

LITERATURE REVIEW: SENSITIVITY AND SPECIFICITY OF VDRL AND RPR AS SCREENING TESTS OF SYPHILIS IN PREGNANT WOMEN

Tamara Audrey Kadariusman¹, Sacharissa Zerlina Tsarwah Thirafi¹, Niki Kusuma Bangsa¹, Ruffina Adelia Widyatama¹, Lutfi Dewanda Nugroho¹, Prima Ardiansah Surya¹, Pudji Lestari*² 

¹Faculty of Medicine, Universitas Airlangga, Indonesia, ²Department of Public Health-Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Indonesia

ABSTRACT

Early detection of syphilis, especially during pregnancy, is important to prevent comorbidities for the mother and the baby. This study aims to determine whether VDRL is more sensitive and specific than RPR as a diagnostic screening test for syphilis infection in pregnant women. Literature searches for relevant articles were conducted in PubMed, Cochrane, and Proquest using the keywords "VDRL AND RPR AND pregnancy AND syphilis". From the search results, we found 7 articles in Pubmed, 2.290 articles in Proquest, and no relevant articles were found in Cochrane. Title and abstracts were screened for their conformity with the case and clinical questions that had been made. Selected articles were then critically appraised. The results of the study in selected articles indicated that VDRL and RPR showed a false positives rate of 10.5% and 9.6%, respectively. The sensitivity and specificity of VDRL were 71.6% and 89.5%, and those of RPR were 73.5% and 90.5%. VDRL and RPR have a moderate agreement with the TPHA ($\kappa = 0.6$). From these studies it can be concluded that VDRL is not more sensitive and specific than RPR, implying that RPR is a better diagnostic screening test for syphilis infection in pregnant women than VDRL.

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CORRESPONDING AUTHOR

Pudji Lestari
pulesaja@gmail.com
Department of Public Health-Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Jl. Mayjend Prof. Dr. Moestopo 6-8, Surabaya, Indonesia



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INTRODUCTION

In early adolescence (12-15 years), one's body undergoes changes accompanied by the development of 'new thoughts', so that they are easily attracted to the opposite sex and easily aroused. Adolescents with limited reproductive health knowledge are at higher risk of teenage pregnancy and sexually

transmitted diseases such as syphilis because knowledge is associated with self-protection behavior.¹ Inadequate treatment of syphilis could lead to health problems later in life. Therefore, early detection of syphilis, especially during pregnancy, is important so as not to cause comorbidities for mother and baby.²

For a very long time, RPR has been a standard diagnostic screening test for syphilis infection of pregnancy in Indonesia. This study aims to determine whether VDRL, which is a standard diagnostic screening test in other countries, is more sensitive and specific than RPR as a diagnostic screening test for syphilis infection in pregnant women. The RPR test uses the same antigen as VDRL, but the antigen is bound to a particle made of carbon, to make better visualization of the reaction without a microscope. RPR titers are usually known to be higher than the VDRL titers.³

articles were conducted in PubMed, Cochrane, and Proquest using the keywords "VDRL AND RPR AND pregnancy AND syphilis". From the search results, we found 7 articles in Pubmed, 2,290 articles in Proquest, and no relevant articles were found in Cochrane. Title and abstracts were screened for their conformity with the case and clinical questions that had been made. The inclusion criteria were original research published in the last 12 months. Sources from worksheets, books, and wire feeds were excluded. Initial studies were screened again for full-text availability and their conformity to the research question, resulting in one study in the final analysis. The study was then critically appraised.

