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SYPHILIS;

SERUM NEOPTERIN IS NOT RAISED IN SYPHILIS POSITIVE BLOOD DONORS.

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ABSTRACT... Objectives: To assess serum Neopterin levels in blood donors of local population and to study its relationship with transfusion transmitted infections (TTIs) including syphilis. **Study Design:** Descriptive cross-sectional study. **Place and Duration of Study:** This study was carried out in the Department of Physiology LNMC in collaboration with Basic Medical Sciences Institute, (BMSI), and Jinnah Post Graduate Medical Centre (J.P.M.C.) Karachi, from Jan to July 2015. **Methods:** Total 174 blood donors were included in the study through random sampling technique. They were screen through the standard procedures used for screening at the JPMC blood bank for WHO recommended diseases. Neopterin was estimated using ELISA. Data analysis was performed using SPSS version 21. Chi square and ANOVA were applied at a confidence level of 95%. **Results:** Neopterin level in the sera of syphilis positive blood donors was 5.86 ± 0.78 nmol/l which was within normal range below the cutoff value of 10 nmol/l. Neopterin content in the serum of blood donors who were negative for transfusion transmitted infections was 6.23± 2.19 nmol/l as compared to blood donors testing positive for transfusion transmitted viral infections showing high Neopterin level of 15.10 ± 4.93 nmol/l. (P value 0.001). **Conclusion:** Neopterin levels were found to be within normal limits in blood donors testing positive for syphilis However in blood donors with transfusion transmitted viral infections serum neopterin levels were elevated.

Key words: Neopterin, Screening, Syphilis, Transfusion Transmitted Infections.

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INTRODUCTION

Blood transfusion is the major source of transmission of infectious diseases. An unsafe blood transfusion bears severe consequences both from human as well as economic view point.[1] It makes the blood donation recipients their families and even their communities vulnerable to the associated morbidity and portability In Pakistan, a country of population about 180 million around 1.5 million bags are required for blood transfusion every year.[2]

The transmission of hazardous infections is an important transfusion associated risk predominantly in the developing countries.[3] In this regard infections such as of Hepatitis B (HBV), hepatitis C (HCV), Human immune deficiency virus (HIV), syphilis and malaria to date remain a great health care concern worldwide. Due to the often asymptomatic and latent course of these infections it is quite difficult to calculate their actual incidence Therefore every pint of blood transfused potentially carries a risk for transfusion transmitted infections.[4]

Incidence of transfusion transmitted infections from blood donor was very high in Pakistani paid donors. HCV positive while 10% cases are hepatitis B infection. In the family replacement/ donors prevalence 2.5% for Hepatitis C infection and 5% for hepatitis B infection and was found, where the voluntary donors showed incidence 0.5% for Hepatitis C and 2% for Hepatitis B and infections.[5]

Moreover in Pakistan the number of patients, diagnosed with sexually transmitted infections including syphilis has risen in previous years. Syphilis is caused by a bacterium known as Treponema pallidum. This infection is mainly

found in body secretions including blood and is transfusion transmissible. Its primary lesion known as chancre occurs around three weeks after the exposure. The disease can progress the latent phase in which it is not evident clinically. If severe, syphilis can be fatal in its tertiary stage.[6]

The World Health Organization recommends core screening tests which include Hepatitis B Surface Antigen, Antibody to HCV and HIV including its subtypes and the serological test for syphilis.[7] But specific testing cannot control for un recognized or newly emerging infections as the blood may be donated during the window period.[8,9]

Additional screening of blood donors with immune marker such as Neopterin could decrease the risk.[10] Neopterin is a sensitive indicator of triggered cell mediated immunity.[11] It is raised in various pathologies specifically the viral infections. Neopterin can be used to evaluate the intensity of cell-mediated immunity since it is stable in body fluids. Increase in neopterin level is seen in a variety of viral, intracellular bacterial and parasitic infections.[8,12]

After the success of long term trials Austria introduced nationwide screening for elevated Neopterin in blood donations. Since then a number of studies have proved the potential of Neopterin screening in improving the safety of donated blood.[10] Therefore we conducted a similar study in our population to estimate serum Neopterin levels in blood donations and to find out its association with common transfusion transmitted infections including syphilis.

MATERIAL AND METHODS

This cross sectional prospective study was performed in the Department of Physiology Liaquat national hospital and medical college (LNH&MC) in collaboration with Basic Medical Sciences Institute (BMSI) and J.P.M.C Blood Bank, from Jan to July 2015. A total of 174 blood donors were recruited by random sampling method. Blood donors within the age group of 18- 60 years who consented to participate in the study were selected."

