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Use of a New Multiplex Quantitative Polymerase Chain Reaction Based Assay for Simultaneous Detection of Neisseria Meningitidis, Escherichia Coli K1, Streptococcus agalactiae, and Streptococcus pneumoniae

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Abstract : Neisseria meningitidis, Escherichia coli K, Streptococcus agalactiae, and Streptococcus pneumoniae cause 90% of bacterial meningitis. Almost all infected people die or have irreversible neurological complications. Therefore, it is essential to have a diagnostic kit with the ability to quickly detect these fatal infections. The project involved 212 patients from whom cerebrospinal fluid samples were obtained. After total genome extraction and performing multiplex quantitative polymerase chain reaction (qPCR), the presence or absence of each infectious factor was determined by comparing with standard strains. The specificity, sensitivity, positive predictive value, and negative predictive value calculated were 100%, 92.9%, 50%, and 100%, respectively. So, due to the high specificity and sensitivity of the designed primers, they can be used instead of bacterial culture that takes at least 24 to 48 hours. The remarkable benefit of this method is associated with the speed (up to 3 hours) at which the procedure could be completed. It is also worth noting that this method can reduce the personnel unintentional errors which may occur in the laboratory. On the other hand, as this method simultaneously identifies four common factors that cause bacterial meningitis, it could be used as an auxiliary method diagnostic technique in laboratories particularly in cases of emergency medicine.

Keywords : cerebrospinal fluid, meningitis, quantitative polymerase chain reaction, simultaneous detection, diagnosis testing
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