

Positive DCIP rates: A study on laboratory incidence

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Background : *DCIP (dichlorophenolindophenol) test is currently a widely used screening test for hemoglobin E and alpha thalassemia. Here, the authors performed a study on laboratory-measured positive DCIP rates in a tertiary hospital in Thailand.*

Method : *The data from laboratory records of female patients who got diagnostic DCIP (dichlorophenolindophenol) test at the Division of Laboratory Medicine, King Chulalongkorn Memorial Hospital, Bangkok, Thailand, from January 2005 to December 2005 were reviewed.*

Results : *There were 3428 laboratory records reviewed in this study. From the total 3428 records, there were 388 positive cases giving the incidence equal to 11.32 %.*

Discussion : *The incidence of positive DCIP is similar to reports from other settings; this implies the importance of the screening test.*

Keywords : *DCIP, Screening.*

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- ความเดิม** : การทดสอบ ดีซีไอพี จัดเป็นการตรวจคัดกรองฮีโมโกลบินอี และ แอลฟาธาลัสซีเมีย ที่ใช้อย่างกว้างขวางในปัจจุบัน ผู้นิพนธ์ได้ทำการศึกษาอัตราการเกิดผลบวกจากโรงพยาบาลระดับตติยภูมิแห่งหนึ่ง
- วิธีการ** : ได้ทำการทบทวนผลการทดสอบดีซีไอพีทางห้องปฏิบัติการจาก ฝ่ายเวชศาสตร์-ชั้นสูตร โรงพยาบาลจุฬาลงกรณ์ระหว่าง มกราคม 2548 ถึง ธันวาคม 2548
- ผลการศึกษา** : ได้ทำการทบทวนรายงานการตรวจจำนวน 3,428 ราย พบผลบวก 388 ราย (11.32%)
- สรุป** : อัตราการตรวจพบผลบวกของดีซีไอพีอยู่ในระดับที่สูงใกล้เคียงกับรายงานจากแหล่งอื่นยืนยันความสำคัญของการตรวจคัดกรองชนิดนี้
- คำสำคัญ** : ดีซีไอพี, การคัดกรอง

Hemoglobinopathies are common inherited disorder with high prevalence in Thailand. Of several haemoglobinopathies, hemoglobin E disorder (beta 26, GAG-AAG, Glu-Lys) is the most common form. Heterozygotes and homozygotes for HbE are microcytic, minimally anemic, and asymptomatic. The microcytosis is attributed to the beta thalassemic nature of the beta E gene, whereas the in vitro instability of HbE does not contribute to the phenotype.⁽¹⁾ Similar to thalassemia carrier, heterozygous Hb E without concomitant thalassemia usually presents no or only a few symptoms.⁽¹⁾ These cases are usually mild and can be detected by blood smear on routine laboratory examinations.⁽¹⁾ An individual with hemoglobin E as the principal hemoglobin but no hemoglobin A, homozygous Hb E E (E/E) is also non-fatal.⁽¹⁾ They may have a mild to moderate degree of anemia with slight reduction of red cell survival and a significant reduction in mean corpuscular volume (MCV).⁽¹⁾

A simple screening strategy for hemoglobin E in a prevention and control program for thalassemia in Thai communities with limited resources is necessary.⁽²⁾ Of several screening methods, dichlorophenolindophenol (DCIP) precipitation test is recommended.⁽²⁾ This DCIP test is introduced as a useful test in antenatal care for the pregnant presenting with anemic problem.⁽³⁾ Here, the authors performed a study on laboratory-measured positive DCIP rates in a tertiary hospital in Thailand.

Materials and Methods

This study was designed as a retrospective study. The data from medical records from Laboratory Information System (LIS) of the female patients who received diagnostic DCIP test at the Division of

Laboratory Medicine, King Chulalongkorn Memorial Hospital, Bangkok, Thailand, from January 2005 to December 2005 were reviewed. The laboratory setting is the largest laboratory of the Thai Red Cross Society with accredited for ISO 15189 Standard. DCIP test, mentioned in this study, is a one step test, KCU-DCIP and can result within 1 hour. DCIP is a synthetic dye which has deep blue color in water. DCIP can oxidize and cause precipitation of unstable hemoglobin such as hemoglobin E and other unstable hemoglobins. Hemoglobin E is a genetic variant of normal adult hemoglobin. It results from a single change in the amino acid at position 26 of the β chain (Glu₂₆ → Lys₂₆). This renders free sulphydryl group to easily oxidize with DCIP. Hb E is oxidized and precipitated when react with DCIP easier than other types of Hemoglobin (HbA, HbF, HbS). The specimen is whole blood which EDTA is anti-coagulation. Internal control is negative and positive control. If DCIP is positive, it will be confirmed by Hemoglobin typing. The specificity and sensitivity of the test is about 100 % and 100 %, respectively. Result of each test noted in medical records were also reviewed and collected. Descriptive statistic was carried out on the data where appropriate.

Results

There were 3428 medical records reviewed in this study. From total medical records, there was no subject who is younger than 10 years old or older than 50 years old. (Table 1)

The screening test results were positive in 388 cases (11.32 %) and negative in 3040 cases (88.68 %).

Table 1. Number of DCIP records classified by age.

Age	Number of DCIP records
10 - 20	306
21-30	1786
31-40	1230
41-50	106
Total	3428

Discussion

Inherited hemoglobin disorders are an important problem in many developing countries including Thailand. Of the several inherited hemoglobin disorders, hemoglobin E (HbE) (beta 26, GAG-AAG, Glu-Lys) is the most common hemoglobinopathy in Thailand. Presently, screening test to identify carriers of hemoglobin disorders among pregnant subjects is an interesting topic in antenatal care in Thailand.⁽³⁾ Of late, many trials have been conducted to identify the right screening methods for the detection of hemoglobin disorders among Thai pregnant women.⁽³⁾ The common screening methods include red blood cell (RBC) index determination, application of mathematical model and hemoglobin electrophoresis.⁽³⁾ However, DCIP is the method proved for its cost effectiveness and efficacy for screening.⁽²⁻⁵⁾

DCIP test is currently a widely used screening test in Thailand. Here, the authors performed a study on laboratory-measured positive DCIP rates in a tertiary hospital in Bangkok and found that the incidence of positive DCIP was similar to the reports from other settings in rural communities of Thailand.⁽⁶⁻

⁷⁾ This implies the importance of this screening test even in Bangkok. The distribution of the Hb E all around Thailand due to the present good transportation can be expected.

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