PREVALENCE AND TRENDS OF TRANSFUSION TRANSMITTED INFECTIONS (TTIS) IN BLOOD DONORS OF DISTRICT PESHAWAR AND WAH CANTONMENT, NORTHERN PAKISTAN.

HAMID HUSSAIN¹, NAEEM ULLAH², SHAYAN QADIR³, SYED AIZAZ HUSSAIN ZAIDI³, NAMRA KHALIL³, HAMAYUN KHAN⁴, AYAZ AYUB¹

1. Institute of Public Health, Khyber Medical University Peshawar
2. Department of Community Medicine, Saidu Medical College, Swat
3. Khyber Medical College, Peshawar.
4. Nowshehra Medical College.

ABSTRACT

BACKGROUND: World Health Organization (WHO) confirms Pakistan amongst those nations which are affected the most by Hepatitis B and C. Studies also suggest blood transfusion to be one of the major risk factors for the high sero-prevalence of these diseases in the general population. Very few studies have been carried out to establish the prevalence of TTIs among blood donors in Northern Pakistan. To estimate the prevalence and trend of transfusion related transmission of infection in Northern Pakistan, a study was carried out among records of blood donors to detect different infection from the year 2007 – 2012.

MATERIAL AND METHODS: A retrospective study to audit the records of 423078 blood donors was carried out in five major Blood Bank Units of Northern Pakistan which included Khyber Teaching Hospital Peshawar, Lady Reading Hospital Peshawar, Hamza Foundation Peshawar, Hayatabad Medical Complex Peshawar and POF Hospital Wah Cantonment, Punjab from January 2007 through May 2012. In order to investigate differences among the trends of different variables in year 2007 - 2012, one-way ANOVA was used.

RESULTS: Combined sero-prevalence of Transfusion Transmitted infections were calculated as 4.245%. The break up is as follows: HCV Ab: 1.856% (7855), HBS Ag: 2.170% (9184), HIV Ab: 0.0316% (134) and Syphilis: 0.315% (867). A mean increase in the number of blood donors ($p=0.000$) was calculated while other infections also increased significantly [HBS Ag $p=0.0001$, HIV Ab $p=0.0051$ and VDRL $p=0.011$] except HCV [$p=0.5515$], which remained steady over the years.

CONCLUSION: The prevalence of infection of HCV during this period remained steady over the years, however it is still high. Other transfusion transmitted infections showed increasing trend. Improvements such as provision of latest screening kits, maintenance of computerized records including necessary data for follow up should be made. We recommend 'pre' instead of 'post' donation screening to be done because of the high seroprevalence of TTIs. Awareness campaigns, seminars and vaccination programs should be conducted by the health sector, especially for Hepatitis B.

KEY WORDS: prevalence, transfusion, infections.

INTRODUCTION

Donating blood is surely an act that manifests devotion and service to humanity. But where each day hundreds of lives are saved, the devastation that an unhealthy donation can cause is ghastly. Transfusion Transmitted Infections (TTIs) of major concern in developing countries like Pakistan are Hepatitis B and C along with

less prevalent Syphilis and AIDS^{1,2,3,4,5,6,7}. World Health Organization (WHO) confirms Pakistan amongst those nations which are affected the most by Hepatitis B and C^{8,9}. Studies also suggest blood transfusion to be one of the major risk factors for the high seroprevalence of these diseases in the general population^{10,11}. This is because of the dearth of adequate screening

equipment in the health care system of the country¹². Apart from that many blood bank units (BBUs) do not follow the screening protocols as made mandatory by the health regulatory authorities¹³. In Pakistan around 1.5 million units of blood are transfused annually and according to UNAIDS only 50 percent of this is screened for different TTIs¹⁴. Window period (i.e the time period required from the attainment of infection to the development of antibodies) also plays a major role in the epidemiologic spread of the TTIs. Very few studies have been carried out to establish the prevalence of TTIs among blood donors in Northern Pakistan, and those that have been done suggest varying figures i.e. 1.9 to 6.5% and 0.27% to 6.2% for Hepatitis B and C respectively^{1,2,3,4,5}. These studies strongly recommended more researches to be carried out in this regard to authenticate the statistical picture in view of the health care system. Therefore a five year study (2007-2012) based on five major BBUs was undertaken to establish a much reliable statistical data regarding prevalence and trend of TTIs in Northern Pakistan.

