

Review Article

Bidet Toilet Use May Cause Anal Symptoms and Nosocomial Infection

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Abstract

Electric bidet toilets are widely used in Japan and are sanitary devices, that are integral to daily life. Approximately, half of the population washed the anus before or after defecation. Cleaning the anus after defecation using the bidets contributes to hand hygiene and local comfort, and it may be effective against constipation. However, excessive bidet use potentially causes anal pruritus and anal incontinence (AI). Physicians are advised to instruct patients with anal pruritus to avoid excessive cleaning of the anus and those with AI to discontinue bidet use. For the estimation of the inherent severity of AI, physicians should instruct a bidet user with AI to discontinue bidet use and assess the severity of AI later. Additionally, the nozzle surface and splay water of bidet toilets may be contaminated with fecal indicator bacteria, such as *Escherichia coli* and *Pseudomonas aeruginosa*, as well as antimicrobial-resistant bacteria, rendering them a potential vehicle for cross-infection. In the hospital setting, compromised patients must be cautious regarding the shared use of bidet toilets to prevent infection by antimicrobial-resistant bacteria. Specifically, they should be provided with bidet toilets exclusive for them or may need to be instructed to not use a bidet.

Keywords

bidet toilet, anal pruritus, anal incontinence, bacterial contamination

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Introduction

Electric bidet toilets are automatic devices that deliver a jet of water to clean the anus after defecation. Ever since their introduction to the Japanese market in 1967, Japanese-manufactured electric bidet toilets have steadily gained popularity. According to the Cabinet Office's Consumer Trend Survey[1], the diffusion rate of bidet toilets in households was 80.2% in March 2020, and the number of these units owned per 100 households was 114.5, which is more than one per household (Figure 1)[2]. Bidets have been developed to incorporate different functions to improve user comfort. Presently, users can select their preferred force, thickness (narrow or wide), and temperature of the water jet. Bidet toilets are installed not only in general households but also in public facilities such as commercial buildings, hotels,

airports, and hospitals, and have emerged as a sanitary device that is integral to daily life in Japan.

Notwithstanding, anal symptoms associated with the inappropriate use of bidet toilets and nosocomial infections caused by using these units have been reported. Thus, physicians are advised to reemphasize the appropriate use of bidet toilets. To the best of our knowledge, there has been no published comprehensive report focusing on issues related to bidet toilet use. In this review, we describe the advantages, current status, and issues regarding the use of bidet toilets.

No approval from any IRB was required because this review article was based on previously published papers.

Advantages of Using Bidet Toilets

One advantage of bidet use is that it contributes to hand

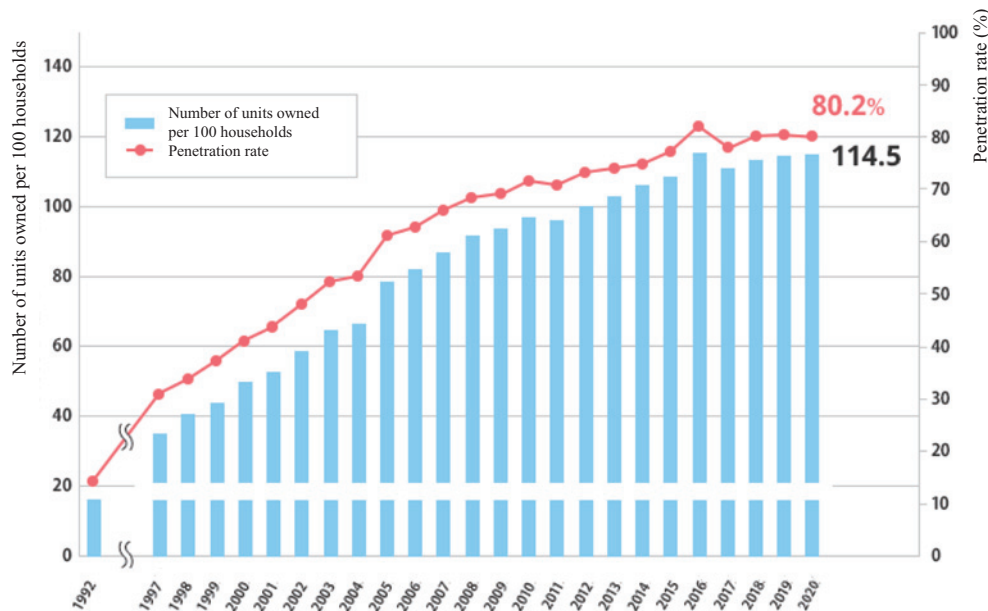


Figure 1. Household penetration rate of electric bidet toilets and the number of these units owned.

