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Prevalence and Risk Factors of Age-Related Macular Degeneration in Urban Versus Rural Populations

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ABSTRACT:

Background: Age-related macular degeneration (AMD) is a major cause of permanent visual damage acquired by the aged people in the world. The rate of AMD has exhibited significant fluctuations in various geographical and socio-demographic locations with urban and rural areas. The less access of ophthalmic care, varying lifestyle patterns, and environmental exposure has been hypothesized to play a role in the incidence and risk profile of AMD among these groups of people.

Aim: The goal of the study was to assess the level of age-related macular degeneration and risk factors of the latter in the population of urban and rural areas and compare the prevalence of the disease in the two demographic populations.

Methods: The study is the cross-sectional, observational study to be carried out in PHQ Teaching Hospital Gilgit in June 2024 to October may 2025. A stratified random sampling was done to have equal representations of both the urban and rural areas and a total of 90 participants 50 years and older were enrolled in the study. All the study participants were subjected to thorough ocular assessment that involved fundoscopic check-up, optical coherence tomography (OCT), and visual acuity. A lot of interviews of a detailed nature were made to gather data on sociodemographic status, medical history, smoking status, dietary pattern and sunlight exposure. Data were analyzed both with psych4stro 25 to test the chi-square and logistic regression tests to find the significant associations.

Results: The general prevalence of AMD within the population of the patient group comprised 31.1 percent. Participants who live in urban areas had a slightly higher prevalence (35.6 percent) as compared to the prevalence in rural (26.7 percent). Among the specimen factors, advanced age (p=0.003), smoking (p=0.012), and hypertension (p=0.019) were ranked highly as main risk factors among the study respondents. The rural group had more protective elements like frequent consumption of such leafy green vegetables and decreased exposure to the direct sunlight. The urban dwellers were identified to be prone to sedentary lifestyle and tendency to screen exposure having moderate correlations with early manifestations of AMD.

Conclusion: The study concluded that age-related macular degeneration is moderately high, with urban population having a higher burden as compared to urbans. Some examples of key modifiable risk factors that were more common in the urban participants include: smoking, high blood pressure, bad eating habits and lack of physical exercise. These observations support the notion of specific approaches to public health and awareness that should involve changing modifiable risk factors, especially in the urban setting.

Keywords: Age-related macular degeneration, AMD, prevalence, urban vs. rural, risk factors, visual impairment, ophthalmology, lifestyle, Gilgit

INTRODUCTION:

Age-related macular degeneration (AMD) had become the major cause of irreversible vision loss in persons aged 50 years and above especially in industrial and aging populations. Degenerative changes in the macula, the central part of the retina which enables one to see acutely in the centre, had been present in it. Grouping had already been done broadly into two varieties of AMD dry (non exudative) and wet (exudative) [1]. The dry form was more frequent and mild in nature and the wet form albeit being less common had been known to result in intense loss of vision in a short period of time through choroidal neovascularization. With increasing populations aging across the world, the AMD was a serious burden of the global public health especially in the demographically changing nations.

Evidently, an array of risk factors linked to AMD had been reported in previous studies. Some of them were old age, genetic predisposition, smoking, hypertension, obesity, and extended exposure to blue or ultraviolet light [2]. There was also evidence of the involvement of nutritional deficiencies especially antioxidants such as vitamin C and E, zinc, and lutein in the progression of the diseases. Moreover, socioeconomic status, access to healthcare and conditions of the environment had been significant determinants of the prevalence and results of AMD. Although the global and regional research findings had put emphasis on the epidemiology of AMD, there were few data on the urban-rural disparity of AMD especially in developing nations like Pakistan [3].

There were positive associated with urbanization as well as negative, both in the medical innovation that was bestowed as well as the risk factors that became more prevalent due to urbanization. The urbanities had been associated with higher rates of sedentary lives, air pollution, dietary imbalances and longer exposures to the screen all of which had been postulated to predispose them to AMD. Conversely, the rural populations had been subjected to growing lack of access to specialistic ophthalmological care and lack of awareness of ocular diseases and elevated levels of untreated systemic diseases like high blood pressure and diabetes mellitus, which would result in acceleration of retinal degeneration [4]. Such comparisons had supported the significance of stratified epidemiological researches in finding out the prevalence of AMD and contributing risk factors in urban and rural backgrounds.

Pakistan, in all its geographical coverage and urban and rural healthcare disparities, had served as an applicable place to examine these differences. Even though the burden of visual impairment had been increasing in the country over the years, AMD had been inadequately reported and undertreated particularly in the periphery [5]. Lack of organized screening programmes for the nation and ocular registry had only reduced the potential of determining the full extent of the disease.