METHODOLOGY

The study was carried out in five major BBUs of Northern Pakistan which includes: Khyber Teaching Hospital Peshawar, Lady Reading Hospital Peshawar, Hamza Foundation Peshawar, Hayatabad Medical Complex Peshawar and POF Hospital Wah Cantonment, from January 2007 through May 2012. It was a retrospective descriptive study based on the records of the BBUs. Ethical approval was taken from the ethical review board of Khyber Medical College, Peshawar to conduct the study. A total of 423078 blood donors attended the BBUs during this time period and were screened for Anti-HIV Ab, Anti-HCV Ab, HBS Ag in all five units. Two units i.e. Hamza Foundation and Lady Reading Hospital also tested for Syphilis. Screening was done using ELISA third generation (Biokit, Spain). Inclusion criteria included all blood donors between ages 18 and 60. For numeric values means and standard

deviation and for categorical variables frequencies and percentages were calculated. In order to investigate significant differences among the years regarding different parameters, the data were analyzed by using one-way analysis of variance ANOVA. In case of significant F-ratio, the means were separated by using least significant difference LSD test at 5% level of significance. The data was statistically analyzed in SPSS version 16.0 and STATISTIX version 8.1. Limitations of the study were that the data was based on blood bank records with deficient details to evaluate possible risk factors.

RESULTS

A total of 423078 blood donors were screened in five blood bank units from January 2007 to May 2012. Of the total 422925 (99.96%) of blood donors were males while only 153 (0.04%) were females. No TTIs were found in females.

The seroprevalence of HCV Ab, HBS Ag, VDRL and HIV Ab was calculated to be 7855 (1.856%), 9184 (2.170%), 867 (0.351%) and 134 (0.0316%) respectively (Fig. 1). Only two blood bank units tested for VDRL which included Lady Reading Hospital, Peshawar and Hamza Foundation, Peshawar. The prevalence of VDRL in these units was 867 (0.351%) out of 246569 donors screened. The total number of blood donors who tested positive for any TTI was 17964 (4.245%) and the total number of blood donations taking place were 405123 (95.754%).

The means and there standard deviation of different infections is shown in table 1. Analysis of Variance regarding total number of cases reveal significant difference (F-ratio 13.90, p-value = 0.000) across the years in the present study. Statistically significant trend was observed in the prevalence of Hbs Ag, HIV and Syphilis. On the other hand a decreasing trend in the HCV seropositive donors was established in these five years but it was not significant.

Monthly average (SD) of total transfusions and TTI'S in the years Jan 2007 – May 2012 [Table 1]

Year	Total transfusions	HCV +ve	HbSag +ve	HIV +ve	VDRL +ve
2007	5425.3 (627)	128.58 (22)	120.25 (20)	1.00 (1.04)	9.5 (4.0)
2008	6280.8 (536)	121.75 (24)	145.75 (13)	1.08 (0.996)	10.9 (9.1)
2009	6427.9 (510)	124.75 (22)	135.58 (17)	3.16 (0.996)	19.1 (8.3)
2010	6933.2 (480)	117.50 (25)	138.08 (20)	2.5 (1.7)	13.08 (4.8)
2011	7123.0 (785)	111.75 (20)	155.33 (23)	1.9 (1.37)	12.8 (5.1)
2012	7360.8 (632)	120.60 (12)	168.80 (17)	3.6 (2.8)	16.2 (4.6)

