



## BACKGROUND CAUSES OF HUMAN CATARACT

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**ABSTRACT**

Among the people participated in the questionnaire method cataract prevalence was highest in the rurals than urbans and coastals, females than males, unilateral cataract blindness than bilateral cataract blindness; rice used as staple food than wheat, non-vegetarians than vegetarians in all the five districts. On a comparative study of usage of different fuels, it was found that the prevalence is significantly higher among those who used firewood than gas and kerosene in Kollam, Pathanamthitta, Alappuzha and Kottayam districts. All the above factors are statistically significant and found as a risk factor of cataract. Diabetics are highest in coastal districts than non-coastal districts. The findings highlight that aging, female gender, rural residence, history of other diseases, other drugs taken, non-vegetarian food, rice as staple food and firewood as cooking fuel might be operating in the causation of cataract. These factors are important not only for cataract causation but also for many other public health problems. The high proportion of responders over all age groups in this study suggests that our results are likely to be representative of the sampled population as a whole. The national level survey in a country like India is a major exercise and cannot be conducted regularly. However, the most important benefit of such survey is that they generate estimates, which are valid for the whole country. In India the absence of national level data, blindness data had been extrapolated to the entire country based on whole population and this may be representative of state of Kerala. Kerala despite being a state with total literacy and good health infrastructure still has a problem of treatable blindness. Kerala has been able to arrest the increasing prevalence of blindness by improving the general health conditions of individuals and by decreasing the population growth by community based programme. It is highly necessary to conduct outreach programmes particularly targeting rurals, females etc. to make aware about the healthy food habits, safe cooking fuels, and unnecessary use of drugs and avoid midday sunlight exposure which may cause lens opacities.

**KEYWORDS :** Human Cataract, Prevalence, cataractous lens, population, Risk factors, Back ground causes, Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha, Kottayam

**INTRODUCTION**

According to World Health Organization's (2011) global estimate, approximately 90% of visually impaired people live in the low-resource developing countries of Africa and Asia, mostly in rural areas with few or underutilized eye-care facilities. Globally 80% of all visual impairments are avoidable i.e. either preventable or curable. India had the largest number of people with diabetes, 31.7 million in 2000, which is projected to increase to 79 million by 2030 according to Wildet *et al.*, (2004).

Cataracts are formed from a protein that has altered from its natural state, distorting and eventually prohibiting required light from entering into the retina. Although diabetes prevalence in India is highest among the upper classes (Mohan, 2004), the southern state of Kerala reported the highest diabetes prevalence of 16.2% (Thankappan *et al.*, 2007). Complications related to diabetes such as coronary heart disease, neuropathy, cataract, peripheral vascular disease, dyslipidemia and hypertension.

Vegetables have so much to offer and yet we choose more of non-vegetarian. But the consequences are pretty clear when a person goes to old age. Obesity and muscle weakness leading to arthritis, low bone density and cataract are very few problems to deal with non-vegetarian food likers are more in this world than the vegetarian food liking people. It is solely for the reason that non-vegetarian is tastier and looks delicious. But the more a person eats non-vegetarian, the more he is prone to complex diseases. On the other hand, non-vegetarian food, makes the body immune system and health (Bukisa, 2012). The smokes from household solid fuel (wood, cow dung cake, crop residues, coal, coke, lignite), along with lack of ventilation in the kitchen, increases the risk of cataracts among women and rural residence seems to be a risk factor for cataracts (Pokhrel *et al.*, 2003).

**METHODOLOGY**

A structural questionnaire was distributed among the patients in the hospitals, as well as in the houses in five districts directly or through the nurses to identify the background causes such as information in the current as prior status including demography, family and medical history etc. as shown in the questionnaire. Individual information were collected about general characteristics, potential risk factors for cataract and history of exposure to medical radiation both personally and occupationally. Completed questionnaire were collected and background causes were calculated on data compilation and statistical

assessment were made. Significance of background causes were analysed using MATLAB and SPSS statistical package (Rao, 1996).

**RESULT**

Among the peoples participated in the questionnaire method, prevalence were highest among rurals than urbans or coastals, females than males, unilateral cataract blindness than bilateral cataract blindness, rice used as staple food than wheat and non-vegetarians than vegetarians in all the five districts.

