An assessment of three noncommercial DNA extraction methods from dried blood spots for beta-thalassaemia mutation identification.

ABSTRACT

Introduction: Dried blood spots (DBS) are currently the recommended sample collection method for newborn screening programmes in America. Early diagnosis of beta-thalassaemia screening is essential as it provides an added advantage especially in sickle cell disease. Beta-thalassaemia frequency is high in many poor countries, and the cost of using commercial DNA extraction kits can be prohibitive. Our study assessed three methods that use minimal reagents and materials to extract DNA from DBS for beta-thalassaemia identification. Methods: The methods assessed in this study were Tris-EDTA (TE) buffer-based method by Bereczky et al. (American Journal of Tropical Medicine and Hygiene 72, 2005, 249), NaCL/NaOH/Sodium dodecyl sulphate (SDS) method by Huang et al. (Human Genetics 84, 1990, 129) and NaOH method by Zhou et al. (Analytical Biochemistry 354, 2006, 159). Extracted DNA was amplified for three common beta-thalassaemia mutations in Malaysia. Results: Amplicons derived from TE buffer-based method were very faint and almost nonexistent while the NaCl/NaOH/SDS method did not produce any visible amplicons. The extraction using NaOH method produced visible bands that were comparable to the standard method using extraction kit. Conclusion: The NaOH method is a simple method that uses minimal equipment and reagents that make it labour- and cost-effective. This method could be adopted by poorer countries to extract DNA for beta-thalassaemia mutation characterization.

Keyword: Assessment; Beta-thalassaemia; DNA extraction; Dried blood spots; Noncommercial.