Feasibility of four discriminant functions for identifying hemoglobin E disorders: Experience in 114 Thai pregnant subjects

Hemoglobin E bozukluklarını tanımlama için dört diskriminant fonksiyonun fizibilitesi: 114 Taylandlı hamile üzerinde deneyim

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To the Editor,

Hemoglobin disorders, especially hemoglobin E disorder, are a major problem in Thailand. Screening of pregnant subjects is among the new public health strategies for control of hemoglobinopathy in Thailand [1]. A number of screening methods for screening in pregnant subjects, such as osmotic fragility test and dichlorophenol indophenol (DCIP) test, have been evaluated [2]. Based on the modern electronic cell counter, quick differential screenings using discriminant functions (DFs) have been widely developed. However, there are only a few papers on this topic in pregnant subjects. According to our previous study using England and Frazer's calculation method in screening for Hb disorders in Thai pregnant subjects, good diagnostic properties were determined [3]. Recently, Ittarat *et al.* [4] proposed the possibility of using some modified discriminant functions (DFs) as alternative tools for screening for such disorders among the general population. However, these DFs were originally primarily applied to the differentiation of iron deficiency anemia from beta-thalassemia. Only a few studies on DF properties in screening for other abnormal hemoglobins have been reported. In this study, the four most widely used DFs were evaluated for their abilities to identify HbE-containing blood samples among 114 Thai pregnant subjects. The functions evaluated were: a) F1=0.01xMCH X(MCV)2, b) F2=RDWxMCHx (MCV)2/ Hbx100, c) F3=MCV/RBC, and d) F4= MCH/RBC. The correlation between DFs and HbE was evaluated according to the previous published method of Ittarat *et al.* [4]. DFs demonstrating a significant difference in distinguishing Hb disorders were selected for further evaluation of diagnostic properties (sensitivity, specificity, and false positive and false negative values). Only F4 showed statistically significant differences in distinguishing between the EE group and the other groups ($p<0.05$) (Table 1). The sensitivity, specificity, and false positive and false negative values of using F4 in identification of the EE group were 100%, 95.2%, 4.8% and 0%, respectively. In conclusion, the four tested DFs are not good screening tools

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doi:10.5152/tjh.2011.11

Table 1. Mean and standard deviations of some hematologic parameters and discriminant functions of blood samples from pregnant subjects with different hemoglobin types

	A2A (n = 77)	EA (n = 27)	EE (n =10)
F1	1689.3+699.8	1898.1+642.5	18.3+4.3
F2	6.4+1.3	1587.7+542.8	1758.1+842.3
F3	17.4+6.4	5.4+0.2	1325.5+498.6
F4*	1548.1+616.5	16.9+5.2	3.0+0.6*

*A significant difference was determined between EE and the other two groups ($P<0.05$) (ANOVA test)

for distinguishing the normal (A2A) from abnormal (disease: EE and carrier: EA) subjects. However, F4 might be used as a screening tool for disease (EE). Due to the fact that these DFs do not possess good diagnostic properties in screening for abnormal subjects and require automated analyzer, implying high screening costs, they do not appear to be appropriate screening tools for antenatal care in Thailand.

Acknowledgement

The authors would like to thank all pregnant subjects who participated in this study. We are also thankful to all medical personnel who assisted us with this study.

Conflict of interest statement

None of the authors of this paper has a conflict of interest, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

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