Thalassemias : hemoglobinopathies in Nakhon Ratchasima Province

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Abstract : Thalassemias/hemoglobinopaties in Nakhon Ratchasima Province. The purpose of This study was to determine the incidence of thalassemias, hemoglobinopathies and their combinations in adults and to validate the existence of α- thalassemia in Nakhon Ratchasima Province. 619 subjects were randomly selected from every tenth patient with various complaints in outpatient clinic of medicine, Maharat Nakhon Ratchasima Hospital. The blood samples were drawn and mixed with EDTA for hemoglobin typing with cellulose acetate electrophoresis method. Hemoglobin A_2 and F were quantified with microcolumn chromatography and alkali denaturation respectively. Types of thalassemia and hemoglobinopathy were demonstrated as followed : hemoglobin E trait 201 (32.5%), hemoglobin E disease 36 (5.8%) β-thalassemia trait 45 (7.3%) β -thalassemia/hemoglobin E disease 6 (1.0%) hemoglobin AE Bart's disease 2 (0.3%), hemoglobin H disease 2 (0.3%), β-thalassemia major 1 (0.2%) and hemoglobin Constant - Spring 2 (0.3%). The rest were normal 324 (52.3%). Total hemoglobin E was found 38.3% which was similar to the study of Kummalue et al. (37.1%). β - thalassemia trait was more commonly found as compared to the previous study (7.3% VS 1.7%). Hemoglobin H and hemoglobin AE Bart's disease were equally found (0.3%). This finding confirmed the existence of α - thalassemia in this province. Severe forms of thalassemia/hemoglobinopathies might be more frequently found than usual because only the hospitalized patients were studied. Further study in the general population should be conducted in order to get more precise incidence of these severe forms.

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Thalassemias both α- and β- and hemoglobinopathies especially hemoglobin E were highly prevalent in Thailand particularly in the northeastern part of the country [1,2] Interaction of these genetic abnormalities results in various combinations, for instance : between α- thalassemia and hemoglobin E or between β-thalassemia and hemoglobin E.

Nakhon Ratchasima is the biggest province of the northeast, its incidence of -β thalassemia trait was 1.7% and hemoglobin E trait was 11% [3,4] no α- thalassemia was reported. The recent study performed in pregnant women showed that hemoglobin E trait was 33.5% and hemoglobin E disease was 3.6% [5], not mentioning both α- and β- thalassemias. From our previous study, besides afore - mentioned thalassemia/ hemoglobinopathy, one hemoglobin H and one β-thalassemia/hemoglobin E from 143 subjects could be demonstrated [6]. Because there was so much difference in incidences of hemoglobin E between the two former studies (11% VS 33.5%). Therefore, this study was conducted to determine the incidence of thalassemias, hemoglobinopathies and their combinations in adults and furthermore, to validate the existence of α- thalassemia in this province.

Material and method

The subjects were patients from the OPD clinic of the department of medicine Maharat Nakhon Ratchaaima Hospital, from 1 January 1995 to 30 June 1996. Every tenth patient with various complaints was daily selected. Blood samples were drawn and mixed with EDTA as anti - coagulant. Types of hemoglobin were identified by cellulose acetate electrophoresis in TRIS - EDTA - Boric acid buffer, pH 8.2 - 8.6 (Titan III-H). [2,7] Amount of Hb A_2 and F were quantified with microcolumn chromatography (Bio-Rad) [2] and alkali denaturation [8] respectively. Because hemoglobin A_2 and E were recognized at the same band on electrophoretic strip, its percentage was used to separate among normal, β- thalassemia trait, hemoglobin E trait and hemoglobin E disease as followed;

percentage of hemoglobin A_2 1.71 - 3.54% : normal
percentage of hemoglobin A_2 3.97 - 7.5% : β- thalassemia trait
percentage of hemoglobin E 24.32 - 31.48% : hemoglobin E trait
percentage of hemoglobin E> 80% : hemoglobin E disease

Results

Six hundred and nineteen subjects recruited in this study comprised 303 males and 316 females. Ages were between 15-77, mean 47.5 years. After performing cellulose acetate electrophoresis, various types of thalassemia and hemoglobinopathy were found and shown in the table.

Table Incidence of thalassemias/hemoglobinopathies in Nakhon Ratchasima

Hemoglobin E trait	201	(32.5%)
β- thalassemia trait	45	(7.3%)
Hemoglobin E disease	36	(5.8%)
β- thalassemia/hemoglobin E	6	(1.0%)
Hemoglobin AE Bart's disease	2	(0.3%)
Hemoglobin H	2	(0.3%)
β- thalassemia major	1	(0.2%)
Hemoglobin Constant - Spring	2	(0.3%)
Normal	324	(52.3%)
Total	619	(100%)

Discussion

From our study, normal hemoglobin was found 52.3% whereas the rest were abnormal in various forms. Hemoglobin E trait 32.5% in combination with hemoglobin E disease 5.8% contributed to 38.3%, confirming total hemoglobin E 37.1% of this province studied by Kummalue et al [5] This figure was lower than that of Ubolrajthani (44.6%) and of Khonkaen (43.3%) but approximately equal to 36.8% of Udornthani. [1] It was between the highest figure of hemoglobin E of Surin (50- 60%) and the lowest one of Chiangmai (4.9 - 8.9%).

