BRIEF COMMUNICATION

Seropositivity of the Rapid Plasma Reagin (RPR) Test in a Dental School Patient Population: a Retrospective Study

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Abstract

Objectives: *The purpose of this retrospective study was to determine the seropositivity of the rapid plasma reagin (RPR) in a dental school patient population.* ***Methods:*** *Blood was drawn on 20,844 subjects registering for treatment at the Louisiana State University School of Dentistry. All subjects who are admitted to the dental school are submitted to RPR screening (Macro-Vue-RPR Card, Becton Dickinson), blood indices, and serum chemistries. Venereal Disease Research Laboratory (VDRL), microhemagglutination assay for* Treponema pallidum *(MHA-TP) and/or fluorescent treponemal absorption test for* Treponema pallidum *(FTA-ABS) were also run on the positive RPR results.* ***Results:*** *Two hundred seventy-nine (1.34%) of the 20,844 were RPR-positive. Sixty-two subjects (0.30%) of this total population from the RPR-positive findings were nonreactive (biological false positives or BFP) to the MHA-TP and FTA-ABS. This left 217 (1.04%) subjects of the 20,844 screened who were seropositive on both the RPR and the FTA-ABS or MHA-TP.* ***Conclusions:*** *Since this study has not been performed in a dental school patient population setting, comparison with other institutions is difficult. The authors agree that routine RPR testing is helpful and cost effective to detect patients possibly infected with* Treponema pallidum *in a large patient population. [J Public Health Dent 2003;63(1):61-63].*

Key Words: rapid plasma reagin (RPR), Venereal Disease Research Laboratory (VDRL), biological false positive (BFP), syphilis, Treponema pallidum, *serology*

The rapid plasma reagin test (RPR) and the Venereal Disease Research Laboratory test (VDRL) are quantitative serology tests routinely used for screening procedures for *Treponema pallidum,* the infectious agent for syphilis. Serology is the process of evaluating and detecting either antigens or antibodies in sera. The VDRL is a quantitative test because the titer or amount of antibody can be determined to find out if a subject has active infection. The RPR test may be negative if quantitatively there are not enough antigens for detection to take place. These two tests are considered nontreponemal tests because they are not specific for the *T. pallidum* antibody.

More sensitive, specific, and definitive serological tests for *Treponema pallidum* are the fluorescent treponemal absorption test for *T. pallidum* (FTA-ABS) and the microhemagglutination assay for *T. pallidum* (MHA-TP). These are qualitative specific serological tests and cannot be used to monitor treatment. These qualitative tests detect the presence of antibody, but not the amount of antibody. Unless the subject had a past treponemal infection, subjects who have a VDRL with titer less than 1:8 dilutions will be negative on the MHA-TP and FTA-ABS for other causes for positive RPR and VDRL results. A VDRL dilution of 1:16 is considered active infection if FTA-ABS or MHA-TP positive (1). A biological false positive (BFP) occurs when screening or definitive serological tests are positive, but the individual tested does not have the disease.

Other conditions can cause a BFP in terms of detecting *Treponema pallidum.* Treponemal infections and diseases such as yaws, pinta, and bejel can cause biological false positives (BFP) with the RPR and VDRL (1,2). Nontreponemal infections producing RPR and VDRL BFPs include but are not limited to bacterial infections such as tuberculosis and scarlet fever, viral infections such as HIV, infectious mononucleosis, measles and chicken pox, and protozoan infections such as malaria (1,3). Noninfectious causes for BFPs in these two tests include systemic connective tissue autoimmune diseases such as systemic lupus erythematosus, malignancies, narcotic addiction, and chronic liver diseases (1,3).

The purpose of this retrospective study was to determine the seropositivity of the rapid plasma reagin (RPR) test in a dental school patient population. We believe screening tests such as the RPR in medical and dental institutions are important for medical and dental education and to the welfare of a large population treated in such institutions. To our knowledge, a study of this nature has never been done for a dental school patient population.

Methods

From July 1, 1992, through June 30, 1998, blood was drawn on 20,844 adult subjects at the Louisiana State University (LSU) School of Dentistry for routine screening. All subjects admitted to the dental school were routinely submitted to blood drawing. The sample of this study consisted of all individuals presenting to the dental clinic for treatment during a six-year period. Blood samples were tested for liver function tests, hematocrit, hemoglo-

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bin, white blood cell count, platelet count, hepatitis B surface antigen, cholesterol, serum glucose, and rapid plasma reagin (RPR) tests. All subjects submitted to RPR screening using a Macro-Vue-RPR Card© (Becton Dickinson). Histories from the subjects' records were reviewed to determine whether there was a previous history of syphilis and other medical conditions, which could cause a BFP.

