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Retinitis Pigmentosa: Genetics and Clinical Presentation

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Purpose: To evaluate clinical presentation and inheritance patterns in patients of retinitis pigmentosa.

Material and Methods: This study was conducted in the department of Ophthalmology, Dow University of Health Sciences, Civil Hospital Karachi and Sindh Government Lyari Greneral Hospital Karachi from October 2002 to March 2008. Ophthalmic examination was performed on 112 patients and their family members to identify affected individuals and to characterize the disease phenotype. Family pedigree was obtained. Some family members also had fundus photographs and fluorescein angiography.

Results: Legal blindness at the time of presentation was found in 104(46.4%) eyes while 76 (33.9 %) eyes have visual impairment. Visual field was constricted on confrontation in 44 (39.3%) cases. Regarding modes of inheritance, autosomal dominant was found in 5 (4.5%) autosomal recessive in 78(69.6%) and X-Linked in 7 (6.3%). Twenty two (19.6%) cases were sporadic. Typical retinitis pigmentosa picture was found in 97 (86.6%) while 15 (13.3 %) patients showed atypical picture in which 6 (5.35%) cases of pericenteric RP, 5(4.46%) cases of Usher's syndrome and 2(1.78%) cases of retinitis punctata albescence. One case of Bardet-Biedl syndrome and one case of Cockayne's syndrome was found.

Conclusions: There is a high prevalence of blindness among patients of retinitis pigmentosa. Autosomal recessive mode of inheritance is the most common. Blindness from retinitis pigmentosa can be prevented by early diagnosis and by

motivating the patients to avoid cousin marriages.

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Retinitis pigmentosa is a generic name given to a group of hereditary disorders characterized by progressive loss of photoreceptor and retinal pigment epithelium (RPE) function[1]. The prevalence is approximately 1 in 4,000 and about 1.5 million peoples are affected world-wide[2]. Retinitis pigmentosa is the commonest retinal dystrophy affecting young individual, causing progressive loss of visual acuity and visual fields and making them visually handicapped[3,4].

Different classifications of retinitis pigmentosa have been described by different authors based on Mendelian pattern of inheritance. Mode of inheritance in these patients has a definite impact on progression of vision loss[5]. Propose of this study was to highlight the clinical presentation and inheritance patterns in our population and compare this to the populations of other countries.

MATERIAL AND METHODS

From October 2002 to March 2008, one hundred and twelve (112) patients of retinitis pigmentosa were examined in the ophthalmic outpatient department of Dow University of Health sciences, Civil Hospital Karachi and Sindh Govt. Lyari general Hospital Karachi, Pakistan. Basic socio-demographic data was recorded on a prescribed performa. Family history and history of contagiousness was obtained from all patients and pedigree was analyzed. An effort was made to examine whole family members. According to the mode of inheritance the patients were categorized into the following broad classes[6,7].

Autosomal dominant (AD): All subjects in this category showed vertical transmission of the disease for at least two generations. Unaffected members did not transmit the trait to their offspring. Both males and females were at equal risk.

Autosomal recessive (AR): One or more subjects were affected. Parents are unaffected. Patients with parental consanguinity were included in this class.

X-Linked (XLRP): Subjects affected were males. Females were carriers. Vertical transmission of the trait for at least two generations was observed. Affected males did not transmit the disease to their offspring.

Sporadic or Isolated (ISO): This category included subjects with no known genetic history. A single individual was involved.

All the patients underwent complete ophthalmic examination including assessment of visual acuity using Snellen's acuity chart, retinoscopy to find out refractive errors, color vision, visual fields by confrontation, applanation tonometry and slit lamp biomicroscopy of both anterior and posterior segment. Fundus examination was done with direct and indirect ophthalmoscope, Goldman triple mirror and +90 D. non-contact lens. Colored fundus photography and fundus fluorescein angiography was performed in selected cases.

Data entry and analysis was done in SPSS (Statistical Package for Social Sciences, USA) version 11.00 for Windows.

RESULTS

One hundred and twelve patients with a clinical diagnosis of retinitis pigmentosa were selected for analysis. Age of the patients ranged from 4 years to 90 years with a mean age of 28.86 years (SD± 16.52), 91 (81.3 %) patients were below the age of 40 years (fig.1) Females (74) (66.07%) were found to be more than males 38 (33.93%) (Fig.2). Fifty two (46.4%) patients were from local population wile 60 (53.6%) were referred from other areas and hospitals. Visual acuity ranged from 6/6 to no perception of light with a mean of 6/24 (Table 1). One hundred and four (46.4%) eyes were legally blind at the time of presentation while 76 (33.9 %) eyes have visual impairment (Table 1). Visual field was constricted on confrontation in 44 (39.3%) cases. Intraocular pressure was found raised in 2 (1.78%) cases. Refractive errors were found in 53 (56.2%) patients with myopia in 48 (42.9%), hyper-metropia in 15 (13.4%) and astigmatism in 17 (15.2%)

(Table 2). Positive family history was found only in 60 (53.6%) (Table 3) patients while history of cousin marriage was found in 81 (72.3%) patients (Table 4). Regarding modes of inheritance, autosomal dominant was found in 5 (4.5%), autosomal recessive in 78(69.6%) and X-Linked in 7 (6.3%). Twenty two (19.6%) cases were sporadic (Table 5). Ninty seven (86.6%) patients have typical retinitis pigmentosa while 15 (13.3 %) patients showed atypical picture in which 6 (5.35%) cases of pericenteric RP, 5 (4.46%) cases of Usher's syndrome and 2 (1.78%)cases of retinitis punctata albescence. One case of Bardet-Biedl syndrome and one case of Cockayne's syndrome was found (Table 6). Cause of blindness was found to be cataract in 59 (52.7%) patients, glaucoma in 2 (1.78%), atrophic maculopathy in 42 (37.5%), cellophane maculopathy in 32 (28.5%) and combined cellophane and atrophic maculopathy in 10 (8.9%) patients (Table 7).Vitreous was degenerated in 76 (67.8%) patients. Keratoconus was found only in one (0.9%) patient and optic nerve head drusen was found in one (0.9%) patient.

