ECRONICON OPEN ACCESS

EC EMERGENCY MEDICINE AND CRITICAL CARE
Research Article

Seroprevalence TTI's (Transfusion Transmitted Infections) Hepatitis C, Hepatitis B and Human Immunodeficiency Virus, VDRL and Malaria in Blood Donors of Peshawar KPK, Pakistan

Hafsa Shah[1]*, Zia ur Rahman[2], Mudassir Khan[3], Fakhar Zaman[4] and Shahid Badshah[5]

[1]CECOS University, Peshawar, Pakistan

[2]Center of excellence in Molecular Biology, Punjab University, Lahore, Pakistan

[3]Department of Healthcare Biotechnology, Atta-Ur-Rahman School of Applied Biosciences (ASAB), National University of Science and Technology (NUST), Islamabad, Pakistan

[4]Frontier Foundation Peshawar, Pakistan

[5]Regional Blood Center Peshawar, Pakistan

***Corresponding Author:** Hafsa Shah, Department of Biotechnology, CECOS University of IT and Emerging Sciences, Peshawar, Pakistan.

Received: November 27, 2021; **Published:** March 30, 2022

Abstract

The goal of the study was to investigate the sero-prevalence of transfusion-transmitted infections (Hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), syphilis, and malarial parasite (MP) among voluntarily blood donors in Khyber Pakhtunkhwa (KPK), Pakistan. It is retrospective single centre cross sectional study. This study has been conducted from June 2020 to September 2021 (16 months) at the frontier foundation thalassemic center Peshawar KPK. Donors were physically healthy and were fit for donation. Donors with physical disabilities and/or having co-morbid conditions were excluded from the report. All of the samples were screened for anti-HIV, anti-HCV, HBsAg, Syphilis and Malarial Parasite via ELISA kit and Immunochromatographic Technique (ICT), respectively.), A total of 6311 blood donations were evaluated. Majority of the donations (92%) were from (VNRBD) voluntary non-remunerated blood donation, while only 8% came off the replacement donors. Amongst these donations, 95 were infected at least with one pathogen, while 6216 were cleared for transfusion; among which HBV positive cases were 0.855% (n = 54), HCV positive cases were 0.316% (n = 20), syphilis positive were 0.30% (n = 19) and MP positive cases were only 0.031% (n = 2). HBV, HCV, and syphilis infections rates were increased while little changes were observed in the malaria infections rates, and no case was reported for HIV. The study also revealed the distribution pattern of the aforementioned pathogens in blood groups of the reactive samples. RH+ve phenotype has the highest frequency of positive cases. Blood group A+ve has HBV 25.92% (14/54), HCV 40% (8/20), VDRL 10.52% (2/19), MP 50% (1/2) followed B+ve has HBV 35.1% (19/54), HCV 30% (6/20), VDRL 42.1% (8/19) and blood group O+ve has HBV 29.62% (16/54), HCV 15% (3/20), VDRL 21.05% (4/19) while blood group AB+ve has HBV 7.40% (4/54), HCV 15% (3/20), VDRL 26.3% (5/19) positive cases.

Keywords: *HIV; HCV; HBV; Transfusion Transmitted Diseases; Infections; Syphilis; MP; ELISA; Blood Group*

Introduction

Millions of lives are saved via blood transfusion every year. According to the World Health Organization (WHO) report, approximately 118.5 million blood units are collected each year globally [1]. Patients suffering from anemia and associated with poor health, chronic transfusion-dependent thalassemia, severe trauma, surgical operations, bleeding, and pregnancy-related problems are all applicants for blood transfusions [2]. Unsafe transfusion, on the other hand, can increase the risk of blood borne pathogens such as Hepatitis B, C, HIV, syphilis, and malaria [3]. Prevalence of such blood borne infections or transfusion-transmitted infections (TTI's) in the blood donors is determined by the magnitude of this problem [4]. With each bag transfused, there is a 1% chance of transmission of transfusion-transmitted infections (TTIs) [5]. Every year, Pakistan collects an estimated 3.5 million blood donations [6].

