

## A Study on Sound for Promoting Urination

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**Abstract:** In this study, we have studied how to improve symptoms by using sound for delayed urination, one of theurination disorders. Research has been carried out to prove that the urine flow is in line with the flow of water and that the urine flow improves urination by drawing the synchronized phenomenon. As a research method, we studied the contents related to urination as a symptom study and the study of sound for promoting of urination as a solution. Regarding the contents related to urination, we investigated the process of urination, the cause of delayed urination and abnormal urination. In order to investigate the sound for promoting of urination, waves, rivers, waterfalls, valleys, streams, tap water were also prepared to analyze the sound of water, and the brain waves and MOS test of the listener were also conducted. As a result, it was found that the acoustic characteristics of water sound and the sound characteristics of sound produced during urination are common. In addition, through the MOS (Mean Opinion Score) test of the listeners, it was found that the water sounds most similar to the urine generated during vigorous urine drainage helped urination and other water sounds also had a positive effect.

**Key words:** Delayed urination, urination disorders, synchronized phenomenon, sound of water, promoting of urination, urination

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### INTRODUCTION

When asked about the scale of health, someone says satirically “eat well and excrete well.” I think it is a very good expression. It is not so easy in modern society to eat well and excrete. Among them, those who have not been able to excrete cannot understand the suffering. Constipation makes bowel movements to cause bowel syndrome and urinary tract infiltration of urine into the kidneys weakens kidney function. If these symptoms worsen, complications may develop and develop into serious illness that cannot be treated. Conversely, first the colon or kidney function becomes poor and sometimes it becomes constipation or dysuria. It is important to eat well but it is also very important to excrete well. Especially, in middle age, males and females start to have abnormal diseases in the circulatory system. Obesity due to lack of exercise and overeating based on aging causes many diseases such as diabetes and hyperlipidemia, angina, heart and kidney disease and internal diseases. In addition, drinking and smoking to resolve stress can lead to hypertension and lung disease. Among them, there are nasty illnesses that come to adult men. More than 10% of Korean men aged 50 or older suffer from prostate enlargement. Among the symptoms of hypertrophy of the prostate, delayed urination is a symptom easily seen in our surroundings. In this study, we conducted a study using the sound to solve the delayed urination disorder which can not discharge urine smoothly due to various

complications. Among them, we studied mainly the sound of flowing water because the principle of urination is related to the flow of water. The idea comes from the fact that the men’s urinal water washers seem to promote urination or that patients with delayed urination of women may urinate urine while lowering the water in the toilet. I analyzed the urination process in order to investigate the relation between the delay of urination and the sound of water and it was checked about the delayed urination symptom. In addition, the effect of water noise on the stimulation of urination was investigated through MOS test and acoustical analysis (Kim, 2010; Ku *et al.*, 2002).

### MATERIALS AND METHODS

**The process of urination:** Normal urination is accomplished by the brain and spinal cord regulating the muscles of the bladder and urethra through the neural network and faithfully performing the functions of the lower urinary tract such as storing and discharging the urine. In particular, the kidneys are located on the upper side of the back of the pancreas which extracts waste from blood and water in the body to produce urine. The shape of the kidney is called bean and red bean because it looks like bean and red bean. It is 10~15 cm in length, 5~6 cm in width, 2.5~3 cm in thickness and 120~190 g in one kidney. Children are fists kidneys play a pivotal role in endocrine function such as contributing to

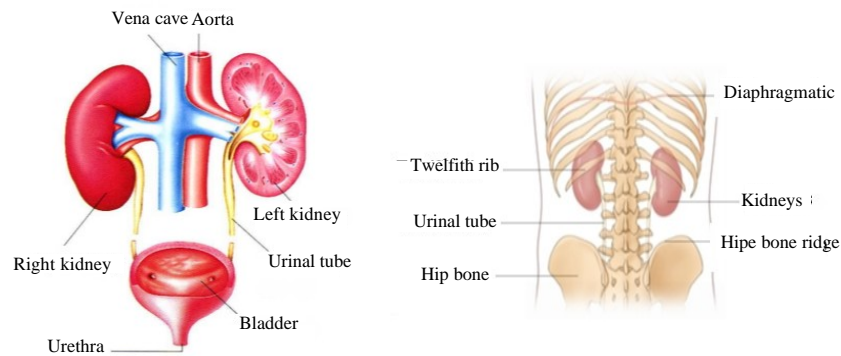


Fig. 1: Structure and location of kidney; a) Surrounding structure of kidney and b) Location of kidney

the metabolism and hormonal regulation of the human body by producing urine and maintaining water and blood pressure. When the urine that is mixed with the waste water collected in the kidneys collects in the bladder through the digestive tract, the sensory nerves in the bladder sense the amount of urine and reflexively urinate (Fig. 1).