DISCUSSION

Retinitis pigmentosa, the most common retinal dystrophy, affects retinal function adversely in working age group making them visually handicapped[2,8]. Mean age of presentation reported in western literature is 24 years while in our study it was 28.86 years (P=0.002)[9]. This indicates a late

Table 1: Categories of vision in both eyes

Visual acuity	Frequency n (%)
3/60 or Below	104 (46.4)
3/60 to 6/60	31 (13.8)
6/60 to 6/18	45 (20.1)
6/18 to 6/6	44 (19.6)
Total	224 (100)

Table 2: Distribution of refractive errors

Refraction	Frequency n (%)
Emmetropia	32 (28.6)
Astigmatism	17 (15.2)
Hypermetropia	15 (13.4)
Myopia	48 (42.9)
Total	112 (100)

Table 3: Family history

	Frequency n (%)
Positive	60 (53.6)
Negative	52 (46.4)
Total	112 (100)

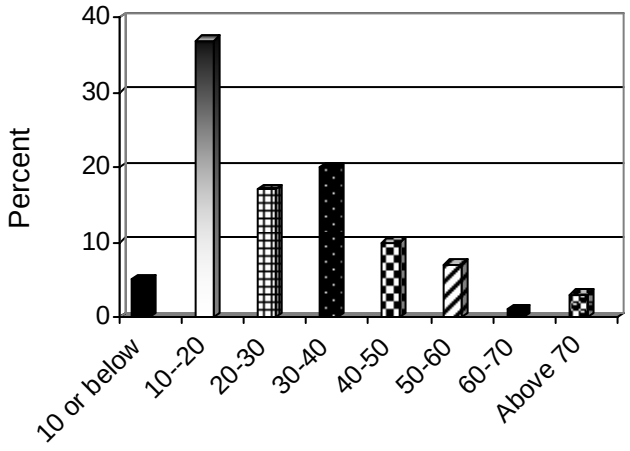

Fig. 1: Categories of age

Table 4: Consanguineous marriages

	Frequency n (%)
Absent	31 (27.7)
Present	81 (72.3)
Total	112 (100)

Table 5: Distribution of modes of inheritance

Modes of inheritance	Frequency n (%)
Autosomal dominant	5 (4.5)
Autosomal recessive	78 (69.6)
X-linked	7 (6.3)
Sporadic	22 (19.6)

Total	112 (100)

Table 6: Distribution of types of retinitis pigmentosa

Types of RP	Frequency n (%)
Typical Retinitis Pigmentosa	97 (86.6)
Atypical Retinitis Pigmentosa	15 (13.4)
o Pericenteric RP	6 (5.35)
o Usher's Syndrome	5 (4.46)
o Retinitis Punctata albescence	2 (1.78)
o Laurance moon Biedl Syndrome	1 (0.9)
o Cockayne Syndrome	1 (0.9)
Total	112 (100)

Table 7: State of maculae

Maculopathy	Frequency n (%)
Atrophic	49 (43.8)
Celluphane and atrophic	15 (13.4)
Celluphane maculopathy	15 (13.4)
Normal maculae	27 (24.1)
Pigmentary	6 (5.4)
Total	112 (100)

Table 8: Proportions of genetic types

Country	Autosomal recessive	Autosomal dominant	X-linked	sporadic	Study	Year of Study
Switzerland	90	9	1	…	Ammann et al[14].	1965
Finland	37	19.5	4.5	39	Viopio et al[14].	1964
Russia	27.9	12.7	1.1	40.0	Panteleeva[14]	1969
England	15	39	25	21	Jay[14]	1972
USA	83.9	10.1	6	…	Boughman et al[14].	1980
India	35.1			27.15	Vinchurkar et al[15].	1996
Pakistan	69.6	4.5	6.3	19.6	This study	2008

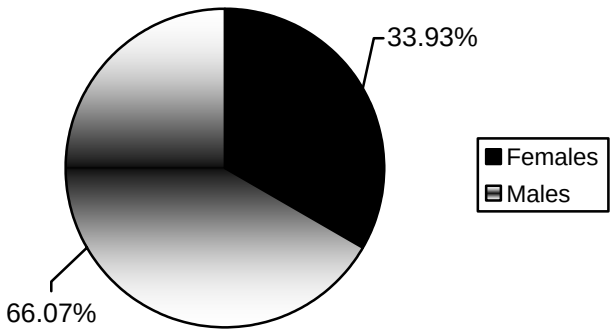

Fig. 2: Patients gender

presentation in our population. In this study there is amale preponderance which might be due to social and cultural background. Most of the patients in this study (81.3%) are below the age of 40 years, this indicates that working age group is mainly affected. Regarding modes of inheritance autosomal recessive was most common found in 69.6% patients. Different studies give different proportions (Table 8).This might be related to more cousin marriages in our society[10], different ways to classify this disorder and difference in recording patterns. In our study 46.4% eyes were legally blind at the time of presentation compared to 25% in western literature[11]. We found cataract or lens extraction in 52.7% cases which is almost similar to reported in litrature[12].

CONCLUSION

- Retinitis pigmentosa is a common blinding disease.
- Electrodignostic facilities should be available at least in a tertiary care hospital for early diagnosis of this disease.
- This disease can be prevented in part by avoiding
- cousin marriages

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