Causes and Risk Factors of Urinary Incontinence: Avicenna's Point of View vs. Contemporary Findings

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Purpose: To extract the causes and risk factors of urinary incontinence from an old medical text by Avicenna entitled "Canon of Medicine" and comparing it with contemporary studies.

Materials and Methods: In this study, etiology and risk factors of urinary incontinence were extracted from Avicenna's "Canon of Medicine". Commentaries written on this book and other old reliable medical texts about bladder and its diseases were also studied. Then the achieved information was compared with contemporary findings of published articles.

Results: Urinary incontinence results from bladder dysfunction in reservoir phase. Bladder's involuntary muscles and voluntary external sphincter are two main components which are involved in this process. Urinary incontinence can exist without obvious structural and neuronal etiologies. According to Avicenna, distemperment of muscular tissue of bladder and external sphincter is the cause for urinary incontinence in such cases. Distemperment is the result of bothering qualities in tissue, i.e.: "wet" and "cold". They are the two bothering qualities which are caused by extracorporeal and intracorporeal factors. Interestingly, the positive associations of some of these factors with urinary incontinence have been shown in recent researches.

Conclusion: "Cold" and "wet" distemperment of bladder and external sphincter can be independent etiologies of urinary incontinence which should be investigated.

Keywords: urinary incontinence; manuscripts as topic; history; Persia; medieval; reference books; Avicenna.

INTRODUCTION

Urinary incontinence, i.e. any involuntary leakage of urine,[1] is a worldwide public health problem with adverse effects on quality of life of affected people.[2] There are various ways to treat this pathological condition. Conservative and behavioral therapy,[3] drug therapy and surgery all have their own limitations and complications.[4] Urinary incontinence is not a new disease. Throughout history mankind has struggled with it and looked for its treatment. So reviewing old medical texts about this morbid symptom is necessary for a deeper understanding of it. Involuntary loss of urine with its old terminology has been mentioned as a symptom of lower urinary tract's dysfunction in old scientific medical books such as Canon of Medicine written in about 1000 years ago by the great scientist "Avicenna". Examining the approach of this great scientist and his followers regarding this bothersome symptom can provide new and different views to urinary incontinence, resulting in new options of prevention and even treatment with natural and herbal medicine. Avicenna was a pioneer of a school of traditional Persian medicine. This school has a unique approach to health and disease. It believes that an organ of body does well when it is in balance quantitatively and qualitatively. The number, shape and position of each organ are unique. This is balance of quantity. The balance in quality is presence of "hot", "cold", "wet" and "dry" qualities to the extent which is necessary for each organ's function. The outcome of the four qualities is called 'temperament' which is specific for every organ. Exacerbation or alleviation of each of these qualities that lead to dysfunction of an organ is called "distemperment". This paper reviewed the etiologies and risk factors of urinary incontinence in a traditional medical text entitled Canon of Medicine with focus on identifying its predisposing factors. It also compared the achieved results with contemporary findings. This can be the first step to offer a documented and effective preventive strategy for urinary incontinence based on traditional medical texts.

MATERIALS AND METHODS

The contents relevant to urinary incontinence and its etiologies were selected from Avicenna's Canon of Medicine. The original version of this book in Arabic was used for this study.[5] Although Avicenna was a Persian

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physician and scholar, his book was written in Arabic since the language of science in that time was Arabic not Persian. Diseases of the bladder and lower urinary tract symptoms were described in detail in separate chapters in the third volume of this four-volume version of the book. In addition, two other reference text-books in traditional Persian medicine were also used to compare and verify the findings.[6,7] The accumulated contents were then classified and listed. Afterwards, databases such as PubMed Central and Scopus were searched based on two keywords (i.e. urinary incontinence and predisposing factors) in order to find articles with relevant evidences which could support the achieved findings of the studied old medical texts regarding urinary incontinence.