On a comparative cataract prevalence study among the rurals, urbans and coastals it is found that the prevalence is higher among the rurals than urbans and coastals. Rurals were 64% ( $p=0.000545$ ) in Thiruvananthapuram, 66.6% ( $p=0.00047$ ) in Kollam, 88.1% ( $p=0.0000125$ ) Pathanamthitta, 77.7% ( $p=0.00035$ ) in Alappuzha and 86.6% ( $p=0.000223$ ) in Kottayam than Urbans and coastals. Among the cataract patients unilateral cataract blindness were higher than bilateral blindness in this study. Unilaterals were 51.8% ( $p=0.041$ ) in Thiruvananthapuram, 53.3% ( $p=0.036$ ) in Kollam, 75.2% ( $p=0.00015$ ) in Pathanamthitta, 50.4% ( $p=0.048$ ) in Alappuzha and 64.8% ( $p=0.0128$ ) in Kottayam than bilaterals. In this study people used rice as staple food were significantly higher in all the five districts, i.e. 71.4% ( $p=0.000112$ ) in Thiruvananthapuram, 76.7% ( $p=0.0000221$ ) in Kollam, 95% ( $p=0.0000032$ ) in Pathanamthitta, 93.3% ( $p=0.000011$ ) in Alappuzha and 93.2% ( $p=0.000017$ ) in Kottayam than wheat. Rurals, unilateral cataract blindness and rice used as staple food were highest in Pathanamthitta district in this study. All these differences were statistically significant in all the five districts.

In a comparative study non-vegetarians were significantly higher than vegetarians among the cataract patients. The non-vegetarians were 82.8% ( $p=0.00029$ ) in Thiruvananthapuram, 88.3% ( $p=0.00024$ ) in Kollam, 90.1% ( $p=0.000135$ ) in Pathanamthitta, 77.7% ( $p=0.00035$ ) in Alappuzha and 87.1% ( $p=0.000265$ ) in Kottayam than vegetarians.

In this study among the cataract patients, history of other disease & eye disease, family history of eye disease & cataract and other drugs & asthma drugs taken were 67.3%, 21.8% and 56.7% in Thiruvananthapuram, 73.3%, 30% and 66.6% in Kollam, 68.3%, 45.5% and 34.7% in Pathanamthitta, 61.4%, 13.7% and 47.1% in Alappuzha and 54.8%, 10.6% and 35.5% in Kottayam. History of other disease and other drugs taken were significant in all the five

districts such as in Thiruvananthapuram 56.7% (p=0.0023) and 54.2% (p=0.005), in Kollam 66.6% (p=0.0011) and 63.3% (p=0.0013), in Pathanamthitta 34.6% (p=0.045) and 33.7% (p=0.046), in Alappuzha 47.2% (p=0.0045) and 45% (p=0.0057) and in Kottayam 35.5% (p=0.0144) and 35.5% (p=0.0144).

Cataract patients who had occasion to undergo radiation and faced dehydrational crisis were not found as a risk factor in this study. Radiation taken among the participants was highest in Kottayam (26.1%) followed in descending order by Pathanamthitta (21.8%), Kollam (10%), Thiruvananthapuram (7.6%) and Alappuzha (5.4%). Dehydrational crisis was highest in Pathanamthitta (11.6%) followed in descending order by Kottayam (9.4%), Alappuzha (3.5%), Thiruvananthapuram (2.5%) and Kollam (1.7%). The alcoholics, smokers, tobacco chewers, diabetics and hair dye users in Thiruvananthapuram accounting 7.9%, 11.7%, 9.3%, 33% and 16%, in Kollam, 5%, 8.3%, 6.7%, 45% and 6.7%, in Pathanamthitta 22.8%, 22.8%, 15.8%, 18.8% and 12.9%, in Alappuzha 10.7%, 14.7%, 11.5%, 21.4% and 6.2%, in Kottayam 22.6%, 22.6%, 12.9%, 16.5% and 16.1% respectively as compared to non-alcoholics, non-smokers, non-tobacco chewers, non-diabetics and no hair dye users. However none of the above factors were statistically significant except the diabetics in Thiruvananthapuram (33% p=0.0475) and Kollam (45% p=0.003). Diabetics are more in the coastal districts than non-coastal districts.

Cataract prevalence among employees were higher in Thiruvananthapuram (57.5%, p=0.0143) and Kottayam (55.2%, p=0.0293). But prevalence among unemployed were higher in Kollam (61.7%, p=0.00763), Pathanamthitta (65.3%, p=0.00435) and Alappuzha (72.4%, p=0.00345).

On a comparative study of usage of different fuels, it was found that the prevalence is significantly higher among those who use firewood, ie. In Pathanamthitta (67.8%, p=0.000321), Alappuzha (66.3%, p=0.000635), Kottayam (49.7%, p=0.00198) and Kollam (48.5%, p=0.0045) among the female patients than gas and kerosene. Only in Thiruvananthapuram district cooking gas (70.3%, p=0.000018) is used as fuel was significantly higher among female patients than firewood (22.3%, p=0.0428) and kerosene (7.4%). The least used fuel is kerosene in all the four districts, except in Pathanamthitta, it is gas.

