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**Review Article**


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## A REVIEW ON WATER RETENTION

Srishti Upadhyay\*, Saumya Shrivastava, Deepak Kumar, Saurav

Chaturvedi, Surya Pratap Singh, M.P. Khinchi

Department of Pharmacology, Kota College of Pharmacy, Kota, Rajasthan, India.

### ABSTRACT

This review attempts to provide some sense of our current knowledge of water including overall patterns of intake and some factors linked with intake, the complex mechanisms behind water homeostasis, the effects of variation in water intake on health and energy intake, weight, and human performance and functioning. Water represents a critical nutrient whose absence will be lethal within days. Water's importance for prevention of nutrition-related noncommunicable diseases has emerged more recently because of the shift toward large proportions of fluids coming from caloric beverages. Nevertheless, there are major gaps in knowledge related to measurement of total fluid intake, hydration status at the population level, and few longer-term systematic interventions and no published random-controlled longer-term trials. We suggest some ways to examine water requirements as a means to encouraging more dialogue on this important topic.

**Keywords:** water, hydration, water intake, water measurement, recommended daily intake, water adequacy

### INTRODUCTION

Water retention, also known as fluid retention refers to an excessive build up of fluid in the circulatory system, body tissues, or cavities in the body. Up to 70% of the human body consists of water - water exists both inside and outside our body's cells. Blood is mostly made up of water, as are our organs and muscles. A complex system of hormones and prostaglandins (hormone-like substances) is used by the human body to regulate water levels. This means that excess water intake can be resolved by the kidneys quickly excreting the excess fluid in the form of urine. Likewise, reduced hydration on another day can result in a decreased urine output than usual.

- Up to 70% of our body is water:
- Muscle is made up of approximately 75% water
- Fat consists of about 50% water
- Bones are made up of about 50% water.

There are at least seven causes of water retention. Most cases of water retention are due to 'idiopathic oedema (edema)' which simply means that the water retention is not being caused by a specific disease. In most cases the cause is reversible by changing what you eat and how you exercise. Read the sections below to see what kind of water retention you have.

#### Weak circulation in the leg veins

This is probably one of the most common causes of water retention in legs and ankles. This occurs in pregnancy and causes swellings like those shown in the video. In older people this problem may also result in varicose veins.

#### Blockage or congestion of the lymphatic system

This can cause a type of water retention known as lymphoedema (lymphedema), which is common after some types of surgery, for instance. People who spend a lot of time immobile, e.g. those in hospital beds, wheelchairs, or on longhaul flights, even 'couch potatoes' can develop water retention

*Corresponding author:*

*Srishti Upadhyay\**

*Kota College of Pharmacy, Kota, Rajasthan*

*E mail: [vamikashri@gmail.com](mailto:vamikashri@gmail.com)*

*Mobile. - 8769975107*

because without regular movement, it is difficult for your lymphatic system to drain excess fluid out of your tissues.

### **Premenstrual water retention**

This is also common, and is caused by the hormonal changes of the menstrual cycle. Nutritional deficiencies caused by consuming too many of the wrong foods and drinks will make this problem worse.

### **Salt**

One of the main causes of water retention is eating too much salty food. The main component of salt is sodium, which the body dilutes with water if too much of it is present. Salt makes you thirsty, and your body will hold on to this water. Reducing the amount of salt in your diet will help you to release a little water retention but not usually more than about 2 lbs in weight. Even a relatively salty diet, although it can be harmful in many ways, will not normally cause gross water retention.

### **Lesser-known causes of water retention Hormones and Medicines**

High levels of certain hormones can also make your body hold on to water. These include insulin, which is needed to process sugar; cortisone, which is produced when you are under stress; and the female hormones oestrogen (estrogen) and progesterone. The water-retaining effect is caused by the effects which these hormones have on sodium levels in your body, and on the hormones which govern how your kidneys work. Certain prescribed medicines such as the contraceptive pill and some painkillers can be causes of water retention by affecting levels of these hormones. Causes of Water Retention | About Water Retention The Tissue Spaces. The round objects represent cells which receive nutrients from the blood capillary and send wastes to the capillary. Water retention which is caused by hormones can be spread around the body but often affects your tummy most of all. Women can also get water retention in the breasts, which causes breast tenderness and swelling.

