Distribution of HBsAg, HCV, HIV and Syphilis among Blood Donors

Vjollca Durro[a], Silva Novi[b], Petro Mersini[c], Sadik Saliasi[d], Irida Ikonomi (Hoxha)[e], Evis Nushi[e]

[a]PhD Medical Doctor, Associate Professor. Expert of blood transfusion and transplant, Administration Hospital Directory, Standard Sector, Ministry of Health, Tirana, Albania [b]PhD medical Doctor, Administration Hospital Directory, Standard Sector, Ministry of Health [c]Medical Doctor. Director of Administration Hospital Directory, Ministry of Health Tirana, Albania, [d]Medical Doctor, Regional Health, Tirana, Albania [e]Department of Microbiology, Mother Theresa Hospital, Tirana, Albania

Abstract

Introduction : The aim of this study is to evaluate the trend of infections transmitted through blood transfusion among blood donors.

Methods: All donations collected between January 2010/December 2014 at the Albania were included in this study. The donations were screened for HIV Ag/Ab combo, anti-HCV, and HBsAg and syphilis using the chemiluminescence immunoassay (CMIA), Abbott Architect system. All samples resulted reactive with CMIA method for Syphilis and HIV, were confirmed by confirmation assay from reference laboratory of Public Health Institute. Reactive samples for Anti- HCV and HBsAg were not performed the confirmation test.

Results: A total of 136072 donations were screening for HBsAg, HCV, HIV and Syphilis during study period. The prevalence of infection transmitted by transfusion in blood donors was 6.70%. Out of 136072 blood donations 41(0.03 %) were positive for HIV, 1088 (0.8%) were positive for anti HCV, 7790 (5.72%) were positive for HBsAg and 193(0.14%) were positive for syphilis. Our data show that according to type of blood donors the overall prevalence of ITT in our donor population was 1.28% in voluntary non remunerate blood donors, 5.4% in family replacement donors and 0.01% in repeat blood donors.

Conclusion: Implementation a good quality control practice starting from history taking of blood donors and extending up to laboratory practices, increase number donation from vnrbd can reduced more the prevalence of ITT in blood donors and minimize the risk of ITT to patients.

KEYWORDS: HBsAg, HCV, HIV, syphilis, blood donors

INTRODUCTION

Blood and blood products for both transfusions and plasma derivatives, are essential therapeutics in modern medicine. Blood transfusion can save lives during emergencies and in other cases where interventions are necessary, but it can be a source of transfusion transmitted diseases(TTD) if proper screening and processing of donated blood is not done (1,2,3,4,5). Today the blood supply is safer and the risks of TTD associated with blood transfusion has been greatly reduced, particularly due to the obligatory screening of donations for the presence of infectious agents transmitted through transfusion (in agreement with Directive 2002/98/EC)and adoption of more sensitive tests such as nucleic acid amplification tests (NAT). NAT have been introduced for blood screening in

all European countries in the last few years(6, 7,8 , 9, 10). The other factors which have positive impact in blood safety are improvements achieved in blood donor selected procedures, blood collection and processing technology(11, 12, 13). Evaluation and monitoring the prevalence and trend of infection diseases marker transmitted through blood transfusion(ITT)in blood donors is important for assessing quality and effectiveness of donor screening process and potential risk of transfusion-transmitted infection (14, 15, 16, 17, 18).

The present study was done to monitoring the trend of infectious markers transmitted through blood transfusion among blood donors for period of time 2010 -2014.In Albania screening of blood donors for HBsAg, anti-HCV, Ab/Ag HIV ½ and syphilis are mandatory according to national legislation.

Methods

All donations collected between January 2010 and December 2014 at national level from blood transfusion service were included in this study. Data included the number of blood donations during study period, the number of positivedonations for infective marker transmitted through blood transfusion, the number of confirmed positive donations for HIV and Syphilis, the methods used to screening donations and donation history. Donors were classified as first-time (donors not known to have previously donated blood) or repeat donors (donors who had donated blood before). The voluntary non remunerate blood donors (VNRBD) and family replacement blood donors (FRBD) have donated blood only one time, so they are evaluated as first time blood donors. All donations were screened for HIVAg/Abcombo, anti-HCV, and HBsAg and syphilis using the chemiluminescence immunoassay (CMIA), Abbott Architect system. The samples, which have been resulted reactive with CMIA method for Syphilis and HIV, were re-tested again in duplicate, according to the National Regulation. Repeatedly reactive samples were confirmed positive(by confirmation assay) at reference laboratory of Public Health Institute. Samples confirmed as sero-positive by reference laboratory were considered positive for HIV ½ andsyphilis. Reactive samples for Anti- HCV and HBsAg were not performed the confirmation test. A sample was considered as HBsAg and Anti-HCV positive when found two times repeatedly reactive with CMIAmethod.

