

Quick-Wee method Versus Standard method for urine collection in infants 1-12 month old

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ABSTRACT

BACKGROUND

Urinary Tract infections [UTI] often presents with fever and nonspecific findings in infants less than one year. So urine sample collection is mandatory for diagnosis or exclusion. Collecting Urine sample is very challenging in infants and choosing the method of collection must balance the reliability, speed and contamination. Clinical guidelines have different recommendations so there is a need for reliable collection method. Therefore this study was conducted to determine if a simple stimulation method (Quick –wee Method) increases the rate of clean catch voiding of urine within five minutes.

METHODS

A prospective age and sex matched case control study in 1-12 months children conducted from June 2017 – June 2018 in Pediatric ward of Manipal college of medical sciences, Pokhara, after Ethical clearance from Institutional review Board[IRB]. The study population was randomized to either clean catch midstream urine with stimulation [Quick –Wee method] or without stimulation [Standard method]. The primary outcome was voiding of urine within 5 minute. Secondary outcome were waiting time for voiding, successful collection, parental satisfaction, and contamination. The analysis was done using SPSS version 20 and a 'p' value <0.05 was considered statistically significant.

RESULTS

Waiting time for voiding in Quick wee group was less and statistically significant compared to standard group. There was 10% increment in voiding within 5 minutes in Quick wee group. It had higher successful urine collection rate (91.4%), slightly higher contamination rate (14.28%) but better parental satisfaction.

CONCLUSIONS

Quick wee method is easy, reliable, successful method of urine collection in infants with better parental satisfaction and slightly higher contamination rate.

KEYWORDS

Clean catch urine collection, infants, Quick –Wee method, Urinary tract infection

BACKGROUND

Urine sampling is frequently required in infants who present with fever and have vague nonspecific clinical symptoms. UTI affects 5-7% of febrile children under 2 years of age.^[1,2] It is important to rule out UTI in these children as missed UTIs can result in renal scarring and ultimately end stage renal disease^[3,4] The incidence of UTI in this age group is 1% in boys and 1-3% in girls.^[5] Therefore urine analysis becomes mandatory for such children. The American

Academy of Pediatrics (AAP) states that the diagnosis of a UTI requires a urinalysis and a urine culture.^[6]

Urine collection in infants is difficult and time consuming with standard mid-stream urine collection method. However AAP strongly recommends an invasive urine sample with a

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suprapubic aspiration or urethral catheterization if the child looks unwell and requires antimicrobial therapy.^[6] Invasive urine sample collection is painful, stressful and also requires expert hands. In such scenario Quick –Wee method can be an easier way to get clean catch urine sample in infants. This study aims to see whether Quick –Wee method is reliable method for collecting urine sample in infants.

METHODS

This was a prospective randomized age and sex matched case control study carried out in Pediatric ward of Manipal Teaching Hospital, Pokhara. Ethical clearance from the IRB [Institutional review board] was taken before commencing the study. The study period was from June 2017 – June 2018.

All infants aged 1-12 months [corrected for prematurity if <37 completed gestation weeks] requiring urine sampling were enrolled. Newborns or children more than twelve months were excluded from the study. Other exclusion criteria was infants with anatomical or neurological abnormalities affecting voiding or sensation and those who did not permit to use simple stimulation method. Then sample size was calculated with the following formula:

$$N = (Z_{\alpha/2} + Z_{\beta})^2 \times P_1(1-P_1) + P_2(1-P_2) / (P_1 - P_2)^2$$

where,

$$Z_{\alpha/2} = 1.96 \text{ for } \alpha \text{ of } 0.05$$

$$Z_{\beta} = 0.84 \text{ for power of } 80\%$$

For purpose of sample size collection we considered P1 [proportion of voiding within 5 min by quick wee method to be 31% and P2 [proportion of voiding within 5 min by standard clean catch urine] to be 12% based on a previous study.⁶

$$\begin{aligned} N &= (1.96 + 0.84)^2 \times (31 \times 69 + 12 \times 88) / (19)^2 \\ &= 7.84 \times 2139 + 1056 / 361 \\ &= 7.84 \times 8.85 \\ &= 69.38 \text{ [We are taking total 70 in each group]} \end{aligned}$$