Globally 325 million people are infected with viral hepatitis B and C that kills 1.4 million people each year. According to recent reports, 7-9 million are carriers of HBV infection, with a carrier rate of 3 - 5% in Pakistan [7]. The prevalence reported in KPK is 2.4%, Sindh 2.3%, Baluchistan 1.9% and Punjab it is 2.4% [8]. HCV infections mostly damage the liver and could lead to cancer [9]. Chronic hepatitis C infected about 170 million people [10]. A high number of the general population is infected with HBV and HCV but mostly carry no signs and symptoms despite being infected [10]. HCV prevalence in various parts of Khyber Pakhtunkhwa (KPK) province of Pakistan ranges from 4.1 to 36% [11]. Hepatitis B and C are persistent infections that can go unnoticed for a long time, even years. They are the leading causes of hepatocellular carcinoma, which causes 1.34 million deaths annually. Such high prevalence is mostly due to late testing or diagnosing, which needs to be addressed at earlier stages. It will not only help in early diagnostics but will also help in the treatment of the diseases on time [12]. In advanced countries, blood transfusions, needle stick wounds, tattooing, hemodialysis, syringes multiple use, sexual contact, and infection in pregnancy are the most commonly known modes of transmission. In developing nations, the use of non-sterile medical devices, is the leading cause of transmission of 8 - 16 million HBV and 2 - 5 million HCV infections [13].

HIV isolates are currently classified into two classes: HIV-type 1 (HIV-1) and HIV-type 2 (HIV-2) (HIV-2). Globally the most prevalent one is HIV-1, while HIV-2 is found only limited to some parts of Africa. According to statistics, in 2019, an estimated 38.0 million [31.6 million - 44.5 million] people globally were infected with HIV. 1.7 million [1.2 million - 2.2 million] people were found to have recently been infected with HIV in 2019. In the mid of 2020, approximately 26 million [25.1 million - 26.2 million] persons had access to antiretroviral [14].

Malaria is caused by *Plasmodium* which is present in the saliva of a female Anopheles. When a vector mosquito bites person the infectious entities are transferred into the body [15]. Malaria affected an estimated 229 million people and 409 000 deaths globally in 2019 [16,17]. Pakistan is susceptible to epidemic outbreaks in certain geographic areas, including the provinces of Khyber Pakhtunkhwa, Sindh, and Balochistan, which have a higher death rate than any other Asian region. In Pakistan, malaria causes half million infection per year and 50, 000 deaths [18].

Syphilis (caused by *Treponema pallidum)* is typically explicitly procured by contact with infected areas. Every year, 6 million are reported worldwide with in people age 15 - 49 [19]. In particular the neonatal are the most effected [20].

Materials and Methods

The study was accomplished during June, 1, 2020, to September, 30, 2021, a cross-sectional investigation was performed at the frontier foundation welfare hospital and blood transfusion service Peshawar Pakistan. The ethical committee of frontier foundation welfare hospital and blood transfusion service Peshawar approved the study proposal and protocol. A total of n = 6311 physically healthy donors were screened for transfusion and transmitted blood borne pathogens. Among 6311 physically healthy blood donors 99.82% (n = 6300) were males and 0.174% (n = 11) were females.

Individuals with name, serious health issues were excluded from the study following completing an appropriate clinical examination.

Informed written consent, name, age, gender, CNIC number, address, contact number, socio-demographic, occupation and a donor history questionnaire, which includes data from previous blood transfusions, history of recent infections or hospitalization, surgeries, jaundice, body piercing, neural problems, allergies, travel history, addiction and unprotected sexual activities were taken from each participant. Donors with physical disabilities and/or having co-morbid conditions were excluded from the study. From each blood donor sterile test tube was used to collect five milliliters of venous blood. Then under aseptic measures as per SOPs of blood bank.

Monoclonal blood grouping antiserum was utilized (anti-A, anti-B, antiAB and anti-D) and reverse grouping method blood grouping ABO and Rhesus (Rh) were performed for blood type. The serum was then centrifuged to separate it for further examination in the lab. Blood donors' serum aliquots were examined for anti-HIV, hepatitis B surface antigen (HBsAg) and anti-HCV using standardized screening test algorithms. ELISA (Fourth-generation) kits were employed for the initial examination (Bio-kit) and Immunochromatographic Technique (ICT). All of the reactive samples were tested twice. False positive were excluded from the study. Confirmed ELISA positive cases, repeat reactive serum were identified. The positive blood units were disposed of in a fire. The data was elevated via graph pad ver 5.0 and Microsoft excel windows ver 2013. The results for all variables were given in the form of rates (%).