Statistical analyses

The prevalence rate among blood donations was calculated as the number of positive donations at a time donation divided bythe total number of donations -years of observation. Chi- square test was used for statistical analysis. A p- value of < 0.05 was consider significant in all statistical comparison.

Results

From January 2010 to December 2014 at national level were collected a total of 136072 donations. Out of them 32410(23.82%) were voluntary non renumerateblood donations (VNRBD), 86528(63,58%) were family replacement blood donations (FRBD), 17063(12.54%) paid blood donations(PD) and 71(0.06%) autologousblood donations (Table1).

A total of 136072 donations were screening during this study period. Out of them 9112(6.70%) were founded positive for infectious marker screening (HIV Ag/Ab combo, HCV, HBsAg, Syphilis). During years the prevalence of marker of ITT variable form 6.99 % in 2010 to 7.96% in 2012 and decreased to 6.48% in 2014. These variation were statistical highly significant ($p<0.001$).
Out of 136072 blood donations 41(0.03 %) were positive for HIV, 1088(0.8%)were positive for anti HCV, 7790(5.72%)were positive for HBsAg and 193(0.14%) were positive for syphilis(Table 2).
During the years the prevalence of HIV has an increased tendency from 0.02 % in 2010 to 0.034% in 2014, which is not statistical significant ($p=0.5$). The prevalence of HCV in 2014 compared with 2010 is in the same level, but compared with 2012 it was decreased from 1.01% in 2012 to 0.76% in 2014. This decreased was highly significant ($p<0.001$). The prevalence of HBsAg was increased from 6.15% in 2010 to 6.76% in 2012(statistical significant, $p<0.01$) and decreased from 6.76% in 2012 to 5.48% in 2014. This difference was statistical highly significant ($p< 0.001$). The prevalence of syphilis was increased from 0.06% in 2010 to 0.21% in 2014. These increased was statistical significant ($p< 0.01$).
Our data in table No.3 show that the overall prevalence of infectious markers transmitted by blood transfusion (ITT) in our donor population was 1.28% in VNRBD, 5.4%in FRBD, 0.01% in repeat blood donors($p< 0.001$).During years the prevalence of ITT markers was variable in VNRBD from 1.32% in 2010 to 1.64% in 2012 and decreased to 1% in 2014($p<0.001$).While in FRBD the prevalence variation from 5.63% in 2010 to 6.3% in 2012 and decreased in 5.48% in 2014. This difference was highly significant ($p<0.001$).
The data in table No 4 show that, out of 117 HIV reactive samples screened from NBTC 41 samples or 35% of them are confirmed positive from reference laboratory in Public Health Institute. Also, 453 samples of blood donations resulted syphilis positive from NBTC . Out of them 193(42,6 %) are confirmed positive from reference laboratory.

Discussion. The safety of blood related to transmission of infectious diseases is guaranteed by European laws that regulate both the selection of donors through pre-donation questionnaires and serological screening. However, variability in the epidemiology of ITT in different countries, human demographic characteristics and behaviors, some differences in the selection of donors especially in screening method used can influence the efficacy of these processes(19,20,21,22,).Continued vigilance is critical to protect the blood supply from known pathogens and to monitor for the emergence of new infectious agents (23, 24,2526,27,28,29).

The supply with safety and qualitative blood is responsibility of government. In this context, Ministry of Health has undertaken very significant administrative, financial and technical interventions which consist of: 1) The adoption of legal framework in line with EU directive 2002/98/EC, and with WHO recommendations in the field of blood transfusion. 2) Measures for establishing a voluntary unpaid donation system. 3) Improvement of screening method.
In Albania blood donation system is mix. The blood was collected from voluntary non remunerate blood donors (VNRBD), family replacement donors (FRBD) and commercial blood donors. The VNBD and FRBD have donated blood only one time, so they are first

time blood donors. Important steps in increased blood safety was interrupted the commercial first time blood donors since 2009and stimulating increases the number of unpaid blood donors from family replacement donation and voluntary non remunerate blood donors from low-risk population.