hygiene. Oie et al.[3] conducted a simulation experiment to examine hand contamination from wiping the buttocks after the use and non-use of an electric bidet toilet with splay water. A model of the buttocks was smeared with an artificial liquid stool containing *Serratia marcescens* and wiped by the participants with toilet paper after the use or non-use of the splay water. The number of bacteria adhering to the hand was significantly lower when the splay water was used before wiping the artificial liquid stool. This finding corroborates the effectiveness of splay water in preventing defecation-related hand contamination.

A positive effect on toileting has also been highlighted. When women aged 75 years or older were asked to use bidet toilets in a nursing home, approximately 50% of them reported a sense of comfort and cleanliness after defecation[4]. The usefulness of bidet use against constipation or defecation difficulties has also been reported. Uchikawa et al.[5] discovered that the use of bidets induced defecation in 15/20 (75%) patients with spinal cord injury. In a study by Shigematsu et al.[6] of 18 patients who had undergone hysterectomy, 15 (83%) of the patients reported smooth bowel movement during the postoperative period when using the bidet toilets. In a study of pregnant women in Turkey, the group that washed their anus before defecation reported a significant improvement in constipation scores compared with the control group, despite not using electric bidet toilets[7].

Regarding the anorectal physiological benefits, Ryoo et al.[8] found that bidet use at low or medium water jet pressure, at a warm temperature, and with a wide-type water jet potentially reduce anal pressure with an effect resembling

that of a warm sitz bath. The authors suggested that the effect of relaxing anal sphincter pressure may be beneficial to patients with elevated anal pressures due to anorectal diseases, such as an anal fissure or hemorrhoids, and during postoperative periods after surgery for anal diseases. Watanabe et al.[9] reported that bidet use at a warm temperature for 10 min increased blood flow in the submucosa of the anus, which potentially contributes to postoperative wound healing.

Current Use of Bidet Toilets

Previously, we conducted a survey of electric bidet use among Japanese community-dwelling residents and found that 55% (2,724/4,952) of the respondents washed the anus either before or after defecation[10]. Additionally, at least 30% (828/2,724) of bidet users washed before defecation, and 70% of the respondents reported “Because it aids defecation by stimulating the anus with a jet of water,” and 20% reported “Because it aids defecation like an enema when water penetrates the rectum.” In a survey of bidet use in 575 outpatients conducted by Yano et al.[11], 349 (61%) washed the anus at every defecation and 75 (13%) did so occasionally. Among the 424 bidet users, 392 (93%) reported that this was for anal cleanliness and 111 (26%) reported that this eased defecation. In a survey of college students, 34% (47/139) of the female students and 44% (43/98) of their male counterparts reported using the washing function of bidet toilets[12]. Overall, approximately half of the population washed the anus before or after defecation.

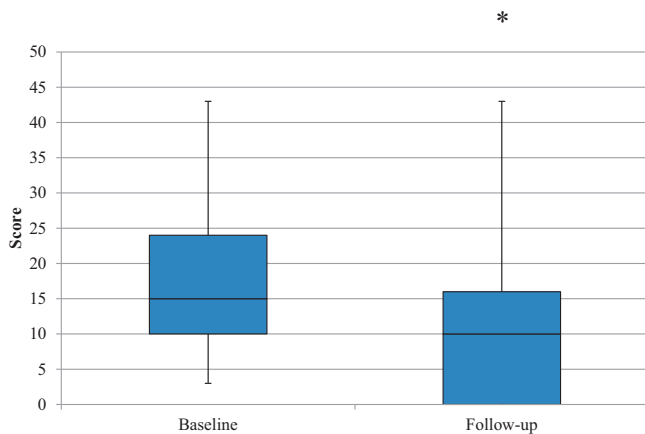


Figure 2. Fecal incontinence severity index scores at the baseline and follow-up. Boxes show median values with upper and lower quartiles. The vertical line extends from the minimum to the maximum values. * $P < 0.0001$ versus the baseline (the Mann-Whitney U -test).