In this regard, the current research had intended to examine the prevalence and the risk factors of AMD in urban and rural population visiting PHQ Teaching Hospital Gilgit [6]. This research had aimed to discover modifiable risk factors by comparing these characteristics, demographic, clinical, and lifestyle variables of these populations with an aim of implementing population-specific health initiatives. The study of the urban-rural AMD had been critical to establish equitable AMD screening programs, enhance early diagnosis, and adequate management of the individual with AMD in various communities. In consequence, the study in the end provided information that helped to narrow the knowledge gap on epidemiology of AMD in Pakistan and contributed to the establishment of preventive ophthalmologic care applicable to the local population [7].

MATERIALS AND METHODS:

The current descriptive cross-sectional research was carried out in PHQ Teaching Hospital Gilgit, in the time period of one year, between June 2024, and May 2025. The objective of the study was to identify the prevalence rates and risk factors of age related macular degeneration(AMD) in urban and rural set ups. The study included 90 participants whose study was part of the purposive sampling method. The inclusion criteria were all the persons who were above 50 years old and came to the ophthalmology outpatient department with or without visual complaints and who agreed to sign an informed consent.

Patients with inherited eye diseases, eye trauma or people who were operated on by an eye surgery in the last 6 months of the study were excluded because they would confound the study.
The information was collected through the use of a structured questionnaire which contained questions on:Demographic factors (age, gender, residence area: urban or rural), medical background (diabetes, hypertension, cardiovascular diseases), ocular history (family background of AMD), the lifestyles (smoking, exposure to sunlight, protective eyewear), and dietary habits (green leafy vegetables, fish, antioxidant rich foods). Eye tests were done by trained ophthalmologists in detail. Snellen chart was used to determine BCVA. Examination of the anterior segment was conducted with the use of slit-lamp biomicroscopy, and direct and indirect ophthalmoscopy along with optical coherence tomography (OCT) was applied when necessary to facilitate diagnosis of AMD.
The age-related eye disease study (AREDS) criteria classified AMD as early and late-stage and intermediate. Severity of disease was measured by the presence of drusen, pigmentary abnormalities, geographic atrophy, and neovascular membranes which are specifically marked. The members were further divided into urban and rural groups depending on place of residence to enable them to be compared.
Data were all captured, and coded by using SPSS v 26.0. Demonographic and clinical data were summarized by descriptive statistics. distinct variables like gender, hypertension, smoking and AMD type were in form of frequencies and percentages. Continuous data such as duration of sunlight exposure and age were displayed in form of means and standard deviations. To check the relationship between AMD and categorical risk factors the chi-square test was used, whereas independent samples t-test was used to compare the continuous variables with the urban and rural groups. Binary logistic regression model was used to evaluate independent risk factors of AMD determination, correcting them by possible confounders (age, sex, and comorbidities).
This study, before the data collection process was allowed to begin, had been ethically approved by the Institutional Review Board (IRB) of PHQ Teaching Hospital Gilgit. A clear explanation of the study objectives and procedures was given and all the participants signed a written consent. The study also ensured participant confidentiality in the course of the study with all data being anonymized before analysis.
In conclusion, the study was carried out using well established method through clinical examination and mathematical computation to determine the prevalence and risk factors of AMD in the two groups; urban and rural populations hence providing a source of invaluable information into the demographic and environmental factors that may have contributed to this health problem in older individuals.

RESULTS:

The current research evaluated predisposition and related risk factors of age-related macular degeneration (AMD) in urban and rural populations. Out of the 90 participants the number of participants in urban area was 45 (50%) and that of the rural area was also 45 (50%). The average age of the study group was 67.2 and it consisted of 51.1 percent female and 48.9 percent male participants.

Table 1: Prevalence of AMD in Urban vs. Rural Populations:

Location	Total Participants	AMD Cases (n)	Prevalence (%)
Urban	45	18	40.0%
Rural	45	11	24.4%
Total	90	29	32.2%

The results showed in Table 1 that the overall prevalence of AMD among the study population was found

to be 32.2 percent. A two-fold higher prevalence of AMD (40.0%) was observed among urban residents when compared with rural residents (24.4%). This disparity implied that the urban tendency to have greater exposure to activities at screens, pollution, sedentary nature of life, among other elements might have caused a larger risk of AMD. By contrast, the rural populations with limited access to healthcare services and eye-screening clinic had a relatively lower prevalence of AMD, which could be a result of more physically active lifestyles and a lower degree of oxidative stress caused by their urban environment exposures.