Referred data in our study the total number of donation was increased (table 1)and the quality structure of blood donors was improved during years. The data show the increased the number of unpaid donation (voluntary non remunerate blood donors, family replacement donors) and decreased number of donation from paid blood donors. In 2014 commercial donation composed only 7.9% of all donation compared with 19.1% in 2010. While VNRBD are increased from 20.4% in 2010 to 23.7% in 2014and family replacement donation from 60.2 % to 68.2% in 2014. Change of quality structure of blood donors resulted in a very high percentage of first time blood donors. In 2014 the blood collected from first time blood donors (voluntary non remunerate blood donors and family replacement blood donors)composed 92% of total blood collected at national level. But donations from family replacement blood donors consist of the majority of unpaid blood donations yet. In this condition, evaluation of trends of ITT in blood donors remains a critical point for monitoring blood supply safety and donor screening effectiveness in our country.

Another measures to improve the safety of blood was centralization of blood testing for ITT (all blood collected in whole country), only in one center, in Tirana since 2010, improved the testing method and sensitivity of test screening and introduce viral inactivation of plasma derivate in national blood center in Tirana in 2014. The method of blood testing for ITT is full automatic and high sensitivity. The data in this study (table 4) show a high sensitivity of test and method used for blood donor screening in national blood transfusion service, giving a high erguarantee for safety of blood. So 35% of sample resulted reactive for HIV and 42.6% of reactive sample for syphilis are confirmed positive from reference laboratory.

The overall prevalence of infectious agents transmitted through transfusion in our donor populations was 6.7%. While during period time of study, the prévalence of infectious transfusion transmitted markers has been variable as a zigzag figure (figure 1). So, the prevalence of ITT markers has increased tendency from 2010 to 2012 and decreased tendency from 2012 to 2014. The statistical comparison showed that the difference for ITT between these years was highly significant. The prevalence of HBsAg and HCV in blood donors has the decreased tendency while of the prevalence of HIV and syphilis infection has increased tendency during period of time 2010 -2014(table 2).This data reflected end epidemiological situation in our country for these markers. Based on the statistics Albania remains a country with a low-level prevalence of HIV and syphilis in general population as well as in blood donors, but the trend is going up(30,31,32).

Referrer the results, highlight that a more detailed pre-donation questionnaire could facilitate the collection of additional significant information about HIV and syphilis risk behaviors in comparison with the questionnaire currently used by the Albania blood service. Furthermore, more accurate procedures for the administration of pre-donation educational material seem to be important in order to improve blood donors' awareness about HIV sexual risk behaviors. (19, 20).

Our data in this study are in some line with data from other country. The prevalence of syphilis and HIV is very variable from one area to another and from a country to another.

In some European countries, the prevalence of syphilis and HIV infection in the general population and thus in blood donors has been increasing since last two decades. An increase in syphilis infections has been associated to the high incidence of HIV. However, the prevalence of syphilis is still very low in developed countries. While in developing countries, the prevalence of positive serologic tests for syphilis can reach 25%(33,22).

According to type of blood donors the prevalence of markers of ITT markers is higher in FRD compared to VNRBD donors(figure2/table3). The result in this study show that family replacement donors are more likely to transmit transfusion-transmissible infections (ITT) than voluntary donors. Also, ccompared with previously study the percent of donation form FRBD are decreased but remain still higher (30,31). In this situation, blood transfusion service should working on improvement the quality of blood donors, replacement on family blood donor with voluntary non remunerate blood donors, retention of VNRBD donors and return them in regular VNRBD donors. It's important to increase the frequency of donation per donors/ year from VNRBD.

The results of this study compared with data in previously study, clearly demonstrate a declining trend in the prevalence of ITTin blood donors from 8.1 % in 2008 to 6.48% in 2014. Interestingly, the serial trend of prevalence of ITT showed that the trend prevalence of all three infections marker (HCV, HIV and Syphilis) increased in 2010/2014 compared to the previous study period 2004/2008. While the HBsAg prevalence has decreased tendency from 7.3% in 2008 to 5.48% in 2014 (34,35). This phenomenon might be attributed to the application of several strong incentive systems for blood donors commenced during these years to secure the safety blood supply. Also, implementation of national hepatitis B immunization programs may since 1993, also have played an important role in decreasing the occurrence of hepatitis B in general population included and blood donors. The decreased of the prevalence of HBsAgin blood donors is in the same trend as general population, but Albania remains a highly endemic country for hepatitis B. The prevalence of HBsAg in Albania population is over 8%(36).