The study participants were routinely screened through the standard procedures used at the JPMC blood bank as per WHO guidelines. The anthropometric data, demographics and vitals were also recorded. Serum Neopterin was estimated through ELISA. The blood samples were collected in 4-5 ml sterile gel tubes. The samples were centrifuged and serum was stored at a temperature of -20ºC. A cut off value of < 10nmol/l. Was considered normal for healthy blood donors.[8]

RESULTS

Table-I shows the age distribution of blood donors. The subjects in age group below 20 years were 2.9%, in 20-24 years group 33.3%, in 25-29 years group 34.5%, in 30-34 years group 21.3%, in 35-39 years group 5.7% and subjects with age above 40 years were 2.3% respectively.

Out of 174 blood donors, 154 were negative when screened for routine transfusion transmitted infections. The Neopterin levels in their blood donors was normal (6.23 ± 2.19 nmol/l) where as it was elevated 15.10 ± 4.93 nmol/l. in blood donors who tested positive for Transfusion Transmitted Infections. This was statistically significant with p value of 0.001. (Table-II)

Neopterin increase in various Transfusion Transmitted viral Infections was highly significant when compared to neopterin level in healthy blood donors p=0.001. In case of transfusion transmitted syphilis neopterin levels were not elevated as compared to healthy blood donors p=0.820 (Table-III).

Age Group (in Years)	Number of Donors	Percent %
<20	5	2.9
20-24	58	33.3
25-29	60	34.5
30-34	37	21.3
35-39	10	5.7
≥ 40	4	2.3
Total	174	100.0

Table-I. Age distribution of blood donors (n=174)

Screening Test	No. (%)	No. of TTI Positive with Elevated Neopterin Level (>10 nmol/L)	Neopterin Level (nmol/L)	
			Mean ± S.D	P-Value
Negative	154 (88.51)	4 (2.6%)	6.23 ± 2.19	
Positive	20 (11.49)	17 (85.0%)	15.10 ± 4.93	0.001*

Table-II. Neopterin levels in donors with positive and negative screening tests (n=174)"

Transfusion Transmitted Infection (TTI)	No. (%)	No. of TTI Positive with Elevated Neopterin Level (>10 nmol/L)	Neopterin Levels nmol/l	P-Value
Hepatitis "B"	7 (4.02)	7 (100%)	16.39 ± 3.21	0.001*
Hepatitis "C"	6 (3.45)	6 (100%)	15.59 ± 1.63	0.001*
HIV + Hepatitis "C"	1 (0.57)	1 (100%)	25.01 ± 0.00	0.001*
CMV	3 (1.72)	3 (100%)	17.0 ± 1.83	0.001*
Syphilis	3 (1.72)	0	5.86 ± 0.78	0.820**

Table-III. Neopterin levels in transfusion transmitted infections
*Highly significant ** Non-significant

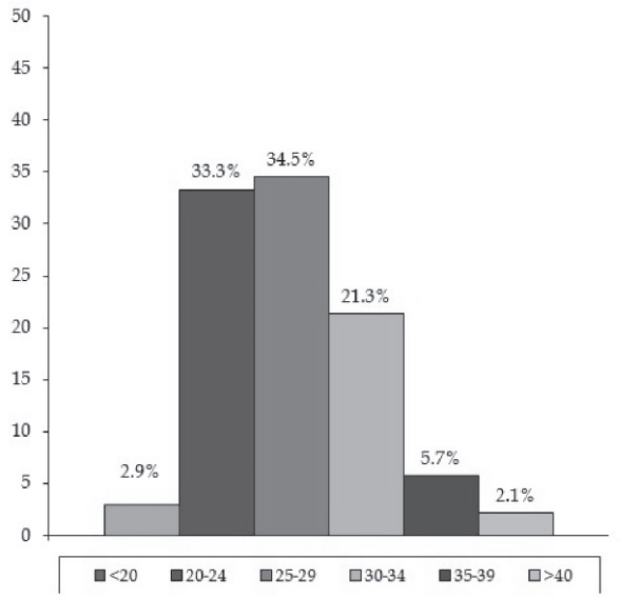

Figure-1. Age distribution of blood donors

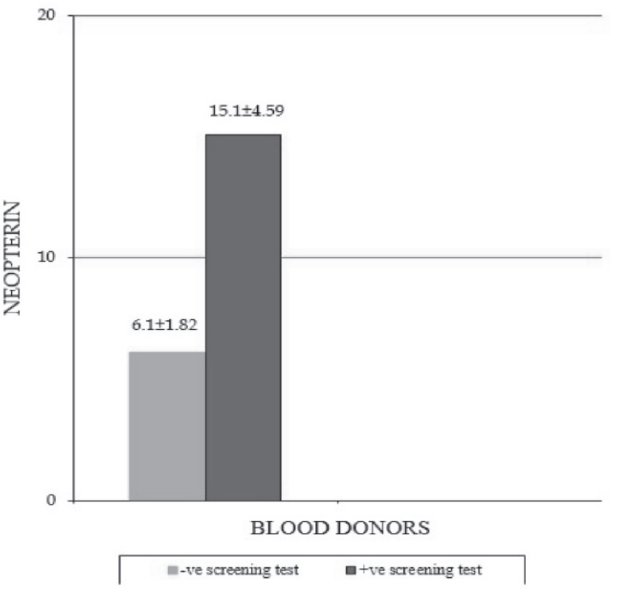

Figure-2. Neopterin levels in blood donors with tti positive and negative screening tests (n=174)