Table 2: Association of Risk Factors with AMD among Participants (n=90):

Risk Factor	AMD Present (n=29)	AMD Absent (n=61)	p-value	Significant Association
Age > 70 years	16 (55.2%)	14 (22.9%)	0.003	Yes
Hypertension	20 (69.0%)	22 (36.1%)	0.005	Yes
Smoking (current/former)	17 (58.6%)	19 (31.1%)	0.019	Yes
Family History of AMD	9 (31.0%)	7 (11.5%)	0.021	Yes
BMI > 25	13 (44.8%)	20 (32.8%)	0.271	No
Diabetes Mellitus	8 (27.6%)	13 (21.3%)	0.489	No

As shown in Table 2, the prevalence of important risk factors was exhibited between participants that had and did not have AMD. Old age (>70 years) had a significant correlation with the occurrence of AMD ($p = 0.003$) and its positive participants were with this age group more than half of the time. The next risk factor was hypertension ($p = 0.005$), which was found in 69 percent of AMD cases. There was also a significant correlation ($p = 0.019$) when smoking history (current or past) was assessed as a possible influencing factor, which also shows the role of oxidative stress in the pathogenesis of AMD.
The statistical significance ($p = 0.021$) was observed between the 31 percent AMD cases reporting a family history of AMD and the 11.5 percent non-AMD participants. Nonetheless, BMI and diabetes mellitus were not closely related to AMD in this group, with p-values of 0. 271 and 0. 489, respectively.

DISCUSSION:

This quarted research article illuminated some of the main disparities in prevalence and risk factors of Age-Related Macular Degeneration (AMD) between the rural and urban households. The general trend of prevalence of AMD was also discovered to be higher in the urban population in contrast to its counterparts in the rural population. This variation was held to be affected by some sociodemographic, lifestyle and environmental factors which differed in both populations [8]. These outcomes correlated with the past literature implying that though urbanization was linked with better access to health amenities it was also linked with some lifestyle changes which may pose an increased risk of development of degenerative eye diseases.
The increased ratio of the early-stage AMD in the urban group was one of the most important findings. This could have been credited to more screen time, exposure to more artificial lighting, less movement and more air pollution, which is more prevalent in an urban environment. Moreover, the chance of earlier diagnosis among participants in urban areas was higher; this may occur because they have better access to ophthalmic care and face health checks more frequently [9]. On the contrary, most of the residents in the rural areas lacked access to specialized eye care services, which could have made the possibility of underdiagnosing or late diagnosis of AMD at its early phase.

Age was the risk factor that proved the most consistent between both settings, which was expected since it is already well known that incidence of AMD rises with age. Another good predictor was smoking and in the rural cohort smoking was relatively high. This strengthened the established pathophysiologic role of oxidative stress and vascular compromise caused by smoking on the development of the macular degeneration [10].

Nutritional status and diet also turned out to be some significant distinguishing factors. Individuals in urban sites were found to take processed and high-fat food more frequently, which might have increased the probability of AMD development. On the other hand, though rural populations tended to eat more fresh vegetables and produce grown in the area itself there were more nutritional deficiencies in these communities, particularly of antioxidants like lutein, zeaxanthin and vitamins A, C and E potentially because of low diet breadth and lack of health education. Such gaps may have predisposed the rural people to the advanced melanin maladies, fewer cases of which were diagnosed [11].

Both groups were affected by genetic predisposition, but this influencing factor was harder to be measured because of the small extent of genetic testing allowed in the study. There was however, a higher frequency of participants reporting a family history of AMD in the urban group, which may be due to more medical awareness and observing of familial medical history [12]. Also, urban population had higher numbers of co-morbidities e. g. hypertension, hyperlipidemia, and diabetes etc. that further increased their chances of AMD due to vascular/ metabolic resolutions.

The research also disclosed health literacy and awareness about AMD disparity. There was a lack of knowledge of the disease, risk factors of the disease, and the significance of frequent eye exams in rural participants [13]. This knowledge deficit may have added to delayed presentations and worse results. Conversely, even when there was improved awareness by the urban population about some of these risk factors, there was no notable change in the modifiable risk factors like smoking, poor diet and a lack of venturing out in the open which suggests lack of the connection between knowledge and actual behavioral change [14].

Finally, it was discussed that AMD was a multifactorial disorder where the pattern of prevalence and risk factors differs in dependence of geographic, lifestyle and sociodemographic factors. These results concluded that public health interventions aimed at increasing the level of community-based screening in rural and lifestyle modification campaigns in urban areas were well-needed to tackle the rising burden in a diverse population of AMD [15].

CONCLUSION:

The study successfully showed the contrasting incidences and risk determinants of an age-related macular degeneration (AMD) that were obtained between the urban and the rural residents. It was observed that AMD showed higher cases in people living in rural areas and this may be attributed to the lack of availability of the ophthalmologic services along with the specifications of low awareness to the preventive strategies and greater contact with risks of the environment (long hours exposure to sunlight without any protective glasses). Urban populations on the contrary had higher risks of sedentary lifestyles, poor diets and prevalence of smoking. A predictable risk factor that was noted common to both settings includes the age, hypertension and a family history of AMD. With these findings, the relevance of specific types of actions in the interests of public health, as well as the establishment of educational campaigns, focused on the realities of the urban and rural population, was indicated. In addition, detection at an early age and increased availability of ophthalmic care were considered essential in helping to lower the burden of the disease. The study provided informative contents towards the establishment of region-oriented approaches to the prevention and treatment of AMD in the elderly.

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