

Original Articles

Comparison Between Hemoglobinopathy Disorders Detection by Screening Test and Hemoglobin Typing

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Abstract: Hemoglobin disorders is one important health problem in Thailand. In this study, 99 pregnant subjects who attended antenatal clinic, King Chulalongkorn Memorial Hospital were included. Screening test for hemoglobinopathy disorders using DCIP - clear test was performed. Hemoglobin electrophoresis was also performed as standard test. From this study, 38.3% of all subjects had hemoglobin disorders. Considering screening for hemoglobin disorders, the sensitivity was 100%, specificity was 97%, positive predictive value was 94% and negative predictive value was 100%. Considering screening for all hemoglobin disorders, the sensitivity was 100%, specificity was 100%, positive predictive value was 100% and negative predictive value was 100%.

Key Words : ● Hemoglobin disorder ● Pregnancy ● Hemoglobin typing ● DCIP test

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Inherited hemoglobin disorders are common anemic blood diseases. Hemoglobinopathy is one major health problems in Thailand. In the present day, 40% of Thai people have abnormal hemoglobin gene. About 600,000 people suffer from the disease - 12,000 people are neonatal group approximately 1.2% of total newborns in

each year are effected.^{1,2} Due to the fact that performing standard confirmation test for hemoglobinopathy in all pregnant women is impossible. Screening for hemoglobin disorders among pregnant women is very interesting. King Chulalongkorn Memorial Hospital, Bangkok is the largest Thai Red Cross Society hospital. There are many pregnant women who get health service from this hospital everyday. This study was set to determine the diagnostic property of screening tests for hemoglobin dis-

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orders of these pregnant women. Furthermore, the results from this study can be good data from further study.

Materials and Methods

The subjects in this study were 99 pregnant women who received routine antenatal check-up in the Out Patient Division, King Chulalongkorn Memorial Hospital during April 1997.

EDTA blood sample from each subject was collected by antecubital venipuncture. Dichlorophenol indolphenol precipitation using KKU-DCIP-clear reagent as screening test in this study. Each blood sample was also performed hemoglobin typing by cellulose acetate electrophoresis (Helena Laboratory: Beaumont, Texas) as standard test. Results from analysis were collected and analyzed using statistical method.

In this study, DCIP-clear test was performed using 20 microliter of sample mixing with KKU-DCIP reagent (4.36 g trisma base, 2.68 g EDTA $\text{Na}_2\text{2H}_2\text{O}$ 0.00276 DCIP, 0.05 Saponin, 6 N HCl

and 500 mm distilled water). Warm at 42°C for 30 minutes then clearing solution 10 microliteris added. Positive result is set in case the product is turbid and negative result is set in case the product is clear.

SPSS computer program was used in statistical analysis. Diagnostic property as sensitivity, specificity and predictive value was used in presentation.

Results

From total 99 subjects in this study, the prevalence of hemoglobin disorder was 38.3%. The types of detected disorders were present in Table 1. The most common hemoglobin disorder was hemoglobin E trait (31.3%).

Considering screening for hemoglobin E disorders (Table 2), the sensitivity was 100%, specificity was 97%, positive predictive value was 94% and negative predictive value was 100%.

Considering screening for hemoglobinopathy

Table 1 Results of hemoglobin study in the pregnant subjects.

Result	Number / %
Normal	61 / 61.2
Abnormal	38 / 38.3
● Beta-thalassemia trait	3 / 3.0
● Alpha-thalassemia trait	1 / 1.0
● Hemoglobin E trait (AE)	31 / 31.3
● Homozygous hemoglobin E (EE)	1 / 1.0
● Hemoglobin H (A_2AH)	1 / 1.0
● Hemoglobin CS (CSA_2AH)	1 / 1.0

Table 2 Comparison between detection for hemoglobin E disorders between screening test and hemoglobin typing.

OF test	Hemoglobin typing	
	Hemoglobin disorder	Non hemoglobin disorder
Positive	32	2
Negative	0	65

Table 3 Comparison between detection for hemoglobinopathy disorders between screening test and hemoglobin typing.

OF test	Hemoglobin typing	
	Hemoglobin disorder	Non hemoglobin disorder
Positive	34	0
Negative	0	65

disorders (Table 3), the sensitivity was 100%, specificity was 100%, positive predictive value was 100% and negative predictive value was 100%.

Discussion

From this study, 38.3% of total pregnant subjects had abnormal hemoglobin. Comparing to other studies in Thailand,^{3,5} the prevalence is in the same level. The most common hemoglobin disorder in this study was hemoglobin E trait with prevalence 31.3%, higher than the previous studies.^{3,5}

Concerning DCIP test in this study, it revealed very good sensitivity for screening the hemoglobin E disorder, which is the most common hemoglobin disorder in Thailand. Therefore, using this method to screen hemo-

globin disorder in pregnant women is an effective method due to its good diagnostic property and low laboratory cost.

It revealed that hemoglobin disorder can be effectively detected by this method. Although there was about 2% of false positive in screening for hemoglobin E disorder but in case of positive result, one of other hemoglobin disorders could be identified.

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การเปรียบเทียบการตรวจความผิดปกติของเม็ดเลือดแดงในสตรีตั้งครรภ์ ด้วยวิธีคัดกรองและการตรวจชนิดของฮีโมโกลบิน

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ภาควิชาเวชศาสตร์ชั้นสูง คณะแพทยศาสตร์, *ภาควิชาเคมีคลินิก คณะสหเวชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย 10330

บทคัดย่อ: ความผิดปกติของฮีโมโกลบินจัดได้ว่าเป็นปัญหาสาธารณสุขที่สำคัญสำหรับประเทศไทย คณะผู้ทำการวิจัยได้ศึกษาในกลุ่มตัวอย่างสตรีตั้งครรภ์ในกรุงเทพฯ ที่ได้รับการฝากครรภ์ที่โรงพยาบาลจุฬาลงกรณ์จำนวน 99 คน โดยศึกษาความผิดปกติของเม็ดเลือดแดงด้วยการคัดกรองด้วยวิธี ดี ซี ไอ พี และใช้วิธีศึกษาฮีโมโกลบินด้วยวิธีการแยกฮีโมโกลบินด้วยไฟฟ้าเป็นวิธีมาตรฐาน จากการศึกษาพบว่าร้อยละ 38.3 ของกลุ่มตัวอย่างมีความผิดปกติของฮีโมโกลบิน พิจารณาการคัดกรองความผิดปกติแบบทาลัสซีเมีย พบว่าวิธีคัดกรองที่ศึกษามีความไวร้อยละ 100 ความจำเพาะร้อยละ 97 ค่าพยากรณ์บวกร้อยละ 94 และค่าพยากรณ์ลบร้อยละ 100 ทั้งนี้เมื่อพิจารณาการคัดกรองความผิดปกติของฮีโมโกลบินโดยรวม พบว่าวิธีคัดกรองที่ศึกษามีความไวร้อยละ 100 ความจำเพาะร้อยละ 100 ค่าพยากรณ์บวกร้อยละ 100 และค่าพยากรณ์ลบร้อยละ 100

Key Words : ● Hemoglobin disorder ● Pregnancy ● Hemoglobin typing ● DCIP test
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