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An Observational Study of Seroprevalence of Hepatitis B, Hepatitis C and HIV (Human Immunodeficiency Virus) and Association of Risk Factors among Cataract Patients

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Abstract: ***Aims**: To study the seroprevalence of hepatitis B, hepatitis C and HIV (Human Immunodeficiency Virus) among patients of cataract surgery and to study the association of risk factors leading to hepatitis b, hepatitis C and HIV (Human Immunodeficiency Virus) among preoperative cataract patients. **Methods**: Preoperative cataract patients were selected for screening of viral markers. Local examination and systemic examination was done before enrolling the patients for the study. **Results**: The risk factor responsible for causing Hepatitis B and Hepatitis C were more common amongst patients who had history of blood transfusion (25.4% and 30.1% respectively), and patients who had received injection from unqualified practitioner(25.4% and 18.1% respectively) whereas the risk factor responsible for HIV (52.38%) was more with patients who had history of unprotected/ unnatural sex. Although history of previous surgery seems to be a risk factor but it statistically insignificant as it was also found in viral negative patients*

1. Introduction

Cataract surgery is one of the most common ocular surgery performed [1]. In India more than 6 million cataract surgeries were done during 2015-16.[1] In the past two decades, cataract surgery rate has gone up to 6.6/1000 population.[2] With the advent of surgical techniques, though topical anaesthesia is getting popular, peribulbar anaesthesia is most often used [2,3]. The technique of peribulbar anaesthesia involves giving mixture of anaesthetic drugs in peribulbar space of orbit using 24 guage 5 ml syringe. There is risk of accidental needle-prick injury during this step. Cataract which has an estimated prevalence of 33% in the general population, is the second leading cause of visual impairment and vision loss worldwide, the first cause being the uncorrected refractive error.[4]

The blood-borne pathogens that are most commonly involved in occupational transmission are hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) [5, 6]. The presence of viral particles for HBV, HCV, and HIV in aqueous humor has been reported [7-9].The prevalence of Hepatitis B in India is 4% [7]. It is most commonly transmitted from mother to child during birth and delivery, as well as through contact with blood or other body fluids.

Hepatitis C virus (HCV) infection has an estimated global prevalence of 2.2% and in India it is estimated to be around 0.5%-1.5% [7]. Hepatitis C virus is a blood borne virus: the most common modes of infection are through exposure to small quantities of blood. This may happen through injection drug use, unsafe injection practices and sexual practices that lead to exposure to blood. [8]

HIV can be transmitted via the exchange of a variety of body fluids from infected individuals, such as blood, breast milk, semen and vaginal secretion. HIV progressively weakens the immune system and can lead to swollen lymph nodes, weight loss, fever, diarrhea and cough.

Hepatitis and Human immunodeficiency virus can be diagnosed by ELISA and immunochromatographic test

2. Material and Methods

The present prospective observational study was conducted in department of Ophthalmology at Chattrapati Shivaji Subharti hospital September 2019 to March/ April2021. Patients were enrolled in the study after obtaining written informed consent and approval from Institutional Ethical committee. All participants were tested for visual acuity, intra ocular pressure and complete ocular examination. Slit lamp examination of anterior segment was carried out and dilated fundus examination was done. Laboratory investigations included were complete blood count, post prandial sugar and urine examination. The ELISA test, also called the EIA for enzyme immunoassay, was used to detect the HIV or Hepatitis anti body. Post-test counselling was offered to both HIV positive and negative patients, and HIV-positive patients were referred to antiretroviral therapy centre for registration and baseline investigations. All patients who had cataract were included irrespective of age and gender.

3. Results

The risk factor responsible for causing Hepatitis B and Hepatitis C were more common amongst patients who had history of blood transfusion (25.4%and30.1% respectively), and patients who had received injection from unqualified practitioner (25.4% and 18.1% respectively) whereas the risk factor responsible for HIV (52.38%) was more with patients who had history of unprotected /unnatural sex. Although history of previous surgery seems to be a risk factor but it statistically insignificant as it was also found in viral negative patients

Table 1: Serology among the study subjects

Viral Markers	N	%
Group A (Negative Viral Markers)	808	81
Group B (Positive Viral Markers)		
Hepatitis B	67	6.7
Hepatitis C	83	8.3
HIV	42	4.2
Total	192	19

Table 1 shows serology among the study subjects.. Out of 1000 patients, 808(80.8%) and 192 (19.2%) were triple viral markers negative and positive respectively. Hepatitis B, Hepatitis C and HIV report was found to be positive among 6.7%, 8.3% and 4.2% of the subjects respectively.

