

## Declining Towards Zero Trend of Syphilis Among Blood Donors: A Sero-Epidemiological Study

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### ABSTRACT

**Introduction:** Syphilis is sexually transmitted and blood borne disease caused by *Treponemapallidum*. After invention of Penicillin, there was rapid decline in number of syphilis.

**Objective:** To study the seroprevalence of syphilis among blood donors with respect to type of donor, age, sex, and blood group of the donor.

**Methodology:** This study was conducted from 1<sup>st</sup> January 2005 to 31<sup>st</sup> December 2009 at blood bank of SSIMRC Davangere. Blood units were collected from eligible donors and were screened for syphilis by VDRL method. Prevalence of syphilis was calculated by using SSPS version 13 statistical package in relation to type of donor, age, sex and blood group of donor. The significance of trend was determined by chi square test.

**Result:** A total of 19410 donors was screened. Two cases (0.01%) of syphilis were serologically identified. The trend of syphilis was declined to zero from the year 2005 to 2009. The association of seropositivity of syphilis with replacement donor was significant ( $p$  value 0.04).

**Keywords:** Seropositivity; Syphilis; Blood donors; Replacement; Blood safety

### INTRODUCTION

Blood transfusion is a life saving essential therapeutic procedure, as there is no substitution for human blood. But it also carries the risk of transmission of transmission transmissible infections (TTIs) like HIV, hepatitis, malaria and syphilis.<sup>1</sup> Concealing medical history by the donors, prevalence of asymptomatic donors, donation during window period, laboratory errors can also pose threat to safe blood.<sup>2</sup>

Syphilis is a sexually transmitted infection caused by spirochete *Treponema pallidum*, which was first recognized in Europe during 16<sup>th</sup> century. The only natural host of *Treponema pallidum* is man and it is usually transmitted through sexual route.<sup>3</sup> Other less common routes of transmission include blood and blood products, via mother to child, organ transplantation. Clinically, there are four stages of syphilis. Primary stage presents with a single chancre, secondary syphilis presents with diffuse rash over palms, hands and soles. Latent syphilis presents with little or no symptoms, whereas tertiary syphilis

presents with gummas, neurological or cardiac symptoms. The diagnosis of syphilis is done by serological tests.<sup>3</sup>

The aim of the present study is to estimate the seroprevalence of syphilis among blood donors with respect to type of donor, age, sex, and blood group of the donor.

### MATERIALS AND METHODS

This retrospective study was conducted from 1<sup>st</sup> January 2005 to 31<sup>st</sup> December 2009 at blood bank attached to tertiary level teaching hospital of SS Institute of Medical Sciences and Research Centre, Davangere. Informed consent was obtained from all participant donors, who were screened by targeted questionnaire and by medical examination. Blood units were collected from eligible donors and were screened for syphilis by VDRL method. Prevalence of syphilis was calculated by using SSPS version 13 statistical package in relation to type of donor, age, sex and blood group of donor. The significance of trend was determined by chi square test.

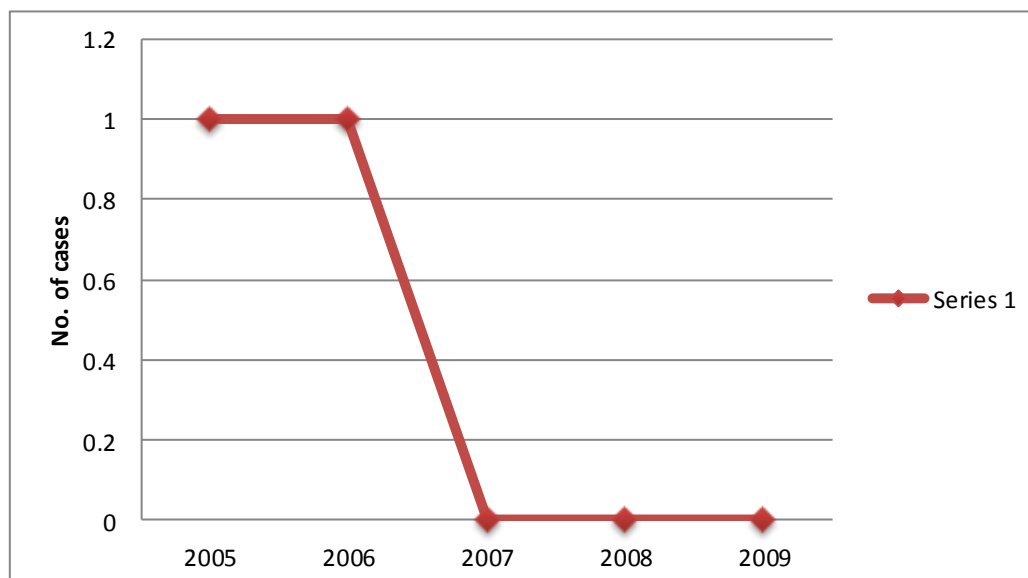
### RESULTS

A total number of 19,410 donors were screened during the study period. Of these 19,186 (99%) were males and 224 (01%) were females. 94% of donors were replacement donors and 46.13% of donors belonged to the age group 18 to 25 years. The commonest blood group observed was O positive. The trend of syphilis was declined to zero from the