Results and Discussion

In the present study a total 6311 blood donor's tested: blood group B+ has highest frequency 29.23% (1845), followed by blood group O+ 27.42% (1731), then A+ve 26.01% (1642) and AB+ 10.12% (639). Blood group A-ve was seen in 2.09% (132), O-ve 2.02% (128) B-ve 1.99% (126) while remaining 1.06% (67) blood donors had AB-ve (Figure 1). The present study results are similar with previous reports from Pakistan, indicating high frequency of blood group B, O and A then AB+ve. B+ve blood group was the highest identified blood group while group AB-ve is the insignificant prevalent among all donors. Rh+ive is commonest while blood group Rh-ive is the rarest in Pakistan [21-24]. The ratio of blood types among different ethnic groups and races varies greatly around the world. It varies depending on the population and from one region to another within the same country. The variation in blood groups in human population is attributed to genetically and environmental factors [25]. High ratio of blood group O can be found in pure Americans Indians. In the United States of America, blood groups O, A, B, and AB are distributed at 45%, 41%, 10%, and 4%, respectively. Eastern Europe has a greater percentage of blood group B while central Asia has the maximum proportion of blood group B. Rh-negative in Britain (17%), Caucasoid (15%) American Blacks (5%), Asians (1%) African Blacks (0%) [26-28].

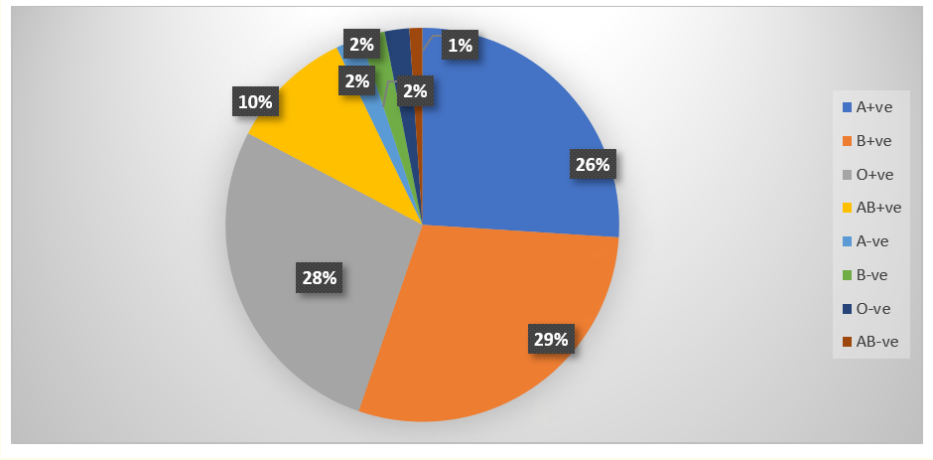

Figure 1: *Prevalence of blood groups among blood group donors.*

Among these 6311 tested individuals 1.50% (n = 95) were seropositive. Among which the prevalence of HBV has highest positive percentage 56.84% (n = 54) then HCV positive were 21.05% (n = 20), Syphilis positive were 20% (n = 19) while MP positive were 2.10 (n = 2) and no positive HIV is reported (Table 1).

Blood Group	HBV Reactive	HCV Reactive	HIV Reactive	VDRL Reactive	MP Reactive
A+ve	14	8	0	2	1
B+ve	19	6	0	8	0
O+ve	16	3	0	4	0
AB+ve	4	3	0	5	0
A-ve	0	0	0	0	1
B-ve	0	0	0	0	0
O-ve	1	0	0	0	0
AB-ve	0	0	0	0	0

Table 1: *Prevalence of HBsAg, Anti-HCV, Anti-HIV, malaria parasite and VDRL in blood donors.*

Among complete tested 6311 blood donors 0.855% (n = 54) were detected HBV positive. Pakistan is endemic to HBV [29]. Few other studies have been documented from Pakistan showing varied prevalence of HBV in BDs, from different areas [30-33]. Diverse country wide emergency clinic based and populace based HBV reviews (singular analysts) assessed a commonness pace of 2-7%, according to which Pakistan is in the halfway HBV predominance zone. During the previous twenty years this danger has gotten much interest as the commonness of HBV has expanded altogether [34]. According to another study, HBV positive was associated to 5.5 percent of tuberculosis cases**.** Another study documented a high correlation of HBV with ocular surgeries (2.35%). Some reports also showed an HBV prevalence of 1.92% among dental surgery patients, as well as β -thalassemia major (96%) and β -thalassemia intermediate (4%) [35].

