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Original Article

Association Between Childhood Refractive Error And Parental Smoking

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OBJECTIVE: To find out the different aspects of parental smoking on type /severity of refractive errors in their children.

METHODS: It was an institution based study, conducted on 150 patients aged between 2 and 20 years having refractive error. It included children with at least one smoker parent, and with no associated ocular and systemic pathology. Refractive errors were measured by doing cycloplegic (1%) retinoscopy and subjective refraction on each individual. Results were obtained by asking the patient to fill a structured and questioner Performa.

RESULTS: Majority of children aged between (2-20 years) i.e. 56% were having hypermetropia and 44% were having myopia. In terms of severity of refractive error out of 150 children 64%had mild (0.75-1.50DS) refractive error while 36% had moderate (1.50-3.00DS) refractive error. Duration of father's smoking had great impact on childhood refractive error i.e. if father's smoking duration was 15+ years, 84% children had hypermetropia while 66% had myopia.

CONCLUSION: It is concluded that parental smoking plays a role in refractive development especially hypermetropia in their children aged between(2-15 years).Duration of parental smoking (father only in our study) has more influence on the severity of refractive errors.so, hypermetropia is more common refractive error among tobacco smokers' children than myopia.

INTRODUCTION:

The main purpose of God gifted eye is to see clearly at all distances. Emmetropia is an optical normal condition which is defined as the parallel light rays coming from infinity focused at the sensitive layer of retina with least accommodation or being at rest. While in optically defective eye “Ametropia" (refractive error) parallel rays of light coming from the infinity do not focus perfectly on the retina[1].One of the major cause of visual abnormalities in world is refractive error.[2] Refractive error is the fixation problem of the eye in which condition the eye cannot focus the light properly. Like In myopia (near- or short-sightedness), there is abnormality of the eye from the normality in myopic condition the axial length of the eye becomes too large or corneal power becomes high due to increase in the corneal curvature. That is why distant objects seem unclear because the parallel rays of light do not focus on the retina but focus in the front of it. Rays of light appear to focus behind the retina and in this condition the near objects seems blurry known as hypermetropia. In Astigmatism, faint or indistinct vision happens due to irregularly shaped cornea or lens. That is why the parallel rays of light do not focus on a single point of retina but are focused on multiple points.[3]

The effects of smoking on our eyes and vision might be significant. Tobacco smoke comprises over 4,000 substances, including many well-known carcinogens, irritantsand the inflammatory agents. As we know smoking tobacco or being exposed towards tobacco smoke leads to the damage of our health, but that one can also increase the risk factor for developing the number of eye diseases and disorders.

Nicotinic cholinergic receptors are the main class of acetylcholine receptor.[4] Therefore, it is suspected that the neural forms of nicotine acetylcholine receptors might have a role in the development of refractive error. Cigarette smoke contains Nicotine it activate the nicotinic cholinergic receptors that cause the development of refractive error of eye like the development of myopia. It is hypothesized that the children are passive observer so those parents who smokes have the refractive changes in their children through passive smoking which contain nicotine.[5]

Smoking is a main avoidable cause of morbidity and death in the world. Epidemiological facts showed smoking is a major fact of many cardiovascular, pulmonary, and malignant diseases. Many smokers know that smoking may cause death. A very few people know that smoking affects their daily routine life.[6] In recent years, smoking appears to be one of cause of blindness. It causes many ocular pathologies like cataract, age related macular degeneration, and glaucoma. This may cause visual dysfunction and ultimately lead to blindness worldwide.[7]

Stone demonstrated the perception of smoking by children living in smoky environment. The children living in smoky environment will have bad health and eyes refractive status as compared to those children who are living in healthy environment not in the smoky environment [8] while it is clear that children of smoking mothers might have developed hyperopia. Many studies show that acetylcholine receptors show the relation between maternal smoking and child refractive error.