RESULTS

In traditional Persian medicine, lower urinary tract consisted of bladder and external voluntary sphincter. Nature, shape, location and other unique characteristics of bladder made it suitable for its function which was reserving large amount of urine to keep human being voiding continuously and letting him/her void in proper time and place willfully. In old Persian medical texts, factors which oppose bladder's reservoir function due to their type and severity can cause symptoms including urinary frequency, urgency, nocturnal incontinency and diurnal incontinency.[6] These factors are divided into two extracorporeal and intracorporeal groups.[5-7]
Extracorporeal factors which affect bladder from the outside of body include:
1.Direct trauma to perineal region like falling from a height on perinea which weakens bladder by causing injury to its tissue or its innervations.
2. Dislocation of lower lumbar and pelvic vertebras which interfere with innervations of bladder and external sphincter.
3. Living in geographical areas with cold and moisturized weather.
4. Being in cold seasons like autumn and winter.
5. Nutritional habits like drinking much liquid, especially cold with ice. Eating sour foods, eating many watery fruits like watermelon, grape, etc.
6. Behavioral habits like going to bathroom frequently and using too much cold water for washing the external genitalia due to obsession.
7. Having jobs like fishing in the traditional form. In this regard, Galen has expressed a fisher man in his era who suffered from urinary and fecal incontinence simultaneously due to standing for a long time in water.[8] They believed that sea with salt water is less harmful than sea with fresh water!
8. Using herbal drugs can be another factor. The old texts have mentioned a list of materia medica which is harmful to bladder if used in high dosage and without peacemakers.
Numbers 3 to 7 are factors which affect bladder's original healthy temperament and cause it to become cold and wet, i.e. two oppose qualities which interfere with bladder's function.
Intracorporeal factors which affect bladder from the inside of body are in two categories:
A) Factors which influence total body initially and then involve bladder secondarily.
Gender: according to traditional Persian medicine woman due to their temperament are generally colder and wetter than men and are more prone to urinary incontinency
Age: children and elderly are two at risk groups for urinary incontinency. Wet is the predominant temperament in them.
Obesity: obese people especially who have fatty non-muscular obesity are wetter than slim people.
Whole body temperament: People with cold and wet temperament are more prone to urinary incontinency. A symptom which indicates the presence of such temperament on body is white color of skin.
B) Factors which influence bladder and external sphincter primarily.
B-1: Bladder's tissue and urine
Any kind of distemperment which occurs to bladder's muscles can cause bladder weakness. The term "bladder weakness" in traditional Persian medical texts is a condition in which bladder cannot tolerate urine and is eager to lose the urine as soon as possible.[5] Weakened bladder is more vulnerable to urine if the urine is not in a standard quality and quantity. So in addition to high volume of urine, any change in quality of urine can cause urinary incontinence especially in a bladder weakness. Urine can be converted to a hot and burning material which is not tolerable by bladder, so bladder ejects the urine as soon as possible even if there is no will to void. Infection, doing sports, fatigue, having intercourse, taking some sorts of foods and drinks are examples of factors which affect the quality of urine.
B-2: Adjacent organs to bladder
Another internal factor that causes urinary incontinence by bothering the bladder indirectly is the pressure effect of adjacent organs on bladder like uterine during pregnancy and rectum in case of chronic constipation and fecal impaction which interfere with augmentation of bladder during reservation phase.
B-3: Sphincter
In traditional Persian medical texts, external sphincter is a volunteer muscle on bladder's neck which closes bladder's outflow by its forceful contraction. Sensory and motor neurons from brain and spine innervate it and let it to relax during voiding phase. Two factors cause the sphincter not to work ideally: First are injuries to nerves supplying the sphincter's innervations: Innervations to sphincter can be interrupted structurally by total or near total dissection of nerves. They can also be interrupted functionally by distemperment of nerve tissues, especially "wet" and "cold". Second are injuries to muscular tissue of sphincter which cause it to become weak and loose. So it cannot contract well and let urine to leak. "Cold" and especially "wet" distemperment of muscular tissue (sphincter) are of those injuries. Exposure of perinea to cold environment by sitting on cold surfaces like ceramics too often, washing this area too much with cold water, and inadequate clothing in cold weather are some examples which gradually result in distemperment of tissues of perinea and subsequently external sphincter, making it so weak that it cannot act perfectly.