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year 2005 to 2009(Figure-1). Seropositivity of syphilis was observed in two cases, who belonged to 18-25 years and 26-35 yearsof age group (Table-1). The association of seropositivity of syphilis with

replacement donor was significant (p value 0.04) (Table-2). Co infection of syphilis with other TTIs was not seen. The overall seroprevalence of syphilis was 0.01%.



**Fig. 1: Yearwise seroprevalence of syphilis among blood donors**

**Table 1: Seroprevalence of syphilis according to age group of the donor**

AGE (Years)	Seroprevalence (%)
18-25	1(0.01)
26-35	1(0.01)
36-45	0
46-60	0
p value	0.68 NS*

\*NS- not significant

**Table 2: Seroprevalence of syphilis according to type of the donor**

Type of donor	Seroprevalence (%)
Voluntary donor	1(0.1)
Replacement donor	1(0.0)
p value	0.04S*

\*S- significant

**Table 3: Seroprevalence of syphilis among various studies.**

Study	Place	Year	Sample size	Prevalence (%)
Arora et al <sup>6</sup>	Haryana	2002-2006	5849	0.9
Patel et al <sup>7</sup>	Gujarat	2007-2013	24335	1.12
Negi et al <sup>8</sup>	Uttarkhand	2008-2009	53069	0.3
Bodarya et al <sup>1</sup>	Gujarat	2008-2013	24335	1.12
Giri et al <sup>9</sup>	Maharashtra	2009-2010	5661	0.07
Karmakar et al <sup>10</sup>	Kolkata	2011	24320	0.23
Kumar et al <sup>11</sup>	Chattisgarh	2011-2013	12680	1.05
Our study	Davangere, Karnataka	2005-2009	19410	0.01

## DISCUSSION

Approximately 340 million cases of curable sexually transmitted infection occur every year, as estimated by WHO and 75-85% of them occur in developing countries, among this 12 million cases are of syphilis.<sup>4</sup> Each unit of donor blood is screened for syphilis as transfusion is one of the route for its transmission. Whole blood, Packed Red Cells (PRC), Fresh Frozen Plasma (FFP), cryoprecipitate are likely to be non-infective after refrigeration for 4 days, as *Treponema pallidum* does not survive at 4°C, whereas seropositivity is not affected by refrigeration. *Treponema pallidum* is more likely to be transmitted in platelet concentrates because of their room temperature storage and short shelf-life. In the past syphilis was considered as surrogate marker of lifestyle associated with high risk of HIV infection, but in our study co-infection of seropositivity of syphilis with other TTI was not observed. The seronegativity for other TTI in these cases could be limitation of screening tests to detect the infection in window period.<sup>5</sup>

The mainstay of diagnosis for syphilis is serology, which includes non-treponemal antibody tests and antitreponemal antibody tests. Non-treponemal antibody tests measure the antibody to cardiolipin, an antigen present in *Treponema pallidum* cell wall and host tissue. Cardiolipin antibodies are detected by Venereal Disease Research Laboratory (VDRL) test, which are usually positive after 4-6 weeks of infection.<sup>3</sup> In our study, prevalence of syphilis was 0.01%. Table 3 shows seroprevalence of syphilis among various studies in different regions.<sup>1,6-11</sup> The trend was syphilis was declining towards zero from 2005 to 2009 in our study, similar observation was noted in other studies.<sup>1&8</sup> Because of good therapeutic response of syphilis to penicillin and no extra human reservoir, the trend of syphilis is declining. In future it may even be possible to eradicate syphilis<sup>12</sup>. In contrast study done by Kumar et al<sup>11</sup> showed raising trend of syphilis. Prevalence of syphilis in replacement donors was statistically significant in our study, similar finding was seen in other studies.<sup>1, 6, 11</sup>

## CONCLUSION

Prevalence of syphilis was declining towards zero in this region and was more in replacement donors. Syphilis can also be considered as surrogate marker of risk behavior among population. Blood safety may be assured by effective screening program and by 100% voluntary donation. Seroprevalence declining to zero indicates a step towards chances of eradication and raises question whether to continue screening blood units for syphilis in blood bank.

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