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Study of Risk Factors Associated with Age Related Macular Degeneration in North Indian Population

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Abstract **Original Research Article**

Introduction: Age-related macular degeneration ARMD is becoming the leading cause of visual impairment. As the size of elderly population is rising in developing countries. To prevent the ARMD and enhance functioning of these persons the knowledge of ris factors are very important. ***Material and Method*:** The study includes 156 patients out of which 50 patients of ARMD and 106 controls all patient's demographic data was recorded and clinical history and examination undertaken all the patients interview to obtain medical residential occupational and smoking history blood pressure visual acuity height weight and refractive error were measured. Detailed ocular examination with the help of indirect of thermos was done and grid and fluorescent angiography done for all patients. ***Result*:** ARMD was most common in 61-70 years age group (40%). 32% of ARMD patients were labor 30% were farmer maximum number 32% of ARMD where illiterate education status was not found to be statistically significant P > 0.9 prevalence of AR MD was higher in hypermetropia 74.07% 22.22% myopia 3.71% was emetropia (P<0.001). Among hyperopia 32% of AR MD patient have refractive error of +2 to +3 D (p< 0.05). 58% of ARMD patient were smokers (P<0.05). ***Conclusion*:** The study found age is the most significant refactor for ARMD. Other significant risk factors were hyperopia, smoking, obesity and high blood pressure. Cataractous lens and colour of iris was not found to be significant risk factors for ARMD patients.

Keywords: ARMD, Age-related macular degeneration, Drusen, wet ARMD.

INTRODUCTION

Age related macular degeneration (ARMD) is one of the leading causes of visual impairment in individuals more than 50 years of age [1]. Now it is becoming the major challenge in the developing countries, as the size of elderly population continues to rise due to betterment of medical facilities and increased life expectancy ARMD was found to be second only to cataract as the cause of severe visual loss even in Asian countries [2, 3].

Role of light exposure and ingesting certain micronutrients in causation of ARMD is not fully established [4-7]. Several studies have found a positive association between cigarette smokings, cardiovascular disease, systemic hypertension, hypermetropia and ARMD [7-9]. To prevent the age-related macular changes and to enhance functioning of this segment of, the knowledge of epidemiology and risk factors for ARMD are important.

Aims and Objective

This study was done with the following aims and objectives:

1. To diagnose clinically, cases of drusen and ARMD, their prevalence in age and sex, unilateral or bilateral
2. To evaluate risk factors associated with ARMD

MATERIAL AND METHOD

This study is a prospective case control study including 156 persons out of which 50 are cases and 106 are controls. Cases and controls matched by age and sex. Cases were selected according to the standard exclusion and inclusion criteria.

Our study comprised of 50 patients of Age - related macular degeneration (cases) and 106 controls. Their demographic data was recorded and clinical history and examination undertaken. 50 cases and 106 controls were interviewed to obtain medical, residential, occupational, smoking as well as social and demographic data. Blood pressure, visual acuity, height, weight and refractive error were measured for both study groups. History of their ocular symptoms was taken and detailed ocular examination including best corrected visual acuity, anterior segment examination and directs indirect ophthalomoscopy was done. A funds diagram was drawn indicating lesions. Central visual field was examined on Amsler grid chart.

The disease was classified as dry or wet. The non-neovascular dry abnormalities noted in ARMD included drusen as well as abnormalities of RPE. Drusen were seen as round, dull yellow lesions located in the outer retina of the posterior pole. The drusen were classified as hard (discrete, well demarcated boundaries), soft (with amorphous, poorly demarcated boundaries), or confluent (with contiguous boundaries between drusen). In some cases, the presence of drusen leads to attenuation or atrophy of the PRE cells. This condition is known as geographic atrophy of PRE or nonexudative or non-neovascular ARMD, in which underlying choroidal vessels are more readily visible, overlying outer retina, is thin and the underlying choroicapillaries appeared attenuated or atrophied as well. Data were analyzed using SPSS software 13.0 for independent samples chi square test was done.

RESULTS

ARMD was most common in age group of 61-70 years. 20 patients were in this age group. 12 patients were in the age group between 71-80 years thus, as has already been described in literature the prevalence of ARMD in patients increased steadily with increasing age. 24 of the 50 patients included in the present study were female. Our study did not show higher prevalence rate in women, as has been described in literature.

74.07% of ARMD cases were hypermetropia while minimum number of people belonged to emetropia. The difference in the prevalence of ARMD cases in different refractory errors as seen in the table above was found to be statistically significant (P<0.001).