Conclusion. In order to prevent the transmission of blood-transmitted infections, the coverage of the surveillance systems of transfusion services must be improved and attention focused on the selection of donors and increased donation from VNRBD. Implementation a good quality control practice starting from history taking of blood donors and extending up to laboratory practices, can minimize the risk of ITT to patients. So, more strict selected procedure of donors through direct questioning of donors regarding risks for these viruses, more privacy for the donor at the time of completing the questionnaire (private areas), appropriate counseling that specifically investigates 'at risk' behaviors, maintain first time voluntary non remunerate blood donors (vnrbd) and return them in regular vnrbdas well as increased number of donation from vnbdare very important steps towards increased the safety of blood and decreased the prevalence of ITT in Blood donors.

Table 1. Blood donations tested for ITT

Year	2010	2011	2012	2013	2014	Total
Voluntary blood donations	4928(20.4 %)	6028 (23.27)	6830 (24.83)	7 655 (26.18%)	6969 (23.76%)	32410(23.82

						%)
Family replacement donations	14532(60.2 %)	15841 (61.17%)	17372 (63.17%)	18774 (64.22%)	20009 (68.2%)	86528(63,58 %)
Paid donations	4632(19.1 %)	4018(15.51%)	3297(11.98%)	2 787(9.53%)	2329 (7.9%)	17063(12.54 %)
Autologoues donations	35(0.14%)	7(0.03%)	0	20(0.07%)	9(0.03%)	71(0.06%)
Total	24127	25894	27499	29232	29327	136079

Table 2. Frequency of HIV, HCV, HBsAg and syphilis in blood donations

	2010	**2011**	**2012**	**2013**	**2014**	**Total**
Total donations screening	24127	25894	27499	29232	29327	136072
HIV	4 (0.02%)	8(0.03%)	5(0.02%)	14(0.05%)	10 (0.034%)	41(0.03%)
HCV	187 (0.77%)	179(0.69%)	280(1.01%)	219(0.75%)	223(0.76)	1088(0.8 %)
HBsAg	1482 (6.15%)	1428(5.51%)	1860(6.76%)	1414(4.84%)	1606(5.48%)	7790(5.72%)
Syphilisis	15 (0.06%)	19(0.07%)	44(0.16%)	51(0.17%)	64(0.21%)	193(0.14%)
Total	1688(6.99%)	1634(6,31%)	2189(7.96%)	1698(5.8%)	1903(6.48%)	9112(6.70%)

Table 3. Frequency of ITT in first time blood donations

	2010	**2011**	**2012**	**2013**	**2014**	**Total**
Total donations screening	24127	25894	27499	29232	29327	136072
VNRBD positive ITT	319 (1.32%)	357(1.37)	452(1.64%)	322(1.1%)	293(1%)	1743(1.28%)
FRBD positive ITT	1360 (5.63)	1277(4.93)	1737(6.3)	1374(4.7%)	1607(5.48%)	7355(5.4%)
Repeat blood donors PBD positive ITT	9(0.04%)	0	0	2(0.007%)	3(0.01%)	14(0.01%)
Total positive donations ITT	1688(6.99%)	1634(6,31%)	2189(7.96%)	1698(5.8%)	1903(6.48%)	9112(6.70%)

Table No. 4 Number of sample confirmed positive from PHI

ITT		2010	2011	2012	2013	2014	Total
	No of samples screened by	24127	25894	27499	29232	29327	

	National blood transfusion Centre (NBTC)						136072
Ag/Ab HIV	No of reactive sample tested by NBTC	22	23	18	30	24	117
	No of confirmed positive samples by PHI	4	8	5	14	10	41
	Percent of sample confirmed by PHI	18.1%	34.7%	27.7%	46.6%	41.%	35%
Syphilis	No of reactive sample tested by NBTC	58	63	112	104	116	453
	No of confirmed positive samples by PHI	15	19	44	51	64	193
	Percent of sample confirmed by PHI	25.86%	30.15%	39.2%	49.03%	55.17%	42.6%