### **Wastes and Toxins**

Cellulite, which mostly affects women's thighs, is a form of fat complexed with retained water. Sometimes it holds so much water that it is swollen and painful to the touch. Metabolic wastes and toxins such as pesticides which the body cannot easily release tend to be stored in this fat. It is thought the causes of water retention in cellulite are either irritation and swelling due to these toxins, or results from the body's attempt to dilute them.

### **Low-Calorie Diets**

If you have water retention you are very likely to be overweight. But overweight people tend to go on a low-calorie diet. A low-calorie diet will unfortunately not get rid of water retention – it can actually make it worse, especially if you eat less than 1,200 Calories a day for months or years. This is because you may not have enough protein in your blood to draw excess water out of your tissues. This type of water retention can cause generalized puffiness but if severe can give you a swollen tummy.

### **Waterfall Diet book review on Amazon**

Histamine causes water retention leading to bloating and tummy swelling. If you have ever been stung by an insect or developed an itchy red lump after a mosquito bite, you will be familiar with the effects of histamine. Histamine widens the joints between the cells which line your smallest blood vessels, known as your capillaries. This makes them leak both water and protein into your tissue spaces – the area surrounding the cells of tissues such as flesh, organs and intestines. If the protein cannot be removed from your tissue spaces, it will stay there, attracting water. Poor digestion and taking antibiotics can cause changes in your intestines which lead to a lot of histamine being produced in this area. Sometimes eating yoghurt and probiotics can help to reduce this problem, but if it has been going on for some time these measures may not be effective on their own. Drinking less fluid will not cure water retention. One of the causes of water

retention is dehydration due to not drinking enough water. These causes of water retention often respond to dietary measures.

### **Effect of water on body**

Water is the second most popular beverage in the U.S. after soft drinks. This is a scary stat, since sugary soda is a huge health hazard, upping the risk of obesity, stroke, and other heart problems. However, these dangers can be avoided if people choose to drink water, which doesn't have negative side effects. So help put the sugary stuff to the side and make water the number one drink of choice. The benefits really are endless.

### **Fluid balance**

Roughly 60 percent of the body is made of water. Drinking enough H<sub>2</sub>O maintains the body's fluid balance, which helps transport nutrients in the body, regulate body temperature, digest food, and more.

### **Calorie control**

Forget other diet tricks—drinking water could also help with weight loss. Numerous studies have found a connection between water consumption and losing a few pounds. Water simply helps people feel full, and as a result consume fewer calories.

### **Muscle fuel**

Sweating at the gym causes muscles to lose water. And when the muscles don't have enough water, they get tired. So for extra energy, try drinking water to push through that final set of squats.

### **Clearer skin**

Certain toxins in the body can cause the skin to inflame, which results in clogged pores and acne. While science saying water makes the skin wrinkle free is contradictory, water does flush out these toxins and can reduce the risk of pimples.

### **Kidney function**

Our kidneys process 200 quarts of blood daily, sifting out waste and transporting urine to the bladder. Yet, kidneys need enough fluids to clear away what we don't need in the body.

## **CAUSES**

- Weak circulation in the leg veins
- Blockage or congestion of the lymphatic system
- Premenstrual water retention
- Salt
- Hormones and Medicines
- Wastes and Toxins
- Low-Calorie Diets
- Histamine
- Waterfall Diet
- Heart or kidney problems
- Capillaries

## **PRECAUTION**

### **Eat Less Salt**

Salt is made of sodium and chloride. Sodium binds to water in the body and helps maintain the balance of fluids both inside and outside of cells. If you often eat meals that are high in salt, such as many processed foods, your body may retain water. These foods are actually the biggest dietary source of sodium. The most common advice for reducing water retention is to decrease sodium intake. However, the evidence behind this is mixed. **Bottom Line:** Sodium can bind to water in the body, and decreasing your salt intake may help reduce water retention

### **Increase Your Magnesium Intake**

Magnesium is a very important mineral. In fact, it is involved in more than 300 enzymatic reactions that keep the body functioning. Moreover, increasing your magnesium intake may help reduce water retention.