A detailed history was taken for the study population according to the preset questionnaire. The purpose of study was explained to the parents and a written consent obtained. The study population were assigned randomly to either the intervention [Quick-Wee method] with gentle suprapubic cutaneous stimulation by gauze soaked in cold water for five minutes or usual midstream urine collection without stimulation [Standard method]. Sealed Opaque envelopes concealing the allocation, of individual study packs, were used to assign the intervention. Study packs were kept in a locked study box from which they could only be taken sequentially.

Sterile autoclaved dressing set containing forcep and gauze was used to clean urogenital area for both groups. The urogenital cleaning was performed using 10 ml sterile water ampoules at room temperature. For Quick –Wee group additional suprapubic cutaneous stimulation was done by gauze soaked in 10 ml of cold sterile water ampoule. The cold fluid was stored in a designated study refrigerator with a monitored temperature of 2.8°C. The procedure was carried out within two minutes of removal from the refrigerator to ensure it remained as close as possible to the designated temperature.

Urine samples for both groups were sent for routine microscopic examination and urine culture and sensitivity with colony count. Then primary and secondary outcome was observed. The primary outcome was voiding of urine within 5 minute. Secondary outcome were waiting time for voiding of urine in both groups, successful collection of urine sample, parental satisfaction with the method and contamination rate. The Data was entered using a set Performa and analysis was done using SPSS version 20.A 'p' value < 0.05 was considered significant in all statistical analysis.

RESULTS

Total of 140 cases were analyzed (70 in standard group and 70 in Quick wee group). Basic demographic characteristics of both the groups were similar [Table 1]. Mean age of study population was 7.57 ± 3.09 months in Quick wee group whereas 8.60 ± 2.67 in standard group, similarly mean weight was 7.48 ± 1.96 in Quick wee group and 8.02 ± 1.88 in standard group. Other basic demographic characteristics like length, temperature are similar between both groups. Similarly, inflammatory markers like leukocyte count, neutrophil count, CRP were similar between both the groups [Table 2]. Waiting time for voiding in standard group was 50.45 ± 45.10 minutes compared to 27.86 ± 30.92 minutes in Quick wee group. This difference in waiting time for collection of urine was statistically significant (p value 0.001).

Out of 140 cases, in Quick wee group 60% (42) were male and 40% (28) were female whereas in standard group 57.2% (40) were male and 42.8% (30) were female. [Figure1]

9 (13%) Infants in standard group voided within 5 minutes whereas 61 (87%) did not void within 5 minutes, In Quick wee group 16 (23%) voided within 5 minutes whereas 54 (77%) did not void within 5 minutes [Figure2]. There was 10% increment in Quick wee group compared to standard group, but this difference was not statistically significant evidenced by p value of 0.124.

61 (87.15%) Infants in standard group had successful urine collection whereas in 9 (12.85%) urine collection was

not successful,[figure 3] In Quick wee group 64 (91.4%) had successful urine collection whereas 6 (8.6%) did not have successful urine collection. Both the group had high successful urine collection rate and there was no statistical difference in collection rate (p value 0.418).

In Quick wee group 55 (78.5%) had parental satisfaction compared to 32 (45.7%) in standard group. [Figure 4]This difference between two groups in parental satisfaction was statistical significant with p value of 0.0001.