The method of this study is literature review, in which literature searches for relevant

OVERVIEW

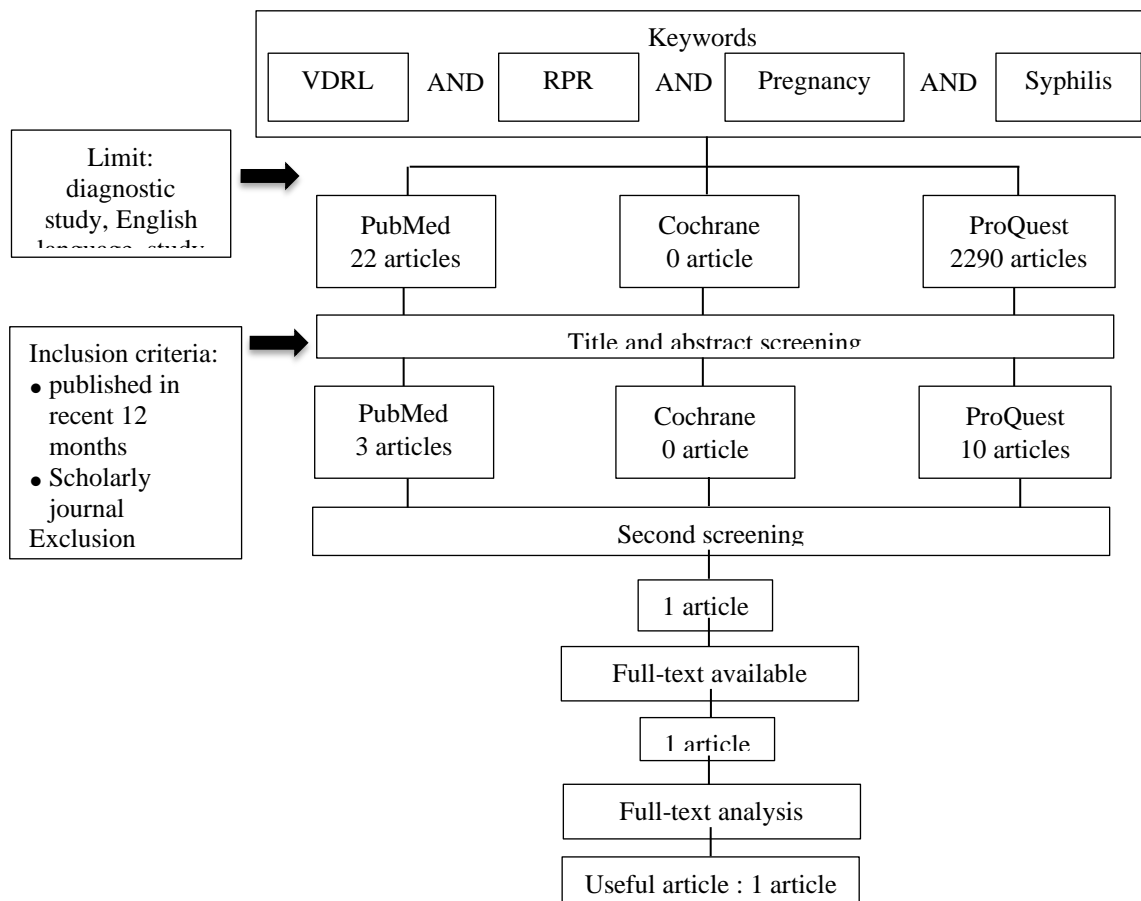


Figure 1. Workflow of article selection

According to a study conducted by Solaimalai *et al.* (2020), untreated syphilis in pregnant women could lead to serious complications such as spontaneous abortion, stillbirth, perinatal death, and IUGR with congenital syphilis sequelae.⁴ In 2009, the United States of Preventive Services Task Force (USPSTF) recommended mandatory screening for early syphilis because syphilis therapy with antibiotics in pregnancy is quite effective.⁵ Therefore, screening for syphilis is mandatory in early pregnancy or at the first antenatal visit as recommended by WHO (2017).⁶ In this study, RPR showed better results as a diagnostic screening test compared to VDRL (73.3% vs 71.6%). This is supported by a higher specificity value in RPR (90.45% in RPR vs 89.5% in VDRL). VDRL and RPR are non-treponemal tests, in which false-negative results can be observed in patients who have been treated or are at the latent or advanced stage of syphilis, as the sensitivity of the non-treponemal tests is lower at this stage. This may explain the low VDRL/RPR sensitivity detected in this study. The same finding was observed by Naidu *et*

al. (2012) who found that ELISA had higher sensitivity and specificity of 96% and 90%, respectively, whereas RPR had 70% and 54%, respectively, with TPHA as the reference standard.⁷