Hepatitis C is associated to a wide range of infections. Studies performed on TB, urinal dialysis, vital surgeries, renal disorders, thalassemia, oral and maxillofacial surgery, and ocular surgery skin disease exhibited HCV prevalence rates of 9.1%, 28%, 8%, 27.2%, 27.33%, 12.8%, 3.68%, and 6.37%, 17.7% respectively. In other literature studies diabetes mellitus, eye dental surgery patients have also been reported with high rate of HBV and HCV infections rate, which was 5.2%, 8.7%, 1.3% respectively [35].

The highest prevalence for HBV was present among blood group B+ve 1.029% (n = 19/1845) then O+ve 0.92% (16/1731) and A+ve0.85% (n = 15/1643) then O-ve 0.78% (1/128). The lowest was seen in A -ive, B-ive and AB-ve (Table 2). Our study is in accordance with [36-39]. A study conducted in Saudi Arabia also reports similar results to our study [40]. Our report is in contrast with findings with of [41] which could be different due to geographical locations.

Blood Group	Prevalence	HCV percentage	HCV Percentage	HIV Percentage	VDRL Percentage	MP Percentage
A+ve	1643	0.85%	0.49%	0%	0.12%	0.06%
B+ve	1845	1.02%	0.33%	0%	0.43%	0%
O+ve	1731	0.92%	0.17%	0%	0.23%	0%
AB+ve	639	0.63%	0.46%	0%	0.78%	0%
A-ve	132	0.00%	0.00%	0%	0%	0.76%
B-ve	126	0.00%	0.00%	0%	0%	0%
O-ve	128	0.78%	0.00%	0%	0%	0%
AB-ve	67	0.00%	0.00%	0%	0%	0%

Table 2: *Distribution pattern of HBV, HCV, HIV, MP and VDRL in relation to blood groups.*

No such HIV positive is reported, the new study's prevalence is lower than that reported in previous studies [42,43]. This possible decrease could be due to safety precautions, increase awareness and education about the blood born infections.

Similarly, HCV highest burden was observed in A+ve 0.49% (n = 8), B+ve 0.33% (n = 6) and O +ive, AB+ve have (n = 3) 0.17%, 0.46 respectively while no positive case were reported in A-ve, O-ive and B -ive (Table 2) our study report is similar with [44,45] who also have highest HCV prevalence in blood group A+ve.

Syphilis infection was found more prevalent in B +ive 0.43% (n = 8), O +ive 0.23% (n = 4) AB+ve 0.46% (n = 3) and A+ive 0.12% (n = 2). On the other hand A-ive, B-ive, O-ive and AB-ive were not found in the blood donors. This report is accordance with [46,47] who also reported that B+ve was more susceptible to syphilis [48,49].

Malarial parasite was only detected in donors having blood group A +ive and A -ive with percentage of 0.07% (n = 1) and 0.86% (n = 1) (Table 2). When in comparison to the blood group B and O, a significant number of type A patients were known by 1978 as a result of combined data analysis [50].

Conclusion

According to this report TTIs, particularly HCV, HBV, and syphilis are less prevalent while HIV and malarial parasite prevalence is low as compared to the other TTI's. Despite the fact that our findings indicate a lower occurrence of HCV, HBV, HIV, syphilis and malaria, but more detailed distribution and frequency testing's are needed to determine the true prevalence. Moreover, research in the general population is required. The epidemiology of any disease is influenced by factors such as awareness, prevention, and treatment which needs to be disseminated among the public which could reduce the disease load. Furthermore, government policies and self-care is a need of the day which will further filter-out more potentially hazardous donors and will improve transfusion service quality.

