Screening thalassemia with the 'icheck turbidity', a new portable nephelometer

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Introduction: In a country with limited resources, osmotic fragility (OF) test has long been used as primary screening tool for α^0-thalassemia (α^0-thal) and β-thalassemia (β-thal). In this study, we applied a portable nephelometer for checking turbidity of the OF-test. Its preliminary results are reported.

Methods: Complete blood count and OF-test were performed on 106 blood samples of northeast-Thai students. In parallel with the conventional naked-eye OF test, the newly invented portable nephelometer, the 'icheck-turbidity', was used to measure the turbidity. Standard methods including hemoglobin and DNA analyses were carried out to identify α^0-thal and β-thal as well as hemoglobin E (Hb E) carriers.

Results: Of the106 samples, none of α^0-thal and β-thal was identified. The samples were categorized into 3 groups according to the naked-eye OF test; i.e. group 1: 53 negative screening, group 2: 40 positive screening, and group 3: 13 suspicious cases. The turbidity measured by a portable nephelometer appears to be consistent with that was observed by naked-eye with median value (inter-quartile range) of 24.6 (21.9-26.7), NTU for group 1, 36.9 (33.7-45.4), NTU for group 2, and 29.2 (28.1-35.1) for group 3. Statistical analysis revealed that turbidity levels were correlated inversely with red blood cell (RBC) indices (r = -0.3023 for Hb, -0.4178 for Hct, -0.5896 for MCV and -0.4982 for MCH; $p < 0.0001$). A direct relationship between turbidity levels and RDW values was also obtained (r = 0.3794, p = 0.0001).

Conclusions: The 'icheck turbidity' might be applicable for screening thalassemia in countries with limited resources. The equipment is easy to use and helpful as it could eliminate an error in reporting turbidity in suspicious cases. However, the establishment of cutoff value and validation with a larger sample size are needed to warrant its applicability.