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Anatomy

ASSOCIATION OF BLOOD GROUP SYSTEMS WITH BLOOD-BORNE INFECTIONS AND ITS IMPLICATION ON CADAVER SELECTION IN THE POST COVID ERA: A STUDY AMONG BLOOD DONORS OF KOLKATA

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ABSTRACT

Introduction: Blood group antigens play a vital role in transfusion safety, understanding genetics, inheritance pattern, researching population migration patterns, as well as resolving certain medico-legal issues

Aims & Objectives: The aim of this study was to investigate the prevalence of hepatitis B, Hepatitis C, HIV and Syphilis infections in blood donors referred to Blood Bank of Calcutta National Medical College and to determine any association between blood groups and blood borne infections and their impact on procurement and dissection of dead bodies.

Methods: An observational study with cross sectional design of data collection was conducted in the Blood Bank of Calcutta Nation Medical College for a period of three months. All of the eligible donor serum samples were screened for HBV, HCV, HIV and syphilis. Test result of the collected blood was noted and tabulated in Microsoft Excel Sheet. Statistical analysis was carried out using SPSS 20 software. Chi-square test was performed for Qualitative comparison.

Result: Total number of HIV, HbS Ag, Anti HCV, VDRL, MP positive cases were 16 (1.54%), 51(4.92%), 18(1.74%), 28(2.7%), 30(2.9%) respectively. 56.2% HIV positive cases were in the age group of 18-30 and 87.5% HIV positive cases were male.3.9% of HbS Ag positive cases, 10.7% VDRL positive cases, 3.3% MP positive cases were also HIV Positive. Significant correlation was obtained HIV & VDRL and VDRL & anti HCV

Conclusion: Hepatitis C was highest among the study population and significant correlation was present between Syphilis and HIV or Hepatitis C. In the background of novel emergent diseases with spread via body fluids, such information on blood borne infections may help us to formulate future guidelines on cadaver dissection.

KEYWORDS : ABO& Rh grouping, HIV, Hb-S Ag, Anti HCV, VDRL, MP Test.

INTRODUCTION

Medical education and academic research based on anatomical dissection along with forensic and surgical skill training in undergraduate and postgraduate medical curriculum throughout the world are dependent primarily on embalmed human cadavers.

Of the several organisms in the human body, only some are pathogenic. Usually those are no longer sustainable in the milieu after death. However, this does not happen immediately, and a cadaver may remain infectious at the time of arrival in an Anatomy Department for subsequent educational purposes. Exposure to a variety of infectious disease agents may occur when handling any deceased body. Not all cases of infection are identified before death and therefore every cadaver should be regarded as an infectious material and high standards should be adopted for the handling of all bodies.[1]

The four main sources of infection that may be present in human remains include the following:[2]

- Blood and body fluids, including saliva, lung, and gastrointestinal fluids. Blood and body fluids may splash into the eye, nose, or mouth for contact with other mucous membranes.
- Waste products, such as feces and urine.
- Aerosols of infectious material might be released when moving or opening the body.
- Microbes may be present on the skin and spread through direct contact.

Embalming may reduce the risks of infection, but blood has to be drained from the body and may be a risk to the embalmer from blood-borne infections, such as hepatitis B and C, HIV and septicaemias.[3]The most likely type of infections are those produced by bloodborne viruses, enteric pathogens, and Mycobacterium tuberculosis.[4] The surface of red blood cells contains different polysaccharides and proteins called blood group antigens. Approximately 700 erythrocyte antigens are discovered and part of them that are related to each other have been described into 33 blood group systems by the International Society of Blood Transfusion (TBTC), of which ABO and Rh groups system are the most important.[5-7]

In modern medicine besides their importance in evolution, their relation to disease and environment is being increasingly important. Some blood groups can act as a receptor and ligand for bacteria, parasites and viruses. "The possible pathogenesis for this susceptibility is that as many organisms that may bind to polysaccharide on cells and soluble blood group antigens may block this binding".[5,8,9,10]

Several studies investigated the association of blood groups with infectious and non-infectious diseases. Among infectious disease, Human immunodeficiency virus (HIV), and Hepatitis virus are of great concern because of their prolonged viraemia and carrier or latent state. They also cause fatal, chronic and life-threatening disorders.