DISCUSSION

The transfusion of blood is a lifesaving process, which carries a potential risk of transmissible diseases. Hepatitis C, Hepatitis B Human Immunodeficiency Virus (HIV), Malaria and syphilis are the major infections acquired through blood donations worldwide especially in endemic countries like Pakistan.[13] The current study was undertaken to estimate Neopterin levels of blood donors in our local population so that its association with transfusion transmitted infections including Syphilis could be studied

In our study out of 174 donors (12.06%) had elevated Neopterin level. This is in accordance with the study of Banu et al. (2011) showing (19.09%) donors with elevated level of neopterin[14], whereas the study conducted by Fisenk et al. (2005) (5%) donors showed elevated Neopterin levels.[15]

In our study n=3 (1.72%) donors tested positive for syphilis. Sial et al. (2016) in their study also found similar results of n=531 (1.78%) blood donors testing positive for syphilis.[16]

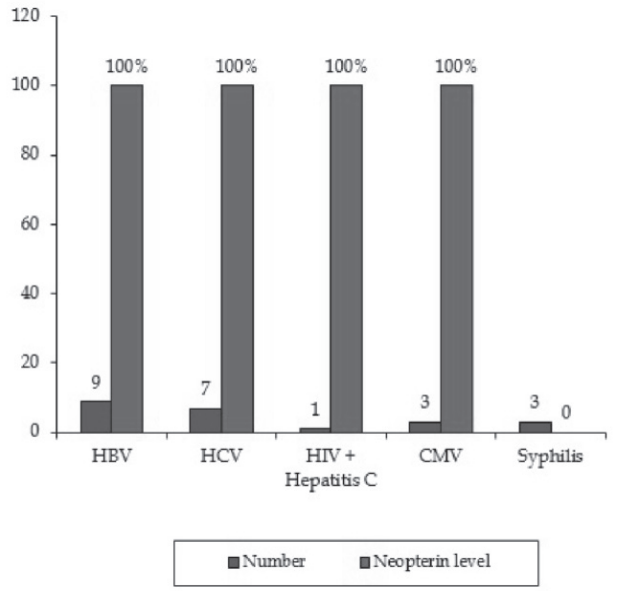

Figure-3. Neopterin levels in transfusion transmitted infections

In our study the neopterin concentration in serum of these blood donors was below the cutoff level of 10 nmol/l. i.e 5.86 ± 0.78 nmol/l. N'gom et al. (1997) in their study also did not find elevated neopterin in blood donors who had tested positive for syphilis.[17] This can be attributed to the fact that systemic bacterial infections invoke humoral immunity involving T-Helper Type 2cells response, instead of the T-Helper Type1 cells and therefore Neopterin levels remain unchanged accordingly. (Murr et al.,2002).[8]

In our study 7 blood donors (4.02%) were positive for Hepatitis B. Their neopterin level was elevated to 16.39 ± 3.21 nmol/l. This is in agreement with the study of Kalkan et al. (2006), who also found elevated neopterin levels Hepatitis B positive subjects.[18]

The HIV positive donor in our study showed raised neopterin level of 25.01 nmol/l in his serum. In their Studies Fusch et al. (1989) and Mildvan et al. (2005) also showed similar results.[19-20]

In our study 6 (3.4%) Hepatitis C positive blood donors had elevated neopterin values of 15.59 ± 1.63 nmol/l. This is in accordance with the results obtained by Banu et al. (2011) in their study conducted on Indian population.[14]

In our study 3 (1.724%) blood donors were positive for Cytomegalovirus IgM. Where as in a similar study conducted by Mahmood et al. (2014) it was almost double showing 3.4% positivity in blood donors.[21]

CONCLUSION

We conclude that Neopterin screening may not reduce the risk of transfusion transmitted syphilis as the Neopterin levels were not elevated in syphilis positive blood donors.

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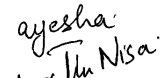
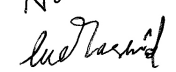
2	Kausar Abbas Saldera	Data collection critical revision of the article for important intellectual content.	
3	Ayesha Ejaz	Drafting of the article.	
4	Noor-un-Nisa Memon	Data collection.	
5	Hina Rashid	Data collection.	
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