International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 7(G); July 2018; Page No. 14330-14335
DOI: http://dx.doi.org/10.24327/ijcar.2018.14335.2595

Research Article

BACKGROUND CAUSES OF HUMAN CATARACT IN THE THREE COASTAL DISTRICTS OF KERALA

Aleyamma Kuruvilla* and Issac Thomas

Department of Zoology, St. Thomas College, Ranni-689673 Pathanamthitta, Kerala, India

A R T I C L E I N F O

Article History:

Received 7th April, 2018
Received in revised form 16th May, 2018 Accepted 3rd June, 2018
Published online 28th July, 2018

Key words:

Cataract, prevalence, districts, coastal, Thiruvananthapuram, Kollam, Alappuzha, background causes.

A B S T R A C T

Introduction: - Cataract is considered as a condition and not a disease, they develops due to multiple reasons.
Methodology:- A structural questionnaire was distributed among the patients in the hospitals, as well as in the houses in the three coastal districts directly or through the nurses to identify the background causes of three southern coastal districts (Thiruvananthapuram, Kollam, Alapuzha)of Kerala state.
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 districts.
Discussion:- 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. The success of public health programs is dependent on a healthy partnership between the government and nongovernmental organizations, and also private sectors.

INTRODUCTION

Cataract is considered as a condition and not a disease, they develops due to multiple reasons. Secondary cataracts develop from procedures performed to correct other vision problems such as glaucoma. Traumatic cataracts develop from injury to the eye lens or the eye as a whole. Congenital cataracts are genetic and are found in babies and sometimes develop in childhood. There are also radiation cataracts that develop after some kinds of exposure such as excessive sunlight, ultraviolet or infra-red light. It has been shown that cataracts can develop from long term use of certain steroids as well as some lifestyle habits.

Exposure to even low-level UVB radiation from sunlight increases the risk for cataracts. Neale *et al.,* (2003), provided new evidence supporting the link between sun exposure and nuclear cataracts. The risk was highest among those who had significant sun exposure at a young age.

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.

Corresponding author:* **Aleyamma Kuruvilla
Department of Zoology, St. Thomas College, Ranni-689673 Pathanamthitta, Kerala, India

Obesity and muscle weakness leading to arthritis, low bone density and cataract are very few problems to deal with non-vegetarian food liker's 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).Ramakrishnan *et al*., (1995) favors the idea that cadmium accumulating in the lens directly causes the damage. They have the cadmium data to support that hypothesis, but other components of tobacco smoke and their products in blood may play a role. The interactions of cadmium with various components of the lens have yet to be explored. Plasma membranes, structural proteins, channels, enzymes, receptors, etc are obvious candidates for study. 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).

PATIENTS & METHODOLOGY

A structural questionnaire was distributed among the patients in the hospitals, as well as in the houses in the three coastal districts (Thiruvananthapuram, Kollam & Alappuzha) of southern Kerala, 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. are in the questionnaire. Individual information was 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 back ground causes were calculated on data compilation and statistical assessment were made.

RESULT

It can be depicted from table-1 that out of 367 cataract patients, its prevalence varied with the place of residence being significantly high (64%) amongst rurals (p=0.000545) as compared to 27% amongst the urbanities and 9% from coastals in Thiruvananthapuram district. Table-1 shows that out of 360 cataract patients, its prevalence varied with the place of residence being significantly (p=0.00047) higher amongst rural (66.6%) as compared to 21.7% amongst the urbanities and 11.7% from coastals in Kollam district. It can be depicted from table-1 that out of 373 cataract patients, its prevalence varied with the place of residence being highly significant (77.7%, p=0.00035) amongst rurals as compared to 16.1% amongst the urbanities and 6.2% from coastals in Alappuzha district.

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 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 and 77.7% (p=0.00035) in Alappuzha 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 and 50.4% (p =0.048) in Alappuzha than bilaterals. In this study people used rice as staple food were significantly higher in all the five districts, ie. 71.4% (p=0.000112) in Thiruvananthapuram, 76.7% (p=0.0000221) in Kollam, and 93.3% (p=0.000011) in Alappuzha than wheat. All these differences were statistically significant in all the 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 and 7.7% (p=0.00035) in Alappuzha 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, and 61.4%, 13.7% and 47.1% in Alappuzha.

