

Seroprevalence of Syphilis among Pregnant Women in the Varna Region (Bulgaria)

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ABSTRACT Syphilis is a sexually transmitted disease with continuously rising rates among European countries. The vertical (mother to child) transmission is an important way of dissemination, often leading to stillbirth and permanent impairment of the newborn. We present a retrospective cross-sectional analysis of 2702 pregnant women tested for syphilis seropositivity. During the study period (2009-2013) non-specific and specific treponemal antibodies were detected in 15 pregnant women (0.56% of sample size with 95% confidence interval (CI) 0.28-0.84). Our results showed a lack of correlation between syphilis seropositivity and age, ethnic origin, or pregnancy trimester of the mother. The only factor found to influence syphilis seropositivity was the mother's place of residence – rural inhabitants had significantly higher risk for syphilis infection when compared to urban inhabitants, with a seropositive proportion of 1.08% versus 0.36%, respectively.

KEY WORDS: syphilis, congenital syphilis, treponema, pregnancy, sexually transmitted diseases

INTRODUCTION

Syphilis is a disease caused by the spirochaete *Treponema pallidum*. It is transmitted mainly by sexual contact (1), but the vertical transmission, which can result in congenital syphilis, is also important for the epidemiology and is associated with increased pregnancy failure rates and severe birth defects (2).

Approximately 1.5% of all pregnant women in the world (2 million) show positive test results for syphilis each year (3,4). In 2011, a total of 87 confirmed cases of congenital syphilis among 19798 positive syphilis cases were reported in 10 EU/EEA Member States. The majority of them was found in Bulgaria (38 cases), Poland (14 cases), Portugal (10 cases), and Romania (10 cases) (5).

The leading position of Bulgaria in congenital syphilis statistics prompted us to evaluate the fre-

quency of syphilis among pregnant women and to identify possible risk factors for syphilis seroprevalence in one of the largest regions in Bulgaria – the Varna Administrative Region.

PATIENTS AND METHODS

In the period of 2009-2013, 2702 pregnant women were serologically tested for syphilis in the Virology Laboratory of Regional Health Inspection, Varna. Blood was collected via venipuncture and the resultant sera were separated and tested for total antibodies to *Treponema pallidum* with the specific treponemal test – double antigen “sandwich” EIA/ELISA (Foresight Acon Laboratories, USA). All EIA positive samples were subsequently tested for confirmation with a “non-treponemal” VDRL carbon antigen test

(Biotec Laboratories Ltd, UK) and the *T. pallidum* Hae-magglutination Assay – TPHA (BioSystems, Spain). All procedures were performed according the standard manufacturer instruction.

The relevant socio-demographic characteristics (age, pregnancy trimester, place of residence, and ethnic origin) were obtained after with patient consent and before the venipuncture and the test.

MedCalc calculator (<https://www.medcalc.org/index.php>) was used for calculation of proportions and confidence intervals, while chi-squared distributions and *P*-values (*P* < 0.05 was considered significant) were calculated with Social Science Statistics (<http://www.socscistatistics.com>).

RESULTS

There were 27 positive EIA/ELISA samples for the 5-year period of study. With VDRL assay, only 15 of all 27 ELISA positive samples were confirmed (56%), and antibody presence was detected with the TPHA test in 16 of all ELISA positive patients (59%). In this context, a positive serology was accepted only for samples whit EIA/ELISA, VDRL, and TPHA positive results – 15 of 2702 tested pregnant women or 0.56%

of sample size (95% confidence interval (CI) 0.28-0.84) (Table 1).

The prevalence of syphilis in pregnant women (although not statistically significant) slightly increased from the beginning of the study (2009-2010) to its end (2013) (Table 1) – a negative trend that has been observed all over the world since the late nineties.

The actual age in the sample ranged from 16 to 45 years (mean age 26.7). Syphilis seropositivity did not show any statistically significant difference between the age groups (*P* > 0.05). However, the highest number of positive tests was found among women older than 31 years.

According the actual Bulgarian regulations, pregnancy care specialists test all pregnant women for syphilis during their first visit and pregnancy registration. Thus, 71% of all women in the study were tested in the first trimester of pregnancy and 20% and 9% in the second and third trimester, respectively. The last two groups represent a significant number of women with late or no prenatal care access. The highest rate (0.84%) of syphilis prevalence was recorded among women tested during the last pregnancy trimester (Table 1), but the difference was not statistically significant.