### **Bottom Line:**

Magnesium has been shown to be effective at reducing water retention, at least for women with premenstrual symptoms.

### **Increase Vitamin B6 Intake**

Vitamin B6 is a group of several related vitamins.

They are important for the formation of red blood cells, and they also serve many other functions in the body.

Vitamin B6 has been shown to reduce water retention in women with premenstrual syndrome. Foods rich in vitamin B6 include bananas, potatoes, walnuts and meat.

**Bottom Line:**

Vitamin B6 may help reduce water retention, especially in women with premenstrual syndrome.

**Eat More Potassium-Rich Foods**

Potassium is a mineral that serves several important functions.

For example, it helps send the electrical signals that keep the body running. It may also benefit heart health.

Potassium appears to help reduce water retention in two ways, by decreasing sodium levels and increasing urine production.

Bananas, avocados and tomatoes are examples of foods that are high in potassium.

**Bottom Line:**

Potassium may reduce water retention by increasing the production of urine and decreasing the amount of sodium in the body.

**Try Taking Dandelion**

Taraxacum officinal is an herb that has been used as a natural diuretic in folk medicine for a long time. Natural diuretics may help reduce water retention by making you pee more often. In one study, 17 volunteers took three doses of dandelion leaf extract over a 24-hour period. They monitored their fluid intake and output during the following days, and reported a significant increase in the amount of urine produced.

Although this was a small study with no control group, the results indicate that dandelion extract may be an effective diuretic.

**Bottom Line:**

Dandelion may help reduce water retention, especially when consumed as a leaf extract.

**Avoid Refined Carbs**

Eating refined carbs leads to rapid spikes in blood sugar and insulin levels.

High insulin levels cause the body to retain more sodium by increasing re-absorption of sodium in the kidneys. This leads to more fluid volume inside the body. Examples of refined carbs include processed sugars and grains, such as table sugar and white flour.

**Bottom Line:**

Eating refined carbs can increase insulin levels in the body. Insulin increases the re-absorption of sodium in the kidneys, leading to increased fluid volume.

Eating refined carbs leads to rapid spikes in blood sugar and insulin levels.

**SYMPTOMS**

**Puffiness, swelling, or a heavy feeling**

Periorbital puffiness, also known as "puffy eyes", or swelling around the eyes, is the appearance of swelling in the tissues around the eyes, called the orbits. It is almost exclusively caused by fluid buildup around the eyes, or periorbital edema.

Swelling caused by fluid retention - excess fluid is trapped in the body's tissues.

Swelling caused by edema commonly occurs in the hands, arms, ankles, legs and feet.

Heavy legs, feeling of swelling and leg pain. A feeling of discomfort in your legs may be a sign of an underlying venous disorder. These symptoms include tired and achy legs.

**Feeling that clothes, shoes, rings, or watches are too tight**

Swelling caused by the abnormal buildup of fluid in the body. The fluid collects under the skin or within spaces inside the body, such as the abdomen or chest. It is most commonly occurs in the feet and legs. It can also occur in the hands, arms, face, chest, and abdomen. Edema may be called by a different name depending on where in the body it is located.

**Decreased flexibility of the joints in the arms and legs, such as the ankles, wrists, and fingers**

It most commonly affects the arms and legs. That is ... It becomes harder to move



anyjoints that are affected. ... Venous insufficiency can cause edema in the feet and ankles, ... Low protein levels in the blood: If there is a lack of the protein albumin in the blood, fluid can leak out of blood vessels more easily.

**Shiny, tight, or stiff skin and may not happen when edema is severe.**

Hardening and thickening of the skin give Scleroderma its name (“hard skin”). There are no ... It is characterized by shiny, tight skin of the fingers.

In some forms of scleroderma, hard, tight skin is the extent of this abnormal process. A connective tissue disease is one that affects tissues such as skin, tendons, and cartilage. The skin may also appear shiny and darkened, with hair loss.

### **Sudden or rapid weight gain**

Fluid retention unexplained rapid weight gain may be the result of fluid retention. Fluid retention, also known as edema, can cause your limbs, hands, feet, face, or abdomen to look swollen. People with heart failure, kidney disease, or those taking certain medications may experience this type of weight gain.

