SPECIMEN FORMAT FOR THESES OF MONTH

Faculty	**:**	Science
Department	**:**	Biochemistry, Biotechnology and Bioinformatics
Branch/ Area:	**:**	Biochemistry
Sub Subject Heading:	**:**	Clinical Biochemistry
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Title of the thesis	**:**	Biochemical Profile and Characterisation of Proteins in the Lens Extracted from Human Cataractous Subjects
(i) In Roman Script (ii) In roman Script		-
Nomenclature of Degree:	**:**	Ph.D
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Designation of Supervisor	**:**	Professor of Biochemistry
Centre/department/school in which research was conducted	**:**	Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore
University's Name & Address	**:**	Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641 043

Abstract within 300 words:

The present research work was designed to analyse the changes in soluble protein and insoluble protein in the eye lens of the cataractous subjects. To analyse any correlation between selected biochemical parameters and insoluble protein content in eye lens. To study the eye lens architecture in cataractous subjects and to study post translational changes in eye lens proteins leading to cataract. Subjects with and without clinical complications namely diabetes mellitus and hypertension were selected. These subjects were then categorised into six groups of apparently normal cataract men (ACM), apparently normal cataract women (ACW), diabetic cataract men (DCM), diabetic cataract women (DCW), hypertensive cataract men (HCM) and hypertensive cataract women (HCW). Changes in the status of soluble and insoluble proteins, biochemical parameters namely enzymatic antioxidants, non enzymatic antioxidants, lipid peroxidation, nitrite, protein oxidation status, enzymes of polyol pathway, membrane bound enzymes, basic biomolecules and glycoproteins were analysed. Protein profiling in the eye lens extracted from cataractous subjects were assessed. The extent of DNA damage was assessed in six groups of cataractous lenses by comet assay. Morphological and histopathological studies were carried out to determine if there was any damage to the lens tissues. Spectral analysis was carried out to identify the functional groups in the lens proteins of the cataractous subjects which might indicate any post translational changes occurring in the cataractous lens. The outcome of the study revealed that diabetic and hypertensive subjects seemed to develop cataract at an early age compared to apparently normal cataractous subjects. From this study, diabetic cataractous subjects showed greater abnormalities during cataract development.

i) Major objectives :

The present research work was designed with the following objectives:

- To analyse the changes in soluble protein and insoluble protein in the eye lens of the cataractous subjects
- To analyse any correlation between selected biochemical parameters and insoluble protein content in eye lens
- To study the eye lens architecture in cataractous subjects
- To study post translational changes in eye lens proteins leading to cataract

ii) Methodology :

Cataractous eye lens were obtained from in and around the ophthalmic centres of Coimbatore. Questionnaires were administered and informed consent was obtained from them. Institutional ethical clearance was obtained. The subjects were selected based on the inclusion and exclusion criteria. Subjects with and without clinical complications namely diabetes mellitus and hypertension were selected. They were categorised into six groups of apparently normal cataract men (ACM), apparently normal cataract women (ACW), diabetic cataract men (DCM), diabetic cataract women (DCW), hypertensive cataract men (HCM) and hypertensive cataract women (HCW). Changes in the status of soluble and insoluble proteins, biochemical parameters namely enzymatic antioxidants, non enzymatic antioxidants, lipid peroxidation, nitrite, protein oxidation status, enzymes of polyol pathway, membrane bound enzymes, basic biomolecules and glycoproteins were analysed. Protein profiling in the eye lens extracted from cataractous subjects were assessed. The extent of DNA damage was assessed in six groups of cataractous lenses by comet assay. The histopathological analysis was done in all the six groups of cataractous subjects. Morphology and elemental composition of the cataractous lenses were examined by scanning electron microscopy with energy dispersive X ray spectroscopy (EDAX). Spectral analysis by Fourier Transform Infrared (FT-IR) and Raman Spectroscopy was carried out to identify the functional groups in the lens proteins of the cataractous subjects which might indicate any post translational changes occurring in the cataractous lens.

iii) Findings:

The results suggested that diabetic and hypertensive subjects seemed to develop cataract at an early age compared to apparently normal cataractous subjects. Significant alterations in biochemical parameters in the eye lens extracted from cataractous subjects with and without clinical complications were observed. Correlation analysis revealed the association of the selected biochemical parameters with cataract development. Gamma crystalline protein fraction was observed to be decreased in diabetic cataractous subjects. The severity of damage in eye lens tissue extracted from cataractous subjects was revealed by histopathological and morphological studies. Spectral analysis revealed the presence of functional groups which suggested that the proteins may undergo post translational changes. From this study, diabetic cataractous subjects showed greater abnormalities during cataract development.

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