Table 1 Comparative study of background causes in the coastal districts

Disrticts		**Thiruvananthapuram(367)**		**Kollam(360)**		**Alappuzha(373)**	
Background causes		Percentage	P value	Percentage	P value	Percentage (%)	P value
Resident	Rural	64	0.000545 **	66.6	0.00047 **	77.7	0.00035 **
	Urban	27	0.076	21.7	0.063	16.1	0.0566
	Coastal	9	0.22	11.7	0.42	6.2	0.432
Sex	Male	45	0.065	45	0.065	45	0.058
	Female	55	0.043 *	55	0.043 *	55	0.033 *
Cataract	Unilateral	51.8	0.041 *	53.3	0.036 *	50.4	0.048 *
	Bilateral	48.2	0.08	46.7	0.09	49.6	0.0478 *
History of	other disease	56.7 / 67.3	0.0023 *	66.6 / 73.3	0.0011 *	47.2 / 61.4	0.0045 *
	eye disease	10.6	0.277	6.7	0.347	14.2	0.247
Family history of	eye disease	2.2 / 21.8	0.68	3.3 / 30	0.46	0.8 / 13.7	0.678
	Cataract	19.6	0.158	26.7	0.059	12.9	0.612
Drug taken (past & present)	other drugs	54.2 / 56.7	0.005 *	63.3 / 66.6	0.0013 *	45 / 47.1	0.0057 *
	asthma drugs	2.5	0.48	3.3	0.58	2.1	0.48
Radiation		7.6	0.54	10	0.734	5.4	0.66
Dehydrational crisis		2.5	0.31	1.7	0.221	3.5	0.382
Staple food	Rice	71.4	0.000112 **	76.7	0.0000221 **	93.3	0.00011 **
	Wheat	28.6	0.12	23.3	0.162	6.7	0.332
Veg/non veg	Vegetarian	17.2	0.28	11.7	0.224	22.3	0.108
	non-vegetarian	82.8	0.00029 **	88.3	0.00024 **	77.7	0.00035 **
Alcoholic/non alcoholics	Alcoholics	7.9	0.39	5	0.549	10.7	0.109
	non-alcoholics	92.1		95	0.0000221 **	89.3	
Smoker/ non-smoker	Smoker	11.7	0.55	8.3	0.585	14.7	0.504
	non-smoker	88.3		91.7		85.3	
Tobacco chewing	Yes	9.3	0.46	6.7	0.446	11.5	0.436
	No	90.7		93.3		88.5	
Diabetic/non diabetic	Diabetic	33	0.0475*	45	0.003 *	21.4	0.065
	non-diabetic	67		55		78.6	
Hair dye	Yes	16	0.65	6.7	0.677	6.2	0.715
	No	84		93.3		93.8	
Occupation	employed (government, private or self employed)	57.5	0.0143 *	38.3	0.0213 *	27.6	0.053
	unemployed	42.5	0.0435 *	61.7	0.00763 *	72.4	0.00345 *
Among, Women-fuel used. (n=159)	fire wood	22.3	0.0428 *	48.5	0.0045 *	66.3	0.000635 **
	Kerosene	7.4	0.78	9.1	0.548	3.4	0.658
	Gas	70.3	0.000018 **	42.4	0.0082 *	30.3	0.034 *

* significant
** h**highly significant

History of other disease and other drugs taken were significant in all the three 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) and in Alappuzha 47.2% (p=0.0045) and 45%(p=0.0057).

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 in Kollam (10%), Thiruvananthapuram (7.6%) and Alappuzha (5.4%). Dehydrational crisis was 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%., and in Alappuzha 10.7%, 14.7%, 11.5%, 21.4% and 6.2%., respectively as compared to non-alcoholics, non-smokers, non-tobacco chewers, non-diabetics and no hair dye users. However the above factors were statistically significant in Thiruvananthapuram (33% p=0.0475) and Kollam (45% p= 0.003). Diabetics are more in Kollam and Thiruvananthapuram districts.