For thalassemia, both α- and β- were found. β- thalassemia trait was the commonest (7.3%), the others were β- thalassemia/hemoglobin E (1.0%), hemoglobin AE Bart's disease (0.3%), hemoglobin H disease (0.3%) β- thalassemia major (0.2.%) and hemoglobin Constant - Spring (0.3%).

As compared with previous literature [3,4] β- thalassemia trait in our study was much more commonly found (1.7% VS 7.3%). The figure was nearly equal to that of Khonkaen (6.0%), Udornthani (5.0%), Lumpoon (7.6%) in the north, and of some specific ethnic groups such as Mon - Khmer (6.5%), Mooser - Lisaw (9.0%), Mong (9.7%) whereas it was quite low in Bangkok (3%) and Surin (1.3%).

If the incidences of hemoglobin E and β- thalassemia traits were taken into consideration, they would probably reflect that the population of this province might have the same origin with those of Khonkaen and Udornthani, not Surin or Bangkok.

Hemoglobin H and hemoglobin AE Bart's diseases were equally found 0.3%. It confirmed our previous study concerning the existence of α- thalassemia in this province [6].

Two cases of hemoglobin Constant - Spring were found. But it could not be determined to be trait or disease because of its very thin band in electrophoretic strip. However

it confirmed that not only α- thalassemia but also α-hemoglobinopathy as hemoglobin Constant - Spring could be found.

Except for hemoglobin H and AE Bart's diseases, some certain types of α-thalassemia i.e. α - thalassemia - 1 and α - thalassemia -2 traits could not be detected in adult, as in this study. In fact they were able to be demonstrated in hemoglobin typing of cord blood only. By performing electrophoresis, if hemoglobin Bart's was detected, its amount was used to separate among α - thalassemia - 2, α -thalassemia - 1 traits and hemoglobin H disease[8]. Wtih this method, the exact incidence of various types of α - thalassemia including hydrops fetalis which had never survived to post neonate period, could be determined.

However this study was conducted in the hospital, severe forms such as β-thalassemia major (0.2.%) and β- thalassemia -hemoglobin E disease (1.0%) might be more frequently found than usual. Further study should be performed in the general population for more precise incidence of severe forms of thalassemia/hemoglobinopathies.

Summary

Six hundred and nineteen subjects were selected from patients who attended OPD clinic of the department of medicine with various complaints. The blood samples were drawn and mixed with EDTA for hemoglobin typing with cellulose acetate electrophoresis method. Hemoglobin A_2 and F were quantified with microcolumn chromatography and alkali denaturation respectively. Types of thalassemia and hemoglobinopathy were demonstrated as followed : hemoglobin E trait 201 (32.5%), hemoglobin E disease 36 (5.8%), β- thalassemia trait 45 (7.3%), β - thalassemia/hemoglobin E disease 6 (1.0%), hemoglobin AE Bart's disease 2 (0.3%), hemoglobin H disease 2 (0.3%), β - thalassemia major 1 (0.2%) and hemoglobin Constant - Spring 2 (0.3%). The rest were normal 324 (52.3%)

The incidence of hemoglobinopathies were compared to the previous studies and severe form might be more frequently found than usual because only the hospitalized patients were studied.