Table 1: Age & sex distribution of 50 patients of ARMD and 106 controls

Age Group	Male		Female		Total	
	ARMD +nt	ARMD –nt	ARMD +nt	ARMD –nt	ARMD +nt	ARMD –nt
41-50	2	4	3	6	5	10
51-60	5	10	5	11	10	21
61-70	9	14	11	20	20	34
71-80	7	13	5	12	12	25
>80	3	6	-	3	3	9
Total	26	54	24	52	50	106

As shown in Table 2, maximum number(32%) of ARMD patients with hypermetropia have refractory error of +2 to +3D. while minimum number of ARMD patients with hypermetropia have refractory error of +1 to +2D. The difference in the prevalence of ocular morbidity in different degrees of hypermetropia as seen in the table above was found to be statistically significant (P<0.05). 58% of ARMD pts, were smokers while 42% were nonsmokers (P<0.05).

Table 2: Relationship of degrees of hypermetropia with ARMD cases

Hypermetropia	ARMD + nt (Case No. of eyes)	Percentage	ARMD - nt (Controls No. of eyes)	Percentage
1-2D	05	8.33	25	26.56
2-3D	25	23.58	32	34.04
3-5D	15	14.15	19	20.20
>5D	15	14.15	18	19.10
Total	60	100	94	100

As shown in Table 3, maximum number (44.83%) of ARMD patient were smoking for the last 10 to 20 yrs (P<0.05). So, greater duration of smoking has association with ARMD.

56% of ARMD patients with obese (>26 kg/m²) (P<0.05).So, obesity has association with ARMD. 62% of ARMD patients were hypertensives (P<0.05). Among hypertensive patients, maximum number (67.74%) of ARMD patient have B.P>160 mmHg (P<0.05). 92% of ARMD pts have brown colored iris .6% have black color and only 2% have blue color iris (P>0.05).

Drusens were the most common sign seen in 65.5% eyes. Dry ARMD with drusen was seen in 14.6% and without drusen in 23.9%eyes. Wet ARMD with subretinal neovascular membrane was seen in 4.1%

eyes and disciform scar in 11.4% eyes. 30 (90.9%) patients had drusen in both eyes. Out of 3(9.1%) patients with drusen in only one eyes one had mature cataract in other eyes and one had disciform scar in other eyes. Out of 63 eyes with drusen, 14(22.2%) were associated with Dry ARMD and 5 (7.9%) were associated with exudative macular degenerations. 5 eyes (55.6%) showed no other signs of macular degeneration clinically .3(33.3%) eyes were associated with pigmentary abnormalities of the retinal pigment epithelium. I (11.1%) eye was associated with exudative maculopathy. 63 (65.6%) of the 96 eyes showed hyperfluorescent drusen. 30 (31.3%) eyes showed RPE window defect.2 (2.1%) eyes showed evidence of pigment epithelium detachment not detected clinically. Out of 4 eyes with SRNVM, only 3 were detected on FA, as one eye had overlying subhyaliod hemorrhage. Disciform scars were present in 11 (11.4%) eyes.Fluorescein angiography was not any help in 7 (7.3%) eyes because ofhazy media due to cataractous changes. 54(56.2%) eyes showed defects or distortions in parts of the Amsler Grid Chart. 42(43.8%) eyes showed no defects.

Table 3: Relationship of duration of smoking with ARMD cases

Smoking	ARMD + nt (Case No. 0f eyes)	Percentage	ARMD - nt (Case No. of eyes)	Percentage
5-10 years	6	20.69	20	46.51
10-20 years	13	44.83	13	30.23
>20 years	10	34.48	10	23.26
Total	29	100	43	100

DISCUSSION

Age related macular degeneration is distributed world-wide but predominantly affects the elderly Caucasian population [2, 3]. Framingham eye study showed a prevalence of 5.7 in general population older than 52 years, 1.6% in those who were 52-64 years old, 11% in those aged between 65-74 years and 27.9% in those aged 75 or more years [2]. The prevalence of neovascular ARMD increased from 0.17% amongst subjects aged 55-64 years to 5.8% for those older than 85 years [10]. The median age for the disease in Asians is 73 years[8]. Women have higher prevalence rates than men (Leibowitz *et al*., 1980) [2]. In our study ARMD was most common in age group of 61-70 years, 20 patients were in this age group. The rest of 5 patients belonged to 41-50 years, 10 belonged to 51-60, 12 to 71-80 and 3 to >80 years age group. Our study did not show higher prevalence rates in women.

In our study 32% of ARMD patients were illiterate followed by Middle Primary, High School and Intermediate group (16%, 14%, 14% and 14% respectively) while minimum number (4%) of people belonged to Post Graduate/Professional category (P>0.90). Previous studies also shows no association of ARMD with educational status but epidemiologic survey of senile macular degeneration by Chung Hua Yen Ko Tsa Chih shows the less education, the type of work and the lower socio economic status were independently associated with increased risk of early ARMD [12]. The Beaver Dam Eye Study shows white-collar jobs are at a lower risk of developing ARMD [13]. Education may be a marker for unknown lifelong exposures not as yet directly studied. In Asian population, highest incidence of ARMD is seen amongst miners (7.98%), followed by peasants (7.33%), factory workers (4.94%) and office cadres (2.78%) [14].