AIDS in human was first reported in 1981 in USA and HIV was first isolated in 1983.[11,12] HIV has infected more than 33 million people thus far worldwide and infection rates continue to increase.[13] Infection with hepatitis B and hepatitis C are also the major health problems worldwide. There are about 2 billion people infected by HBV and among them more than 240 million have chronic liver infections.[14] It is estimated that 150 million people are chronically infected with HCV and 3 – 4 million are newly infected each year.[15] Syphilis is also a systemic disease caused by Treponema pallidum.[16] The world health organization (WHO) estimates that 12 million new cases of syphilis occur each year.[17] Despite the fact that T. pallidum cannot survive in properly stored blood and the inescapable cost implications of syphilis testing of blood donors particularly in resource-poor settings, it must be noted that the emphasis of blood transfusion should be on two fundamental objectives – safety and protection of human lives. Syphilis screening of donated blood, no matter what the incidence is in the donor population, has been considered to have value as a 'lifestyle' indicator, as individuals exposed to syphilis may also have been exposed to other sexually transmitted diseases. [18]

Studies on cadaveric tissue donors have mostly highlighted the limitation in the use of cadaveric tissue as a transplantation material due to presence of pathogenic organisms. It has also been reported that organ transplantation from cadavers can transmit hepatitis.[1] Specific serologic markers of Hepatitis B and C viruses have been detected in cadaveric tissue banks and in post-mortem blood tests for body donation programs. High prevalence of serologic markers for HIV and Hepatitis C virus infection have been reported among studies in cadaver population.[1] Anatomists also face risk of contamination leading to serious questions about the infective hazards of cadavers and the effectiveness of fixatives against hepatitis viruses.

An AIDS patient can remain infectious at the time of arrival in the

Anatomy Department as a cadaver and is often infected with opportunistic infections, such as tuberculosis. Infectious HIV has been reported in pleural fluid, pericardial fluid, and blood of such deceased patients after storage at 2°C for up to 16.5 days after death.[1] Viable HIV was also isolated from bone fragments, spleen, brain, bone marrow, and lymph nodes from a patient with AIDS at autopsy 6 days post-mortem. Although in suspension tests, 25% ethanol and 0.5% formaldehyde were shown to be effective against HIV, it is not clear whether these concentrations are also effective in cadavers.[1]

Several studies have assessed the association of blood groups with blood-borne infections but based on different sample size, test methodology, covered age, social risk factors and geographic conditions, results have been different. In view of the immense importance of blood borne infectious hazards related to a cadaver, the Department of Anatomy conducted an observational study to establish an association of blood borne infections and Blood Groups and subsequently institute a directory on cadavers based on this information in future studies.

MATERIALS & METHODS

An observational study with cross sectional design of data collection was conducted in the Blood Bank of Calcutta Nation Medical College for a period of three months. All blood donors who were eligible to donate blood were reviewed for a period of three months. Donors who were selected by the medical screening based on standard criteria for blood donation, participated in this study. The volunteer donors constituted 100% of total blood donors. All of the eligible donor serum samples were screened for HBV, HCV, HIV and syphilis. Hepatitis B surface Antigen (HBS Ag), HIV (Ag/Ab) and HCV Ab were screened using third generation ELISA kits. Serum from all donors was tested for the presence of Treponemal antibodies using Rapid Plasma Reagin test (RPR). Initial reactive samples were tested in duplicate. Repeatedly reactive results were considered sero-positive for their infections. Blood group was determined by forward blood grouping (cell grouping) and reverse blood grouping (serum grouping) by test tube agglutination method. Final blood group is confirmed only if both cell type and back type are identical. Rh negative blood groups were confirmed by antiglobulin technique. Data on the prevalence of blood-borne infections and the frequency of blood groups of donors was collected from database (software with functionality to the blood banking and blood transfusion Centers that used in CNMC). Area of blood donation camp, gender, age, and the test result of the collected blood were noted and tabulated in Microsoft Excel Sheet. Statistical analysis was carried out using SPSS 20 software. Chi-square test was performed for Qualitative comparison. P value less than 0.05 was considered statistically significant.

RESULT & ANALYSIS

1036 cases were recorded and among which 862 cases (83.2%) were male and rest were female. Distribution of cases according to gender & age is depicted in Table-1. 18-30 years of age group was commonest and 51.2 % cases were male within this age group. Among the total study population, 1029 (99.3%) cases were Hindu and others were Muslim. B+ve blood group was commonest (42.7%). Distribution of cases according to blood group & Rh factor are represented in table-2. Total number of HIV, HbS Ag, Anti HCV, VDRL, MP positive cases were 16 (1.54%), 51(4.92%), 18(1.74%), 28(2.7%), 30(2.9%) respectively. Table-3 & 4 represents the distribution of cases according to age, gender & HIV. It was found that 56.2% HIV positive cases were in the age group of 18-30 and 87.5% HIV positive cases were male.