Cataract prevalence among employees were higher in Thiruvananthapuram (57.5%, p=0.0143). But prevalence among unemployed were higher in Kollam (61.7%, p=0.00763), 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 Alappuzha (66.3%, p= 0.000635), and Kollam (48.5%, p=0.0045) among the female patients than gas and kerosene . 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%).

DISCUSSION & CONCLUSION

In this study among the cataract patients, diabetics in Thiruvananthapuram were 33% (p=0.0475), Kollam 45% (p=0.003) and Alappuzha 21.4%. In Thiruvananthapuram and Kollam the number of diabetics was statistically significant among the cataract patients so diabetes mellitus can be one of the reasons for cataract formation in these. Districts. In Alappuzha the diabetes mellitus is not a significant cause for cataract formation.

In 2000, India had the largest number of people with diabetes, 31.7 million, which is projected to increase to 79 million by 2030 according to Wild *et al.*, (2004). 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).

According to Glover *et al*.(2012), prevalence of sight-threatening diabetic retinopathy was high and type 2 diabetes was associated with albuminuria, neuropathy and insulin use in consecutive cases attending an urban/semi-urban diabetes clinic in sub-Saharan Africa. Pathologic conditions such as diabetes are emerging as serious burden for aging populations and account for most of the retinal vascular disease (Schemann, 2006). According to Veromann *et al.,* (2003), the non-diabetics may also be prone to cataractous change caused even by moderate amount of surplus sugar and salt.

On a comparative study of usage of different fuels among the female patients, it was found that the prevalence is significantly higher among those who use firewood in four districts. More women used firewood as fuel in Alappuzha (66.3%, p= 0.000635), and Kollam (48.5%, p=0.0045) than gas and kerosene. In Thiruvananthapuram district gas (70.3%, p=0.000018) was used as fuel among the female cataract patients than firewood (22.3%,p=0.0428) and kerosene(7.4%). 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).

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. Three epidemiological studies have provide some evidence of an association between cataract or blindness and exposure to indoor smoking from household use of solid biomass fuels such as animal dung, wood and crop residue (Mohan *et al.*,1989., Mishra *et al.*,1999., Zodpey & Ughade,1999) from the 1992-1993 Indian national family health survey.

History of other disease and other drugs taken were significantly higher among the cataract patients in the districts. History of other disease and other drugs taken were 56.7%(p=0.0023) and 54.2% (p=0.0057) in Thiruvananthapuram, 66.6%(p=0.0011) and 63.3%(p=0.0013) in Kollam and 47.2% (p=0.0045) and 45%(p=0.0057) in Alappuzha. In several subsequent reports, the occurrence of PSCC have also been reported in children receiving systemic corticosteroid for asthma and other diseases (Abuekteish, 1995) PSCC are a well-known complication of long term oral corticosteroid therapy. Yilmaz, *et al*., (2000) reports the prevalence of PSCC in asthmatic patients receiving corticosteroid therapy.

In this study people used rice as staple food than wheat is significantly high in all the five districts. People used rice as staple food among the cataract patients were 71.4% (0.000112) in Thiruvananthapuram, 76.7% (p=0.0000221) in Kollam and 93.3% (p=0.000011) in Alappuzha. 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). Cadmium damages the photosynthetic apparatus (Krupa 1988; Sidlecka and Baszynsky, 1993), lowers chlorophyll content (Larsson *et al*., 1998; Stobart *et al*., 1985), and inhibits the stomatal opening (Barcelo and Poschenrieder 1990).

