Effectiveness of osteopathic treatment in patients with Lower Urinary Tract Symptoms (LUTS)

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ABSTRACT

Introduction and Aim: International continence society mentions that more than 50 % of females suffer from lower urinary tract symptoms (LUTS) and more than 90% of them were not on any medication. LUTS is a term that covers symptoms resulting from conditions affecting the urinary bladder and urethra, prostate, other pelvic organs or any other part of the body which is related to the bladder and urethra anatomically. LUTS can be classified into 3 subcategories, i.e., storage symptoms (symptoms during storage of urine), voiding symptoms (symptoms during micturition), and post micturition symptoms (symptoms after completing micturition). Patients with LUTS may present with a combination of storage, voiding, and post micturition symptoms. The aim of this study is to assess the effectiveness of osteopathy treatment in patients with lower urinary tract symptoms.

Materials and Methods: This is a pre-test post-test single group experimental study conducted at Sri Sri University. In this study, 20 females having the mean age of 21.9± 2.61 years with moderate and severe symptoms voluntarily participated. The pre-test scores were measured in 3 different questionnaires (AUA symptom score index, ICIQ – FLUTS and HPMDQ). The subjects were diagnosed and given 4 osteopathy sessions. The post-test scoring was noted and data was analysed using MS Excel.

Results: Compared to the baseline scoring, the post intervention scores on all the questionnaires reduced significantly. Subjects having moderate and severe symptoms were selected for the study. After intervention either the symptoms were absent or mild residual symptoms were seen.

Conclusion: The results shows that osteopathy treatment is effective in patients having lower urinary tract symptoms.

Keywords: Storage symptoms; voiding symptoms; post micturition symptoms; osteopathy treatment.

INTRODUCTION

Low urinary tract symptoms is a term that refers to symptoms resulting from conditions that affect the urinary bladder, urethra, prostate (in men), other pelvic organs, or any other part of the body that is related to the bladder and urethra anatomically (1).

In a study it was found that the LUTS were found in 15.8% to 82.0% of adults worldwide (2). International Continence Society (ICS) also mentions that more than 50 % of females suffer from lower urinary tract symptoms and more than 90% of them were not on any medication for the same (3).

LUTS can be sub classified into 3 categories - storage symptoms (symptoms during storage of urine), voiding symptoms (symptoms during micturition), and post micturition symptoms (symptoms after completing micturition). Storage symptoms include urinary incontinence, nocturia, nocturnal enuresis, overactive bladder, and bladder pain. Voiding symptoms include slow stream, intermittent stream, straining, hesitancy, and terminal dribble. Post micturition symptoms include post micturition dribble and incomplete emptying (4).

Dysfunction of any structure related to the urinary tract anatomically or physiologically can disrupt the voiding mechanism and may cause lower urinary tract symptoms. Most of the time these symptoms are idiopathic and no specific cause could be found for them.

Osteopathy is a drug free, non-invasive form of treating patients. An osteopath is trained to palpate the body layers and tissues with his hands and to differentiate normal and diseased body tissue through palpation. Osteopathy is patient centred and helps in finding the root cause behind a disease. In a case study performed by James E Farley it was noted that a patient presenting with the chief complaint of urinary incontinence had dysfunctions in the pelvic diaphragm, thoracoabdominal diaphragm, rib 12, psoas, lumbar thoracic and cervical spine and the cranium. He related the function of pelvic diaphragm, thoracoabdominal diaphragm, ribs, spine and the urinary bladder (5).

This research is highly relevant as in many cases the LUTS are idiopathic and the exact cause behind them can’t be known. Using osteopathy as a tool to differentially diagnose the structures can prove to be an effective diagnostic and treatment approach. Also, research supporting use of osteopathy in managing Lower Urinary Tract Symptoms (LUTS) is scanty.

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The aim of this study was to compare the severity of the lower urinary tract symptoms in the subjects before and after an osteopathic intervention. I hypothesized that osteopathic treatment is effective in treating patients with lower urinary tract symptoms.

**MATERIALS AND METHODS**

This study had a pre-test post-test single group experimental design. 20 female subjects from Sri Sri University campus having moderate to severe lower urinary tract symptoms (diagnosed using the AUA symptom score index) were selected for the study using convenient sampling technique. Informed consent was taken from all the subjects and they were asked to undergo a routine urine exam to rule out any urinary tract infection and microscopic haematuria.

**Inclusion and exclusion criteria**

Female subjects having a score of more than 8 on the AUA symptom score index were included in the study. Subjects having active urinary tract infection, renal stones, microscopic haematuria, any congenital disease of urinary tract and premature menopause were sent for appropriate treatment and were excluded from the study.