Table 5-8 represents the distribution of cases according to the result of HbSAg, Anti HCV, VDRL, MP and HIV. It was found that 3.9% of HbS Ag positive cases, 10.7% VDRL positive cases, 3.3% MP positive cases were also HIV Positive (**Table: 5-8**). Significant correlation was obtained HIV & VDRL and VDRL & anti HCV (**Table-9**). But no correlation was obtained blood group and different disease among the study population. (**Table: 10-14**)

DISCUSSION

After the discovery of blood groups, numerous studies on associations of blood groups and various diseases were performed. Identifying the prognostic and associating factors, which predict the condition of the disease and its response to the treatment, can play an important role in determining the therapeutic strategies.[19]

The impact of the recent pandemic on the academic brethren in anatomical sciences has been exceptional. In general, the safety precautions applied in the basic handling of any human cadaver should cover the risk of a Covid-19 infection. As in any given case, if no infection can be confidently ruled out, any cadaver should be treated as potentially infectious. [20]

Although there is no convincing information regarding the viability of SARS-CoV-2 on glass, fluids such as sewage, ex vivo samples of blood, well designed inter-human SARS-CoV-2 transmission studies concerning human body fluids can fill the knowledge gap. [21]

Research based on the presence of ACE2 receptor in some organs continues to explore whether the transmission of SARS-CoV-2 is limited to the respiratory transmission. It is speculated that the exposure to human body fluids such as bronchoalveolar-lavage, saliva, blood, urine, feces, sputum, tears, semen and from organs expressing the ACE2 receptor may be infected with SARS-CoV-2 virus especially among asymptomatic patients may represent a risk factor for the invasion of the virus into the human body.[22]

Whether extended periods of preservation will be needed before dissecting embalmed bodies that are tested positive to the COVID-19 will need further pieces of evidence and research.[23] As the Coronavirus is novel, its disease progression is still under study and not yet entirely clear, therefore, stringent precautionary measures should be instituted until further information becomes available.

In view of the rapid evolution of scientific evidences about the virus, our future knowledge and practices might be a pointer towards considering full incorporation of technology into the medical education curriculum.

The prevalence of all infections was lower among females, maybe females made a smaller section of blood donors in Kolkata because they were found to be anaemic and did not fulfil the required fitness criteria or maybe, as mentioned in many studies, women were reported as a healthier source of blood in the community.[24]

So far, in several studies the association of specific blood groups to certain diseases has been investigated. Prevalence of cardiovascular disease, ischemic heart disease, venous thrombosis, atherosclerosis, squamous cell carcinoma and basal cell carcinoma is higher in individuals with non-O blood groups.[25-29] B antigen links with increased risk of ovarian cancer and diabetes mellitus (6). Prevalence of gastric cancer, pancreatic cancer and salivary gland tumors is higher in "A" blood group.[30-32]"O" blood group individuals are known to have a higher risk of cholera, gastro-intestinal infection with E. coli, peptic ulcer, duodenal ulcer, chronic myelocyticleukemia, acute lymphocytic leukemia and thalassemia. HTLV-1, cervical carcinoma and pulmonary tuberculosis have reported to be more common in persons with blood group "AB".[33-35] On the other hand, some studies demonstrated association of specific blood groups and resistance to certain infections for example blood groups "O" and "B" are associated with resistance to small pox[34], blood group "Pk" is associated with resistance to HIV-1 and the absence of the Duffy blood group is associated with resistance to Plasmodium vivax.[36] Hirszfeld and Hirszfeld showed the frequencies of blood groups A and B differ between populations.[37] One of the most significant disease associations described for non-O (subjects of group A, B, or AB) versus O subjects is susceptibility to arterial and venous thromboembolism (VTE).[38] The major clinical disease associated with the Rh blood group system is hemolytic disease of the fetus and newborn (HDFN). HDFN usually arises when a mother who is blood group D− carries a fetus that is blood group D+, and fetal red cells released into the maternal circulation immunize the mother to make antibody to D, which traverses the placenta and damages the fetus. Before the introduction of a successful prophylactic treatment in 1968, the frequency of the disease in England and North America was approximately 1 per 170 births.[39] The clearest examples of selection in the face of malaria are reflected in the widespread distribution of inherited anemias, particularly sickle cell anemia and alpha thalassemia and the occurrence of hemoglobin C in regions of the world where malaria is endemic. The mutation giving rise to sickle cell disease (SCD; HbS) may have arisen at 3 different sites in Africa (Atlantic West Africa, Central West Africa, and Bantu-speaking Central and Southern Africa) with expansion of the mutation occurring 2000 to 2500 years ago.[40] Complete absence from red cells of the molecule carrying the Duffy blood group antigens (aka DARC) is found in almost 100% of West Africans, and this absence is clearly and unambiguously demonstrated to provide protection from *P vivax*.[41] The molecular basis of this Duffy