Similarly, contamination rate was 10 (14.28%) in Quick wee group compared to 7 (10%) in standard group but statistically not significant

DISCUSSION

Invasive urinary samples have lower contamination rates^[7] but it requires equipment and technical expertise to collect urine sample plus it causes pain and distress for infants so this method is not favored by many clinicians,^[8,9,10] and is impractical in outpatient settings.^[11]

Non-invasive methods for urine collection is regarded as practical, easy and acceptable method for urine collection for children who do not require urgent treatment^[6]Urine collection bags are often used^[12,13] but have unacceptably high false positive and contamination rates.^[7,14] The recommended method of urine collection by the UK National Institute for Health and Care Excellence guidelines is Clean catch urine collection^[15] but this involves long waiting time for a nappy free child to void spontaneously. There are multiple methods of urine collection in infants, including vibrating bladder stimulator,^[16] lumbar or bladder stimulation^[17] but efficacy of these methods are still unknown. Suprapubic stimulation with gauze soaked in cold fluid is known as Quick-Wee method of urine collection. This method is noninvasive, collects clean catch urine with shorter waiting time. Waiting time for voiding in clean catch group was 50.45 ± 45.10 minutes compared to 27.86 ± 30.92 minutes in Quick wee group. This difference in waiting time for collection of urine was statistically significant (p value 0.001). 13% Infants in standard group voided within 5 minutes whereas 87% did not void within 5 minutes, In Quick wee group 23% voided within 5 minutes whereas 77% did not void within 5 minutes. There was 10% increment in Quick wee group compared to standard group, The average waiting times for clean catch urine collection was 30-71 minutes as observed by Davies P et.al and Kaufman J et.al ^[16,18]Other study showing effectiveness of Quick wee method was by Herreros et al-^[19] but the study population was limited to neonates. Contamination rate was 10 (14.28%) in Quick wee group which was slightly higher compared to 7 (10%) in standard group in our study. Labrosse et al[20]showed contamination rate of 16%, similar to our study whereas Altuntas N. et al ^[17] and

Tran A et al^[21] showed higher contamination rate of 24% and 38% respectively in Quick wee group. For clean catch urine sample Contamination rates of 5-27% have been reported by different authors.^[7,19,17,22] Contamination solely depends upon the sterile technique applied during collection of urine sample rather than the method.

The suprapubic stimulation by cold, wet gauze is likely to trigger cutaneous voiding reflexes, by parasympathetic detrusor contraction through the exteroceptive somato-bladder reflex mechanism and faster urine voiding ^[23,24,25] Cold thermal stimulation has a risk of cold burns to sensitive skin, especially in infants^[20] however, in the 70 infants in the intervention arm of this study there were no such adverse events and there was high parental and clinician satisfaction associated with stimulation using gauze soaked in cold fluid refrigerated to a temperature of 2.8°C. In our study, Quick wee group 55 (78.5%) had parental satisfaction compared to 32 (45.4%) in clean catch group. This difference between two groups in parental satisfaction was statistically significant as evidenced by p value of 0.0001. Neonates were not included in our study, but younger infants have been shown to be more responsive to stimulation of newborn cutaneous voiding reflexes ^[16, 26] This method could be further evaluated for neonates where urine is being collected for reasons other than investigation of a UTI.

CONCLUSION

Quick-Wee method of urine collection can enhance clean catch urine collection by increasing the speed and success of obtaining urine. This method has slightly higher contamination rate but can be improved with better compliance to sterile technique. The parental and clinician acceptance and satisfaction was also better. It can easily be incorporated into urine collection methods in clinical practice where non-invasive collection is indicated. Where appropriate this method alleviates pain and distress associated with catheter and suprapubic aspiration procedures. The Quick-Wee method requires minimal resources and is a simple way to trigger faster voiding for clean catch urine from infants in the acute care setting.

List of abbreviations

UTI: urinary tract infection

AAP: American Academy of Pediatrics

SPSS: statistical package for social sciences/statistical product and service solutions

IRB : Institutional review board

Conflict of Interest; None

Author Contributions:

1. Kalpana Karmacharya Malla – study concept, Study design, supervise data collection, drafting and writing of manuscript, material support study supervision
2. Dr. Sandip Kumar Singh – Analysis and interpretation of data, statistical analysis, Drafting of manuscript writing, critical revision of the manuscript
3. Dr. Brajesh raj Chaudhary – drafting of manuscript writing and critical revision of the manuscript for important intellectual content
4. Dr. Nabal Kishore Ray – Acquisition of data, data entries for statistical analysis, literature review for manuscript writing
5. Dr. Shivani Singh -Collection of data, literature review for manuscript writing, critical review of the manuscript