DISCUSSION

Blood transfusion can be considered a major contributor to the spread of deadly diseases such as Hepatitis B and HCV given the inadequacy of screening protocols in BBUs of Pakistan^{13,14}. Although all five BBUs that were assessed had screened their donors for HCV Ab, HBs Ag and HIV Ab, only two had their donors VDRL tested. This accounts for the uncertainty of number of healthy donations made. The records in majority were not computerized and had less information regarding the personal details of the donors. This implies that, follow up care and treatment of positively tested donors is not possible through these units. One of the major reasons for these limitations is the massive influx of patients unmatched by the limited skilled personnel, equipment and administrative feasibility of these units. Furthermore, results of our study reveal an increasing donor load in these already over-burdened units. This immoderate influx can be explained on part by

internal displacement towards larger cities in 2009 due to military operations in Malakand region of the Khyber Pakhtunkhwa (KPK) province. This lead to an exodus of about 2.3 million people in a little over a fortnight, creating one of the largest displacement crises in the history of KPK¹⁵. An annual population growth rate of 2.1% also accounts for the increasing donor load¹⁶. The seroprevalence of TTIs from our study was less as compared to those of other countries: Tanzania (HIV-8.7%, HBV-11%, HCV-8%, syphilis-12.7%), Thailand (HIV-0.69%, HBV-4.61%, HCV-2.90%) and Ethiopia (HIV-4.5%, HBV-8.2%, HCV-5.8%)^{17,18,19}. Comparison with a neighboring country India shows the seroprevalence of HCV and HBV greater in Pakistan but that of HIV greater in India (India: HCV-0.66%, HBV-2.23%, HIV-0.56%)²⁰. A major factor that contributes to the minimal seroprevalence of HIV (0.0316%) among Pakistani donors in our view is the apparently infrequent sexual malpractice as per the religious trends. This low seroprevalence of HIV is also highlighted in similar studies carried out in other Islamic countries such as Saudi Arabia, Iran and Turkey: 0.00%, 0.004% and 0.28% respectively^{21,22,23}. Assessment of TTIs seroprevalence among blood donors may also give an idea about the prevalence of these infections in the general populations as a whole²⁴. Still, an overestimation as well as underestimation of the true prevalence that this can lead to has been discussed in some studies^{25,26}. Comparison with another major study carried out in Northern Pakistan from 2008- 2011 displayed a much higher seroprevalence for HBs Ag, HCV Ab and HIV Ab in the study (2.68%, 2.46% and .06% respectively)⁶. This variance can be accounted to the differences in sample size and time period of study. Discussing the trend of TTIs established from our study we can state that a decreasing trend was found for HCV seroprevalence in these five years (2007:2.370%, 2008: 1.938%, 2009: 1.940%, 2010: 1.694%, 2011: 1.568%, and 2012: 1.638%) which is also supported by the study of khan et al²⁷. Recent health programs initiated by the government to wipe off Hepatitis C such as

“National Programme for the Prevention and Control of hepatitis C” and “Benazir Health Support Program” appear to play a leading role behind this significant decrease. This decline was however not noted by Sobia et al. Temporal trend for HIV and syphilis also appeared to rise gradually, but it had no statistical significance (HIV: 0.018% to 0.049%, Syphilis: 0.0304% to 0.0386%). Hbs Ag seroprevalence appeared to fluctuate between 1.991% and 2.320% without following a significant trend. All the BBUs in our study carried out post donation screening. Keeping in mind the 4.245% prevalence of TTIs among the donors, it is strongly recommended that pre donation screening should be done in the units Post-donation screening leads to the trouble of decontaminating and discarding infectious blood, wastage of blood bags and the loss to follow-up treatment of positive cases who pose a risk of spreading these deadly infections in the society^{28,29,30}. Furthermore, we recommend pre donation screening to be done while also adjusting its cost in a feasible range. Health sector should make more plans such as awareness campaigns, seminars and vaccination programs in order to eradicate these deadly diseases, especially Hepatitis B. We also recommend more researches to be done in order to keep a track of the prevalence of TTIs in future. The screening facilities provided in BBUs of Northern Pakistan are not up to the mark. Improvements such as provision of latest screening kits and better skilled personnel should be made to augment the standards of screening for the increasing donor load Computerized records including necessary data for follow up should also be maintained in these units

CONCLUSION

More than 4% Sero-prevalence of the transfusion transmitted infections is alarming. This burden is identified in the apparently healthy population of blood donors. If we use this as proxy variable for the general population, the situation becomes frightening. The decreasing insignificant prevalence of HCV shows that there is some effort made by the government and both public

and private health sectors but it is still ineffective and more struggle is needed.