deficiency is a point mutation in the binding site for the transcription factor GATA-1.[42] The dual availability of in vitro culture systems to study the invasion of human red cells by *P falciparum* and well-characterized rare blood group phenotypes made it possible to identify red cell receptors used by different parasite strains. Early studies on cells lacking Glycophorin A (Ena− cells) and glycophorin B (S-s− cells) provided evidence that these sialic acid–rich red cell-surface glycoproteins were parasite receptors and these observations have been confirmed.[43] Glycophorins C (GPC) and D (Ge− red cells) are also receptors for some strains of *P falciparum*. Glycophorins are major proteins at the red cell surface. Glycophorin A (GPA) and the major anion transport protein (AE1, Band 3) with approximately 10^6 copies/red cell are the most abundant red cell surface proteins with glycophorins B, C, and D together accounting for a further 450 000 copies per red cell.[44]

A previous study documented that blood group "O" was more frequent among people with HBV,[45] but in their study there was no significant association between O blood group and HBV.[46] In another study, higher frequency of blood group "B" in HBV infected patients was reported but there was no significant correlation between HBV infection and blood groups.[47] Meo et al. showed a significant association between hepatitis B and secretor status.[48]

We did not find any association between sero-positivity of HCV and ABO/Rh antigens. This is in concurrence with previous reports.[49] However, in some studies, with less population, a significant association between blood groups and hepatitis C was reported.[50] In a systematic review on 14 papers there was no significant association between four types of blood groups and HCV infection.[51] In a study on patients with chronic hepatitis C infection, it was observed that non-O blood group was associated with increased severity of fibrosis.[52]

Blood group "A" was the commonest blood group in HIV infected patients and percentage of HIV (Ag/Ab) was lower in donors who has blood group "B". Similar results were reported by Amidu, et al.[53] In one study patients who were HIV sero-positive, "O positive" was the most prevalent blood group and "AB negative" blood group was the least prevalent.[54] In Nigeria in pregnant women, the prevalence of blood group "O positive" was higher than in the general population.[55] Farhud et al. showed a significant decrease of "B" blood group in anti-HIV positive individuals.[56]

A study in UK showed that ABO blood group sugars were detected on the viral envelope protein, gp120. Thus incorporation of ABO antigens by HIV-1 may affect transmission of virus between individuals of discordant blood groups by interaction with host natural antibody and complement.[57] We found no significant association between syphilis infection and blood groups in this study, similar to previous finding). In other studies, there was no association between syphilis and blood groups.[58] In our study, the prevalence of hepatitis B, hepatitis C, HIV, and syphilis infections was higher in subjects with RhD+. One reason for this, is the higher prevalence of RhD+ in the population of blood donors.

The mechanism between blood type and infections remained undefined, which may be related to red cell immune adherence function among persons with different blood types.[59] As the Swedish researchers investigated cell surface–expressed Pk in HIV infection and concluded that Pk expression strongly influences susceptibility to HIV-1 infection, which implicates Pk as a new endogenous cell-surface factor that may provide protection against HIV-1 infection and showed that Individuals with high Pk levels exhibited a greater natural resistance to HIV infection, [60] ABO and Rh blood groups polymorphisms may be involved in viral transmission.