Table 2: Gender distribution among the study subjects

Gender	N	Group A		Group B					
				Hepatitis B		Hepatitis C		HIV	
		N		N=67	%	N=83	%	N=42	%
Male	458 (45.8%)	363	44.9	34	50.8	36	43.4	25	60
Female	542 (54.2%)	445	55.1	33	49.2	47	56.7	17	41
Total	1000	808	100	67	100	83	100	42	100
p value		0.13		0.87		0.36		0.07	

Table 2 shows gender distribution among the study subjects. Out of 1000subjects, 45.8% of the subjects were male and 54.2% of the females. Hepatitis B, Hepatitis C and HIV positivity was reported among 50.8%, 43.4%, & 59.5% of the male patients respectively and 49.2%, 56.7% & 40.5% of female patients respectively. When Hepatitis B, Hepatitis C and HIV was compared among male and females, it was found to be statistically insignificant as p>0.05

Table 3: Age distribution among the study subjects

Age Group (in years)	N	Group A		Group B					
				Hepatitis B		Hepatitis C		HIV	
		N	%	N=67	%	N=83	%	N=42	%
21-30	13	11	1.4	1	1.5	1	1.2	0	0
31-40	126	101	13	7	10	16	19	2	4.8
41-50	304	243	30	11	16	37	45	13	31
51-60	374	305	38	29	43	16	19	24	57.1
>60	183	148	18	19	28	13	16	3	7.1
Total	1000	808	100	67	100	83	100	42	100
p value				0.042*		0.038*		0.12	

*statistically significant

Table 3 shows the age distribution among the study subjects.MaximumsubjectsingroupAbelongedto51-60 years (37.8%) followed by 41-50 years (30.1%), while minimum subjects were in the age group of 21-30 years (1.5%). Hepatitis B and HIV were found to be maximum in the age group of 51- 60 years (43.3 % and 57.1%) whereas Hepatitis C was found to be maximum among 41-50 years (44.5%). When Hepatitis B, Hepatitis C and HIV was compared with respect toage group, it was found to be statistically significant in case of Hepatitis B and Hepatitis C in age group of 51-60 years with p value of 0.042 and HIV in age group of 41-50years with p value of 0.038

Table 4: Occupation among the study subjects

Occupation	N	Group A		Group B					
				Hepatitis B		Hepatitis C		HIV	
		N	%	N=67	%	N=83	%	N=42	%
Businessman	27(2.7%)	24	3	0	0	3	3.6	0	0
Carpenter	39(3.9%)	27	3.3	7	10.4	2	2.4	3	7.1
Driver	216(21.6%)	154	19	17	25.4	28	33.7	17	41
Farmer	185(18.5%)	152	19	10	14.9	14	16.9	9	21
House Wife	453(45.3%)	379	47	27	40.3	35	42.2	12	29
Tailor	23(2.3%)	22	2.7	1	1.5	0	0	0	0
Unemployed	57(5.7%)	50	6.2	5	7.5	1	1.2	1	2.4
Total	1000	808	100	67	100	83	100	42	100
p value				0.07		0.18		0.1	

Table4 shows the occupation among the study subjects. Businessman, carpenter, driver, farmer, house wife, tailor and unemployed subjects were 2.7%, 3.9%, 21.6%, 18.5%, 45.3%, 2.3% and 5.7% of the total study population. Hepatitis B, Hepatitis C and HIV was found to be maximum among housewife and driver. When Hepatitis B, Hepatitis C and HIV was compared with respect to occupation, it was found to be statistically insignificant with p value= 0.07and 0.10 respectively.

Table 5: Risk factors among the study subjects

Risk Factors	Group A		Group B		p value
	N=808	%	N=192	%	
History of Blood Transfusion	33	4.1	46	24	<0.01*
Unprotected/Unnatural Sex	0	0	34	18	<0.01*
Receiving Injection from Unqualified Practitioner	71	8.8	35	18	0.019*
History of Previous Surgery	125	16	33	17	0.72
History of Dental Extraction	1	0.1	17	8.8	<0.01*
History of Drug Abuse	0	0	10	5.2	<0.01*

*:statistically significant

Table 5, shows the distribution of risk factors among the study subjects. History of blood transfusion, unprotected/ unnatural sex, receiving injection from unqualified practitioner, history of previous surgery, history of dental extraction and history of drug abuse was reported among 4.1%, 0%, 8.8%, 15.5%, 0.1%, 0% of the subjects in group A respectively. . History of blood transfusion, unprotected/unnatural sex, receiving injection from unqualified practitioner, history of previous surgery, history of dental extraction and history of drug abuse was reported among 23.9%,17.7%, 18.2%, 17.2%, 8.8%, 5.2% of the subjects in group B respectively. The more commonly associated risk factors leading to positivity of viral markers were with patients who had history of blood transfusion (23.9%) and who had received injection from unqualified practitioner (18.2%) whereas it was less common with patients who had history of dental extraction (8.8%) and history of drug abuse (5.2%). The risk factors associated

with group A and B were found to be statistically significant except for history of previous surgery.

