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Prevalence and Rapid Diagnosis of Acute Bacterial Meningitis in Children in Bangladesh

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Introduction

An attempt was made to analyze the Cerebrospinal Fluid (CSF) profile and to isolate and identify aetiological agents from the specimens from children with suspected acute bacterial meningitis. Among total 79 samples, 65 (82.3%) were crystal clear, 9 (11.4%) were moderately turbid, 2 (2.5%) highly turbid and remaining 3 (3.8%) were high blood mixed. The total cell (leucocyte) count of the CSF was proportionate to the turbidity. In case of crystal clear CSFs, total leucocyte counts were normally ranging from 0 to 700 per mm3 with predominant lymphocytes. Moderately turbid fluid showed 200 to 2,000 cells per mm3 and highly turbid fluid and highly blood mixed showed more than 40,000 cells per mm3. In the later cases, differential counts demonstrated polymorph nuclear predominancy. In 65 cases whose CSF were crystal clear, total protein and sugar concentration ranged from 20 to 400mg/dl and 20 to 180mg/dl respectively. In turbid CSFs, total protein and sugar concentration varied from 70 to 500mg/dl and 10 to 200mg/dl respectively, while in the highly turbid CSFs, they ranged from 50 to 800mg/dl and 40 to 140mg/dl respectively. Among total 79 CSF samples, Pandeys tests were positive for 16.9% and negative for 9.2% in cases of the crystal clear. In case of moderately turbid and highly turbid CSFs, Pandeys test was positive for 88.9% and 100% cases respective. C - Reactive Protein (CRP) were positive (12mg/dl) for 3 (3.79%) samples. A total of 79 CSF was culture. There were 5 culture positive cases, which included Escherichia coli (20%), Haemophilus influenzae (20%) and Streptococcus pneumoniae (60%). Using the latex agglutination test, the detection rate was higher than that of culture. Most of meningitis positive cases showed an increased total cell counts as well as proteins concentration and decreased serum sugar concentrations. High resistant rate to cotrimoxazole was observed among the invasive isolates. On the other hand, none of these invasive strains showed resistant to ceftriaxone. A rapid diagnostic test (RDT) is a medical diagnostic test that is quick and easy to perform. RDTs are suitable for preliminary or emergency medical screening and for use in medical facilities with limited resources. They also allow point-of-care testing in primary care for things that formerly only a laboratory test could measure. They provide same-day results within two hours, typically in approximately 20 minutes. The European Union defines that a rapid test means qualitative or semi-quantitative in vitro-diagnostic medical devices, used singly or in a small series, which involve non-automated procedures and have been designed to give a fast result. Lateral flow tests are probably the most known type of rapid diagnostic tests, similar to pregnancy tests, but there exist other systems as dipsticks, vertical flow, etc. Anything that can be used at bedside (point-of-care) of the patient.

Covid-19 Rapid Antigen Tests

Rapid antigen tests for COVID-19 are one of the most useful application of these tests. Often called lateral flow tests, they have provided global governments with several benefits. They are quick to implement with minimal training, offered significant cost advantages, costing a fraction of existing forms of PCR testing and give users a result within 5–30 minutes. Rapid antigen tests have found their best use as part of mass testing or population-wide screening approaches. They are successful in these approaches because in addition to the aforementioned benefits, they identify individuals who are the most infectious and could potentially spread the virus to a large number of other people. This differs slightly from other forms of COVID-19 tests such as PCR that are generally seen to be a useful test for individuals. As early as February 2021, the US Department of State considered the antigen test suitable for entry to the country.

Scientific Basis and Underlying Biology

Antigen tests and antibody tests are often Immunoassays (IAs) of one kind or another, such as dipstick IAs or fluorescence immunoassays; however, RAT is an immune chromatographic assay which gives visual results that can be seen with the naked eye. It is considered to be qualitative but a person experienced in RDT testing can easily quantify the results. Being a screening test, if the sensitivity and specificity are relatively low for the test then the results should be evaluated on the basis of confirmatory tests like PCR testing or western blot. One inherent advantage of an antigen test over an antibody test (such as antibody-detecting rapid HIV tests) is that it can take time for the immune system to develop antibodies after infection begins, but the foreign antigen is present right away.

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Although any diagnostic test may have false negatives, this latency period can open an especially wide avenue for false negatives in antibody tests, although the particulars depend on which disease and which test are involved. A rapid antigen test typically costs around US$5.00 to manufacture.

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