Tables:

Table-1: Distribution of cases according to age and gender

Age Group			Gender		Total
			Female	Male	
Age Group	18-30 years	Count	67	441	508
		% within Sex	38.5%	**51.2%**	49.0%
	31 – 40 years	Count	41	161	202
		% within Sex	23.6%	18.7%	19.5%
	41 – 40 years	Count	51	154	205
		% within Sex	29.3%	17.9%	19.8%
	51 – 59 years	Count	15	106	121
		% within Sex	8.6%	12.3%	11.7%
Total		**Count**		**862**	**1036**
		% within Sex	**100.0%**	**100.0%**	**100.0%**

Table-2: Distribution of cases according to Blood Group and Rh factor

			Rh		Total
			-	+	
ABO	A	Count	8	147	155
		% within Rh	47.1%	14.4%	15.0%
	AB	Count	2	66	68
		% within Rh	11.8%	6.5%	6.6%
	B	Count	0	435	435
		% within Rh	0.0%	**42.7%**	42.0%
	O	Count	7	371	378
		% within Rh	41.2%	36.4%	36.5%
Total		**Count**	**17**	**1019**	**1036**
		% within Rh	**100.0%**	**100.0%**	**100.0%**

Table-3: Distribution of cases according to Age Group and HIV Status

Age Group			HIV		Total
			Negative	Positive	
Age Gr.	18-30 years	Count	499	9	508
		% within HIV	48.9%	**56.2%**	49.0%
	31 – 40 years	Count	198	4	202
		% within HIV	19.4%	25.0%	19.5%
	41 – 40 years	Count	205	0	205
		% within HIV	20.1%	0.0%	19.8%
	51 – 59 years	Count	118	3	121
		% within HIV	11.6%	18.8%	11.7%
Total		**Count**	**1020**	**16**	**1036**
		% within HIV	**100.0%**	**100.0%**	**100.0%**

Table-4: Distribution of cases according to sex and HIV Status

Sex			HIV		Total
			Negative	Positive	
Sex	Female	Count	172	2	174
		% within HIV	16.9%	12.5%	16.8%
	Male	Count	848	14	862
		% within HIV	83.1%	**87.5%**	83.2%
Total		**Count**	**1020**	**16**	**1036**
		% within HIV	**100.0%**	**100.0%**	**100.0%**

Table-5: Distribution of cases according to HBS-Ag and HIV Status

			HBs-Ag		Total
			Negative	Positive	
HIV	Negative	Count	971	49	1020
		% within HBs-Ag	98.6%	96.1%	98.5%
	Positive	Count	14	2	16
		% within HBs-Ag	1.4%	**3.9%**	1.5%
Total		**Count**	**985**	**51**	**1036**
		% within HBs-Ag	**100.0%**	**100.0%**	**100.0%**

Table-6: Distribution of cases according to Anti-HCVand HIV Status

			Anti-HCV		Total
			Negative	Positive	
HIV	Negative	Count	1002	18	1020
		% within Anti-HCV	98.4%	100.0%	98.5%
	Positive	Count	16	0	16
		% within Anti-HCV	1.6%	0.0%	1.5%
Total		**Count**	**1018**	**18**	**1036**
		% within Anti-HCV	**100.0%**	**100.0%**	**100.0%**

Table-7: Distribution of cases according to VDRL and HIV Status

			VDRL		Total
			Negative	Positive	
HIV	Negative	Count	995	25	1020
		% within VDRL	98.7%	89.3%	98.5%
	Positive	Count	13	3	16
		% within VDRL	1.3%	**10.7%**	1.5%
Total		**Count**	**1008**	**28**	**1036**
		% within VDRL	**100.0%**	**100.0%**	**100.0%**

Table-8: Distribution of cases according to MP and HIV Status

			MP		Total
			Negative	Positive	
HIV	Negative	Count	991	29	1020
		% within MP	98.5%	96.7%	98.5%
	Positive	Count	15	1	16
		% within MP	1.5%	**3.3%**	1.5%
Total		**Count**	**1006**	**30**	**1036**
		% within MP	**100.0%**	**100.0%**	**100.0%**

Table 9: Correlation between HIV, HbS-Ag, Anti HCV, VDRL and MP cases

		HIV	HBs-Ag	Anti-HCV	VDRL	MP
HIV	Pearson Correlation	1	.044	-.017	**.124****	.025
	Significant		.158	.592	**.000**	.421
	N	1036	1036	1036	1036	1036
HBs-Ag	Pearson Correlation	.044	1	-.030	-.038	.041
	Significant	.158		.331	.223	.192
	N	1036	1036	1036	1036	1036
Anti-HCV	Pearson Correlation	-.017	-.030	1	**.069***	-.023
	Significant	.592	.331		**.026**	.460
	N	1036	1036	1036	1036	1036
VDRL	Pearson Correlation	**.124****	-.038	**.069***	1	.007
	Significant	**.000**	.223	**.026**		.829
	N	1036	1036	1036	1036	1036
MP	Pearson Correlation	.025	.041	-.023	.007	1
	Significant	.421	.192	.460	.829	
	N	1036	1036	1036	1036	1036