When either mother or father or both of them are smokers, their children are found to have myopia with a prevalence of 25.4% vs. 12.4% ($p = 0.004$) and hyperopia of 1.83 ± 0.24 diopters vs. 0.96 ± 0.27 diopters ($p = 0.02$) as compared to children whose parents never smoke. The same effect occur during pregnancy of mother if one or both parents smoke then their child is at the risk of developing myopia or hyperopia which may result in strabismus and amblyopia.[9]

A study in USA showed relation between childhood myopia and parental smoking. That study has showed that in parental smoking children there is more Hyperopia and less myopia when either their parents smoke at home or during pregnancy.[10]

Smoking in Pakistan has been estimated to be 21.6% (36% males and 9% females) with male preponderance. This study is aimed to find out the relationship between smokers and their children especially regarding development of refractive errors in the children exposed to second hand smoke.

AIMS AND OBJECTIVES:

The aims and objectives of study were:

1. To determine the different aspect of parental smoking in their children's refractive development of eye.
2. To find an association of childhood refractive errors whose parents were smoking.
3. To find out the type of refractive error that is most prevalent in children's of smoking parents.

STUDY DESIGN, MATERIAL AND METHODS:

This descriptive cross-sectional study was conducted at College of Ophthalmology and Allied Vision Sciences (COAVS), Lahore, from September 2015 to December 2015. One hundred and fifty patients were included in study by using non probability purposive sampling method. The type of refractive error was measured objectively by cycloplegic (1%) retinoscopy and by subjective refraction among the children's of smokers. Visual acuity was measured on Snellen's acuity chart. All the data was assessed by filling a self-structured and questioner proforma. Data was recorded and entered in statistical package for social science (SPSS Version20.0).the results were analyzed and tabulated by using same software.

RESULTS:

Fig:1 Type of refractive errors:

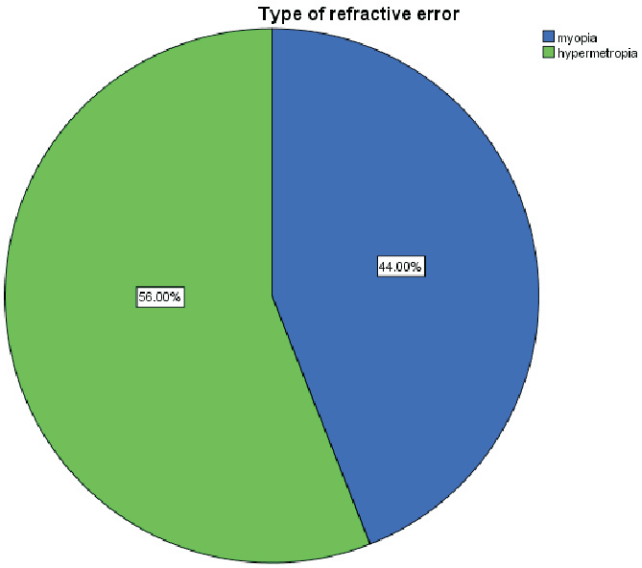


Fig no 1 shows that out of 150 patients, 56% were hypermetropic and 44% were myopic i.e. there were more hypermetropes than myopes in this study.

Duration of father smoking vs. Type of refractive error

		Type of refractive error		Total
		myopia	Hyperm etropia	
Duration of father smoking	00 - 05 yrs	0	14	14
	05 - 10 yrs	13	20	33
	10 - 15 yrs	14	18	32
	15 + yrs	39	32	71
Total		66	84	150

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.727[a]	3	0.002
Likelihood Ratio	19.932	3	0
Linear-by-Linear Association	11.805	1	0.001
N of Valid Cases	150		

This chi- square test compares the duration of father smoking versus type of refractive error. The results shows hyperopia is more as compared to myopia. The results were highly significant with (p=0.002) which is less than (p=0.05).