Normally, a normal person who passes the infant may be able to tolerate urine by controlling the sphincter of the urethra through the cerebrum, even if the sensory nerve receives the urge to urinate. However, a person with abnormal urination of the urinary tract does not start from the cerebral delivery procedure of the sensory nerve or even if the cerebral transmission is done, the urethra sphincter does not function and sometimes makes a mistake. On the other hand, the sensory nerves are so sensitive that the urine does not collect in the bladder but there are also signs that urge urination on the cerebrum continues to come and go to the bathroom frequently. Also because the urethra sphincter is too tightly controlled in the cerebrum, urination may not occur even if the bladder is full of urine. Normal people can tolerate urine for about 4~6 h through this process and urinate about 300 cc (Yang, 2006).

**Symptoms and treatment of delayed urination:** A delay in urination is a phenomenon that takes a long time to actually urinate after trying to urinate. Delay in urination is one of the symptoms of lower urinary tract obstruction due to enlarged prostate or urethral stricture. When the prostate enlargement progresses, the posterior urethra and the bladder neck are pressed and the tension of the nerve that governs the prostate becomes higher and the resistance of the urethra during urination increases. At that time, it takes a long time for the urinary muscle to shrink more strongly in order to overcome this resistance and actually urinate. In other words, when urination needs

urination but urine is difficult to evacuate, men are caused because the prostate pushes the urinary tract and women have symptoms of narrowing the entrance of the urethra. Treatment of delay of urination includes both medication and laser treatment and surgery. Another symptom of delayed micturition is the psychological impact of being unable to urinate when there is a person next to him or traveling to another area. The cause is psychological stress or tension. The symptoms of delayed urination are symptoms when urination is attempted only after a few seconds have elapsed or when urination is not possible at all. Symptoms related to this are urinary frequency symptoms, residual urinary symptoms and nighttime frequent urination. Prevention methods for delayed urination and various urinary symptoms are to refrain from drinking and smoking to reduce fatty foods or instant intake and to exercise regularly (Lee and Moon, 2014; Lee and Seong, 2006).

**Study on sound for promoting of urination:** The belief that water sounds improves urination is that when the sound of water is delivered to the brain through the hearing of the human body, it means that the accumulated flow has been accumulated in the meantime, thus, helping urination. I was able to verify the possibility of the study through the experience that the water in the urinal or the toilet on the left side helped urge urination. Based on such a possibility, we conducted a study on how water helps to stimulate urination. To study sounds for stimulation of urination, we studied sounds with individual characteristics ranging from water-related sounds such as waves, rivers, waterfalls, valleys and even tap water. We analyzed the response of the listener who heard and felt the sound of the water by the moss test measurement and compared with the sound of the highest score in the MOS test by the acoustic analysis. The reason why we tried the acoustic frequency analysis by

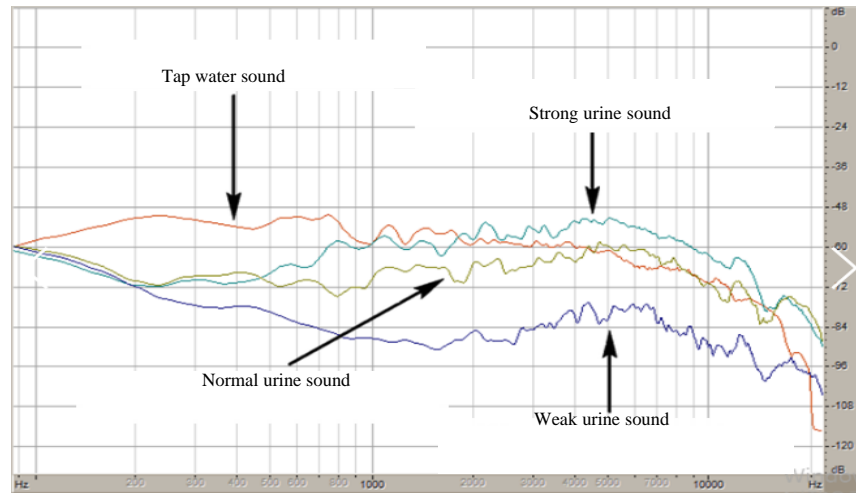


Fig. 2: Comparison of frequency of tap water and three urine sounds

Table 1: MOS test on water-related sounds and listener's desire for urine

Sound of water\listeners	A	B	C	D	E	EVE
Ocen wave	3	2	3	4	3	3.0
River	2	3	2	1	2	2.0
Waterfall	4	4	4	3	5	4.0
Valley water	3	2	2	2	3	2.4
Stream	5	4	3	3	3	3.6
Tap water	4	4	5	4	4	4.2

Meaning of score: Desire for urine high score is 5

dividing the sound of the highest score in the MOS test and the sound of urination during the urination was to investigate the correlation between the sound of urine and the sound of water during the smooth urination (Chan-Jung and Myung-Jin, 2007).

