

suspect with the questioned source and the probability values of genetic and demographic features of collected samples in numerous populations. On this admire the contribution of LPL, TH01 and TPOX loci is extremely critical.

In forensic DNA profiling, the statistics is additionally used for assessment of proof in paternity determination, identification of deceased in murder, mass disaster cases, and suspects in rape cases and for anthropological analysis of population. The statistical tests performed on these numbers are to gauge the worth of evidence. The power of discrimination (PD) is equivalent to 1- probability of match [25]. PD is that the average number of individuals one should survey before finding similar comparable genotype pattern among randomly selected individuals. This can be one in all of the vital parameters studied and used for individual identification and population research. Low power of discrimination indicates decrease polymorphism and least degree of knowledge from that locus. Over 20 alleles were observed at LPL, TH01 and TPOX loci providing maximum discriminatory strength to these markers. The PD for the three loci studied were within the range 0.88 - 0.95 clearly illustrated very high intra population diversity within the studied population.

Polymorphism Information Content (PIC) indicates what percentage alleles a particular marker has and the manner those alleles divide evenly. In paternity cases, it reflects the probability that a given offspring of a parent carrying a rare allele at a locus will allow deduction of the parental genotype at the locus and it's determined by summing the mating frequencies multiplied by the probability that an offspring are going to be informative. PIC for LPL locus was 0.73, for TPOX and TH01 loci was 0.81 respectively (**Table 4**).

The power of exclusion (PE) that's calculated as the sum of the squares of the frequencies of all the genotypes and indicates the probability that the two randomly chosen person don't have the same genotype was observed to be 0.433 in LPL, 0.560 in TPOX and in TH01 it absolutely was 0.472 (**Table 4**).

CONCLUSION

Crime samples are mainly uncovered to environmental insults due to this DNA gets fragmented or degraded. Fragmented DNA and degraded DNA make the task of amplification difficult. Efficiency to get a complete DNA profile decreases due to reduced amplification. Very often there may be imbalance in the height of the peak and the possibility of an allele to drop out increases. To overcome this, it is essential to amplify smaller number of loci at a time. Therefore, there is a pressing want to develop more miniplex, standardized them, examine polymorphisms and use them regularly in cases where DNA is degraded or fragmented. A massive Heterozygosity of the system offers good information in genetic linkage applications. The current study, showed large individual diversity within random

populations. The study also demonstrated that Micro satellite - LPL, TPOX and TH01 loci are the highly polymorphic loci in the genome. The study explicitly proved the utility of LPL, TPOX and TH01 loci in deciphering genetic diversity of population. The system would seem to be very useful for forensic application, exclusion in paternity cases and in the evaluation of degraded samples.

REFERENCES

1. Edwards A, Hammond HA, Jin L, Caskey CT, Chakraborty R (1992) Genetic variation at five trimeric and tetrameric tandem repeat loci in four human population groups. *Genomics* 12: 241-253.
2. Kimpton CP, Fisher D, Watson S, Adams M, Urquhart A, et al. (1994) Evaluation of an automated DNA profiling system employing multiplex amplification of four tetrameric STR loci. *Int J Legal Med* 106: 302-311.
3. Lins AM, Micka KA, Sprecher CJ, Taylor JA, Bacher JW, et al. (1998) Development and population study of an eight locus short tandem repeat (STR) multiplex system. *J Forensic Sci* 43: 1168-1180.
4. Butler JM (2006) *Genetica and genomics of core short tandem repeat loci used in human identity testing*. *J Forensic Sci* 51: 253-263.
5. Lins AM, Sprecher CJ, Puers C, Schumm JW (1996) Multiplex sets for the amplification of polymorphic short tandem repeat loci silver stain and fluorescence detection. *Bio Techniques* 20: 882-889.
6. Butler JM, Buel E, Crivellente F, McCord BR (2004) Forensic DNA typing by capillary electrophoresis using the ABI Prism 310 and 3100 genetic analyzers for STR analysis. *Electrophoresis* 25: 1397-1412.
7. Krenke BE, Tereba A, Anderson SJ, Buel E, Culhane S, et al. (2002) Validation of a 16-locus fluorescent multiplex system. *J Forensic Sci* 47: 773-785.
8. Collins PJ, Hennessy LK, Leibelt CS, Roby RK, Reeder DJ, et al. (2004) Development validation of a single tube amplification of the 13 CODIS STR loci, D2S1338, D19S433 and amelogenin: The AmpFISTR Identifier PCR amplification Kit. *J Forensic Sci* 49: 1265-1277.
9. Kwang-Man W, Seung-Hwan L, Choi CY (2016) Differential pre-amplification of STR loci for fragmented forensic DNA profiling. *Electrophoresis* 37: 3002-3009.
10. Coble MD, Butler JM (2005) Characterization of new mini STR loci to aid analysis of degraded DNA. *J Forensic Sci* 50: 43-53.
11. Hill CR, Kline MC, Coble MD, Butler JM (2008) Characterization of 26 mini STR loci for improved analysis of degraded DNA samples. *J Forensic Sci*