Bidet Toilet Use and Anal Symptoms

1) Anal pruritus

Excessive bidet use may cause itching of the anus[13]. Kurokawa et al.[14] reported that perianal dermatitis found in 932/3,541 (26%) patients was due to excessive bidet use. In our surveillance, the incidence of respondents who complained of anal pruritus was 14% (345/2,449), and multivariate analysis of the risk factors showed that the correlates for anal itching included the active use of bidet toilets, such as washing before defecation, and using relatively warm water for washing the anus[10]. The pathophysiology underlying anal pruritus is the shedding of sebum around the anus due to excessive bidet toilet use, leading to skin dryness[13].

2) Anal incontinence

In our surveillance, 6% (156/2,534) of the respondents experienced fecal incontinence at least once a month after using bidets[10]. In another study that investigated the relationship between AI (defined as incontinence to gas, mucus, or feces) and bidet use, 49 patients with AI who had habitually used bidets were asked to discontinue bidet use for a median of 4 weeks. Consequently, both the AI score (Figure 2) and the frequency of fecal incontinence were significantly lower at follow-up than at baseline[15]. Although the causes of AI are multifactorial, it is possible that when patients wash the anus using a bidet, water may penetrate the rectum, especially in those with a lax anal sphincter. Enemas induce the defecation reflex and increase bowel peristalsis with water streaming into the rectum, thereby resulting in post-defecation AI symptoms.

3) Anal fissure

A previous study reported 10 cases of anterior fissures due to bidet toilet use for 1-5 min[16]. The author speculated that the stronger water pressure of the bidet use with a longer duration may be the causative factor of the anterior fissure.

Bidet Toilet Use and Bacterial Contamination

Outbreaks of resistant bacteria have been reported to be due to the contamination of the cleaning nozzles of bidet toilets in hospitals[17-19]. In each case, the outbreaks were reportedly due to bidet use by patients in the hematology department, and it is speculated that antimicrobial-resistant bacteria attached to the nozzles spread to other patients through the splay water. According to the outbreak of drug-resistant bacteria in the hematology unit, *Enterobacter cloacae* producing metallo- β -lactamase (MBL) infection was found in 16 (5 males and 11 females) patients[17] and *Pseudomonas aeruginosa* producing MBL infection was found in 24 (18 males and 6 females) patients[18].

Iyo et al.[20] investigated the actual status of bacterial contamination of water storage-type bidet toilets installed on university campuses and found that *Escherichia coli* and *Pseudomonas aeruginosa* were detected at frequencies of 2.4% (3/127) and 1.6% (2/127), respectively, in the splay water. It is inferred that fecal indicator bacteria attached to the nozzle surface and around the water discharge hole were mixed with the splay water and detected. The heterotrophic bacteria in the splay water proliferated significantly more than those in the tap water. This might have been because the heterotrophic bacteria in the tap water proliferated in the water storage tank and nozzle piping as the residual chlorine concentration decreased because of heating of the water storage tank[20,21]. We have also reported similar findings regarding the remarkable growth of heterotrophic bacteria in the splay water of bidet toilets[22].

Regarding the detection of antimicrobial-resistant bacteria recovered from water storage-type bidet toilets, a survey of 292 toilets installed at a university hospital in Japan detected methicillin-resistant *Staphylococcus aureus* and extended-spectrum β -lactamase (ESBL)-producing *E. coli* contamination on the nozzle surface[23]. We also conducted a similar study on 192 water storage-type bidet toilets installed in a district hospital and found that *E. coli* was detected in five (2.6%) of the nozzle surfaces and in the splay water of four (2.1%) of the bidet toilets, and ESBL-producing *E. coli* was recovered in one sample each (Table 1)[22].