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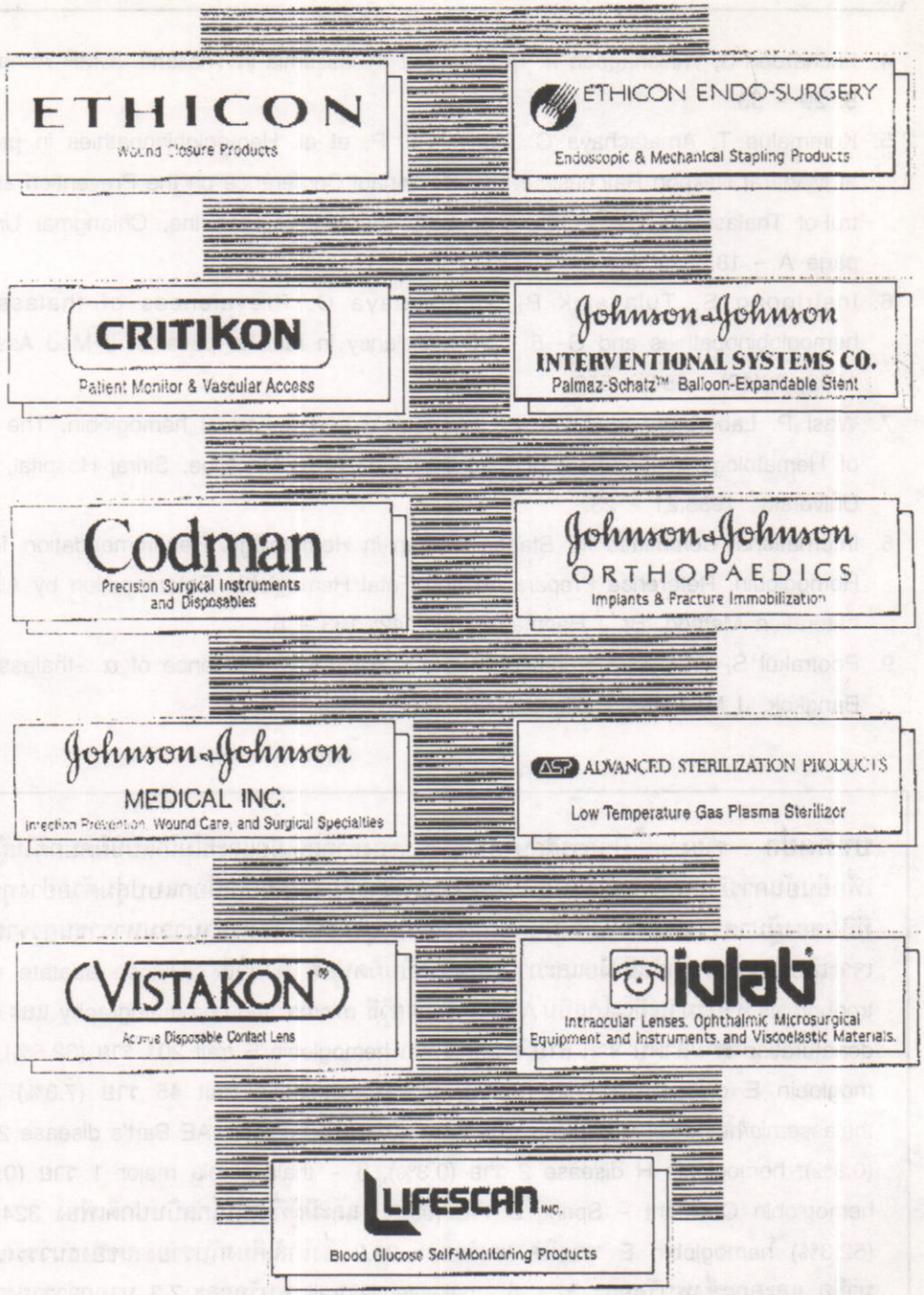
บทคัดย่อ : รายงานนี้เป็นการศึกษาอุบัติการณ์ของธาลัสซีเมียและฮีโมโกลบินผิดปกติในผู้ใหญ่เพื่อยืนยันการมีแอลฟ่าธาลัสซีเมียในจังหวัดนครราชสีมา โดยคัดเลือกแบบสุ่มตัวอย่างทุกรายที่สิบของผู้มาตรวจโรคทั่วไปที่แผนกผู้ป่วยนอกอายุรกรรม โรงพยาบาลมหาราชนครราชสีมา เจาะเลือดตรวจหาธาลัสซีเมียและภาวะฮีโมโกลบินผิดปกติ ด้วยวิธี cellulose acetate electrophoresis หาปริมาณฮีโมโกลบิน A_2 และ F ด้วยวิธี micrcolumn chromatography และ alkali denaturation ตามลำดับ จาก 619 ตัวอย่าง พบ hemoglobin E trait 201 ราย (32.5%), hemoglobin E disease 36 ราย (5.8%), β - thalassemia trait 45 ราย (7.3%) β - thalassemia/hemoglobin E disease 6 ราย (1.0%), hemoglobin AE Bart's disease 2 ราย (0.3%), hemoglobin H disease 2 ราย (0.3%), β - thalassemia major 1 ราย (0.2%), hemoglobin Constant - Spring 2 ราย (0.3%) และมีผู้ที่มีฮีโมโกลบินปกติเพียง 324 ราย (52.3%) hemoglobin E ทุกชนิด พบร้อยละ 38.3 ซึ่งใกล้เคียงกับรายงานของธนวรรณ กุมมาลือ และคณะซึ่งพบร้อยละ 37.1 β -thalassemia trait พบร้อยละ 7.3 มากกว่ารายงานอื่นซึ่งพบร้อยละ 1.7 ส่วน hemoglobin H และ hemoglobin AE Bart's disease พบได้เท่ากันประมาณร้อยละ 0.3 ซึ่งยืนยันการมี α - thalassemia ในจังหวัดนี้ ภาวะผิดปกติชนิดรุนแรงที่พบมากกว่าปกติ เนื่องจากเป็นการศึกษาในผู้ป่วยที่มาโรงพยาบาล จึงเสนอแนะให้ทำการศึกษาในกลุ่มประชากรทั่วไป เพื่อหาอุบัติการณ์ธาลัสซีเมียและฮีโมโกลบินผิดปกติชนิดรุนแรงให้ถูกต้องแน่นอนยิ่งขึ้น



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