**. Correlation between HIV and VDRL is significant at the 0.01 level
*. Correlation is significant between Anti-HCV and VDRL at the 0.05 level

Table 10: Correlation between HIV and blood group

			Blood Group						Total
			A	AB	B	B+	O	O+	
HIV	Negative	Number	154	67	401	28	369	1	1020
		%	99.4%	98.5%	98.5%	100.0 %	97.9%	100.0 %	98.5%
	Positive	Number	1	1	6	0	8	0	16
		%	0.6%	1.5%	1.5%	0.0%	2.1%	0.0%	1.5%
Total		**Number**	**155**	**68**	**407**	**28**	**377**	**1**	**1036**
		%	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.122[a]	5	.832
Likelihood Ratio	2.714	5	.744
N of Valid Cases	1036		

Impression: Chi square tests shows that there is no relation between HIV and blood group.

Table 11 : Correlation between HBs-Ag and blood group

			Blood Group						Total
			A	AB	B	B+	O	O+	
HBs -Ag	Negative	Number	148	65	383	26	362	1	985
		%	95.5 %	95.6%	94.1%	92.9%	96.0%	100.0 %	95.1%
	Positive	Number	7	3	24	2	15	0	51
		%	4.5%	4.4%	5.9%	7.1%	4.0%	0.0%	4.9%
Total		Number	155	68	407	28	377	1	1036
		%	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.982[a]	5	.852
Likelihood Ratio	2.001	5	.849
N of Valid Cases	1036		

Table 12: Correlation between Anti HCV and blood group

			Blood Group						Total
			A	AB	B	B+	O	O+	
Anti-HCV	Negative	Number	152	68	402	26	369	1	1018
		%	98.1 %	100.0 %	98.8 %	92.9%	97.9 %	100.0%	98.3%
	Positive	Number	3	0	5	2	8	0	18
		%	1.9%	0.0%	1.2%	7.1%	2.1%	0.0%	1.7%
Total		Number	**155**	**68**	**407**	**28**	**377**	**1**	**1036**
		%	**100.0%**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0%**	**100.0 %**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.992[a]	5	.221
Likelihood Ratio	6.158	5	.291
N of Valid Cases	1036		

Table 13: Correlation between VDRL and blood group

			Blood Group						Total
			A	AB	B	B+	O	O+	
VDRL	Negative	Number	151	68	394	28	366	1	1008
		%	97.4%	100.0 %	96.8 %	100.0 %	97.1%	100.0 %	97.3%
	Positive	Number	4	0	13	0	11	0	28
		%	2.6%	0.0%	3.2%	0.0%	2.9%	0.0%	2.7%
Total		**Number**	**155**	**68**	**407**	**28**	**377**	**1**	**1036**
		%	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.143[a]	5	.678
Likelihood Ratio	5.743	5	.332
N of Valid Cases	1036		

Chi square tests shows that there is no relation between VDRL and blood group.

Table 14: Correlation between MP and blood group

			Blood Group						Total
			A	AB	B	B+	O	O+	
MP	Negative	Number	152	67	395	27	364	1	1006
		%	98.1%	98.5%	97.1%	96.4%	96.6%	100.0%	97.1%
	Positive	Number	3	1	12	1	13	0	30
		%	1.9%	1.5%	2.9%	3.6%	3.4%	0.0%	2.9%
Total		Number	155	68	407	28	377	1	1036
		%	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0%	100.0 %

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.488[a]	5	.914
Likelihood Ratio	1.663	5	.894
N of Valid Cases	1036		

Impression: Chi square tests shows that there is no relation between HBs-Ag and blood group.

CONCLUSION

From the above data it is evident that the prevalence of Hepatitis C was highest among the study population and significant correlation was present between Syphilis and HIV or Hepatitis C. But further studies are required to find out the association between different blood borne diseases and blood groups in different communities and even in national level it is necessary to get more knowledge about this aspect. In view of the significance of COVID-19 infection related to a cadaver, similar correlative studies may be formulated that should form the platform for further evidence based guidelines for the risk factors and precautionary measures involved.

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