- 53(1): 73-80.
12. Raimann PE, Mariot RF, Avila E, Alho CS (2018) Internal validation of the Non codis Mini STR NCO1 and NCO2 for use in forensic casework. *J Criminol Forensic Stud* 1(2): 180006.
 13. Smith JC, Newton CR, Alves A, Anwar R, Jenner D, et al. (1990) Highly Polymorphic minisatellites DNA probes, Further evaluation for individual identification and paternity testing. *J Forensic Sci Soc* 30: 3-18.
 14. Wyman AR, White R (1980) A highly polymorphic locus in human DNA. *Proc Natl Acad Sci USA* 77: 6754-6758.
 15. Butler JM (2002) *Forensic DNA Typing*, second edition, Elsevier, Academic Press.
 16. Robertson A (1975) Gene Frequency Distributions as a test of Selective Neutrality. *Genetics* 81: 775-785.
 17. Maniatis T, Fritsch EF, Sambrook J (1989) *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York.
 18. Morling N (1998) Amplification of short tandem repeat loci using PCR Methods. *Mol Biol* 98: 173-180.
 19. Zulian G, Hobbs HH (1990) Tetranucleotide polymorphism on the LPL (LIPOL) gene. *Nucleic Acid Res* 18: 4958.
 20. Glock B, Schwartz DWM, Schwartz-Jungl EM, Mayr WR (1996) Allelic ladder characterization of the short tandem repeat polymorphism in Intron 6 of the lipoprotein lipase gene and its application in an Austrin Caucasian population study. *J Forensic Sci* 41: 579-581.
 21. Berschick P, Henke L, Henke J (1994) Analysis of the short tandem repeat polymorphism TC 11(HUMTH01): Allele frequencies and family studies. *Adv Forensic Haemogenetics* 5: 469-471.
 22. Nellemann L, Moller A, Morling N (1994) PCR typing of DNA fragments of the short tandem repeat (STR) system HUMTH01 in Danes and Greenland Eskimos. *Forensic Sci Int* 68: 45-51.
 23. Nagai A, Yamada S, Watanabe Y, Bunai Y, Ohya I (1996) Analysis of the STR loci HUMF13A01, HUMFXIIIIB, HUMLIPOL, HUMTH01, HUMTPOX and HUMVWFA31 in a Japanese population. *Int J Leg Med* 109: 34-36.
 24. Barbuji G, Magagni A, Minch E, Luca LC (1997) An apportionment of human DNA diversity. *Proc Natl Acad Sci USA* 94: 4516-4519.
 25. Lufig MA, Richeys (2001) DNA and forensic science. *New Engl Law Rev* 35(3): 609-613.
 26. Jin L, Chakraborty R (1995) Population structure, stepwise mutations, heterozygote deficiency and their implications in DNA forensics. *Heredity* 74: 274-285.
 27. Gupta SC, Kapoor VK (1983) *Fundamentals of Mathematical Statistics*, Eighth edition, Sultan chand and sons, Delhi.