Based on the research of Solaimalai *et al.* (2020), VDRL or RPR test is routinely used in many laboratories as a screening test for syphilis because of its ease of performance, sensitivity, and low cost. Their sensitivity in the primary, secondary, and tertiary stages of syphilis are 60%-70%, 100%, and 60%-70%, respectively. The test can be performed on both serum and cerebrospinal fluid specimens and is an indicator of response to treatment in 6-18 months.⁴ However, the drawback of these tests is the pro-zone phenomenon (0.8%–2%) which leads to false-negative reports,⁸ 18-20 whereas 26% - 56% positive VDRL/RPR tests can turn out to be biological false positives. Additionally, the VDRL is a labor-intensive manual test that requires trained personnel and can only be performed in large volume laboratories.⁹

Table 1. Evaluation of ELISA with different kit.^a (VDRL and RPR). Source: Solaimalai *et al.* (2020)

	TPHA		Sensitivity	Specificity	PPV	NPV	Kappa	False positive rate (%)
	Positive	Negative						
ELISA Lot No E 171206 AI								
Positive (n=76)	72	4	98.63 (92.60–99.97)	97.04 (92.59–99.19)	94.74 (87.27–97.93)	99.24 (94.92–99.89)	0.95 (0.902–0.993)	3
Negative (n=132)	1	131						
ELISA Lot No E 171206 AG								
Positive (n=53)	48	5	94.12 (83.76–98.77)	96.77 (92.63–98.94)	90.57 (80.17–95.80)	98.04 (94.34–99.34)	0.9 (0.827–0.967)	3.2
Negative (n=153)	3	150						
ELISA Lot No E 171206 AK								
Positive (n=73)	65	8	95.6 (87.64–99.08)	94.12 (88.74–97.43)	89.04 (80.55–94.10)	97.71 (93.38–99.23)	0.88 (0.813–0.949)	5.9
Negative (n=131)	3	128						

Abbreviations: CI, confidence interval; ELISA, enzyme-linked immunosorbent assay; FN, false negative; FP, false positive; NPV, negative predictive value; PPV, positive predictive value; TPHA, Treponema pallidum hemagglutination.

^aValues are given as percentage (95% CI).

The recommendation of the study by Solaimalai *et al.* (2020) is that ELISA has the potential to replace VDRL/RPR as a syphilis screening test in centers that can perform ELISA, especially for antenatal screening in large-volume laboratories.⁴ However, in

terms of availability of test kits and affordability for the community, ELISA is not yet potential as a screening test that can be applied in Indonesia for triple elimination screening in pregnancy. Indonesia also relies on small, distributed community health centers (“Puskesmas”) which can perform

simple screening tests for syphilis,¹⁰ and not large-volume laboratories, so that from the comparison between RPR and VDRL, RPR is the better option for screening tests.

CONCLUSION

From research conducted by Solaimalai *et al.* (2020), it can be concluded that VDRL is not more sensitive and specific than RPR so that RPR is better used as a diagnostic screening test for syphilis infection in pregnant women than VDRL. The research undertaken is quite complete and purposeful as a cross-sectional study. The sampling process is carried out by means of simple random sampling and the results obtained are reliable. However, this research is not necessarily applicable to countries with limited availability of diagnostic tests and the socio-economic conditions of society, such as Southeast Asian countries. Thus, further research is needed related to the comparison of the use of conventional diagnostic tests such as RPR and VDRL in these countries.

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