If an RPR test was found positive, samples were sent to the Office of the Louisiana State Public Health in New Orleans, where a VDRL was run. Then MHA-TP and, if needed, an FTA-ABS were run to confirm or rule out infection from *T. pallidum*.

The Louisiana State University Health Sciences Center Institutional Review Board approved the study; total confidentiality of the subjects was preserved. Before this retrospective study was started, subjects and their physicians were notified when the results were made known that the MHA-TP or FTA-ABS were positive with VDRL titers of 1:8 or greater. All subjects signed consent forms for use of laboratory results, history, and dental findings for research purposes.

Results

Our subject sample ages ranged from 20 to 89. Two hundred seventy-nine (1.34%) of the 20,844 were RPR-positive. Sixty-two (22.2%) of the 279 of the RPR-positive findings were nonreactive to the MHA-TP and FTA-ABS. Two hundred-seventeen (1.04%) subjects of the 20,844 screened were RPR, FTA-ABS, or MHA-TP positive on all tests. Forty of the 217 subjects who tested positive on all three tests did not have a past history of exposure to *T. pallidum* or other cause for a BFP to the RPR test. Twenty of the 62 with a positive RPR and negative FTA-ABS or MHA-TP had no contributory history and no known cause for the RPR-positive result. One subject had fibromyalgia with systemic lupus erythematosus and another subject had active hepatitis B. There was no significant increase or decrease of seropositivity during the years of the study (Table 1).

TABLE 1
RPR-positive Patients at LSU Dental School from 1992 though 1998

Year	Total Subjects	RPR-positive	% Subjects Positive
1992–93	3,841	38	1.00
1993–94	4,615	94	2.04
1994–95	3,252	47	1.46
1995–96	2,855	24	0.84
1996–97	3,121	30	0.96
1997–98	3,160	46	1.46
Totals	20,844	279	1.34

Discussion

The RPR is a useful tool to screen for syphilis. We found 40 subjects with positive RPR and MHA-TP or FTA-ABS findings who might not have known they had exposure to *T. pallidum*. There were only two subjects from our sample with conditions found to attribute to the positive RPR and VDRL findings with negative MHA-TP and FTA-ABS. Reviewing the remaining 20 subjects' medical history and laboratory findings did not reveal any specific causes for the majority RPR BFP findings.

The issue of false negatives for the RPR was not addressed. Since the RPR was the screening tool to determine if further testing was needed, those subjects who tested negative with the RPR were not tested further. Since this study was completed, the newer enzyme-linked immunosorbent (ELISA) test for *T. pallidum* is now used for screening tests.

All subjects entering the dental school were submitted to the RPR test. There are no reports of dental school patient populations to compare our results. It is not possible to compare this subject population to the general population of the New Orleans area and our results might be skewed toward a population seeking dental treatment in an educational institution. Despite this, our results were similar to other studies even though other studies were targeted specifically to high-risk groups.

In a group of adolescents in an ambulatory adolescent medicine clinic, 10 of 630 (1.59%) patients were RPR-positive and four of these patients had evidence of active syphilis. These authors concluded that screening for high-risk adolescents should be performed (4). Of 1,515 patients admitted to the VA Medical Center in Buffalo, NY, in 1987 for psychiatric, alcohol, and drug rehabilitation, 16 (1.05%) were positive for the RPR and FTA-ABS. None of these patients had signs or symptoms consistent with syphilis. These authors concluded that these high-risk groups should be routinely tested with close follow-up (5).

In an emergency department (ED) of an urban hospital in New Orleans, high-risk and nonhigh-risk patients were tested with the RPR and MHA-TP. Of 373 patients tested by RPR in the ED (216 claimed high risk and 157 control patients did not claim high risk), no significant difference was found between the high-risk and the control patients [8 of 216 (4%) vs 4 of 157 (3%)]. Twelve of the 373 (3.2%) were RPR-positive. These total results are skewed because high-risk behavior was a prerequisite for patients in the study group. They concluded that this inner-city population was at high risk for positive serologies and that consideration should be given for all patients to be screened (6).

Because subjects are discovered to have asymptomatic disease, we agree with the authors of these studies to recommend RPR screening with large patient populations for the detection of syphilis. Additionally, the RPR is inexpensive and cost effective; the kit—including the reagent, card, and control ordered in kits of 500—runs about 50 cents per patient.

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