

Serial Urinary Calcium Creatinine Ratio in Predicting Pre-eclampsia: How Useful ?

Pankaj Desai, Sajid Malik

Dept. of Obst. & Gyn., Medical College & S.S.G. Hospital, Vadodara - 390 001.

Summary

In predicting pre-eclampsia many tests are used. Urinary Calcium-Creatinine Ratio (CCR) is just one of them. For scientific analysis, it becomes necessary to evaluate as to how useful is this test singly compared to serially, for predicting pre-eclampsia. Our subjects had Ca: Cr. Ratio estimated thrice as per the duration of pregnancy. First was at 16-20 weeks, second at 22-28 weeks and third at 28-34 weeks of pregnancy. There was a gap of 6 weeks between each evaluation. Thus in all 252 tests were done. The chances of developing PIH were highest in cases where all three samples showed Ca: Cr. <0.04 . When all 3 tests were negative (that means if the value was >0.04 on all three occasions), chances of not developing PIH was as high as 96.67%. Accuracy of 0.88 is very satisfactory for this test. By Youden's Index the non error rate is 0.65.

Introduction

In predicting pre-eclampsia many tests are used. Urinary Calcium-Creatinine Ratio (CCR) is just one of them. It has been studied and used by many workers routinely in predicting pre-eclampsia. But we are not aware of any studies where a serial study of this parameter is done for predicting pre eclampsia. This has been done in the present study. However for scientific analysis, it becomes necessary to evaluate as to how useful is this test singly compared to serially, for predicting pre-eclampsia, in the maze of statistical jargon. In the present study we have tried to answer this question. Different workers like Saudan et al (1998) and

Izumi et al (1997) have given conflicting figures as regards the efficacy of this test. How valid is it, how much erroneous, or accurate is it in predicting pre-eclampsia are the areas we have assigned to studying in this paper.

Subjects & Methods

This is prospective analysis carried out in the department of Obstetrics & Gynecology, at Medical College, Baroda. Eighty four consecutive subjects who recorded at least one systolic reading of 140 mm of Hg or more between 16 to 20 weeks of pregnancy, during the study period were subjected to measurement of CCR in a

Table – I
(Serial tests and development of PIH)

No.	No.	Developing PIH	%Developing PIH
All 3 with positive	8	5	62.5
2 test positive	4	1	25
1 test positive	12	1	8.3

Table II
(Negative tests and development of PIH)

Test result	No.	Developed PIH	Did not develop PIH	Result +ve	% -ve
All 3-ve	60	2	58	3.33	96.67

spot urine sample. Urinary calcium was measured by cresolphthalein complexone method. Urinary creatinine measurement was done by alkaline picrate method. CCR was calculated in each spot sample so obtained. A ratio of 0.04 was considered as a cut out for evaluation. These subjects were subjected to Ca: Cr. ratio, thrice as per the duration of pregnancy. First was at 16-20 weeks, second at 22-28 weeks and third at 28-34 weeks of pregnancy. There was a gap of 6 weeks between each evaluation. Thus in all 252 tests were done. For statistical evaluation the standard Chi-Square test and Youden's index were used. Results so obtained were critically analyzed to reach valid conclusions.

Results:

As shown in Table I, the chances of developing PIH was highest in cases when all three samples showed Ca: Cr. <0.04 . This reduced to 25% when two of the three times the test value was <0.04 . When only one of the three was positive the chances of case developing PIH fell to 8.3%.

As shown in Table-II, negative results were also very interesting. When all 3 tests were negative (that means if the value was >0.04 on all three occasions) chances of not developing PIH was as high as 96.67%.

Table III
Statistical indices

Sensitivity	78%
Specificity	87%
Positive Predictive Value	40%
Negative Predictive Value	87%
Accuracy	0.88
None error rate	0.65

As shown in Table III, the sensitivity of this test was 78%. This means 78% of cases having a PIH will have a CCR less than 0.04. The specificity of this test is 87%. It means 87% of women not having PIH will have a CCR >0.04 . High negative predictive value of this test is in line with most tests to detect PIH. Accuracy of 0.88 is very satisfactory for this test. By Youden's Index the non-error rate is 0.65. This is also satisfactory as for both these the ideal figure is 1 and there is no test which achieves 1 on both counts. Values closest to 1 are satisfactory.

Discussion

There is virtually no such thing as perfect test in clinical medicine. All tests have an error rate and on occasion will either fail to identify an abnormality or identify an abnormality which is not present. (Chard, 1991) Predicting PIH has been a major challenge for obstetricians. A series of tests have been predicting PIH. Urinary CCR is one test proposed for the purpose in mid nineties (Ozcan et al 1995). It is not our aim to test applicability alone but also test usefulness and validity of this test in clinical practice.

In the present study we found that the sensitivity and specificity of this test came to 78% and 87% respectively. However Saudan et al (1998) found a sensitivity and specificity of 70% and 68% only. The efficacy of this test is most when repeated three times serially in pregnant subject compared to when it was done only once. In light of the same we like Saudan et al (1998), feel that its value as a screening test is limited.

One more point of critical analysis of this test came out when its accuracy was tested. This was done

by Youden's index and showed an accuracy of 0.88 on a non-error rate of 0.65 is very close to the ideal of 1. Therefore this test is quite valid and efficacious. When Izumi et al (1997) applied the relative risk index in 39 subjects they studied, they found that the relative risk of development of preclampsia, proteinuria, or superimposed preeclampsia was 1.98 (95% confidence interval, 1.22 to 3.22) for women with a Ca/Cr. ratio less than the 30th percentile (0.082) compared with women with a Ca/Cr. ratio greater than the 30th percentile. They also found the test to be above average in predicting PIH. We have found it to be so when used thrice and above average when used once.

The efficacy of negative test is much more than positive test. In 96.67% cases who had a negative test, did not develop PIH. It gave a negative predictive value of 87%. Ozcan et al (1995) found a negative predictive value of 95%. This is in line with most of the test used for predicting PIH and similar to our results.

Acknowledgement

The authors are thankful to The Dean, Medical College, Baroda, The Supritendent, S.S.G. Hospital, Baroda, and the Professor & Head, Dept. of Obst. & Gynecology for allowing us to publish this data

References

1. Chard, T-Prog. In O. & G.: 10,3, 1991
2. Izumi A, Minakami H, Kuwata T, Sato E Metabolism. 46 (10), 1107, 1997.
3. Ozcan T, Kaleli B, Ozeren M, Turan C, Zorlu G., Am J Perinatol: 12, 349, 1995
4. Saudan PJ, Shaw L, Brown MA: Am J Hypertens: 11, 839, 1998.