Bibliography

1. https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability
2. Ehsan H., *et al*. "A Systematic Review of Transfusion-Transmissible Infections Among Blood Donors and Associated Safety Challenges in Pakistan". *Journal of Blood Medicine* 11 (2020): 405.
3. Arshad A., *et al*. "Prevalence of transfusion transmissible infections in blood donors of Pakistan". *BMC Hematology* 16.1 (2016): 27.
4. Apata IW., *et al*. "Progress toward prevention of transfusion-transmitted hepatitis B and hepatitis C infection—sub-Saharan Africa, 2000-2011". *MMWR: Morbidity and Mortality Weekly Report* 63.29 (2014): 613.
5. American Association of Blood Banks. Technical Manual/American Association of Blood Banks. AABB (2005).
6. Saqlain N., *et al*. "BLOOD DONATION". *The Professional Medical Journal* 24.12 (2017): 1806-1811.
7. Ali M., *et al*. "Hepatitis B virus in Pakistan. a systematic review of prevalence, risk factors, awareness status and genotypes". *Virology Journal* 8.1 (2011): 1-9.
8. Mehr MT., *et al*. "Frequency of hepatitis B & C infection in newly recruited civil servants in Khyber Pakhtunkhwa". *Khyber Medical University Journal* 5.2 (2013).
9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4721999/
10. Mehr MT., *et al*. "Frequency of hepatitis B & C infection in newly recruited civil servants in Khyber Pakhtunkhwa". *Khyber Medical University Journal* 5.2 (2013).

11. Shah SZ., *et al*. "Sero-Prevalence of HCV and HIV antibodies among different groups of general population of Peshawar Cantonment, KPK, Pakistan" (2015).

12. World Hepatitis Day 2018 global.

13. Mehmood S., *et al*. "National prevalence rate of hepatitis B and C in Pakistan and its risk factors". *Journal of Public Health* 28 (2019): 751-764.

14. https://www.unaids.org/en/resources/fact-sheet#:~:text=26%20million%20%5B25.1%20million%E2%80%9326.2,%20living%20with%20HIV%20in%202019

15. Rehman GU and Shi H. "ABO and RH (D) blood groups distribution in Pakistan. a systematic review". *International Journal of Pure and Applied Zoology* 9.1 (2021): 1-9.

16. https://www.who.int/news-room/fact-sheets/detail/malaria#:~:text%20=%20Malaria%20is%20caused%20by%20Plasmodium,%20vivax%20%E2%80%93%20pose%20the%20greatest%20threat

17. https://www.who.int/docs/default-source/malaria/world-malaria-reports/9789240015791-double-page-view.pdf?sfvrsn%20=%202c24349d_5

18. https://www.who.int/hac/crises/pak/Pakistan_Aug08.pdf

19. Newman L., *et al*. "Global estimates of the prevalence and incidence of four curable sexually transmitted infections in 2012 based on systematic review and global reporting". *PloS one* 10.12 (2015): e0143304.

20. https://apps.who.int/iris/bitstream/handle/10665/246296/WHO-RHR-16.09-eng.pdf

21. Rehman GU and Shi H. "ABO and RH (D) blood groups distribution in Pakistan. a systematic review". *International Journal of Pure and Applied Zoology* 9.1 (2021): 1-9.

22. Anees M and Mirza MS. "Distribution of ABO and Rh blood group alleles in Gujrat region of Punjab, Pakistan". *Proceedings-Pakistan Academy of Sciences* 42.4 (2005): 233.

23. Babar M., *et al*. "ABO and Rhesus blood group distribution in District Nowshera". *Journal of Postgraduate Medical Institute: Peshawar-Pakistan* 13.2 (1999).

24. Anees M., *et al*. "Distribution of ABO and Rh blood group alleles in Mandi Bahauddin district of Punjab, Pakistan". *Proceedings-Pakistan Academy of Sciences* 44.4 (2007): 289-294.

25. Alam S., *et al*. "ABO and Rh blood groups I. Markers of cardiovascular risk and association with lipids and other related risk covariables in a Pakistani population". *Proceedings-Pakistan Academy of Sciences* 39.1 (2005): 47-66.

26. Hassan FM. "Frequency of ABO subgroup ABO and Rh (D) blood groups in major Sudanese ethnic groups". *Pakistan Journal of Medical Research* 49.1 (2010).

27. Rehman GU and Shi H. "ABO and RH (D) blood groups distribution in Pakistan. a systematic review". *International Journal of Pure and Applied Zoology* 9.1 (2021): 1-9.

28. Pennap G., *et al*. "Frequency distribution of hemoglobin variants, ABO and rhesus blood groups among students of African descent". *British Microbiology Research Journal* 1.2 (2011): 33-40.