In our study 74.07% of ARMD cases were hypermetropia 22.22% were myopics, 3.71% were emetropics (P<0.001). So hypermetropia is associated with ARMD. The prevalence of age-related maculopathy in South India by Narendran V, Tulsiraj RD, Kim R, *et al*., shows hypermetropia was the most significant risk factor for ARMD in a study from south India [15]. Among hypermetropics 32% of ARMD patients with hypermetropia have refractory error of +2 to +3D.

Smoking and visual impairment in New Zealand study, smoking isone of the most consistently documented modifiable risk factor by majority of workers [17, 18]. In our study 58% of ARMD patients were smokers while 42% were nonsmokers (P<0.05). History of smoking was present in 26.8% of all ARMD cases in a recent study from New Zealand [19-21]. In pooled data from Europe, America, Australia history of smoking was present and it emerged as the most important preventable cause of ARMD [20]. We also observed that 20.69% ARMD pts were smoker for the last 5to 10 yrs,44.83% were smoking for past 10 to 20 years, 34.48% were smoking for >20 yrs (P<0.05).

56% of ARMD patient were obese (BMI>26kg/m²) (P<0.05). Schaumberg DA, Christen WG, Hankinson SE, *et al*., shows body mass index of men has also been related to incidence of visually significant ARMD [22]. However, the relationship between BMI and dry ARMD is J-shaped. The obese and the leanest individuals are at a higher risk of ARMD [23]. Obesity is related to high level of oxidative stress. Dietary deficiencies are speculated to be the cause of ARMD in lean men. In females however, waist to hip ratio as compared to BMI is more significantly associated with risk of developing ARMD [24]. We also observed that maximum obeses pts (56%)

are belonging to BMI group between 25-30 kg/m^2, 44% pts have BMI >30 kg/m^2 (P>0.05).

62% of ARMD patient were hypertensives (P<0.05). In literature the present and past history of systemic diseases like cardiovascular disease, hypertension and arteriosclerosis was also associated with higher degree of ARMD. Recently POLA study demonstrated the risk of drusens is less in subjects with CVS disease and increases with the increase in high density lipoproteins (HDL) cholesterol [25].

32.26% ARMD pts have BP between >140 159mm Hg and 67.74% of ARMD patient have B.P>160 mmHg (P<0.05). Our study showed 64% of ARMD patient have cataractous lens. 24% were pseudophakics and only 12% have normal lens (P-0.05). In literature melanin and cataractous lens have protective influence on retina [26, 27]. However, latest report of Beaver Dam Study shows no association of ARMD with Ultra violet-B radiation though sunlight exposure may have bearing on ARMD [28, 29]. Young RW *et al*., reported higher incidence of ARMD in individuals with peripheral cataracts than central cataracts [30]. Central cataracts could have a protective influence on ARMD by cutting the solar rays reaching the macula. As reported by Leslie G hyman, Abraham *et al*., the positive association with blue or medium pigmented eyes, or, alternatively, the protective effect of brown eyes for senile macular degeneration was statically significant [6, 7]. Our study shows that 92% of ARMD pts, have brown colored iris .6% have black color and only 2% have blue color iris (P-0.05).

ARMD is defined as the presence of some degree of visual loss in association with drusen and geographical atrophy of the RPE or changes association with drusen geographical atrophy of the RPE or changes associated with subretinal neovascularization in individuals over 50 years old (Kanski JJ.) In our study, drusen was the most common sign seen in 65.5%eyes. Dry ARMD with drusen was seen in 14.6% and without drusen in 23.9%eyes. Wet ARMD with subretinal neovascular membrane was seen in 4.1% eyes and disciform scar in 11.4% eyes.

Drusen are frequently the earliest clinically detectable feature of ARMD appearing as asymptomatic small, bright, discrete, yellow-white. On fluoresein angiography 65.6% eyes showed hyperfluorescent drusen. 31.3% eyes showed RPE window defect. 2.1% eyes showed evidence of pigment epithelium detachment not detected clinically. CNVM were detected in 3.1% eyes. Disciform scars were present in 11.4%0 eyes. FA was not of any help in 7.3% eyes because of hazy media due to cataractus changes. One eye with exudative maculopathy had overlying subhyloid hemorrhage, therefore the SRNVM was not detectable on FA.

CONCLUSION

ARMD was most common in age group of 61-70 years. The difference in prevalence of ARMD in relation to Educational Status and occupation were not found to be statistically significant. Hypermetropia and smoking was found to be significantly associated with AMD. Majority of ARMD patients were obese (BMI-26kg/m^3). The difference in the prevalence of ARMD in different degrees of blood pressures was found to be statistically significant. The different states of lens and color of iris were not found to be associated with ARMD. Drusen was the most common sign. Wet ARMD with subretinal neovascular membrane was seen in 4.1% eyes and disciform scar in 11.4% eyes. 30 (90.9%) patients had drusen in both eyes.

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