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Isolation and characterization of microsatellite markers for human identification in the Vhembe district, Limpopo province, South Africa

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ABSTRACT

Forensic science is a growing discipline in South Africa. However, there are only a few forensic laboratories, mostly situated in Gauteng, Western and Eastern Cape. Due to this lack of facilities, combined with a high demand for forensic services, there is a huge backlog and turnaround time throughout South Africa; forensic testing has therefore become a major challenge. Studies have revealed that paternity disputes in rural areas are not resolved due to affordability. This contributes to an increase in single parenting among South Africans, particularly by mothers of the rejected children. The purpose of this study was to design a cost-effective Standard Operational Procedure (SOP) for isolating potentially polymorphic human microsatellite markers at a cheap and most convenient time. The designed human microsatellite markers were optimized for PCR amplification and used in genotyping a mini population of three major ethnic groups in the Limpopo province within in the Vhembe district. GENETOOLS software was used to analyze band patterns and generate data. The generated data was analyzed Using SPSS v 21. A total of 14 autosomal microsatellite markers where screened from 41 positive clones. Of the 14 screened markers, a total of 13 markers successfully amplified specific targets with an average of 3 alleles. However, only 5 markers ((GAD02; GAD06; GAD11; GAD12 and GAD13) were successfully optimized to produce a single allele per locus. A multidimensional unfolding clustering analysis grouped the three ethnic groups into 7 clusters based on band pattern similarities suggesting that the individual populations are closely related. However, three individuals clustered away from the rest of the populations suggesting that they are genetically distanced from the rest of the populations. These results need to be validated using a larger sample size with more markers. This protocol serves as brainchild for isolation of microsatellite markers for identification purposes and can be further improved for paternity test analysis.

Key words: Microsatellite markers; Paternity; Polymorphism; DNA profiling/fingerprinting; Forensics; Limpopo; Population.