RECOMMENDATION

We recommend ‘pre’ instead of ‘post’ donation screening to be done because of the high seroprevalence of TTIs. Awareness campaigns, seminars and vaccination programs should be conducted by the health sector, especially for Hepatitis B.

REFERENCES

1. Naila Asif, Nasir Khokhar, Fazal Ilahi. Seroprevalence of HBV, HCV and HIV infection among voluntary non remunerated and replacement donors in Northern Pakistan. *Pak J Med Sci* Jan - Mar 2004; 20(1):24-8.
2. Shamim Mumtaz, Mehmood Ur Rehman, Muhammad Muzaffar, Masood ul Hassan, Wasim Iqbal. Frequency of seropositive blood donors for hepatitis B, C and HIV viruses in railway hospital Rawalpindi. *Pak J Med Res* Apr - Jun 2002; 41(2):51-3.
3. Khattak M F, Salamat N, Bhatti F A, Qureshi T Z. Seroprevalence of hepatitis B, C and HIV in blood donors in northern Pakistan. *J Pak Med Assoc* Sep 2002; 52(9): 398-402.
4. Muhammad Ryas, Tassawar Hussain, Farhat Abbas Bhatti, Farooq Ahmed, Waheeduz Zaman Tariq, Muhammad Farooq Khattak. Epidemiology of Hepatitis C Virus Infection in Blood Donors in Northern Pakistan. *J Rawal Med Coll* Dec 2001; 5(2): 56-9.
5. Faisal Ahmed, S H Shah, M Tariq, J A Khan. Prevalence of hepatitis B carrier and HIV in healthy blood donors at Ayub Teaching Hospital. *Pak J Med Res* Apr - Jun 2000; 39(2): 91-2.
6. Sobia Attaullah, Sanaullah Khan, Jabbar Khan. Trend of transfusion transmitted infections frequency in blood donors: provide a road map for its prevention and control. *Journal of Translational Medicine* 2012; 10: 20.
7. Faisal sultan, Tariq Mehmood, Muhammad Tariq Mahmood. Infectious pathogens in volunteer and replacement blood donors in Pakistan: a ten-year experience. *International Journal of Infectious Diseases* 2007; 11(5): 407-412.
8. Previsani N, Lavanchy D. Hepatitis B. Geneva: World Health Organization 2002.
9. Hepatitis C. Geneva: World Health Organization; 2000 [(accessed August 2012)]. World Health Organization fact sheets. Available at: <http://www.who.int/mediacentre/factsheets/fs164/en/>.
10. Syed Asad Ali, Rafe M.J. Donahue, Huma Qureshi, Sten H. Vermund. Hepatitis B and hepatitis C in

