CASE REPORT OPEN ACCESS

Clinical Presentation of Congenital Heterochromia Iridis in Pakistani Patients

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ABSTRACT

Heterochromia iridis is a rare genetic disorder, characterized by variation in the concentration and distribution of the melanin pigment. It is caused by mutation in genes responsible for synthesis of melanin pigment iris of eye. Heterochromia Iridis is inherited as a simple Mendelian trait. Heterochromia is normally harmless and do not require any specific treatment. It can be caused by congenital and acquired condition like Waardenburg and Horner syndrome. It is also occur due to eye trauma. Eye trauma leads to iron deposition in the eyes which darkens the human iris. There are four types of Heterochromia, such as complete, partial, central and sectoral Heterochromia. Here we report 3 individuals, two with complete heterochromia iridis and one with sectorial/partial heterochromia iridis. Multiple disorders associated with heterochromia iridis but these three individuals do not possess any other disorder. Counseling helps to reduce the psychological and mental pressure of the Heterochromia patients.

Keywords: Clinical Case Report, Heterochromia, Iridis, Congenital eye abnormalities

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INTRODUCTION

Heterochromia is a variation in iris color. Iris color is determined by the concentration of the melanin pigment[1]. It may be congenital, syndromic or caused by an injury[2]. Congenital heterochromia iridis is an autosomal dominant[3]. Congenital cases are associated with Sturge-Weber, Waardenburg, and Horner syndrome[4].

Heterochromia affects 1 in every 200, 000 people in the United States. The prevalence ratio in Pakistani population is unknown due to limited literature is available related to Heterochromia prevalence. In the iridis, heterochromia can be complete, sectoral, or acquired. The amount of melanin pigment influences the eyes color. Higher levels of melanin produce brown colour, while lower levels produce blue colour in the eyes[5].

CASES PRESENTATION

In first case fifteen (15) years old boy, having a light silver color right iris and brown color left iris (Figure 1A). The boy was born with complete heterochromia iridis (congenital heterochromia). Ocular examination revealed that there is no decrease in eye sight. There is no inflammation or any tumor present in his eyes. There is no family history of heterochromia iridis form the past 4 generations. Both Parents and siblings did not show the presence of heterochromia. The boy is healthy, and no other medical condition associated with him. He has no specific medication and no iron deposition sign which may

cause darken iris. His all sibling are healthy with no medical record as well.

In second case 6 years old male child, having light silver color right iris and brown color left iris (Figure 1B). This condition was observed by parents within days after the child birth. He was gone through for complete medical examination in local hospital and no anomalies were identified except the iris with different color. Ocular examination revealed that there is no decrease in eye sight; only complete Heterochromia was diagnosed in the children. There is no other medical condition has been associated with children expect the distinct eyes color. Parents and siblings of the affected child did not show the presence of Heterochromia or any other medical condition associated with Heterochromia.

In third case 22 years of young girl, having case of partial congenital heterochromia iridis. She has light silver color left iris and brown colour right iris (Figure 1C). The girl was born with partial congenital heterochromia iridis. Both the eyes sight are normal and no inflammation or tumor present in the eyes. Both parents and the sibling are also having no sign of Heterochromia

Figure 1: (A) In first the left eye is blue and the right eye exhibiting dark brown color, it is called complete heterochromia case. **(B)** In second picture the children left eye is blue and right eye is light brown color. **(C)** In third picture children left eye is lighter dark color and right eye is light blue color.

DISCUSSIONS

In this study we have performed clinical analysis of three individuals with heterochromia. The outcome of the study suggests that two of them are affected with complete heterochromia and the third case is of partial congenital heterochromia. A comparison analysis also performed by doing literature search and identified similar type heterochromia, such as complete and partial congenital heterochromia also present in the globe as well. Clinical analysis of Moroccan origin girl also exhibited hyper pigmented skin and sectorial heterochromia iridis with blue right eye and brown left eye[6]. In other study in Saudi Arabia, a girl diagnosed with Beckwith-Wiedemann syndrome (BWS) also exhibited partial iris hypopigmentation in her left eye[7]. Different research studies shown association of Heterochromia Iris with other genetic syndromes, for example; Waardenburg syndrome, Horner Syndrome and Sturge-Weber syndrome[8, 9]. So, all homosapien possess different eye colors among each other due to genetic traits they carry from their parents. The melanin pigment concentration in the iris mainly determines eye colors. There is a distinctive feature in human eye colors and varies from person to person. Four major factors which influence iris pigmentation are: the melanin pigment concentration in the iris melanocytes, the pigment epithelium granules, melanin pigment nature within the iris melanocytes and the extracellular stromal matrix absorption and light scattering properties[10]. The higher melanin concentration in iris leads to brown colour whereas the lower melanin shows blue colour in eyes. The mode of inheritance of eye color was thought to be as a simple Mendelian trait, in which the dominant trait was considered as brown and recessive trait as blue color, but according to previous studies that eye color may follow polygenic mode of inheritance[11].They are two main types of heterochromia one is congenital and other is acquired. Congenital heterochromia is further classified into complete heterochromia iridis and partial/sectoral heterochromia iridis. Acquired heterochromia is occurred due to some injuries, medication or some infections. It is linked with some diseases or syndromes like waardenburg syndrome, congenital horners

syndrome, Sturge-weber syndromes, parry-Romberg syndromes but rarely. The pathway responsible for the production of melanin pigment is 8- HTP. Chromosomal homogeneity genes mutations corresponding to the 8-HTP pathway may lead to the development of heterochromia iridis[12]. There are 15 genes have been linked with eye colour. From which two major genes are OCA2 and HERC2 are involved in iris colour. Mutations in these genes cause variety of eye colour in humans[13]. Three affected sporadic cases presented in this study, and a clinical examination was performed. All the patients have heterochromia iridis. In Pakistan there is a little awareness with regards to heterochromia, which is linked with other genetic disorders or diseases. Molecular genetic analysis of the affected individuals will be carried out to check for any novel or previously known mutations in targeted genes.

CONCLUSION

Though Heterochromia iridis phenotypes are very rare in Pakistani population, it is extremely important to address the ocular diseases associated with condition. In present study three cases were studied, two of them diagnosed with complete Heterochromia and the third one is diagnosed with congenital Heterochromia. Due to high consanguineous marriages, risk of acquiring autosomal recessive conditions is high in Pakistani population. In some cases, Heterochromia is associated with genetic condition such Waardenburg syndrome and Horner's syndrome. There is a need for more clinical and genetic research to understand the Heterochromia in Pakistani population. People must undergo for medical examination and genetic testing for the correct diagnosis of the disease.

DECLARATIONS

Not applicable

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We are highly acknowledged the children and parents participated in our research.

CONFLICT OF INTEREST

All the authors declared no conflict of interest.

ETHICAL APPROVAL

This case report is original research, and it is not submitted in whole or in parts to another journal for publication purpose.

INFORMED CONSENT

The case report is thoroughly reviewed by all authors and manuscript is approved for submission.

AUTHORS CONTRIBUTION

BA: Manuscript original draft and writing, **MI:** writing and proof-reading formatting, **SN:** help in the writing and drafting the text, **SBEI:** Writing and review, **SBM:** writing and proof reading.

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