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Seroprevalence And Demographic Profile Of Syphilis Among Blood Donors At The Blood Bank Of A Tertiary Care Hospital, In Southern India

Dr.Sindhuja Kondareddy[1], Dr.Anitha M[2]

[1]Associate Professor, Department of Transfusion Medicine, Anam Chenna Subba Reddy (ACSR) Government Medical College, Nellore
[2]Assistant Professor, Department of Transfusion Medicine, Anam Chenna Subba Reddy (ACSR) Government Medical College, Nellore

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*Corresponding Author:

Dr.Sindhuja Kondareddy
Associate Professor, Department of Transfusion Medicine, Anam Chenna Subba Reddy (ACSR) Government Medical College, Nellore

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A B S T R A C T

Introduction: Blood transfusion is a life saving process, how ever, can be proved lethal to the recipient's by exposing them to the transfusion transmissible infectious pathogens. One of these agents is the spirochete called Treponema pallidum which causes the panic infectious disease "Syphilis".

Objective: To study the seroprevalence and the demographic profile of syphilis among blood donors at the Blood Bank, ACSR Government General Hospital, Nellore.

Materials & methods: The present study was done retrospectively from January 2021 to June 2023(a two and half year study) in the Department of Transfusion Medicine, ACSR Government General Hospital, Nellore. Before donation each potential donor was made to fill a detailed health history questionnaire, which included data regarding age, gender, address, occupation and other questions concerning the donor's general health, lifestyle and risk behaviour. All the samples were tested for Transfusion Transmissible Infections (TTI). Prevalence of TTI and syphilis and demographic profile of the donors was analysed.

Results: In the present study the total number of donors are 3592 and the prevalence of TTI is 1.97% (71 out of 3592) and the total number of seropositive cases of syphilis are 22 (0.6%). Out of 3592 donors, 3377 (94%) were voluntary donors and the remaining 215 (6%) were replacement donors. The predominant age reactive for syphilis was 20 -29 years. 16 syphilis positive donors were married and 6 were unmarried. All the syphilis reactive donors are males. 17 donors were from urban area and 5 were from rural area. The rates were found to be high among labourers.

Conclusion: Proper counselling prior to blood donation and awareness about syphilis among blood donors may increase the safety of blood as well as community.

Key words: Seroprevalence, Syphilis, Demography, blood donors, Blood Bank**,** blood transfusion.

INTRODUCTION

Blood transfusion is a life-saving procedure for millions in current medical and surgical practices (1). However, can be proved lethal to the recepients by exposing them to the transfusion transmissible infectious pathogens (2). According to National Aids Control Organisation (NACO) guidelines, all mandatory tests should be carried out on donors blood samples for HIV, HBV, HCV, syphilis and malaria. The whole blood or components from any unit that tests positive should be discarded (3).

Syphilis is an infectious disease caused by Treponema pallidum. Syphilis is a sexually transmitted infection (STD) which can also be transmitted via accidental direct inoculation, transplacental during pregnancy and rarely via blood transfusion (4,5). However, blood transfusion now play a minor role due to the available sensitive methods of detection, as well as routine screening of blood products for syphilis. However, this procedure does not guarantee complete elimination of transmission risk because of the difficulty in detecting serologic markers in the early infection phase.

So, in order to reduce the risk, stringent donor selection using validated donor questionnaire should be used and confidentiality in all steps of donation. Promotion of non-remunerated voluntary blood donors and screening of high risk groups is mandatory. Blood donor recruitment should emphasize on excluding the high risk donors and recruiting more

low risk blood donors. Since there was no data form our geographical area about syphilis seroprevalence and demographic profile among blood donors, the present study was conducted to know the seroprevalence and demographic profile among blood donors.

MATERIALS & METHODS

This is a retrospective study with a study duration of two and half years from january 2021 to june 2023.Approval is taken from the institution ethics committee.For the donor details, donorrecord,master record,screening record and donor questionners were verified in the transfusion medicine department. Those who are tested positive for syphilis,the demographic details like age,gender,address,educational qualification, marital status, occupation, date of previous donation, pregnancy status and risk factors such as surgery, hospitalisation, hypertension, diabetes, blood transfusion were noted. We contacted telephonically the syphilis positive donors and advised them to come to hospital and we have asked about the risk factors and symptoms of syphilis and then we referred them to VCTC referrel centre in our hospital.

Inclusion and Exclusion Criteria

We have included all the donors who were eligible for blood donation as per our standard operating procedures and excluded the donors who were not fitting into the eligible criteria.

Collection of samples:

We have collected 2 ml blood in a labeled pilot tubes at the time of collection of blood from donor tubing of the blood units.