On a comparative cataract prevalence study among the rurals, coastals and urbans, it is found that the prevalence is higher among the rurals than urbans and coastals. Among the cataract patients rurals were 64% (p=0.000545) in Thiruvananthapuram, 66.6% (p=0.00047) in Kollam and 77.7% (p=0.00035) in Alappuzha. 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). An interesting finding according to Dandona *et al*., (2001), was that the total potential cataract blindness in the well-off rural West Godavari was more than twice that in the poor rural Mahabubnagar. However, this finding suggests that the risk of developing cataract blindness can vary considerably between different areas of the same state. The total potential cataract blindness in rural female subjects was more than in the male subjects, which may be related to the higher life expectancy of women or to other biological or nutritional variables.

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).

This study shows that unilateral cataract blindness was higher than bilateral cataract. Unilateral cataract patients were 51.8% (p=0.041) in Thiruvananthapuram, 53.3% (p=0.036) Kollam, 75.2%, (p=0.00015) and in Alappuzha. 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). According to Song (1992), the prevalence of monocular blindness, bilateral and monocular low vision were 0.72%, 0.57% and 0.30% respectively in China.

The alcoholics and smokers accounting 7.9% and 11.7% in Thiruvananthapuram, 5% and 8.3 % in Kollam, and 10.7% and 14.7%, in Alappuzha as compared to non-alcoholics and non-smokers. Drinking and smoking is not found to be a risk factor of cataract in the present study. The study in Candigrah (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. In this study tobacco chewing and hair dye usage were not found as a risk factor. The tobacco chewers and hair dye users accounting 9.3%and 16% in Thiruvananthapuram, 6.7% and 6.7%in Kollam and 11.5% and 6.2% Alappuzha as compared to non-tobacco chewers and no hair dye users.

Among the participants who had occasion to undergo radiation was very small in Kollam (10%), Thiruvananthapuram (7.6%) and Alappuzha (5.4%). 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). In the present study Dehydrational crisis is not identified as a significant risk factor in Alappuzha (3.5%), Thiruvananthapuram (2.5%) and Kollam (1.7%). 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).

Non-vegetarian diet is found to be a risk factor in the present study. In a comparative study among the cataract patients non-vegetarians are more than vegetarians. The non-vegetarians were 82.8% (p=0.00029) in Thiruvananthapuram, 88.3% (p=0.00024) in Kollam, and 77.7% (p=0.00035) in Alappuzha than vegetarians. Vegetarians were at lower risk of cataract than were meat eaters in the cohort of health-conscious British residents (Appleby Paul N 2011). Early studies on animal experiments suggested that various factors such as caloric and nutrient intake, vitamins and minerals have been significantly involved in cataractogenesis (Kador and Kinoshita 1984; Bunce 1990). Laboratory, clinical, epidemiologic and animal data support the association between cataract prevention and diet supplements such as riboflavin, vitamin C, vitamin E and Caroteniods (Mathew et al., 2003, Mares- Perlman et al., 1994).

Among the cataract patients Employees were higher than unemployed in Thiruvananthapuram. But unemployed were higher in Kollam (61.7%, p=0.00763) and Alappuzha (72.4%, p=0.00345). According to Bachani D *et al.,* (2000), productively employed individuals had lowest blindness rates and the blindness rates were five times higher among respondents who were not working and two times higher among those engaged solely in household activities. In the study from Punjab (Chaterjee,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. Cataract blindness in India can be effectively controlled only if effective strategies are developed to reduce the incidence of blinding cataract. It also shows that the success of public health programs is dependent on a healthy partnership between the government and nongovernmental organizations, and also private sectors. 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.

References

Abuekteish F., Kirkpatrick JNP., Russell G (1995). Posterior subcapsular cataracts and inhaled corticosteroid therapy. *Thorax*; 50: 674-676.

Appleby PN., Allen NE ., Key TJ (2011). American Society for Nutrition Diet, vegetarianism, and cataract risk. *Am J Clin Nutr*.; 94(5): 1128-35.*+

Bachani D., Murthy GVS., Sanjeev KG (2000). Rapid Assessment of cataract blindness in India. *Indian Journal of Public Health.*; 44 (3):82-88.

Barcelo J. and Poschenrieder C (1990). Plant water relations as affected by heavy metal stress: review. *J Plant Nutr.*; 13: 1–37.