Duration of father smoking vs. severityof refractive error

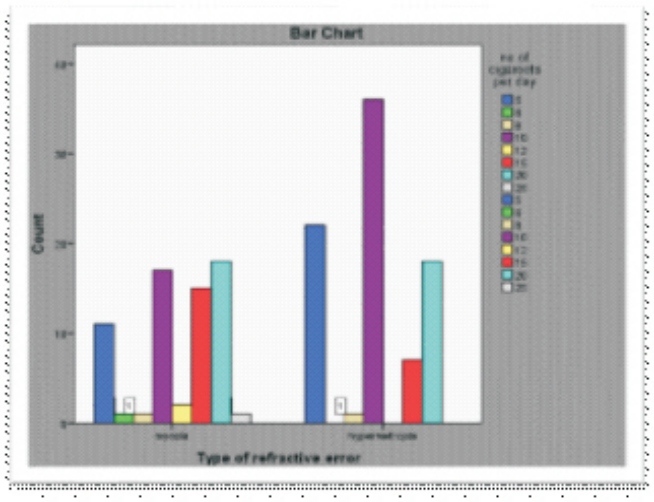
Duration of father smoking (Years)	severity of refractive error		Total
	0.75-1.50 (mild)	1.50-3.00 (moderate)	
0-5	14	0	14
5-10	24	9	33
10-15	20	12	32
15+	38	33	71
Total	96	54	150

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.381[a]	3	0.006
Likelihood Ratio	16.938	3	0.001
Linear-by-Linear Association	11.261	1	0.001
N of Valid Cases	150		

In this cross table severity of refractive error*duration of father smoking shows that if duration of father smoking is prolonged like 15+ years the severity of mild (0.75-1.50DS) refractive error also increased thatshows more significant (p=0.006) which is less than (p=0.05).

Type of refractive error * No of cigarettes per day (Chi-Square Tests)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.450[a]	7	0.031
Likelihood Ratio	17.06	7	0.017
Linear-by-Linear Association	4.829	1	0.028
N of Valid Cases	150		



According to this data if number of cigarettes smoked increased day by day the chances of refractive errors would also increase. This cross table shows the highly significant (p=0.003) with Comparison of refractive error and tobacco smoking per day.

DISCUSSION:

The first large scale study was done on children of different age groups like 6-72 months of age to find relation between childhood refractive in association with parental smoking. Parental smoking history show decreased amount of childhood myopia and increased amount of childhood hypermetropia. This association between childhood refractive error and parental smoking aware the people because in smoking nicotine receptors are present these receptors also develop in the eye.

A similar population study was performed in 1999 and 2001 studying myopia and parental smoking in older Singapore Chinese children showed no significant link between parental smoking and refractive error.This study showed that children of mothers who used to do smoking were more likely on to have a hyperopic refractive error than in children whose mothers did not use to smoke. The number of such mothers in the study population was, however, too small to make any further final conclusions.

Another early population-based study9in the United States studied the link between childhood myopia and exposure to parental smoking. This study give result that parental smoking (either by mother or father) to be give the relation with lower myopic occurrence and more hyperopic mean refractions. Smoking at home, smoking during the child's life, and smoking during pregnancy by either parent were contrariwise related to the development of childhood myopia.

In the result of this finding of such an inverse relation between smoking and development of myopia, more studies are needed to better understand the role of nicotinic acetylcholine receptor pharmacology in ocular development and myopia. This may stop the prevalence of developing myopia in the children's in this way life of many children can be saved and can be protected from developing refractive error.[11]

Cigarette smoking have different harmful components, much more studies are needed to understand the mechanism of development of refractive error by smoking. The receptors of smoking are present in the body to understand their presence studies are required. The development of refractive error like more hyperopia and less myopia shows that both parental and childhood exposure of smoking.

A long-held and extensive study suggested environmental and genetic factors' interfering refractive developments and the causes of ametropia are well known. Laboratory research has now shown that visual input rules the refractive development of chicks and mammals that the retina plays a major role in controlling the development of refractive error, and that recognizable receptor system is involved in the controlling process.[11]

The analysis of my study indicates the harmful effects of parents smoking on their children health especially on their visual system. The data of my research supported all previous studies.

On this topic but in my study I found severity of childhood refractive error prevalence more in Pakistan. In my research work duration of parents smoking especially father duration showed the greater Influence on their children refractive development of eye due to excessive tobacco smoking in Front of them.My study results supported the previous researches conclusion that hypermetropia is more common among the smoker children's.

CONCLUSION:

There is greater development of hypermetropia among children aged between (2-20years) than myopia among those children who are exposed to parental smoking. Duration of parental smoking (father only in our study) has more influence on the severity of refractive errors. Hence, we can conclude that parental smoking does play a role in refractive development especially hypermetropia in their children.

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