- Pakistan: prevalence and risk factors. *Int J Infect Dis* Jan 2009; 13(1): 9-19.
11. Yasir Waheed, Talha Shafi, Sher Zaman Safi, Ishtiaq Qadri. Hepatitis C virus in Pakistan: A systematic review of prevalence, genotypes and risk factors. *World J Gastroenterol* Dec 7 2009; 15(45): 5647-5653
  12. Stephen Luby, Rafique Khanani, Maliha Zia, Zuleikha Vellani, Mohsin Ali, Abdul Haleem Qureshi, et al. Evaluation of blood bank practices in Karachi, Pakistan, and the government's response. *J Pak Med Assoc* Jan 2006; 56(Suppl 1): 25-30.
  13. Alia Zaidi, Waheeduz Zaman Tariq, Kashan Abidi Haider, Liaqat Ali, Abdus Sattar, Farah Faqeer, et al. Seroprevalence of hepatitis B, C and HIV in healthy blood donors in Northwest of Pakistan. *Pak J Pathol* Jan - Mar 2004; 15(1): 11-6.
  14. Iram Manzoor, Noreen Hashmi, Seema Daud, Sana Ajmal, Hira Fatima, Zainab Rasheed, Sara Syed. Seroprevalence of transfusion transmissible infections (TTIS) in blood donors Biomedica Jul - Dec 2009; 25(2): 154-8.
  15. Najam U Din. (2010). Internal displacement in Pakistan a contemporary challenge. Human rights commission of Pakistan.
  16. Abdul hakim. Population Policy Shifts and Their Implications for Population Stabilization in Pakistan. *The Pakistan Development Review*. 2001; 40(4): 551-573.
  17. Matee MI, Lyamuya EF, Mbena EC, Magessa PM, Sufi J, Marwa GJ, et al. Prevalence of transfusion-associated viral infections and syphilis among blood donors in Muhimbili Medical Centre, Dar es Salaam, Tanzania. *East Afr Med J* March 1999; 76(3): 167-71.
  18. Luksamijarulkul P, Thammatana N, Tiloklurs M. Seroprevalence of hepatitis B, hepatitis C and human immunodeficiency virus among blood donors, Phitsanulok regional blood center, Thailand. *Southeast Asian J Trop Med Public Health* 2002; 33(2): 272-9.
  19. Diro E, Alemu S, G/Yohannes. A Blood safety & prevalence of transfusion transmissible viral infections among donors at the Red Cross Blood Bank in Gondar University Hospital. *Ethiop Med J* 2008 Jan; 46(1): 7-13.
  20. Pahuja S, Sharma M, Baitha B, Jain M. Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors: a hospital based study. *Jpn J Infect Dis* 2007 Nov; 60(6): 389-91.
  21. El-Hazmi MM. Prevalence of HBV, HCV, HIV-1, 2 and HTLV-I/II infections among blood donors in a teaching hospital in the Central region of Saudi Arabia. *Saudi Med J* Jan 2004; 25(1): 26-33.
  22. H Abolghasemi, M Maghsudlu, S Amini Kafi-Abad, A Cheraghali. Introduction to Iranian Blood Transfusion Organization and Blood Safety in Iran. *Iranian J Pub Health* 2009; 38 (Suppl 1): 82-87.
  23. I Afsar, S Gungor, AG Sener, SG Yurtsever. The prevalence of HBV, HCV and HIV infections among blood donors in Izmir, Turkey. *Indian Journal of Medical Microbiology* 2008; 26(3): 288-289.
  24. Khan ZT, Asim S, Tariq Z, Ehsan MA, Malik RA, Ashfaq B et al. Prevalence of transfusion transmitted infectious in healthy blood donors in Rawalpindi District, Pakistan: a five year survey. *Inter J of Pathology* 2007; 5(1): 21-25.
  25. Ali SA, Donahue RMJ, Qureshi H, Vermund SH: Hepatitis B and Hepatitis C in Pakistan: Prevalence and risk factors. *Int J Infec Dis* 2009; 13(1): 9-19.
  26. Jafri W, Jafri N, Yakoob J, Islam M, Tirmizi FA, Jafar T. Hepatitis B and C: prevalence and risk factors associated with seropositivity among children in Karachi Pakistan. *BMC Infect Dis* 2006; 6: 101.
  27. Afshan Khan, Syed Sarmad Bukhari, Muhammad Ismail Alvi, Alia Qazi. Seroprevalence of hepatitis b, hepatitis c and hiv in blood donors of Peshawar. *Gomal Journal of Medical Sciences* January-June 2011; 9(1): 46-50.
  28. Shahtaj khan, Farah Faqir, Noor Rehman, Fazle Faziq. Reducing the Risk of transfusion-transmitted Infections through predonation screening of Blood Donors. *International Journal of pathology* 2011; 9(2): 59-62.
  29. Salawu L, Murainah HA. Pre-donation screening of intending blood donors for antibodies to infectious agents in a Nigerian tertiary health institution: a pilot study. *Afr J Med Sci* Dec 2006; 35(4): 453-6.
  30. Okonko IO , Okerentugba PO , Adeniji FO , and Anugweje KC. Detection Of Hepatitis B Surface Antigen (Hbsag) Among Intending Apparently Healthy Blood Donors. *Nature and Science*, 2012; 10(4): 69-75.

CORRESPONDENCE ADDRESS

Dr. Hamid Hussain
Institute of Public Health, Khyber Medical
University Peshawar
Cell: 0333-9112885
Email: hamidhussain22@hotmail.com