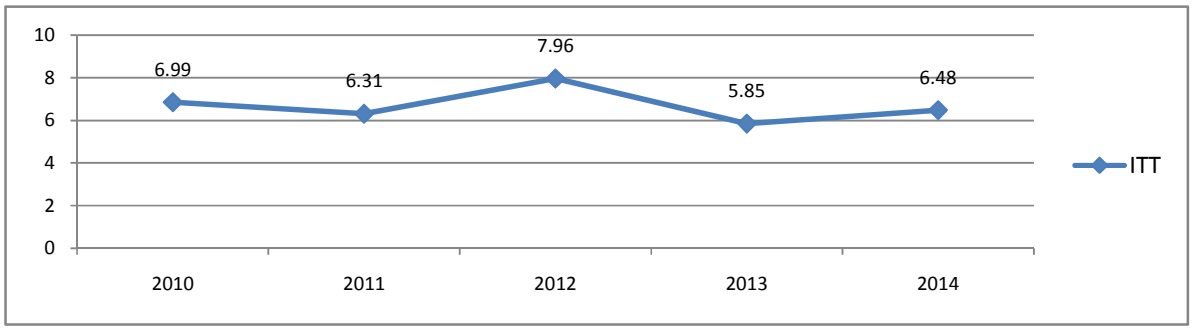

Figure 1. Prevalence of Infection Transmitted through transfusion

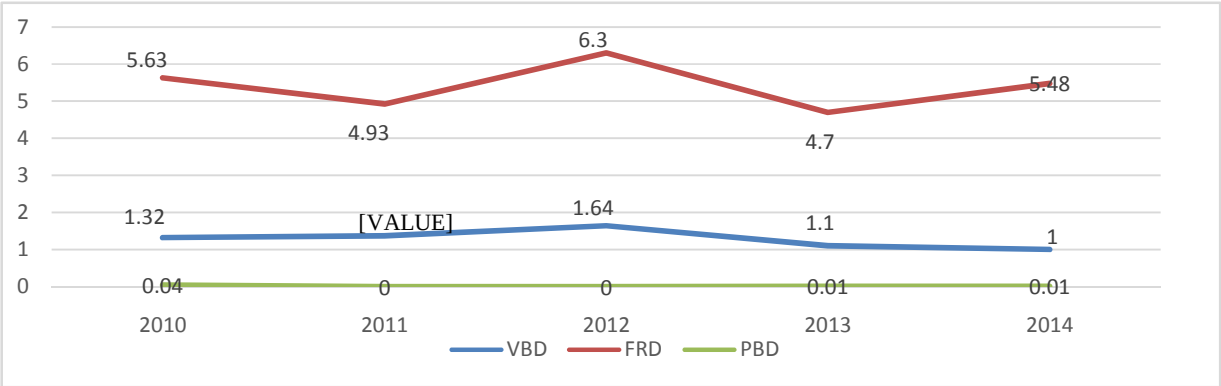

Figure 2. TTI according to type of blood donors

Acknowledgements
We wish to thank National Blood Transfusion Centre and Dr. Valbona Doci, Director of NBTS.
Albana Çela Associate Professor, for critical reading of the manuscript.

References :