All five tests, mandatory for each and every donor/or blood units i.e., HIV 1 and 2, HCV, HbsAg, VDRL and Malaria were performed in our TTIs laboratory. For syphilis; Rapid Plasma Reagin (RPR) test kit was used (Make -Bio Lab diagnostics Pvt .limited). Donor samples were processed for the detection of non treponemal antibodies by using rapid plasma reagin (RPR) test kit, as per the procedure given by the manufacturer. Patient's serum was placed on the circle of test card. To this the antigen suspension was added and the suspension was mixed well. After about 4-8 minutes, we observed for flocculation, seen as clumping on the card which was taken as positive test and if there was no clumping then it was taken as negative test.The blood units were discarded as per guidelines of NACO whenever the pilot donor samples were found positive.

RESULTS

TABLE 1: PREVALENCE OF TTI AND SYPHILIS IN THE STUDY PERIOD

YEAR	COLLECTIONS	TOTAL TTI'S POSITIVES	RPR POSITIVE'S
2021	941	21 (2.23%)	6(0.6%)
2022	1843	37 (2%)	11 (0.5%)
2023 (JAN-JUNE)	808	13 (1.6%)	5 (0.6%)
TOTAL	3592	71 (1.97%)	22 (0.6%)

TABLE 2: AGE WISE DISTRIBUTION OF SYPHILIS POSITIVE DONORS IN THE STUDY PERIOD

AGE RANGE	REACTIVE POSITIVE SAMPLES	PERCENTAGE(%)
18-20	2	9.1%
20-29	14	63.6%
30-39	4	18.2%
40-49	2	9.1%
50-59	-	-
TOTAL	22	100%

TABLE 3:DEMOGRAPHIC CHARACTERISTICS OF SYPHILIS AMONG BLOOD DONORS AT BLOOD BANK, ACSR GOVERNMENT GENERAL HOSPITAL FROM 2021 JANUARY TO 2023 JUNE

CHARACTERISTICS		RPR POSITIVES (%)
GENDER	MALE	22
	FEMALE	0
TYPE OF DONATION	VOLUNTARY	3377 (94%)
	REPLACEMENT	215 (6%)
EDUCATION	MIDDLE SCHOOL OR LESS	15 (68.2%)
	SECONDARY SCHOOL	4 (18,2%)
	HIGHER SECONDARY SCHOOL	1 (4.6%)
	GRADUATE	2 (9%)

OCCUPATION	LABOURER	10 (45.5%)
	BUSINESS	1 (4.5%)
	DRIVER	1 (4.5%)
	EMPLOYEE	7 (32%)
	STUDENTS	2 (9%))
	OTHERS	1 (4.5%)
MARITAL STATUS	MARRIED	16 (72.7%)
	UN MARRIED	6 (27.3%)
DONOR HISTORY	FIRST TIME DONOR5	5 (23%)
	REPEAT DONOR	17 (77%)
RESIDENCE	RURAL AREA	5 (23%)
	URBAN AREA	17 (77%)

TABLE 4: DISTRIBUTION OF BLOOD DONORS ACCORDING TO CO- INFECTION WITH SYPHILIS.

SL NO	CO INFECTION	TOTAL
1	HCV + SYPHILIS	1
2	HIV + SYPHILIS	1
TOTAL		2

TABLE 5: COMPARISION OF SERO PREVALENCE OF SYPHILIS AMONG BLOOD DONORS IN DIFFERENT STUDIES.

SL.NO	STUDY	STUDY PERIOD	PLACE OF STUDY	TOTAL DONATION	RPR POSITIVES	SERO PREVALENCE
1	SUDHIR KUMAR VUJHINI et al[6]	January 2016 to December 2018	NIMS Telangana	55,306	148	0.27%
2	Kulkarni et al[7]	August 2015 to July 2018	Gadag institute of medical sciences ,northern mid Karnataka	20,144	5	0.023%
3	Khageshan K et al[8]	July 2012 to June 2013	S N Medical College Bagalkot Karnataka	8187	4	0.04%
4	Shah Y et al[9]	April 2012 to march 2017	Government Medical College Baroda	42,266	187	0.44%
5	Singhal et al[10]	January 2012 to December 2019	G R Medical College Gwalior	1,46,032	392	0.268%
6	Present study Sindhuja K	January 2021 to June 2023	ACSR Government General Hospital Nellore	3592	22	0.6%

DISCUSSION

In our study the voluntary donors were 94 % (3377) and the replacement donors were 6% (215) (Table 3).The study conducted by Bhattacharya et al (11) and Pallavi et al(12) shows predominance of voluntary donors (94.6% and 64.78% respectively).