It is also happen in many of other diseases like:-

- Cushing's Syndrome
- Dysthymia
- Pituitary Cancer
- Bipolar Disorder

### **Decreased amount of urine**

Oliguria is the medical term for a decreased output of urine. Oliguria is considered to be a urinary output of less than 400 milliliters, which is less than about 13.5 ounces, over the course of 24 hours. The absence of urine is known as anuria.

### **Weeping of fluid out of the skin**

Weeping leg edema is a medical condition in which pressure builds up in small veins in the leg and water from the blood seeps out of the veins and eventually out the skin. Typically the leg will swell up and eventually a

clear liquid will start to "weep" out of the area that is swelled.

### **TESTS AND DIAGNOSIS**

- Chest X-ray
- Pulse oximetry
- Blood tests
- Electrocardiogram (ECG).
- Echocardiogram.
- Transesophageal echocardiography (TEE).
- Pulmonary artery catheterization.

### **Home treatment for Water Retention**

Water retention usually causes swelling and puffiness in the affected body parts. It may also cause stiff joints, weight change, a bloated feeling, and increased blood pressure and pulse rate.

### **Dandelion**

It is also loaded with potassium, which helps reduce sodium levels in the body. Moreover, being rich in magnesium, it is good for relieving premenstrual bloating.

- Steep one teaspoon of dried dandelion herb in a cup of hot water for about 10 minutes. Strain and drink this tea up to three times a day.
- You can also take dandelion tincture or supplements (500 mg one to three times a day). Before starting any herbal remedy such as dandelion tea, make sure you consult your doctor as it may interfere with certain drugs.



**Fig-7.1 Dandelion**

### **Parsley**

Prepare parsley tea by putting two teaspoons of dried parsley leaves in a cup of boiling

water. Let it steep for 10 minutes. Drink it up to three times a day.

You can also drink a mixture of fresh parsley juice and lemon juice



**Fig-7.2 Parsley**

### Epsom Salt

An Epsom salt bath can help you get rid of water retention and a bloated tummy through reverse osmosis. It draws out excess fluids and toxins from your body. The relaxing bath also soothes sore muscles and calms the nerves.

### Lemon Juice

- Mix two tablespoons of lemon juice in a cup of warm water. You can also sweeten it with honey.
- Drink the solution.
- Continue taking this remedy once daily for a few days or until you see improvement



**Fig: 7.3 Lemon Juice**

### Fennel Seeds



**Fig.7.4 Fennel**

- Put one teaspoon of fennel seeds in a cup of hot water.
- Cover and let it steep for 10 minutes, then strain it.
- Drink this tea three times a day until you see improvement.

### Nettle

Being a natural diuretic, nettle works well to prevent and reduce water retention

- Boil a cup of water mixed with one teaspoon of powdered nettle root.
- Let it steep for about 10 minutes.
- Drink this tea three times a day until you see improvement.



**Fig.7.5 Nettle**

### Treatment by some drugs

Mild edema usually goes away on its own, particularly if you help things along by raising the affected limb higher than your heart.

More severe edema may be treated with drugs that help your body expel excess fluid in the form of urine (diuretics). One of the most common diuretics is furosemide (Lasix).

Long-term management typically focuses on treating the underlying cause of the swelling. If edema occurs as a result of medication use, your doctor may adjust your prescription or check for an alternative medication that doesn't cause edema. Or gives water pill

### Most common side effect of drug treatment

- cut your physique,
- tone your muscle and
- shape your body simply by swallowing an easily available,
- lose weight fast.