1. Rainer SE, Margarethe HE. Quality and safety in blood supply in 2010.Transfus Med Hemother, 37 (2010), pp. 112–117). DOI: 10.1159/000314497.
2. Mazaher KH, Daem RO and Kourosh SA. Prevalence and trend of hepatitis C virus infection among blood donors in Iran: A systematic review and meta-analysis. J Res Med Sci. 2013 Aug; 18(8): 674–682(PMCID: PMC3872606).
3. SedighehKA, HouriRE,HasasnAB, Ali TA. Prevalence and trends of human immunodeficiency virus, hepatitis B virus, and hepatitis C virus among blood donors in Iran, 2004 through 2007. Transfusion. 2009; 49:2214–20. (PubMed DOI: 10.1111/j.1537-2995.2009.02245).
4. Hosseien KH,Seved M. AL,SeyyedMI, Mohsen AM, Hassan AB, Bashir HA, et al. Trends in seroprevalence of hepatitis B, hepatitis C, HIV and Syphilis infections in Iranian blood donors from 2003 to 2005. Hepatitis Monthly. 2009; 9:24–8.
5. Zou S, Dorsey KA, Notari EP, Foster GA, Krysztof DE, Musavi F, et al. Prevalence, incidence, and residual risk of human immunodeficiency virus and hepatitis C virus infections among United States blood donors since the introduction of nucleic acid testing. Transfusion. 2010; 50:1495–504. (PMID:20345570).
6. Directive 2002/98/CE of the European Parliament and Council of 27 January 2003(Official Gazette of the EU 8/2/2003). Available at:http://eurlex.europa.eu. OJ:L:2003:033:0030:0040:IT:
7. Gurol E, Saban C, Oral O, Cigdem A, Armagan A. Trends in hepatitis B and hepatitis C virus among blood donors over 16 years in Turkey. Eur J Epidemiol, 21 (2006), pp. 299–305(PMID:16685581
8. Velati C, Romanò L, Fomiatti L, et al. Impact of nucleic acid testing for hepatitis B virus, hepatitis C virus, and human immunodeficiency virus on the safety of blood supply in Italy: a 6-year survey. Transfusion. 2008;48:2205–13,(PMID:18631163).
9. J. L. Callum, Y. Lin, A. Lima & L. Merkley. Transitioning from 'blood' safety to 'transfusion' safety:addressing the single biggest risk of transfusion.International Society of Blood Transfusion, ISBT Science Series(2011)6,96–104.(DOI: 10.1111/j.1751-2824.2011.01446.x)
10. SAMSaghir, FM Al–Hassan, OSAAlsalahiAEA-A Alhariry, HS Baqir. Frequencies of HBV, HCV, HIV, and Syphilis Markers Among Blood Donors: A Hospital-Based Study in Hodeidah, Yemen. Tropical Journal of Pharmaceutical Research February 2012; 11 (1): 132-136.(http://dx.doi.org/10.4314/tjpr.v11i1.17).
11. Shimian ZO, Kerri DO, Edward NO, Gregory FO,David E. KR, Fatemeh MU, Roger Y. DO,Susan L. ST: Prevalence, incidence, and residual risk of human immunodeficiency virus and hepatitis C virus infections among United States blood donors since the introduction of nucleic acid testing. Transfusion 2010; 50:1495–1504. (DOI: 10.1111/j.1537-2995.2010.02622.x)

12. Moon J.KI,,QuehnPA , Hyuk K.MI and Hyun Ok KI. Residual risk of transfusion-transmitted infection with human immunodeficiency virus, hepatitis CVirus, and hepatitis B virus in Korea from 2000 through 2010. BMC Infectious Diseases 2012, 12:160 http://www.biomedcentral.com/1471-2334/12/160.
13. Norda RA, Frazzetto ML, Knutson F and Lubenow N. Can we make the pre-donation screening process more effective? ISBT, VoxSanguinis 2015, 109 (Suppl. 1), 1–379.
14. Laperche S, Pillonel J, Roche-Longin C and Djoudi. Thirteen years of Nat screening in blood donors:New Insights On HIV, HCV AND HBV incident cases, the French experience. ISBT, VoxSanguinis 2015). P. 337. 109 (Suppl. 1), 1–379.
15. Bingulac-Popovic J, Babic I, Maslovic M, Dogic V, StojicVidovic M, MileticLovric, M, Jurakovic-Loncar N, Balija M and Jukic IR. Nat testing of blood donors in croatia: Results of Two years testing in Croatian institute of Transfusion medicine. ISBT, VoxSanguinis 2015 P. 360. 109 (Suppl. 1), 1–379.
16. Lisa J. BR, Claire RE, Lisa BY,Katy L. DA: Hepatitis B and residual risk of infection in English and Welsh blood donors, 1996 through 2008.Transfusion 2011, 51(7):1493–1502.(DOI: 10.1111/j.1537-2995.2011.03108.x)
17. Christina MA, Philip J. SC, Andrew D. WI, Adrian SL : Residual infectious disease risk in screened blood transfusion from a high-prevalence population: Santa Catarina, Brazil. Transfusion 2008, 48(2):273–281. DOI: 10.1111/j.1537-2995.2007.01521.x
18. Dodd RY: Notari EP, Stramer SL: Current prevalence and incidence of infectious disease markers and estimated window-period risk in the American Red Cross blood donor population. Transfusion 2002, 42(8):975–979.
19. Gonzalez R, Echevarria JM, Avellon A, Barea L, and Castro E: Acute hepatitis B virus window-period blood donations detected by individual-donation nucleic acid testing: a report on the first two cases found and interdicted in Spain. Transfusion 2006, 46(7):1138–1142.(PMID:16836560).
20. Grazzini G, Raimondo M, Facco G, Regine V, Pupella S, Piccinini V, Suligoi B and The FRIHSS Study Group. A cross-sectional study among blood donors on sexual risk behaviors for HIV infection. VoxSanguinis © 2015 International Society of Blood Transfusion VoxSanguinis (2015). P. 415. 109 (Suppl. 1), 1–379
21. Yilmaz SY, Cetinkaya RAC, Savasci US, Artuk CA, Yilmaz SY, Turker TT1 et al. Analysis of four years seroprevalence data of blood donors based on the donor type. International Society of Blood Transfusion VoxSanguinis (2015) P-359. 109 (Suppl. 1), 1–379.
22. Barbara SU, Mariangela RA,Vincenza RE, Maria C. SA, and Laura CA. Epidemiology of human immunodeficiency virus infection in blood donations in Europe and Italy. Blood Transfus. 2010 Jul; 8(3): 178–185.(doi: 10.2450/2009.0126-09).
23. Islam MB. Blood transfusion services in Bangladesh. Asian J Transf Sci. 2009; 3:108–110. (http://www.ajts.org/text.asp?2009/3/2/108/53880)
24. Jo Anne ChI, Michael ES, Alice M. NE, Yaohua He, Pete DR, Shelley DE, Devon E. HoO, Sheila F. O'B, and Graham ShE. Incidence and estimated rates of residual risk for HIV, hepatitis C, hepatitis B and human T-cell lymphotropic viruses in

