Editorial

Int Neurourol J 2023;27(3):157-158
https://doi.org/10.5213/inj.2323edi04
pISSN 2093-4777 · eISSN 2093-6931

INTERNATIONAL NEUROUROLOGY JOURNAL
INJ
OPEN ACCESS

Stress, Anxiety, and Urine: The Evolutionary Tactics to Survival and How We Became Anxious in Public Restrooms

Jin Wook Kim[1,2]

[1]Department of Medical Informatics, Chung-Ang University, Seoul, Korea
[2]Department of Urology, Chung-Ang University Gwang-Myeong Hospital, Gwangmyeong, Korea

Corresponding author: Jin Wook Kim https://orcid.org/0000-0003-4157-9365
Email: jinwook@cau.ac.kr

The act of voiding is intricately related to a specific behavioral pattern. What, then, is the behavioral voiding pattern of human beings, and how does this translate into a clinical picture? What does this tell us about the origins of human voiding behavior?

Pet owners are keen to the behavioral characteristics of other animals. Well known is the fact that felines actively seek to cover their excrements in sand. Less known is how canines seek places to urinate or defecate far from their habitual sleeping and eating locales.

Despite being an appendage of very recent evolutionary development, the functional control of the urinary bladder, i.e., voiding behavior of mammals are distinct from other vertebrae. As pointed out by P.J. Bentley in 1979, grossly piscine and tetrapodal urinary bladders differ in evolutionary origin entirely, displaying different electrophysiological properties on the outset [1]. The piscine bladder showing qualities of low electrophysiological potential, similar to gall bladders and other less muscular cul-de-sacs. Furthermore, tetrapodal urinary bladders further diversify in characteristic, as amphibian and reptilian urinary bladders share with the kidney additional regulatory functionality in terms of fluid resorption; this function is entirely lost in mammals, as mammalians have become capable of hyperosmolar condensation of urine within the kidneys itself. To relegate fluid reabsorption activity in the bladder would be unnecessary distribution in terms of central cohesive control, and thus, extraneous and wasteful in terms of evolutionary economy.

Thus, behavioral patterns in mammals in utilizing their urinary bladder, i.e., voiding, is a recent and intrinsically behavioral activity associated closely with the connection between higher and lower neurological functions, viz a viz, the limbic system [2,3]. This may express itself from simple mental conditions such as anxiety, stress, or in more urological terms, urgency [4]. This may also be expressed in higher mental functions, such as seeking behavior for voiding locations, seeking isolation to void, eliciting high stress in crowded areas when containing urine, and, of course, sensitivity to the sound of running water [5].

The implications of human voiding behaviors such as avoiding crowds, seeking isolation and the proximity to water, especially fresh running water, as well as feline or canine voiding behaviors are highly suggestive of prey-predator behavior. Biochemically, the central aspect of urine is to process nitrogen, which, no matter how a species evolve the process into less pungent forms such as uric acid or urea, inevitably gives off some portion of its byproduct as ammonia, a widely diffusing gas which can be detrimental to prey and predator alike [6]. Hence, the function of the urinary bladder became a weapon and shield for survival itself. Storage of urine became a tool to disguise movement by creating a discontinuous trail by containing and depositing urine with cognitive control, avoiding creating a scent entirely by utilizing fresh flowing water, allowing either prey or predator the element of strategy.

By avoiding the inevitable fate of animals continuously exuding a whiff of ammonia, the urinary bladder allows masking the presence of the prey from the predator, or conversely, hiding the approach of the predator from the prey. Thus it shows traits essential to survival benefit; It is highly regulating of behavior [2,4,5] and sensitively dependent on energy regulation states [7]. Only by understanding such clinical implications, can we be able to diffuse the modern distortion of survival anxiety that is now represented irrationally in the modern human as urgency.

• **Conflict of Interest:** No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Bentley P. The vertebrate urinary bladder: osmoregulatory and other uses. Yale J Biol Med 1979;52:563-8.
2. Schott B, Choksi D, Tran K, Karmonik C, Salazar B, Boone T, et al. Is the brainstem activation different between healthy young male and female volunteers at initiation of voiding? A high definition 7-Tesla magnetic resonance imaging study. Int Neurourol J 2023; 27:174-81.
3. Kim JW, Kim SJ, Park JM, Na YG, Kim KH. Past, present, and future in the study of neural control of the lower urinary tract. Int Neurourol J 2020;24:191-9.
4. Lin CC, Kuo HC, Li JR, Chuang YC. Comparative study between behavior therapy and behavior therapy plus mirabegron 50 mg in sexually active men with bothersome overactive bladder symptoms – a multicenter, randomized study. Int Neurourol J 2023;27:182-91.
5. Çulha Y, Ak ES, Çulha MG. The effect of running water sound listened to patients during urodynamics on anxiety and urodynamic parameters. Int Neurourol J 2023;27:217-23.
6. McCarthy M, McCarthy L. The evolution of the urinary bladder as a storage organ: scent trails and selective pressure of the first land animals in a computational simulation. SN Appl Sci 2019;1:1727.
7. Kim JH, Yang HJ, Lee HJ, Song YS. Differentially expressed mRNA in streptozotocin-induced diabetic bladder using RNA sequencing analysis. Int Neurourol J 2023;27:159-66.