## DISCUSSION & CONCLUSION

The highest rates of diabetes prevalence are in India's southern states. Notably, diabetes affects all social strata. Although diabetes prevalence in India is highest among the upper classes (Mohan, 2004), the southern state of Kerala reported the highest diabetes prevalence of 16.2% (Thankappan *et al.*, 2007). Complications related to diabetes such as coronary heart disease, neuropathy, cataract, peripheral vascular disease, dyslipidemia and hypertension are highest among the lower social classes (Ramachandran *et al.*, 2007). The incidence of visual impairment in at least one eye was 6.6%, 1.2% and 0.7% per year for cataract, diabetic retinopathy and trachoma respectively among the indigenous Australian population within central Australia and advancing age was the main risk factor common to all three (Landers *et al.*, 2012).

Cooking with rice straw was identified as being positively associated with young adult cataract, whereas cooking with cow dung was negatively associated (Tanchangya & Geater, 2011). In several subsequent reports, the occurrence of PSC has also been reported in children receiving systemic corticosteroid for asthma and other diseases (Abuekteish, 1995) PSC are a well-known complication of long term oral corticosteroid therapy.

In this study people used rice as staple food than wheat is significantly high in all the five districts. If cadmium is playing a major role in the link between smoking and cataract then workers exposed to high cadmium levels in the cadmium plated steel industry, or those consuming cadmium enriched food - for example, rice in some parts of Japan, might have an increased risk of cataract (Harding, 1995). Rice is found as a risk factor in this study.

Cadmium (Cd) is one of the most toxic heavy metals with no described biological function. It is supplied to soil, air and water mainly by effluent from industries, mining, burning and leakage of waste, and by fertilization with phosphate and sewage sludge. Cadmium is readily taken up by plants, leading to toxic symptoms such as growth reduction (Chen and Kao 1995). One possible mechanism by which excess

heavy metals may damage plant tissues is the stimulation of free radical production, by imposing oxidative stress (Foyer *et al.*, 1997). Plant cells are equipped with several free radical detoxifying enzymes to protect them against oxidative damage. Cadmium can inhibit (and sometimes stimulate) the activities of several antioxidative enzymes (Chien *et al.*, 2001).

Rural residence seems to be a risk factor for cataracts in this study. Low postoperative visual acuity was associated with rural region, under correction of refractive error, and hemorrhagic retinopathy (Liu, 2009). Cataract affects 20% of the population aged 30 years and older living in rural China, with cortical cataract the most common subtype and risk factors for cataract include myopia and diabetes (Duan *et al.*, 2012). Treatable blindness, particularly that associated with cataract and refractive error, remains a significant problem among older adults in South Indian population especially in females, the illiterate and those living in rural areas (Nirmalan *et al.*, 2002). Murthy *et al.*, (2001), reports blindness because of cataract, continues to be a significant problem among the elderly living in remote areas of rural northwest India. In Shandong Province of China the prevalence rates increased with age and the leading causes of blindness were cataract, corneal diseases and glaucoma in urban areas, and cataract, corneal diseases and retinal diseases in rural areas (Yu, 1992).

In Shandong Province of China prevalence of binocular blindness was 0.34%, that of unilateral blindness 0.65%, that of binocular low vision 0.46%, and that of unilateral low vision 0.64% (Yu, 1992). Drinking and smoking is not found to be a risk factor of cataract in the present study. The only adverse effect of alcohol was among smokers: people who smoked and drank heavily had an increased prevalence of nuclear cataract (Cumming & Mitchell, 1997). The study in Chandigarh (Sharma *et al.*, 2009) smokers had 73.9% prevalence of cataract and non-smokers 72.5%, showing no big difference. A case control study by Mohan *et al.*, (1989) did not find an association between smoking and senile cataract. A prevalence of 73.7% cataract among alcohol users is just little more than the prevalence of 72.6% cataract among non-alcohol users. This may well be due to the fact that most of the elderly in Chandigarh (Sharma *et al.*, 2009) were light drinkers and later group may have less chances of cataract development as shown by Clayton *et al.*, (1982) by J shaped relationship.

A comparative study of the cataract prevalence of elderly >or= 40 years in the areas of different levels above the sea and sunshine times, it shows that the higher level above the sea and longer sunshine time the higher cataract prevalence (Zhang, 1999).

Like this study, a case-control study was carried out in the state of Tamilnadu, southern India do not support the hypothesis of an increased risk of visually disabling cataract in persons with a positive history of severe diarrhoea (Bhatnagar, 1991).

Vegetarians were at lower risk of cataract than were meat eaters in the cohort of health-conscious British residents (Paul N Appleby, 2011). In the study from Punjab (Chatterjee, 1982) though a higher prevalence of cataract amongst illiterates compared to educated ones was observed, but the multivariate analysis concluded that, education was not an independent risk factor for cataract. Case control studies from Italy and Boston (Leske, 1991) have demonstrated low education to be associated with cataract development.

It is thus concluded that cataract is a major public health problem in Kerala, many factors including aging, female gender, rural residence, history of other diseases and other drug taken, non-vegetarian food, rice used as staple food and firewood as cooking fuel operating in its causation. The above risk factors are of concern not only for cataract prevention but also for public health at large.

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