receipts wearing nitrile gloves. The option to participate in the second simulation or to provide sequential urine samples following the first simulation was offered to all participants at study entry.

All participants provided a spot urine sample, collected in a sterile BPA-free polypropylene specimen cup, immediately before handling of receipts and 4 hours later. Volunteers provided additional sequential urine samples at 8, 12, and 24 hours after handling of receipts without gloves. Urinary-specific gravity was measured using a handheld refractometer. Urine was stored in polypropylene cryogenic vials at or below −20°C until analysis. Total (free plus conjugated species) urinary BPA concentration was measured at the US Centers for Disease Control and Prevention using published methods.[1] Concentrations of BPA were adjusted for specific gravity to account for urine dilution.

Using SAS version 9.3 (SAS Institute Inc), mixed regression models were used to examine associations between log-transformed specific gravity–adjusted urinary BPA concentrations for prehandling and posthandling samples and across time points for those who provided sequential urine samples. Statistical significance was set at a $P \leq .05$ (2-sided test).

Results

Twenty-four volunteers (mean age [SD], 35 [12] years) provided at least 2 urine samples for the simulation without gloves; 12 volunteers provided additional sequential samples and 12 also completed the simulation with gloves (Table). We excluded 1 participant for reporting consumption of 4 cans of beverage prior to the simulation (baseline urinary BPA concentration of 49.3 μg/L vs <2 μg/L for the remaining participants, decreasing to 12.0 μg/L postsimulation).

We detected BPA in 83% (n = 20) of samples at baseline and in 100% of samples after handling receipts without gloves. The geometric mean urinary BPA concentration was 1.8 μg/L (95% CI, 1.3–2.4 μg/L) before simulation and 5.8 μg/L (95% CI, 4.0–8.4 μg/L) postsimulation ($P = .005$ for interaction between presimulation and postsimulation BPA and glove status). The geometric mean BPA urinary concentrations from 12 participants who provided sequential samples following receipt handling without gloves were 2.1 μg/L (95% CI, 1.4–3.3 μg/L) at baseline, 6.0 μg/L (95% CI, 3.4–10.7 μg/L) at 4 hours, 11.1 μg/L (95% CI, 5.5–22.8 μg/L) at 8 hours, 10.5 μg/L (95%CI, 4.9–22.6 μg/L) at 12 hours, and 4.7 μg/L (95%CI, 2.4–9.1 μg/L) at 24 hours. Each measure was significantly different from baseline ($P < .001$ for 4-hour, 8-hour, and 12-hour urine samples and $P = .04$ for 24-hour samples). We observed no significant increase in urinary BPA after handling receipts with gloves (Figure).

Discussion

In this pilot study, we observed an increase in urinary BPA concentrations after continuously handling receipts for 2 hours without gloves, but no significant increase when using gloves. The peak level (5.8 μg/L) was lower than that observed after canned soup consumption (20.8μg/L).[3] The clinical implications of the height of the peak level and the