Bhatnagar R., West KPJr., Vitale S., Sommer A., S Joshi., G Venkataswamy (1991). Risk of Cataract and History of Severe Diarrheal Disease in Southern India. *Arch Ophthalmol*. 109(5):696-699.

Bukisa - Share your knowledge. (2012). Veg vs Non Veg Food - Which one is Better. feb-21 st.

Bunce GE., Kinoshita J., Horwitz J (1990). Nutritional factors in cataract. *Annual Review of Nutrition.;* 10: 233-254.

Chaterjee A., Milton RC., Thyle S (1982). Cataract prevalence and aetiology in Punjab. *Br J Ophthalmol.;* 66: 35-42.

Chen SL., Kao CH (1995). Cd induced changes in proline level and peroxidase activity in roots of rice seedlings. *Plant Growth Regul.;* 17: 67–71.

Dandona L., Dandona R., Srinivas M., Giridhar P., Vilas K., Prasad MN., John RK., McCarty CA., Rao GN (2001). Blindness in the Indian state of Andhra Pradesh. *Invest Ophthalmol Vis Sci.*;42: 908–916.

Duan XR., Liang YB., Wong TY., Sun LP., Yang XH., Tao QS., Yuan RZ., Friedman DS (2012). Prevalence and association of cataract in a rural chinese adult population; the Handan Eye Study. *Grafes Arch Clin Exp Opthalmol.*; April 11[Epub ahead of print].

Glover SJ., Burgess PI., Cohen DB., Harding SP., Hofland HWC., Zijlstra EE., Allain TJ. (2012). Prevalence of diabetic retinopathy, cataract and visual impairment in patients with diabetes in sub-Saharan Africa *Br J Ophthalmol.*; 96(2):156-161.

Harding JJ (1995). Cigarettes and cataract: cadmium or a lack of vitamin C? *Br J Ophthalmol.*; 79: 199-201.

Kador FP., Kinoshita JH (1984). Diabetic and galactosemic cataract. In Nugent J and Whelan Eds. Human cataract formation, pitman , London. P p-110.

Krupa Z (1988). Cadmium-induced changes in the composition and structure of the light-harvesting complex II in radish cotyledons. *Physiol. Plant*. 73: 518–524.

Landers J., Henderson T., Craig JF (2012). Incidence of visual impairment due to cataract, diabetic retinopathy and trochoma in indigenous Australian with in central Australia : the central Australian ocular health study. *Clin Exp Opthalmol.*; dio 10.1111/j.1442-9071. 2012.02817.x. [Epub ahead of print].

Larsson EH., Bordman JF., Asp H (1998). Influence of UV-B radiation and Cd 2+ on chlorophyll fluorescence, growth and nutrient content in Brassica napus. *J Exp Bot.;* 49: 1031–1039.

Leske MC., Chylack LT Jr., Wu SY (1991) The lens opacities case control study group. The lens opacities case control study. Risk factors for cataract. *Arch Ophthalmol,;* 109: 244-251.

Liu B., Xu L., Wang YX., Jonas JB (2009). Prevalence of cataract surgery and post operative visual outcome in Greater Beijing : the Beijing Eye study. *Ophthalmol. ;* 116 (7): 1322-1331.

Mares-Perlman JA., Klein BEK., Klein R., Ritter LL (1994). Relation between lens opacities and vitamin and mineral supplement use. *Ophthalmol.*; 101(2): 315-25.

Mathew JP., Thomas VC., Thomas I (2003). Selenite Cataract and its attenuation by Vitamin E in Wistar rats. *Ind J Ophthalmol.;* 51(2): 161-170.

Mishra VK., Retherford RD., Smith KR (1999). Biomass cooking fuels and prevalence of blindness in India. *J Enviorn. Med.;* 1: 189-99.

Mohan M., Sperduto RD., Angra SK., Milton RC., Mathur RL., Underwood BA.,Jeffery N., pandya CB.,Chhabra VK., Vajpayee RB (1989). India-US case-control study of age-related cataracts. *Arch Ophthalmol,* 107: 670-676.

