



A Novel Urine Collection Device Prototype for Non-Toilet-Trained Male Babies

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Received: 19 June 2021 / Accepted: 9 February 2022 / Published online: 14 April 2022
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To the Editor: Urinary tract infections (UTI) are a common cause of fever in non-toilet-trained babies, with a prevalence of 7% [1]. An uncontaminated urine sample is essential to establish a definite diagnosis. Noninvasive methods of urine collection such as urine bags have very high rates of contamination [2] mostly from the surrounding skin and fecal flora [3], and invasive methods such as suprapubic aspiration and ureteral catheterization cause injury and harm to the baby and need trained personnel and specialized equipment to administer.

In our experiment, we developed a device prototype by repurposing condom catheter and 15 mL vials, where the former acts as the penis receptacle and the latter as the sample-collection chamber. This device could separate urine sample and excess urine based on forces of surface tension and theoretically prevent contamination. We tested the proof of concept of our device in an in vitro model (water bath filled with D glucose) which mimicked the environment in a baby's diaper. We pushed tap water (glucose nil on urine dipstick) into our prototype and a control (urine bag) using a 20 mL syringe. We collected samples from both the devices after 0 h (immediately), 1 h, and 4 h and tested concentration of glucose in the sample as a measure of contamination. We observed lower mean glucose concentrations in the sample collected via our prototype as compared to the control (11.665 mmol/L vs. 105.832 mmol/L). The limitations of our experiment are: 1) we used glucose which is a poor surrogate marker of microbiological activity, 2) the urine sample was not obtained from human infants, and 3) the degree of contamination with increasing time points was

nonzero. This proof of concept shows that a similar device design, upon modifications, has the potential to collect urine noninvasively in non-toilet-trained male babies.

Funding The work was funded through the UG Mentorship Scheme by the All India Institute of Medical Sciences, New Delhi (Grant Number - Ref No – F.5-59/IRG/2010/RS).

Declarations

Conflict of Interest None.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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