



Development of Rapid Strip Assay for Typhoid, Dengue and Malaria

**Nageen Hussain*

Department of Microbiology and Molecular Genetics, University of Punjab, Lahore, Pakistan

***Correspondence:** Email: nageen1704@hotmail.com

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Dear Editor-in-Chief

According to a recent survey of the WHO, malaria is the second most reported disease in Pakistan that affects approximately 4.5 million people each year. In 2010, Pakistan dengue fever became epidemic especially in Punjab (Lahore), Khyber Pakhtunkhwa, and Sindh (Karachi, five from Hyderabad, two from Sukkur, one each from Tando Muhammad Khan, Jamshoro, Mirpurkhas, Sanghar, Ghotki, Thatta, Shikarpur and Shaheed Benazirbad). On the other hand, typhoid fever is also associated with fever caused by the *Salmonella typhi*, *Salmonella paratyphi* bacteria. India, Pakistan and Egypt are among the developing countries which are at high-risk for developing typhoid (1). We aimed to design and develop a lateral flow assay for the qualitative identification of typhoid, dengue and malaria in one go. Secondly to commercialize the kit with industrial partners for the community benefit.

In this study, rapid strip test that was designed to differentiate between dengue, typhoid, and malaria in one go means at the same time as the symptoms of malaria, dengue and typhoid mimic with each other (2). This is very helpful for the public as it is cheap, rapid, easy to perform and with many other advantages like biocompatibility, better specificity and sensitivity, quick results, wide working range of analysis, accuracy of analysis,

better output, compactness, economical, easy to assemble, use and carry, environmental friendly for on-site detection. Malaria, dengue and typhoid are the common problems of Pakistan; each year, number of deaths occur in Pakistan because of these diseases (3). By using this kit, doctors can start the right medication for the right disease. Rapid strip test is separately available in the market for the diagnosis of dengue fever, malaria and typhoid but this lateral flow assay was designed in such a way that one can diagnose all these three different diseases by using a single kit. Such type of kit is not available in the market.

There are different types of immunochromatographic assay and one of them is multiplex detection format. This multiplex detection format is much helpful in the diagnosis of various diseases where two or more two analytes mimic each other in various stages of diseases to be detected (4). The first step was the preparation of colloidal gold particles. Then ELISA was performed to check conjugation interaction. Third step was the conjugation of colloidal gold particles. Further Immunoblot analysis was done and finally the reparation of lateral flow assay. In this study, the Lateral flow strips format was built by following its kinetics such as by increasing length and test



lines on conventional strips for the detection of more than one target species (Dengue virus, *Plasmodium falciparum*, *Salmonella typhi*). The assay was done over the nitrocellulose strip containing test lines equal to the number of target species to be analyzed as well as the control lines. Thus one can examine number of analytes at the same time under the same set of conditions. This kit is designed for great benefit to the community; in addition to its low cost, stability; it is rapid and no need for long storage or transportation of serum samples. In this device, the use of Nanoshells helped improve sensitivity, output of this method and also the kinetics of the kit because our goal is of better sensitivity and good reproducibility (5). The new materials used have well-distributed pore size that increased affinity for analytes and helped in capillary action for the controlled flow of samples. One major goal in clinical analysis was to use biological samples for analysis without any sample preparation or pretreatment. Its use is limited when highly quantitative and reproducible results are demanded.

Conflict of interest

The authors declare that there is no conflict of interests.

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