

Nitrite dipstick urinalysis, a potential method for point-of-care testing in sodium nitrite poisoning.

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Background

Sodium nitrite is primarily used as a preservative and coloring agent in food. Intentional poisoning with sodium nitrite (i.e. 'Suicide powder X') is an emerging trend. Ingestion of sodium nitrite can lead to methemoglobinemia (MethB), which warrants a rapid diagnosis as treatment (antidote is methylene blue) is extremely time sensitive and potentially lethal. Urine dipstick analysis for nitrite presence is a common point-of-care test as part of the diagnosis of urinary tract infections (UTI). We hypothesized that a nitrite presence in urine analyzed by point of care nitrite test strips may be an useful indicator for sodium nitrite poisoning.

Methods

Post-mortem urine samples were prospectively analyzed with a urine dipstick (Multistix® 10 SG, Siemens) for nitrite presence. Analysis was performed by applying urine on the reagent pad of the test strip. The color of the test strip was recorded by visual inspection. The degree of coloring was determined by using a custom-designed 8-point pink color chart (0=white, 8=darkest pink).

Results

80 post-mortem urine samples were analyzed for nitrite presence. 77 urine samples were negative for nitrite presence and 3 urine samples were positive for nitrite presence. Of these three positive nitrite cases, 2 had a low MethB level in blood (ca. 1.5% and ca. 3.3%) suggesting nitrite presence due to a UTI. The other nitrite positive case had a high MethB level in blood (ca. 34%) suggesting sodium nitrite poisoning. Case analysis of this post-mortem case had indeed sodium nitrite poisoning confirmed as a death cause. The pink coloring of the suspected UTI cases versus the sodium nitrite poisoning were notably different in severity of pink color, with the former having a light pink coloring (pink color of 2) and the latter a much darker pink (pink color of 7). Retrospectively, another set of 4 post-mortem urine samples of confirmed cases of sodium nitrite poisonings confirmed these results.

Conclusions

Nitrite dipstick strips for urine may be a feasible point-of-care method for detecting nitrite poisoning. This rapid point of care test can, next to post-mortem settings, be easily performed in acute settings (e.g in ambulances, medical helicopters, emergency departments).

Keywords: Sodium nitrite, poisoning, urine dipstick, point-of-care test