29. Zuberi SJ. "Seroepidemiology of HBV/HCV in Pakistan". *International Hepatology Communications* 5.1 (1996): 19-26.

30. Mehmood S., *et al*. "National prevalence rate of hepatitis B and C in Pakistan and its risk factors". *Journal of Public Health* 28 (2019): 751-764.

31. Zuberi SJ. "Seroepidemiology of HBV/HCV in Pakistan". *International Hepatology Communications* 5.1 (1996): 19-26.

32. Attaullah S., *et al*. "Prevalence of HBV and HBV vaccination coverage in health care workers of tertiary hospitals of Peshawar, Pakistan". *Virology Journal* 8.1 (2011): 275.

33. Ali M., *et al*. "Hepatitis B virus in Pakistan. a systematic review of prevalence, risk factors, awareness status and genotypes". *Virology Journal* 8.1 (2011): 1-9.

34. Jahan S. "Epidemiology of needlestick injuries among health care workers in a secondary care hospital in Saudi Arabia". *Annals of Saudi Medicine* 25.3 (2005): 233-238.

35. Mehmood S., *et al*. "National prevalence rate of hepatitis B and C in Pakistan and its risk factors". *Journal of Public Health* 28 (2019): 751-764.

36. Tyagi S and Tyagi A. "Possible correlation of transfusion transmitted diseases with Rh type and ABO blood group system". *Journal of Clinical and Diagnostic Research JCDR* 7.9 (2013): 1930-1931.

37. Sharma P., *et al*. "Distribution of transfusion transmitted infections in ABO and Rh blood groups. a 5 year study". *Annals of International Medical and Dental Research* 3.5 (2017): 16-18.

38. Mehmood S., *et al*. "National prevalence rate of hepatitis B and C in Pakistan and its risk factors". *Journal of Public Health* 28 (2019): 751-764.

39. Memon FA., *et al*. "Seroprevalence of transfusion transmitted infections among different blood group donors at Blood Bank LUMHS, Hyderabad". *Pakistan Journal of Medical Sciences* 33.2 (2017): 443-446.

40. Alabdulmonem W., *et al*. "Sero-prevalence ABO and Rh blood groups and their associated transfusion-transmissible infections among blood donors in the central region of Saudi Arabia". *Journal of Infection and Public Health* 13.2 (2020): 299-305.

41. Nigam JS., *et al*. "The prevalence of transfusion transmitted infections in ABO blood groups and Rh type system". *Hematology Reports* 6.4 (2014): 5602.

42. Ali M., *et al*. "Thirty years of HIV in Pakistan. a systematic review of prevalence and current scenario". *Future Virology* 12.10 (2017): 609-623.

43. Zaheer HA., *et al*. "Prevalence and trends of hepatitis B, hepatitis C and human immunodeficiency viruses among blood donors in Islamabad, Pakistan 2005-2013". *Journal of Blood Disorders and Transfusion* 5 (2014): 217.

44. Mahmoud NS. "Blood Groups and Susceptibility to Hepatitis C Virus Infection Among β-Thalassemia Patients". *Diyala Journal of Medicine* 14.1 (2018): 20-28.

45. Woo SM., *et al*. "Risk of pancreatic cancer in relation to ABO blood group and hepatitis C virus infection in Korea. a case-control study". *Journal of Korean Medical Science* 28.2 (2013): 247.

46. Sharma P., *et al*. "Distribution of transfusion transmitted infections in ABO and Rh blood groups. a 5 year study". *Annals of International Medical and Dental Research* 3.5 (2017): 16-18.

47. Nigam JS., *et al*. "The prevalence of transfusion transmitted infections in ABO blood groups and Rh type system". *Hematology Reports* 6.4 (2014): 5602.

48. Nigam JS., *et al*. "The prevalence of transfusion transmitted infections in ABO blood groups and Rh type system". *Hematology Reports* 6.4 (2014): 5602.

49. Sharma P., *et al*. "Distribution of transfusion transmitted infections in ABO and Rh blood groups. a 5 year study". *Annals of International Medical and Dental Research* 3.5 (2017): 16-18.

50. Abegaz SB. "Human ABO Blood Groups and Their Associations with Different Diseases". *BioMed Research International* (2021).

Volume 6 Issue 4 April 2022