Guidance

Excessive anal washing with bidets is considered the pri-

Table 1 Number of Toilets Sampled That Were Positive for *Enterobacteriaceae* and *Pseudomonas* Spp.

Authors	No. of toilets sampled	Isolates	Isolated from	
			Nozzle surface	Splay water
Iyo et al. [20]	127	<i>E. coli</i>	-	3 (2.4%)
		<i>Enterococcus</i> spp.	-	4 (3.1%)
		<i>Pseudomonas</i> spp.	-	2 (1.6%)
Kanayama Katsuse et al. [23]	292	<i>E. coli</i>	34 (11.6%) (1: ESBL producer)	-
		<i>Enterococcus</i> spp.	58 (19.9%)	-
		<i>Klebsiella</i> spp.	12 (4.1%)	-
		<i>Citrobacter</i> spp.	3 (1.0%) (1: ESBL-producing <i>C. koseri</i>)	-
		<i>Pseudomonas aeruginosa</i>	6 (2.1%)	-
Tsunoda et al. [22]	192	<i>E. coli</i>	5 (2.6%) (1: ESBL producer)	4 (2.1%) (1: ESBL producer)
		<i>Enterococcus</i> spp.	7 (3.6%) (1: <i>E. faecalis</i>)	0 (0%)
		<i>Klebsiella</i> spp.	1 (0.5%) (1: <i>K. pneumoniae</i>)	2 (1.0%) (2: <i>K. oxytoca</i>)
		<i>Pseudomonas</i> spp.	0 (0%)	0 (0%)

mary cause of anal symptoms. Sasaki et al.[13] discouraged excessive anal washing and the use of topical steroids for anal pruritus and reported that 94 patients with the disease were treated according to the treatment plan, and all (100%) recovered successfully. This treatment plan is quite reasonable. In the present writer's clinic, anal cleaning is specifically restricted to less than 5 s with weak water pressure and a wide water jet, because a strong water pressure or a thin water jet may feel harder and more stimulating at the anus. Patients with AI are instructed to discontinue washing to prevent the splay water from penetrating the rectum. Conversely, when researchers estimate the severity of AI using the AI score, they should check whether a patient with AI is a bidet user or not. If the patient uses a bidet, instead of treating AI immediately, the patient should be instructed to discontinue bidet use for a certain period of time and the severity of AI should be assessed again later.

To prevent infection by antimicrobial-resistant bacteria, not only patients with hematological malignancies but also compromised hosts, such as patients with severe inflammatory bowel disease, terminal cancer, and those receiving hemodialysis, must be cautious in the shared use of bidet toilets. Specifically, they should be provided with bidet toilets exclusive for them or may need to be instructed to not to use a bidet. Additionally, the appropriate cleaning method for bidet toilets, including the nozzle or the service life of these units, must be considered. Recently, an on-demand type of bidet toilet with a nozzle cleaning mechanism that uses electrolyzed hypochlorite water, has been devised to replace the water storage-type bidet toilets; however, in the nozzle-contamination test, *E. coli* in the splay water was sterilized, whereas *P. aeruginosa* was not completely sterilized[24].

Conclusion

The current status and issues regarding the use of bidet toilets were reviewed. The bidet toilet is the most widely used toilet in Japan, and approximately half the population washes the anus before or after defecation. Excessive bidet use should be considered an etiologic factor in patients undergoing a medical examination for anal pruritus or AI. In the hospital setting, compromised patients should be cautious regarding the shared use of bidet toilets to prevent infection by antimicrobial-resistant bacteria. Further studies are required to confirm the issues surrounding bidet toilet use.

Coronavirus disease 2019 has been prevalent since 2020, and the novel severe acute respiratory syndrome coronavirus 2 has reportedly been detected in the stool or urine of patients affected by this disease[25]. Consequently, the cleaning of bidet toilets (including the nozzles) that are installed in hospital rooms dedicated to this disease must be prioritized.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Akira Tsunoda: the design of the research, acquisition of data, analysis and interpretation of data, drafting of the article, and final approval of the version to be published.

Approval by Institutional Review Board (IRB)

No approval from any IRB was required because this review article was based on previously published papers.

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