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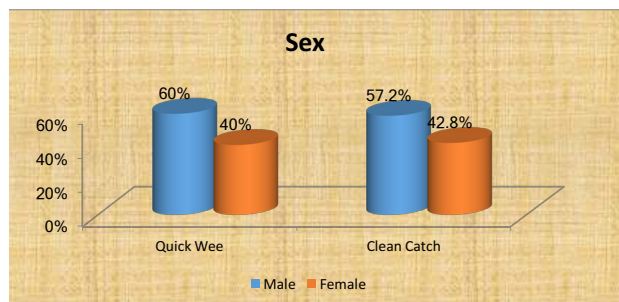


Figure 1: Showing gender comparison between two groups

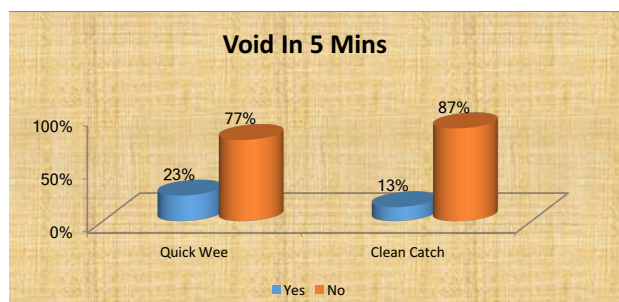


Figure 2: Showing voiding within 5 minutes comparison between two groups

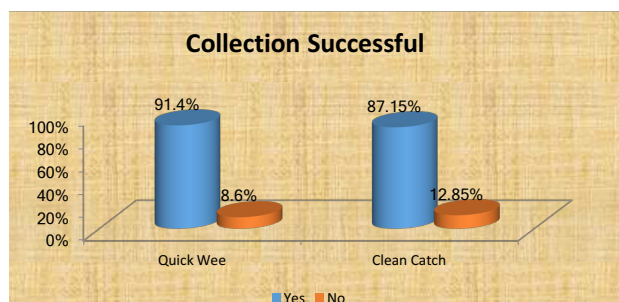


Figure 3: Showing comparison of successful urine collection between two groups

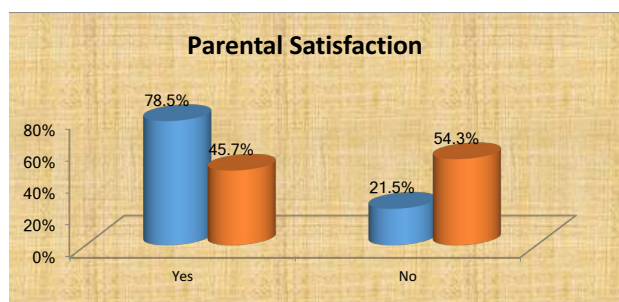


Figure 4: Showing Parental satisfaction comparison between two groups

Table 1: Showing comparison of Baseline characteristics between two groups

Groups		Mean	Std. Deviation	P Value
Age In Months	Quick Wee	7.57	3.09	.037
	Standard	8.60	2.67	

Weight	Quick Wee	7.48	1.96	.095
	Standard	8.02	1.88	
Length	Quick Wee	65.92	6.30	.017
	Standard	68.35	5.55	
Temperature	Quick Wee	99.46	1.40	.178
	Standard	99.78	1.38	
Waiting Time	Quick Wee	27.86	30.92	.001
	Standard	50.45	45.10	

Table 2: Showing comparison of lab parameters between two groups

Groups		Mean	Std. Deviation	P Value
TLC	Quick Wee	14669.01	6794.63	.898
	Standard	14528.99	6017.31	
Neutrophil	Quick Wee	55.27	18.18	.700
	Standard	54.07	18.45	
Lymphocyte	Quick Wee	41.68	18.09	.931
	Standard	41.94	18.17	
HB	Quick Wee	9.64	1.58	.547
	Standard	9.79	1.38	
CRP	Quick Wee	15.49	18.90	.580
	Standard	17.28	19.14	