

PREDICTION OF PREGNANCY INDUCED HYPERTENSION BY ISOMETRIC EXERCISE (HAND GRIP)

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SUMMARY

A total of 96 women in 12th to 20th week of gestation attending the Department of Obstetrics & Gynaecology during the period from July, 1995 to April 1996 were offered the Hand Grip Test.

In this study maximum cases (48) were primigravida i.e. (52%), and 55 (57.29%) belonged to the lower socioeconomic strata. Body mass Index a criteria for obesity was 7 / 24 in (80.2%) cases.

The sensitivity for the Hand Grip Test was 98.0% specificity was (72.09%), positive predictive value was (25%), Negative predictive value was (96.8%).

The incidence of PIH for Bundelkhand region in our study was 12.5%. Hand Grip Test is very simple, noninvasive inexpensive and reproducible, it can be performed in the outpatient department, the advantage it enjoys over other tests is that it is an early predictor of PIH which is important because preventive methods can be applied accordingly.

INTRODUCTION

During sustained muscle contraction, blood vessels to and from the contracting

muscle are occluded. To overcome this obstruction endogenous catecholamines are secreted and sympathetic activity is increased, resulting in dynamic systemic changes when vascular sensitivity is increased, as in the case of PIH. The degree

of increased pressure should be higher than in the case of normotension.

Increased vascular sensitivity to pressor agents such as catecholamines and Angiotensin II have been considered to be the main pathophysiologic condition of PIH. Several tests have been invented to measure vascular sensitivity.

The isometric exercise test that we call the Hand Grip test has been considered as a means of measuring vascular sensitivity to catecholamines.

PIH is diagnosed when a woman with previously normal blood pressure shows a sustained rise of pressure to 140/90 mmHg or more on at least two occasions, 24 hours apart, after the 20th week of gestation, in the absence of evidence of any underlying cause for hypertension.

Early detection and appropriate treatment may prolong pregnancy long enough to ensure a satisfactory outcome for both mother and foetus. Regular and meticulous antenatal care is the key to detection of PIH in its early stage.

Since the pathophysiologic changes appear to occur as early as between 8-18 weeks of gestation, it seems logical to search for earlier indicators of this disease.

MATERIAL AND METHODS

This study was performed in the Department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi in 1995-96.

Ninety six patients were selected to participate in the test. The meaning and procedure of the Hand Grip test was explained to them.

Each of these six women underwent the Hand Grip test at their first visit prior

to 15th gestational week, they then received routine antenatal care and delivered in our hospital.

Women were diagnosed to have PIH when the systolic blood pressure was over 140 mmHg or when diastolic blood pressure was over 90 mmHg at least two times 6 hours apart after the 20th week of gestation. The Hand Grip test was administered as follows :-

A pregnant subject reclined in the supine position. After her vital signs were stable for five minutes, the blood pressure of her less skillful arm was measured.

The subject then used her more skillful hand to grasp a hand grip which required 15-25 kg strength, maintaining the grip for 3 minutes. We measured blood pressure in the control arm immediately before and after the patient released the grip.

We recorded systolic and diastolic blood pressure and their difference, before, during and after the test.

Finally the positive predictive value, the negative predictive value, specificity and sensitivity of the Hand Grip test was assessed, for the prediction of PIH.

RESULTS

Clinical background of 96 selected women were evaluated in terms of age, parity, family history of hypertension, obesity, mean blood pressure at first trimester and incidence of PIH.

In this study maximum number of cases (43) belonged to the age group of 31-36 years and above (44.75%). Fortynine (52%) were primigravida and 62 (63.5%) were nullipara, 56 (57.29%) of the cases belonged to low socio-economic strata.

TABLE
SHOWING DISTRIBUTION OF CASES ACCORDING TO
POSITIVITY OF HAND GRIP TEST AND ITS
STATISTICAL ANALYSIS.

Hand Grip Test	Disease Positive	Disease Negative	Total
Hand Grip Test Positive	8 (a)	24 (b)	32 (a+b)
Hand Grip Test Negative	2(c)	62 (d)	64 (c+d)
Total	10 (a+c)	86 (b+d)	96 (a+b+c+d)

$$\text{Sensitivity} = \frac{a}{a + c} \times 100 = \frac{8}{10} \times 100 = 80.0\%$$

$$\text{Specificity} = \frac{d}{b + d} \times 100 = \frac{62}{86} \times 100 = 72.09\%$$

$$\text{Positive predictive value} = \frac{a}{a + b} \times 100 = \frac{8}{32} \times 100 = 25.0\%$$

$$\text{Negative predictive value} = \frac{d}{c + d} \times 100 = \frac{62}{64} \times 100 = 96.8\%$$

Sensitivity for Hand Grip Test was 80.0%

Specificity for Hand Grip Test was 72.09%

Positive predictive value = 25.0%

Negative predictive value = 96.87%

The Hand Grip test was rated positive when the systolic blood pressure increased 15 mmHg or more during isometric exercise or the systolic blood pressure decreased 14 mmHg or more after exercise.

The Hand Grip test had (80%) sensi-

tivity which means that 80% of the diseased people screened by this test will give a "true positive" results.

Specificity (72.09%) was highest among other risk factors. Positive predictive value was 25% and negative predictive value was 96.8%. False negative was 20%.

DISCUSSION

The present study was undertaken to evaluate the efficacy of isometric exercise as a predictor of PIH in pregnant women as early as 15th to 18th week of gestation.

Many causes and factors contribute to the development of PIH. However, once PIH has developed, one of the main pathogenesis of PIH is increased vascular sensitivity to catecholamines, Angiotensin II and so forth.

The isometric exercise test or the Hand Grip test is a very simple, virtually costless, non invasive, reproducible, reliable screening method, which effectively predicts PIH as early as 15th gestational week.

Prediction as early as 15th gestational week is important because during 15th to 18th weeks, trophoblastic cell invasion of

the placental spiral arteries occurs, in normotensive women this invasion is protective, in the sense by destruction of smooth muscle layer, the spiral arteries become refractory to pressor agents.

This invasion is lacking in PIH group of patients. Thus early prediction helps in prevention of the disease before it gets established.

Once at risk patients are identified, to improve foetal and maternal prognosis, we can give preventive/prophylactic treatment in the form of low dose aspirin and calcium supplements.

Although numerous predictive methods have been proposed, many of them have predictive value only after the 20th week of gestation, or one or two weeks prior to the development of PIH.