Interpretation of Diagnostic Tests: Likelihood Ratio vs. Predictive Value

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Dear Editor;

We read with interest the Iranikhah et al's article entitled "Stool Antigen Tests for the Detection of Helicobacter Pylori in Children" in the second issue of 2013 of *Iran J Pediatr*[1].

The authors have well reported an interesting investigation about the detection of bacterial antigens in stool for diagnosis of Helicobacter pylori in children. Also they appropriately used endoscopy and biopsy as a gold standard test for validation of the H. pylori infection and statistical indices are calculated accordingly. In the study, sensitivity, specificity, positive and negative likelihood ratios for H. pylori stool antigen was reported to be 85%, 93%, 89.7%, and 90% respectively, while 89.7%, and 90% are not likelihood ratios, they are positive and negative predictive values.

There are some notices which should be considered before using these indices.

The studies which mean to evaluate diagnostic tests or methods (as above mentioned Iranikhah et al's article) usually represent the basic characteristics of tests such as sensitivity specificity, predictive value and likelihood ratios to quantify diagnostic accuracy.

Two important measures of test performance are positive predictive value (PPV), the proportion of patients with positive test who actually have the disease, and negative predictive value (NPV), the proportion of patients with negative test who are actually free of the disease. These measures are usually represented as percentages.

Although clinicians are well familiar with predictive values, these measures are not invariant characteristics of the tests and significantly depend on the prevalence of the disease in the population tested. In order to solve this problem, the other measure can be used as Likelihood Ratio (LR) which is independent of prevalence[3,4].

LR is one of the most clinically useful measures. LR shows how much more likely someone is to get a positive test if he/she has the disease, compared with a person without disease. Positive LR is usually a number greater than one and the negative LR ratio usually is smaller than one.

Although LR is very useful and some authors have proposed simple methods to use this criterion, there are several limitations to using it in clinical practice. To use this measure a nomogram should be employed or pretest probabilities should be converted into Odds, then multiplied by LR, then converted back into post test probability (Post-test odds = pre-test odds* LR)[5,6].

Based on the results of the above mentioned article, and calculating the likelihood ratios [LR^+= sensitivity/(1-specificity)][LR^-=(1-sensitivity)/ specificity] the following results are achieved: LR+=[0.85/1-0.93=12.1] and LR-=[1-0.85/0.93= 0.16], this result indicates that positive H. pylori stool antigen test significantly increases the probability of H. pylori infection and negative H. pylori stool antigen test significantly decreases the probability of infection. Although these results indicate that the study is very admirable, the figures described in the article as the positive and negative likelihood ratio really are positive and negative predictive values which have a completely different meaning.

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