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Evaluation of optimal neutrophil gelatinase-associated lipocalin value as a screening biomarker for urinary tract infections in children

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Objectives: Neutrophil gelatinase-associated lipocalin (NGAL) is identified as a 25-kDa protein that is a promising biomarker for detecting kidney injury. Urinary tract infection (UTI) is one of the most common bacterial infections in children. Although urine culture is the gold standard for the diagnosis of UTI, positive culture results require 2–3 days for complete bacterial identification. Currently, urine pH, leukocyte esterase, nitrite levels, etc., are used to screen for UTI, but these tests have sensitivities of about 70¬–80%. Recently, several studies have suggested that urine NGAL (uNGAL) may be used as a novel biomarker to predict UTI in children. The aim of this study was to assess whether uNGAL and serum NGAL (sNGAL) represent reliable markers of UTI in children, and to evaluate the appropriate levels of NGAL for the screening of UTI. Methods: We analyzed 375 and 760 samples from UTI and non-UTI patients, respectively. If the culture showed more than 105 CFU/mL of a single pathogen, or if the child was symptomatic with the culture showing more than 104 CFU/mL, the child was diagnosed as having a UTI. sNGAL and uNGAL levels were measured by using enzyme-linked immunosorbent assay (Bioporto, Denmark). The sensitivity, specificity, and optimal cut-off values of NGAL for UTI screening were calculated using the receiver operating characteristic (ROC) curves formed using NGAL values and the number of UTI and non-UTI cases. Results: sNGAL and uNGAL levels were more elevated in the UTI cases than in the non-UTI cases, but the differences in levels were not statistically significant ($P > 0.005$). The optimal cut-off values of sNGAL and uNGAL for UTI screening were 65.25 ng/mL and 5.65 ng/mL, respectively, with sensitivities of 70% each, which was similar to the corresponding sensitivities of other conventional screening tests. These values were lower than the proposed cut-off values of sNGAL and uNGAL by the manufacturers, which were 106 ng/mL and 9.8 ng/mL, respectively. Conclusions: sNGAL and uNGAL are not the only markers for an early prediction of UTI. If NGAL levels are considered for the screening of UTI, the cut-off levels lower than those recommended by the manufacturer will have to be used. Therefore, further investigations, for example, comparison of NGALs with other markers for the screening of UTI, are required to evaluate the exact cut-off values of NGAL for UTI in children.