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Concentration of copper and iron in human aqueous humour obtained from glaucomatous and non-glaucomatous eyes

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In some of the glaucoma patients the level of copper and ascorbic acid were found to inversly corelated to each other[1] which may be due to the rapid oxidation of ascorbic acid in the presence of high concentration of copper. Thus these metals are possible involved in the oxidation of ascorbic acid. In-vitro studies showed that the depolymerization of hyaluronic acid is enhanced in the presence of copper or iron [2], which causes the increase in post operative IOP, when used in ocular surgery and also have been detected in glaucomatous eyes [3].

In present work the level of copper and iron have been studied in non-glaucoma patients and is in progress to determine the concentration of these metals in aqueous humour of glaucoma patients. Due to low concentration of these metals and small volume of human aqueous humour these metals were analyzed by atomic absorption spectrophotometer (Perkin-Elmer model 3300) equipped with graphite furnace (HGA-600) and autosampler (As-60). A single element hollow cathode lamp 20mA for copper and 30mA for iron was employed. A wavelength of 324.8 nm with slit-opening of 0.7 nm for copper and 248.3 nm with the slit- opening of 0.2 nm for iron were used. Argon gas was used as purge gas and 20µl sample was aliquoted on the platform for each analysis.

The instrumental response for the various dilutions (0.01-0.1 µg/ml) of reference standard solutions of copper SC-194 (Fischer Sci. Co) was found to be linear (r = 0.999) and it was also linear (r = 0.996) in the range of 0.01-0.15 µg/ml for the reference standard solutions of iron SI-124 (Fischer Sci. Co). Precision of the method was checked by quantifying the copper and iron in five replicate of bovine aqueous humour. The relative standard deviation for copper and iron was found to be 2.87% and 2.41%, respectively.

The informed consent from all the randomly selected patients were first obtained. The level of copper and iron was determined in human aqueous humour samples (n= 19), which was obtained from cataract patients undergoing ocular surgery for various eye diseases. Copper was quantified in 16 samples with a mean (± SEM) concentration of 0.023 ± 0.005 µg/ml and the concentration of iron was quantified in only 14 samples with mean (± SEM) concentration of 0.045 ± 0.009 µg./ml. The level of copper and iron in male and female was not significantly different and in patients with the age of 61 and above the concentration of these metals was slightly lower but the difference was not significant.

Patients with intraocular pressure (IOP) 10 mm Hg or below the concentration of copper and iron was low compared to the patients with the IOP above 10 mmHg but the difference was insignificant ($p < 0.17$).

The work is in progress to determine the concentrations of these metals in patients with open angle glaucoma. This will help to understand the role of these metal in open angle glaucoma.

References

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