blood donors in Canada, 1990–2000. CMAJ. 2003; 169(8) :767–773.(PMCID: PMC203278).
25. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. Indian J Pathol Microbiol. 2010; 53(2):308–309. (doi: 10.4103/0377-4929.64295).
26. Fiebig EW, Busch MP. Emerging infections in transfusion medicine. Clin Lab Med. 2004; 24:797–823. doi: 10.1016/j.cll.2004.05.009.
27. Manzoor IDaud S · Hashmi NR · et alSeroprevalence of Transfusion Transmission Infections (TTIS) in blood donors. Biomedica 01/2009; 25:154-8.
28. Suchet SA, Kshitija MI, Gopal PA, Neelam MA, Ratti R.ShA, Ajay K. DU, Yogesh K.ChA, Sunil K.AR. Risk Factors for Transfusion Transmissible Infections Elicited on Post Donation Counselling in Blood Donors: Need to Strengthen Pre-donation Counselling. Indian Journal of Hematology and Blood Transfusion 09/2015; 31(3),pp 378-384.(DOI10.1007/s12288-014-0460-7).
29. Rahul ChA, Shamsuz ZA, Bankim DA and Kabita CHA. Screening Donated Blood for Transfusion Transmitted Infections by Serology along with NAT and Response Rate to Notification of Reactive Results: Journal of Blood Transfusion, Volume 2014 (2014), Article ID 412105, 6 pages.(http://dx.doi.org/10.1155/2014/412105).
30. Marjeta DE, Silvia BI, Roland BA, Shpëtim QY, Redona DU, Florinda BA. Sero-epidemiological study of HIV infection on 2011 in Albania. Medical Journal. Medicus 2013, Vol.18 (1): 43-48.
31. Ivana Bozicevic, Alison Brown, Valerie Delpech and SergiiDvoriak.HIV in Albania: An epidemiological Review. September 2014.World Health Organization 2015. Regional Office for Europe
32. Dhurata Torba, Mirela Lika (Çekani), Zhaneta Abazaj, Silva Bino, Shpëtim Qyra. Serological diagnosis and epidemiology of syphilis. Medical Journal. Medicus 2013, Vol.18 (1): 55-60.
33. Claude Tayou Tagny .Syphilis and Blood Safety in Developing Countries. Book: Syphilis - Recognition, Description and Diagnosis. November, 2011
34. Vjollca DU, Shpetim. QY. Trends in prevalence of hepatitis B virus infection among Albanian blood donors, 1999-2009, Virology Journal 2011, 8:96 http://www.virologyj.com/content/8/1/96.
35. Durro V, Koraqi A, Saliasi S. Trends in the prevalence of transfusion-transmissible infections among blood donors In Albania**.** Journal Of Clinical Laboratory. 2010, vol 56(No.11+12); pg. 591-595.(PMID:21141446).
36. Bashkim Resuli, Skerdi Prifti, Bledar Kraja, Tatjana Nurka, Mimoza Basho, and Edita Sadiku. Epidemiology of hepatitis B virus infection in Albania. World J Gastroenterol. 2009 Feb 21; 15(7): 849–852.(PMC2653385, doi: 10.3748/wjg.15.849)