DISCUSSION

Continence is the result of correct function of bladder and external sphincter. Bladder stores urine in proper amount during the phase of reservation and external sphincter does not let urine to leak by its powerful contraction on bladder's neck during this phase.[9] Any impairment to these two structures causes them not to do their roles completely. By reviewing old medical texts, especially Avicenna's Canon of Medicine, causes and risk factors of urinary incontinence were extracted and listed. Most of these

factors attenuate the power of involuntary muscles of bladder and voluntary muscle of sphincter by causing distemperment, especially of wet and cold. It seems that the Persian physicians of the past believed that there is a special internal power in bladder resulting in intact holding of urine. Beside bladder, this power is in the external sphincter's muscle which lets it contract completely. When some qualities occur to muscles' tissue of bladder and sphincter, they cannot do their role correctly during the phase of reservation. Depending on the severity and chronicity of attenuator quality, different degrees of incontinency occur from occasional to total urinary incontinence. In fact cold and wet distemperments are the harmful described qualities. Nowadays apart from detectable and gross clinical pathologies, like trauma, cord injuries, vertebral fractures, dislocation of bladder, etc., there are undetectable pathologies which cause urinary incontinence. They cannot be recognized even by rigorous and detailed laboratory studies. In such cases treatments are somewhat blind and symptomatically without real cure, eradicating the etiology. In traditional reliable medical texts, distemperment of bladder and external sphincter can be an etiology of urinary incontinence. "Wet" and "cold" distemperments are the main reason why bladder and external sphincter do not to work well during the phase of reservation. Distemperment is a cause of urinary incontinence and its predisposing factors have been listed. Interestingly, the relationship between some of these factors and urinary incontinence has been shown in recent studies. Nowadays age is considered as a risk factor for urinary incontinence in both women and men.[10] Prevalence of incontinence which is increased with aging has been shown in many contemporary researches.[11-13] In addition to other etiologies like functional impairment, traditional Persian medicine's explanation for this relationship is predominant temperament in adult age which is "cold" and "wet". Obesity is another factor that is primarily associated with urinary incontinence. It has been shown that excessive weight is an established and potent risk factor for urinary incontinence among women of all ages.[14-16] The reduction effect of decreasing obesity especially in women on burden of urinary incontinence has been studied.[17] The association of body mass index (BMI) with higher risk of urinary incontinence has been shown. However, recently different mechanisms for urinary incontinence other than purely mechanical stress on the bladder in obesity has been suggested.[18] Traditionally, wet and cold temperaments have more association with fatty obesity than muscular obesity. The elderly, women and obese have established risk factors for urinary incontinence because of their cold and wet temperament. The prevalence of urinary incontinence by race or ethnicity in women has been variable. Some studies did not show differences between racial or ethnic groups,[9,23] but others have shown higher prevalence of urinary incontinence in white women compared to black women.[19-22,24] The finding that white women are more prone to urinary incontinence than black women is consistent with traditional Persian medicine's view about different temperaments in different races and genders. Some temperaments are more likely to cause some diseases according to traditional Persian medicine. In this sense, white people have "colder" temperaments compared to black people. Nutrition, drugs, sports and intercourse affect the quality and quantity of urine. This effect is sometimes intolerable for the bladder, leading to urinary incontinence. Some of these factors have been studied in recent researches. Constipation and high fluid intake are factors which have been mentioned in traditional medical texts as risk factors for urinary incontinence. The positive association of constipation with dysfunction of lower urinary tract including urinary incontinence has been shown.[25] Constipation prevention methods and less fluid intake in the evenings especially for elderly women has been shown to be useful for preventing urinary incontinence in recent studies.[26]

CONCLUSION

It seems that traditional Persian physicians' belief about the relationship between distemperment of bladder and external sphincter and urinary incontinence is not out of date and can be reviewed today. Also, the concept of temperament might become clearer with more clinical research on disease etiologies of the traditional Persian medical texts. Urinary incontinence can be prevented by controlling its traditional predisposing factors, if distemperment is found to be associated with it by more studies. This can be the first step to offer a documented and effective preventive strategy for urinary incontinence based on traditional Persian medical texts.

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CONFLICT OF INTEREST

None declared.

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