### DISCUSSION

The current worldwide epidemic of obesity in adults and children alike has led to the search for compounds that can increase energy expenditure, thereby promoting weight loss. Because thermo genesis is partly regulated by sympathetic activity, substances that interact with the sympathetic nervous system can be considered as potential agents for weight reduction. Sympathomimetic compounds such as ephedrine are effective at increasing thermo genesis, but can have undesirable side effects. Safe, preferably non pharmacological substances that can stimulate thermo genesis without causing side effects are hence preferable. Water can be once such agent Drinking half a liter of water increases activity of the sympathetic nervous system as measured by enhanced plasma nor epinephrine levels and muscle sympathetic nerve activity Recent studies suggest that water drinking elicits acute changes in human physiology. Water drinking profoundly increases blood pressure in patients with autonomic failure. Also, water drinking was shown to increase energy expenditure. The acute changes in cardiovascular regulation and in energy expenditure with water drinking appear to be mediated through activation of the sympathetic nervous system. The acute water pressor response has been exploited in the treatment of patients with impaired orthostatic tolerance showed that the sympathetic activation after water drinking might stimulate thermo genesis and increase resting energy expenditure by 30% within 10 min of drinking the water (peaked at 3040 min) and was sustained for over an hour. The water induced thermo genesis was attributed to sympathetic nervous system activation because ingestion of a beta adrenoreceptor blocker before drinking water almost completely abolished this response. Drinking water that had been heated to 37°C, attenuated the thermogenic response

by 40%; which led to the suggestion that water induced thermo genesis could be partly attributed to the energy cost of warming the water to body temperature. The authors extrapolated that increasing daily water intake by 1.5 L would augment energy expenditure by approximately 200 kJ/d A previous study evaluating the effect of drinking water on the resting energy expenditure (REE) in overweight children demonstrated an increase of up to 25% in REE lasting for over 40 min following drinking of 10 ml/kg of cold water However, the concept of water induced thermo genesis is controversial. Several studies in humans have reported that water drinking has little or no effect on resting energy expenditure Hence, the 30% increase in energy expenditure after water drinking although impressive, is not supported by other published studies. This whole room indirect calorimetry vs ventilated hood or mouthpiece techniques. Ventilated hood and mouthpiece apparatus have a small dead space, thereby permitting rapid attainment of steady state gas concentrations. In contrast, whole room calorimeters may require over an hour to attain steady state conditions because of their large size in relation to ventilation rate and hence is less suitable for acute measurements. The mechanism causing sympathetic activation with water drinking is not fully understood. Studies in tetraplegic patients suggest a spinal mechanism. The nature of the afferent stimulus and the afferent pathway causing activation of efferent sympathetic neurons is unknown. Water temperature, distension of gastrointestinal organs, or changes in osmolarity could also be involved. Water drinking induced cardiovascular and metabolic responses are not solely explained by a thermal stimulus because in autonomic failure patients, drinking colder or warmer water elicited an identical pressor response. In healthy normal weight subjects, approximately 6070% of the water induced thermo genesis could not be attributed to heating of the ingested water. Indeed, drinking 37°C warm water elicited a substantial thermogenic response. Gastric distension increases sympathetic nerve traffic in human subjects. However, gastric distension is not considered as the crucial mechanism for water drinking



induced sympathetic activation. The idea is supported by the observation that water drinking elicits more pronounced cardiovascular responses than drinking the same volume of saline. Also, human magnetic resonance imaging (MRI) studies demonstrated that after 40 min, only 25% of the ingested water remains in the stomach. It is likely that the water induced changes may be explained by stimulation of osmosensitive structures. Indeed, the time course of the changes in sympathetic activity, blood pressure, and metabolic rate parallel the time course of altered plasma osmolarity post water drinking. Moreover, infusion of hypo osmotic solutions through a gastric tube in humans caused a greater increase in sweat production, a sympathetic response, than infusion of is osmotic solutions. In the present study, effect of excessive water intake on body weight, BMI, body fat, and appetite score of overweight female participants was evaluated in view of the inadequacy of the studies addressing this issue.

## CONCLUSION

Obesity is a major public health issue, which is prevalent pandemic ally among all age groups. Hence, the urgent need to manage this overwhelming epidemic of obesity cannot be overemphasized. In the present study, an attempt has been made to see the effect of drinking excessive water in female overweight participants, in terms of weight loss. The decrease in body weight, BMI, sum of skinfold thickness, and appetite score of overweight participants at the end of study period establishes the role of drinking excessive water in weight reduction, body fat reduction, and appetite suppression of participants. Thus, water drinking induced increase in sympathetic activity is an important and unrecognized component of daily energy expenditure. If confirmed in future studies with larger number of subjects, this cost free intervention may be a useful adjunctive treatment in overweight and obese individuals to attain an increase in energy expenditure.

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