#### MOS test with listening to water related sounds:

Water-related sounds were prepared by ocan wave, river, waterfall, valley water, stream, tap water, etc. and five people were asked to score the degree of need for urination. The highest score is 5 points which means that the urination is the greatest and the lowest score is 0 point which is not related to urge urination. As a result of the MOS test, the tap water sounded surprisingly the highest score. The sound of tap water is most likely to be heard around us and the sound itself is most similar to the sound of urination. Next, the waterfall sound score is high, probably because the dropping sound from the top down is similar to the action of the urine. Next is followed by streams, waves, valleys and rivers (Table 1).

#### Listening to the selected water sounds and comparing the frequency of improved urination sounds:

The MOS test showed the highest score for tap water as a result of selecting a water louse to help urination. The reason why the tap water sounded the highest score for promoting urination is that it is often heard in our surroundings and

is similar to the sound of urination and similar to that of urinal flushing water. If so, it is necessary to check whether the acoustical component of the tap water is somewhat similar to the sound produced during urination. We compared the sound of tap water with that of urination and we analyzed the spectrum of tap water noise. The sound of tap water was prepared for the common tap water used in the MOS test. The sound of urination was divided into three groups: strong urination, normal urination and difficult urination. Figure 2 is a spectrum frequency comparison graph comparing tap water and three urine sounds. As shown in the graph, the weak urine sounds are generally weakly distributed in the frequency energy (Ahn and Bae, 2006, 2017).

It has low power while drawing a downward curve from low frequency to 1500 Hz and shows lower energy than other sounds even in high frequency band over 2000 Hz. Next, the normal urine sounds are generally lower than the strong urination sounds but both of them show high energy from 200 Hz to high frequency direction. This mundane urine and strong urine sound show that the urine function is smooth as the sound itself. Finally, the highest score was selected in the MOS test. When we look at the frequency spectrum graph of tap water sound which should be compared with these three kinds of urine sound, it has energy midway between normal urine sound and strong urine sound from above 1000 Hz and tap water sound is similar to the two sounds.

## RESULTS AND DISCUSSION

As a part of helping urination in people with delayed urination, we studied whether water can promote urination. For the study, we conducted a MOS test by preparing sounds such as waves, rivers, waterfalls,

valleys, streams and tap water. In MOS test, we selected the most frequent urge to urinate. The highest score in the MOS test was compared to three different urine sounds and frequency spectrum graphs. Experimental results showed that the tap water sound was the highest score in MOS test. In the frequency spectrum comparison graph, it was confirmed that the tap water sound has similarity with the strong urine sound frequency and the normal urine sound frequency. The results of this study show that tap water sounds similar to the sound when urination is smooth, so that, it is possible to delay urination by listening to the sound which activates the brain's central nervous system through hearing to promote urination (Bae *et al.*, 2013).

### CONCLUSION

We have studied the effect of water on the urination by preparing a variety of water sounds based on the findings of the men around the urinal washer and the wastes that help the urination. Water sounds, waterfall, stream, waves, valleys, rivers, tap water sound, etc. were prepared but the sound of tap water surprisingly proved to be the most helpful in promoting urination. The reason for this is that the tap water is the most similar to the feeling that the urine is urinating vigorously and it is also because it is the most friendly and often heard around us. Based on the results of this study, it was concluded that it would be very helpful to prepare the sound of tap water to improve the urination and then to provide the prepared sound effect to the urinal or the left side of the urinal to urinate while urinating. In addition, waterfalls, water, waves, valleys and the sound of water in the water are different but it helps to urinate. From these results, it can be deduced that the presence of water in the urine is more effective than the absence of water. We can see that the impact of sound on the human body is mysterious. In the future, studies on the healing, treatment and health realization of the human body using sound should be continued and in depth studies are needed (Bae and Bae, 2017; Ik-Soo *et al.*, 2018; Bae and Kim, 2013).

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