Table 6: Risk factors according to group B subcategories

Risk Factors	Group B					
	Hepatitis B		Hepatitis C		HIV	
	N=67	%	N=83	%	N=42	%
History of Blood Transfusion	17	25	25	30	4	9.52
Unprotected/Unnatural Sex	7	11	5	6	22	52.4
Receiving Injection from Unqualified Practitioner	15	22	15	18	5	11.9
History of Previous Surgery	12	18	16	19	5	11.9
History of Dental Extraction	5	7.5	9	11	3	7.14
History of Drug Abuse	5	7.5	4	4.9	1	2.38

Table 6 shows risk factors according to group B subcategories. The risk factor responsible for causing Hepatitis B and Hepatitis C were more common amongst patients who had history of blood transfusion (25.4% and 30.1% respectively), and patients who had received injection from unqualified practitioner (25.4% and 18.1% respectively) whereas the risk factor responsible for HIV (52.38%) was more with patients who had history of unprotected/ unnatural sex. Although history of previous surgery seems to be a risk factor but it statistically insignificant as it was also found in viral negative patients

4. Discussions

Cataract is one of the most common eye diseases in the world. Surgery with local anesthesia is often used for the treatment of cataract. Local anesthesia is performed in the peribulbar or subtenon area in the form of injection. All the precautions have to be taken to prevent any needle prick injury. It has been estimated that a surgeon sustains 0.8 injuries/100 hour of surgery time, resulting in a 6.9% lifetime risk of contracting hepatitis C and a 0.15% life time risk of HIV infection[10].This study was performed to estimate the prevalence of Hepatitis B, Hepatitis C and HIV among preoperative cataract patients attending Subharti Medical College, Meerut at Ophthalmology OPD and to further discuss the need and feasibility of preoperative screening for such patients undergoing cataract surgery. Patients were divided into two groups i.e. Group A (Patients with triple H viral markers negative and undergoing cataract surgery) and Group B (Patients having positive triple H markers and undergoing cataract surgery). Out of 1000 patients, 808 (80.8%) and 192 (19.2%) were having triple viral markers negative and positive respectively. Hepatitis B, Hepatitis C and HIV report was found to be positive among 6.7%, 8.3% and 4.2% of the subjects respectively. Hence Hepatitis C was found to be predominant transmissible viral infection**. T H. Mba Aki et al**[11] (2019) in their study revealed that viral seroprevalence rate was 18.0% which is approximately similar to our study. HCV was the predominant transmissible viral infection and affected 11.8% of participants undergoing cataract surgery.

Out of 1000 subjects, 45.8% of the subjects were male and 54.2% of the females. In group A and B, there were 363 and 95 males respectively. In group B Hepatitis B, Hepatitis C and HIV was reported among 50.8%, 43.4%, & 59.5% of the male population and 49.2%, 56.7% & 40.5% of female population respectively. Similarly in a study by **Mehmet Cubuk et al**[12(2019), of the 1040 patients included in the study, 462 (44.4%) were females and 578 (55.6%) were males. But **Tahir MA et al**[13 **(2014)** revealed female dominance in their study as they found Hepatitis C was predominant in females 22(6.32%). Maximum subjects in group A belonged to 51-60 years (37.8%) followed by 41-50 years (30.1%), while minimum subjects were in the age group of 21-30 years. Hepatitis B and HIV were found to be maximum in the age group of 51-60 year whereas Hepatitis C was found to be maximum among 41-50 years respectively.

When Hepatitis B, Hepatitis C and HIV was compared with respect to age group, it was found to be statistically significant in case of Hepatitis Band Hepatitis C. Age distribution similar to our study was reported in **Rewri P et al**[1] (2018). **T. H. Mba Aki et al**[10](2019) in their study reported that mean age was more among subjects with positive viral markers. Hepatitis B, Hepatitis C and HIV seropositivity was found to be maximum among housewife and driver. **In literature we could not find any study which showed relationship of viral disease with occupation.**

The risk factors leading to positivity of viral markers were more common with patients who had history of blood transfusion (23.9%) and received injection from unqualified practitioner (18.2%) whereas it was less common with patients who had history of dental extraction (8.8%) and history of drug abuse (5.2%). **Rewri P et al**[1(2018) in their study found that risk association history was reported by151(56%; 95% CI:50–62) patients. History of dental extraction was noted in 145 patients (54%; 95% CI: 48–60).The risk factor responsible for causing Hepatitis B and Hepatitis C were more common amongst patients who had history of blood transfusion (25.4% and 30.1% respectively) and patients who had received injection from unqualified practitioner (25.4% and 18.1% respectively) whereas the risk factor responsible for HIV (52.38%) was more with patients who had history of unprotected/ unnatural sex. In a study by **Verma et al**[14](2002), history of injection from the local practitioner and dental treatment were two most common risk factors for HCV infection.

5. Limitations

This was a single-center study and included patients from limited geographical area; hence, seroprevalence and its pattern may not be representative of the whole population. Larger multicenter study would be needed to know distribution of types of seropositive cases in different regions. The calculation of cost- benefit analysis of universal screening would have been useful but could not be done due to lack of data on viral transmission in ophthalmic practice.

6. Conclusions

The prevalence of blood-borne viral infection among cataract patients was 19.2% in our study. Significant number of asymptomatic carriers of hepatitis C and B and HIV were

found in pre- operative cataract patients in our study. Thus awareness of the prevalence of blood-borne viral infections in service area, along with knowledge of rate of accidental exposure and risk of transmission would help to understand cost- effectiveness of universal preoperative screening before cataract surgery. Thus it is recommended that it needs to be included in regular practice of every ophthalmologist to screen every patient for triple viral markers preoperatively.

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