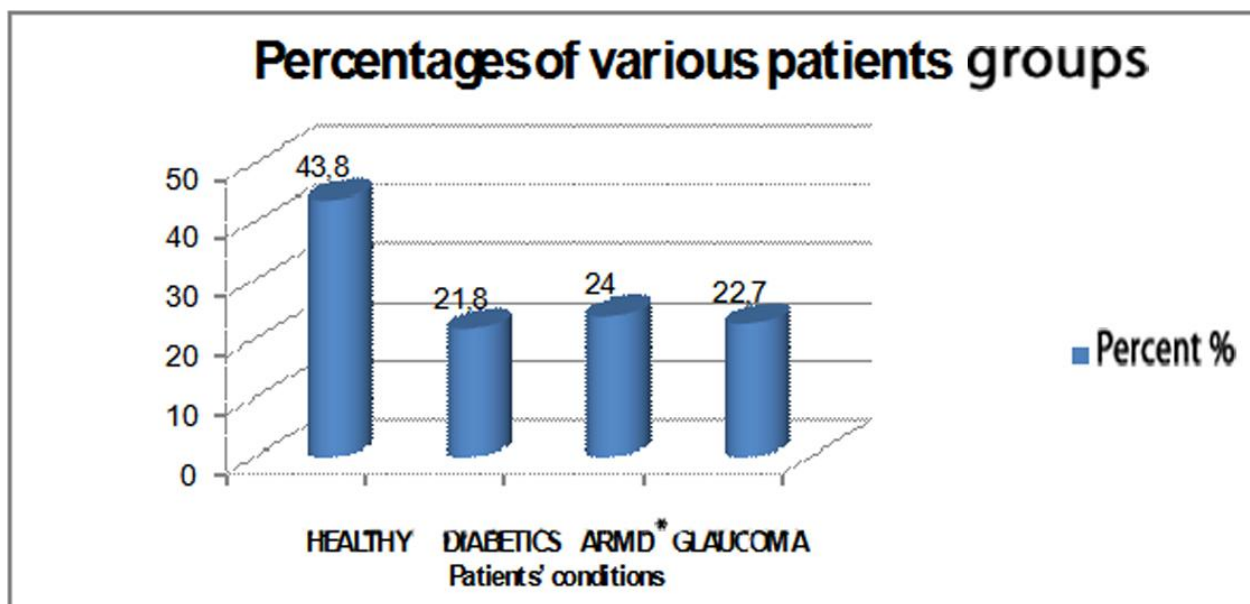
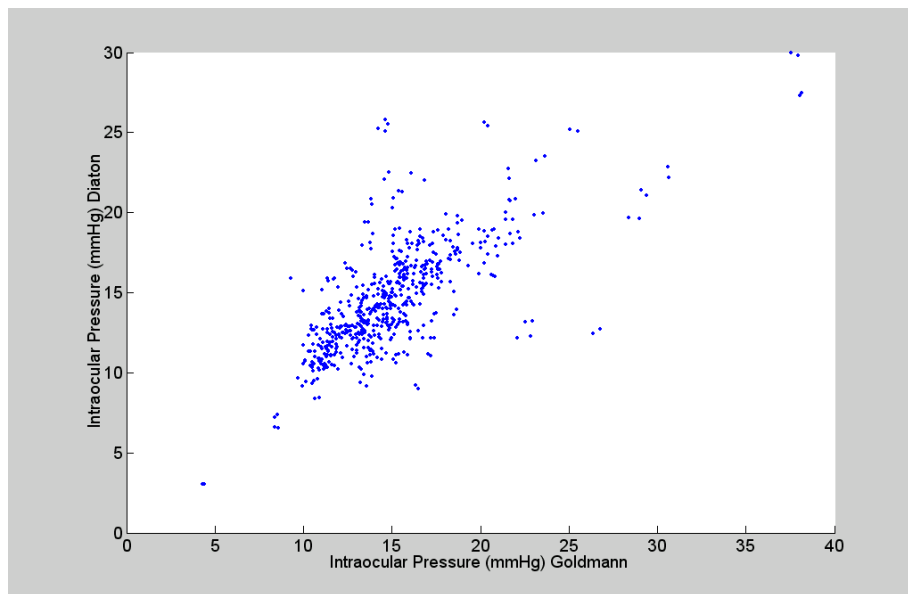


Figure 1



*ARMD - age-related macula degeneration

Methods. 572 eyes of 287 patients were studied. The selection of patients was random. There were 45,5% of males and 54,5% of females of various ages in the group. The overwhelming majority of the patients were more than 60 years old (Figure 1). The research group contained the patients suffering from glaucoma (22,7%), ARMD (24%), diabetics (21,8%) and healthy patients (43,8%). Obviously, there were a few patients that suffer from glaucoma and simultaneously they were diabetics. The intraocular pressure was measured in both eyes from all the above patients with the exception of 2 to whom it was measured only one eye. The IOP was measured with the Goldmann and the Diaton tonometer and the values were recorded. The measurements with the Goldmann tonometer were carried out by all doctors of the clinic whereas the measurements with the Diaton tonometer were carried out by the same doctor and always with the same method. The patients were in sitting or lying position during the examination with the Diaton tonometer.



Scatter Plot.

Results. There was statistically significant correlation between the measurements of both tonometers ($p < 0.001$). 83,11% of the research group had absolute difference between the values of the two measurements up to 2 mmHg. There is also significant correlation between the “absolute difference between the values of the two measurements” and glaucoma ($p < 0,05$). Moreover, absolute difference between the values of the two measurements seems to be related with age but more measurements are needed to verify this relation statistically. For the so-called “healthy”, divergence between the measurements of the 2 tonometers greater than 5mmHg is observed for less than 5% of the sample, whereas for the patients with glaucoma divergence greater than 5mmHg is measured for the 15% of the sample. There is no correlation between divergence and parameters such as gender, diabetes, ARMD, thyroid ophthalmopathy, refractive abnormalities and cataract ($p > 0,05$).

Deviation of measured value	Frequency	Percent %	Cumulative Percent %
0	170	31,10	31,10
1	182	33,28	64,39
2	102	18,71	83,11%
3	28	5,14	88,25
4	21	3,36	96,1

Deviation between measurements

Conclusion. Ballistic Principle Diaton Tonometry can be used as an alternative for the measurement of the intra-ocular pressure above eyelids for patients with recent ocular surgeries, after refractive surgeries, with severe corneal injuries, with corneal apoptosis of epithelium and with large pterygium. Additionally, children can be measured easily with Diaton for IOP and also it can be used in patients with mobility problems.

Key Words. Glaucoma, IOP, Ballistic Principle Diaton Tonometry, tonometry above the upper eyelid.