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Urinary reagent strips for rapid analysis of cerebrospinal fluid in suspected cases of meningitis in emergency settings

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The initial diagnosis of meningitis requires examination of the cerebrospinal fluid (CSF) for proteins, glucose and leukocytes which is still the gold standard investigation for the same. Early diagnosis and starting of the treatment within 3 hours can significantly reduce the mortality and morbidity. Aims and objective of the present study was to determine the usefulness of urinary reagent strip for the semi-quantitative analysis of CSF chemistry and cellularity in rapid diagnosis of meningitis in emergency setting of a hospital. 120 sample of CSF was received in emergency lab of a tertiary care hospital in period of 8 months. All CSF samples were subjected to two types of tests, the definitive test and the index test. CSF microscopy for leucocyte and erythrocyte as well as biochemical tests for protein and glucose were considered as definitive test. The index test for protein, glucose, leucocyte and erythrocyte was conducted by Combur-10 urinary reagent strips. The diagnostic accuracy of each index test was calculated using corresponding cut-off levels (proteins 1+, 2+ & 3+ is compared to CSF protein 30 mg/dl, 100 mg/dl and 500 mg/dl respectively, glucose 1+, 2+, 3+, 4+ vs. CSF glucose 50 mg/dl ,100 mg/dl, 300 mg/dl and 1000 mg/dl respectively, leukocyte esterase positivity 1+ vs. CSF leukocytes 10-25/cumm, 2+ vs. CSF leukocytes 25-75/cumm and 3+ vs. CSF leukocytes 75-500/cumm, for erythrocytes 1+, 2+, 3+, 4+ vs. CSF erythrocyte 5-10/µl, 25/µl, 50/µl, 250/µl). Statistical analysis was performed to derive the specificity, sensitivity, positive predictive value, negative predictive value, positive likelihood ratio (LR)+ and negative likelihood ratio LR-. The strip test showed a sensitivity of 89.72% and a specificity of 92.31% for proteins. With respect to glucose, the strip was highly sensitive (98.13%) as well as highly specific (92.31%). It showed a high sensitivity and specificity for leukocytes ≥10 cells/cumm i.e., 80% and 98.75% respectively. For CSF erythrocytes sensitivity and specificity was 100%. Urinary reagent strip can be used routinely for rapid analysis of CSF. If implemented, this technique will be useful in emergency setting as well as in rural areas.

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