Mohan V (2004) Why are Indians more prone to diabetes? *J. Assoc Physicians India;* 52: 468–70.

Neale RE., Purdie JL., Hirst LW., Green AC. (2003) Sun exposure as a risk factor for nuclear cataract. *Epidemiol.*, 14: 707-712.

Ramachandran A., Snehalatha C., Vijay V., King H (2002). Impact of poverty on the prevalence of diabetes and its complications in urban southern India. *Diabet Med*.;19:130-135.

Ramakrishnan S., K N Sulochana., T Selvaraj., A Abdul Rahim., M Lakshmi ., K Arunagiri. (1995). Smoking of beedies and cataract: cadmium and vitamin C in the lens and blood. *Br J Ophthalmol*.; 79;202-206.

Schemann JF., Inocencio F., de Lourdes Monteiro M, Andrade J., Auzemery A., Guelfi Y (2006). Blindness and low vision in Cape Verde Islands: results of a national eye survey. *Ophthalmic Epidemiol*.;13(4):219-26.

Sidlecka A., Baszynsky T (1993). Inhibition of electron flow around photosystem I in chloroplasts of cadmium-treated maize plants is due to cadmium-induced iron deficiency. *Physiol. Plant*. 87: 199–202

Sharma M K., D Kumar., C Mangat., V Bhatia (2009). An epidemiological study of correlation of cataract among elderly population aged over 65 years in Ut. Chandigrah. *The internet journal of geriatrics and gerontology*. 4(2). DOI: 10.5580/2793.

Song XJ (1992). An epidemiological survey of blindness and low vision in Hebei Province. *Zhonghua Yan Ke Za Zhi.* 28(2): 105-7.

Stobart AK., Griffiths WT., Ameen-Bukhari I., Sherwood RP (1985). The effect of Cd 2+ on the biosynthesis of chlorophyll in leaves of barley. *Physiol. Plant*.; 63: 293–298.

Tanchangya J., Geater AF (2011). Use of Traditional cooking fuels and the risk of young adult cataract in rural Bangladesh: a hospital- based case-control study. *Tanchangya and Greater BMC Opthalmol*.; 11(16) :1-13.

Thankappan KR., Soman B., Srinivas G., Daivadanam M., Mini GK (2007). Prevalence, predictors, awareness, treatment and control of diabetes: results of a community based study in Kerala, India. In: 39th Conference of Asia Pacific Academic Consortium for Public Health, Abstract Book Wako-city, Saitama, *Japan: National Institute of Public Health (NIPH)*. 117.

Veromann S., Sunter A., Tasa G., juronen E., Panov A., Pastak M., Kaljurand K. (2003). Dietary sugar and salt represents real risk factor for cataract development. *Ophthalmol*.; 217(4): 302-7.

Wild S., Roglic G., Green A., Sicree R., King H. (2004). Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care.;* 27: 1047-53.

Yılmaz A., Akkaya E., Bayramgurler B., Guney., Baran A., Kilic Z (2000). Frequency of Posterior Subcapsular Cataracts Due to Corticosteroid Usage in Asthma Patients. *Turkish Respiratory journal*.; 1(1): 51-53.

Yu XM (1992). An epidemiological survey of blindness and low vision in Shandong Province. *Zhonghua Yan Ke Za Zhi.;* 28(6):363-6.

Zhang S (1999). Data analysis on epidemiologic survey of cataract in China. *Zhonghua Yan Ke Za Zhi.;* 35(5): 336-40.

Zodpey SP., Ughade SN (1999). Exposure to cheaper cooking fuels and risk of age related cataract in women. *Ind J Occupational Enviorn Med.;* 3: 159-161.

How to cite this article:

Aleyamma Kuruvilla and Issac Thomas (2018) 'Background Causes of Human cataract in the Three Coastal districts of Kerala', *International Journal of Current Advanced Research,* 07(7), pp. 14330-14335.
DOI: http://dx.doi.org/10.24327/ijcar.2018.14335.2595

****