In the present study the overall seroprevalence of TTI is 1.97% (71 out of 3592) (Table 1).

In the present study, prevalence of syphilis is 0.6%. In developed countries, the prevalence of T. pallidum infection has dropped both in the general population and in blood donors. However, the scenario is different in developing countries where the prevalence is raising because of the poor quality of laboratory screening due to the lack of equipment, trained personnel, reagents and standard procedures. The prevalence of syphilis among the donors was 0.6% (Table 1) which is comparable with the study of Hira Amin et al (0.68%) (13). In other studies conducted by Kulkarni et al (7) Khageshan et al (8) and Singhal et al (10), the prevalence of syphilis among the donors was 0.023%, 0.04% and 0.268% respectively (Table 5). The disparity in the prevalence of syphilis observed in different studies may be due to geographical differences in the prevalence of syphilis as well as some methodological differences.

In India, according to the Drug and Cosmetics Act & Rules 1945, it is mandatory to screen donated blood for transfusion-transmitted infections. The blood should be non-reactive for anti-HIV antibodies, hepatitis B surface antigen, anti-hepatitis C virus antibodies, syphilis and malaria. Currently, only one screening test for syphilis is mandatory. According to the WHO, blood banks may choose VDRL, RPR or treponemal-based EIA due to cost constraints. The traditional approach to the diagnosis of syphilis begins with a non-treponemal assay, either VDRL or RPR. The traditional method has several advantages including the fact that it is reliable, especially in high prevalence settings. In addition, this is a rapid, inexpensive screening method that is economical and easily implemented in most hospitals and small clinics. However, this approach also has several limitations, including a low specificity and subjective interpretation of results of non-treponemal assays, which can translate into higher rates of false positive results, especially in low incidence settings.

In our study the most common age group affected by syphilis was 20-29 years (63.6%) (Table 2) While it was 45 years and older in the study done by Vera L et al (14). As the study found out that syphilis prevalence higher among young adults aged 20-29 years health awareness and syphilis prevention programs focussing on young adults is needed.

In our study all the syphilis donors were males and non of the female donors turned out be sero positive for syphilis (Table3) .This is comparable with the study done by Kulkarni et al (7) where all the syphilis reactive donors were males only. The reason for higher sero -prevalence among males is due to minimum participation by females due to socio cultural beliefs and traditional practices and prevalence of anaemia among them.

In the present study 68.2% syphilis sero positive donors had educational qualification of middle school or less (Table 3). The study also showed that those with a lower educational experience had a higher syphilis sero prevalence which was consistent with many other studies (15, 16, 17, 18, 19, 20) with the development of society and increasing mobility of the population, it is essential for the public health institutions to disseminate the knowledge of STD s to low education population.

In the present study the sero positives of syphilis among donors were found to be high among labourers (45.5%) (Table 3). This is comparable with the study conducted by Y Shah(9) et al where sero prevalence of syphilis among blood donors is commonly present In labourers. This may be attributed to high risk behaviour among individuals.

In our study married men (72.7%) had high prevalence of syphilis reactivity than unmarried (27.3%). Donors from urban area had higher prevalence than rural area (Table 3). This is similar to the study done by Sudhir Kumar Vujhini et al (6) where sero prevalence of syphilis is higher among married men and donors from urban area.

Our study indicated that repeated donors were more likely to have T.pallidum sero positivity than first time donors (Table 3). This in contrast to a study conducted by Chen et al (21) where first time donors had higher sero positivity than repeated donors.

Two cases of coinfection were noted, one with HIV and the other with HCV. (Table 4).Syphilis Infection is a risk factor for HIV, HBV, and HCV infections (22,23,24).The risk factors for blood donors infected with syphilis are also risk factors for other blood borne diseases. Screening for high-risk groups before blood donation currently depends entirely on pre-donation health consultation.They can donate blood or need postpone and withdraw from blood donation is depend on the report of blood donors on medical history and dangerous behavior (25,26) .Blood donation in high-risk groups is a threat to blood safety. It is a matter of concern whether the high-risk group of blood donors is effectively excluded from the health consultation before blood donation(27). In order to ensure blood safety and reduce the proportion of blood donation in high-risk groups, it is necessary to strengthen the screening and health survey of blood donors before blood donation.

CONCLUSION

Prevalence of syphilis is high among married males from urban areas. It is more prevalent in young adults and with educational qualification of middle school or less. It is more commonly present in labourers. Proper counselling prior to blood donation and awareness about syphilis among blood donors may increase the safety of blood as well as community.

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