Abstract

There is growing significance in identifying the genotypes A, B, and O which can be determined by the presence and absence of A & B antigens in the cell surface of the red blood cells. Both A & B antigens are synthesized by the process of glycosylation of common H antigen precursors with A antigen containing N-acetylgalactosamine and B antigen expressing galactose. O type cells however showed no modifications in the H antigens. Traditional serological blood typing relied on the principle of agglutination between antigens and specific antibodies. While more accurate and sensitive methods such as Next Generation Sequencing (NGS) can be employed, the technology is high in cost and thus, faces a problem in accessibility and distribution. This paper explored the utilization of Loop-Mediated Isothermal Amplification (LAMP) in ABO blood type diagnostics to achieve high sensitivity and specificity to each gene A,B or O targets. This study highlights one of the optimized A LAMP assays which possessed high discrimination towards non-target gene B and O, and good sensitivity as the assay has a limit of detection (LoD) of 100 copies/µL (cp/µL) of the target gene. However, the sensitivity did not achieve the target LoD of 100 cp/µL. Furthermore, the assay was relatively stable as the results for both A synthetic gene template/gBlock (gB) and processed A saliva samples were deemed similar in terms of cycle threshold value (Ct). However, it was observed that the A saliva samples acquire a greater variance and delayed Ct in comparison to the AgB. This variation was due to both contaminants and possible heterozygous expression of the sample.

Keywords: A antigen, B antigen, phenotypes, glycosylation, H antigens, N-acetylgalactosamine, galactose, LAMP, serological blood typing, NGS, allele, specificity, sensitivity, discrimination, heterozygous, cycle threshold (Ct), variance, gBlock, synthetic gene template, A saliva samples, AgB, Limit of detection, LoD