Table 1. Distribution of syphilis among pregnant women in the Varna Region

	No. of screened women	Seropositive women*		
		No	Proportion (95% confidence interval)	<i>P</i> -value**
Year				
2009	207	1	0.48 (-0.46-1.42)	0.96
2010	693	3	0.43 (-0.06-0.92)	
2011	659	4	0.61 (0.02-1.20)	
2012	606	3	0.50 (-0.06-1.06)	
2013	537	4	0.74 (0.02-1.46)	
Age				
<20	444	3	0.68 (-0.08-1.44)	0.40
21-25	731	5	0.68 (0.08-1.28)	
26-30	912	2	0.22 (-0.08-0.52)	
>31	615	5	0.81 (0.10-1.52)	
Trimester				
First	1929	11	0.57 (0.23-0.91)	0.71
Second	535	2	0.37 (-0.14-0.88)	
Third	238	2	0.84 (-0.32-2.00)	
Residence				
Urban	1961	7	0.36 (0.09-0.63)	0.02
Rural	741	8	1.08 (0.34-1.82)	
Ethnic group				
Bulgarian	2166	12	0.55 (0.24-0.86)	0.99
Others	536	3	0.56 (-0.07-1.19)	

*Samples are reported as positive when positive ELISA tests were confirmed with both TPHA and VDRL;

***P*-value for trend is measured from chi-square distribution.

Table 1. shows that ethnic origin (determined as Bulgarian or other) did not influence syphilis prevalence – it was almost the same among Bulgarians and women of ethnic minority origin, 0.55% and 0.56% respectively.

We found a statistically significant higher prevalence of syphilis among rural inhabitants compared with urban inhabitants (1.08% versus 0.36%) (Table 1). The risk ratio (rural/urban residence) was calculated to be 3.02, and after accounting for sampling variability, we found that rural residence could increase the risk of syphilis infection during pregnancy from 1.10 to 8.31 times when compared to urban residents.

DISCUSSION

In the current work, syphilis prevalence rates in pregnant women were between 0.43% for 2010 and 0.74% for 2013, with an average frequency of 0.56% (95% CI 0.28-0.84). Similar results were obtained in other national surveys, where syphilis frequency among pregnant women in the Pleven Region was found to be 0.32-0.65% (6).

In the Republic of Bulgaria, the health care of pregnant women and newborns is a national priority, and all pregnant women undergo obligatory testing for syphilis and hepatitis B during their first visit to a pregnancy care specialist. This active screening creates a real possibility of detecting and preventing congenital syphilis, but nearly half of all congenital syphilis cases in European Union are registered in our country, indicating that the screening program still needs further efforts to offer good prenatal services to all pregnant women, including marginalized social groups.

If treatment starts several months before delivery, congenital syphilis could be largely preventable. Syphilis-infected pregnant women who seek late prenatal care generally receive late treatment. This in turn restricts the necessary time for elimination of infection and birth of a healthy child. Although no statistically significant difference was measured between the numbers of seropositive women registered in the first, second, or third trimester, the high proportion of late pregnancy registrations (almost 30% of the studied population) is a worrying result.

Another alarming result is the three-fold higher number of syphilis positive women from villages in the Varna Region compared with those of city residents with syphilis infection (Table 1). Reasons for this can be found in the unbalanced distribution of general medical practices and pregnancy care specialists – a worrying tendency, resulting in lack of adequate health care in the rural areas of the region. An

additional explanation could be the low educational level and poor knowledge on adequate prevention of sexually transmitted diseases in rural communities. Rural residents differ from urban residents in terms of cultural and social behavior: rural communities are generally closed communities with limited access to medical information – sexually transmitted diseases are regarded as shameful and are often kept secret for a long time, facilitating the spread of infection within the community.

CONCLUSION

Our study revealed another important aspect – lack of collaboration between the hospital and out-of-hospital prenatal care – it was impossible to link the number of seropositive pregnant women found in the present study and the number of seropositive newborns, born of these mothers. Of all 15 seropositive pregnant women found in this study, we have feedback information (with the help of social workers) for the pregnancy outcome of only two of them – one still-birth case and one birth of child with confirmed congenital syphilis.

Our study identified rural residence as important risk factor for syphilis infection and confirmed the wide disparity between urban and rural populations in Bulgaria. These health inequalities need to be addressed to limit the incidence of congenital syphilis.

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