**Study procedure**

<table>
<thead>
<tr>
<th>Steps:</th>
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<tbody>
<tr>
<td>Assessment for eligibility of subjects (inclusion and exclusion criteria)</td>
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<tr>
<td>Consent form is signed by the subject</td>
</tr>
<tr>
<td>Collecting Past medical history and subjects have to undergo the urine test to rule out present urinary tract infection and microscopic haematuria.</td>
</tr>
<tr>
<td>Pretest: answering the required questionnaires: AUA symptom score index, ICIQ-FLUTS, ICIQ LUTS QoL and HPMD Questionnaire</td>
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<tr>
<td>Osteopathic intervention is given to patients (four osteopathy sessions – 1 session/ 7-8 days)</td>
</tr>
<tr>
<td>Posttest: re answering the questionnaires: AUA symptom score index, ICIQ-FLUTS, ICIQ LUTS QoL and HPMD Questionnaire (Immediately after the last session and 10 days after the last session)</td>
</tr>
<tr>
<td>Comparing pretest and post test acquired data</td>
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</tbody>
</table>

**Osteopathic diagnosis**

A detailed history of all the subjects was taken after which a diagnosis was done on the basis of five models of osteopathic diagnosis, i.e., the biomechanical model, the neurological model, the respiratory-circulatory model, the metabolic model, and the behavioural model. Based on these models different standardised osteopathic tests were used to diagnose the subject and find the root cause manually.

**Osteopathic treatment**

As the study used a diagnosis protocol to find the root cause of the Lower Urinary tract Symptoms the main structure treated in every patient varied depending on this diagnosis. The main structures that were treated during the study are: pelvic girdle (ilia, pubic symphysis, sacrum and coccyx), pelvic diaphragm, thoracoabdominal diaphragm, psoas muscle, peritoneum, abdominal and pelvic organs (uterus, ovaries, urinary bladder, kidneys, small intestine, liver), spinal column (mainly thoracolumbar), pituitary gland, sphenobasilar synchondrosis and 4th ventricle. These structures were treated using the standardised osteopathic techniques.

**Evaluation**

The post test scores were again recorded 10 days after the last session. After the data collection was complete, the pre-test and post-test scores were compared using statistical analysis in MS Excel.
RESULTS

Effect on AUA symptom score index
As shown in fig. 1, 85% of the subjects had moderate symptoms and 15% of the subjects had severe symptoms before the osteopathic intervention. After the intervention, the data was collected again and it was found that 90% of the subjects had mild symptoms and symptoms were absent in 10% of the subjects.

Table 1: Mean, SD, p value and t value of AUA score

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre test</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>15.37</td>
<td>3.1</td>
</tr>
<tr>
<td>SD</td>
<td>±3.28</td>
<td>±1.96</td>
</tr>
<tr>
<td>p value</td>
<td>0.00 (p&lt;0.05)</td>
<td></td>
</tr>
<tr>
<td>t value</td>
<td>25.3</td>
<td></td>
</tr>
</tbody>
</table>

As shown in table 1 p<0.05.

Effect on ICIQ FLUTS
ICIQ - FLUTS has 3 different subcategories within it i.e., F Score (filling score), V Score (voiding score) and I Score (incontinence score). The calculation of symptoms for ICIQ - FLUTS questionnaire was done as a whole as well as for these 3 categories individually.

Table 2: Mean, SD, p value and t value of ICIQ - FLUTS score

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre test</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>16.1</td>
<td>3.78</td>
</tr>
<tr>
<td>SD</td>
<td>±5.26</td>
<td>±2.6</td>
</tr>
<tr>
<td>p value</td>
<td>0.00 (p&lt;0.05)</td>
<td></td>
</tr>
<tr>
<td>t value</td>
<td>17.156</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Fig. 3 the baseline mean for the completed ICIQ questionnaire was 16.1 with a standard deviation of ±3.78. After the intervention, the mean for the ICIQ questionnaire was 5.26, with a standard deviation of ±2.6. The p value and t value were calculated using a t test: Paired two samples for means. As shown in table 2 p<0.05.
Effect on Hallym Post Micturition Dribble Questionnaire

As shown in Fig. 4 the baseline mean for the HPMD questionnaire was 6.73, with a standard deviation of ±3.75. After the intervention, the mean for the HPMD questionnaire was 1.57 with a standard deviation of ±2.26.

Table 4: Mean, SD, p value and t value of HPMDQ score

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre test</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.73</td>
<td>1.57</td>
</tr>
<tr>
<td>SD</td>
<td>±3.75</td>
<td>±2.36</td>
</tr>
<tr>
<td>p value</td>
<td>0.00</td>
<td>(p&lt;0.05)</td>
</tr>
<tr>
<td>t value</td>
<td>6.751</td>
<td></td>
</tr>
</tbody>
</table>

The p value and t value were calculated using a t test: Paired two sample for means and as shown in table 4 p<0.05.

Fig. 4: Graphical representation of pretest and posttest scores of HPMDQ

DISCUSSION

Lower Urinary Tract Symptoms are prevalent in around 15.8% to 82% of the adult population of the world (2). LUTS can be due to many reasons like a neurologic disorder, diabetes, multiple pregnancies, occupational stress, episiotomy, menopause, renal stones, constipation, pelvic organ prolapse, alcohol consumption, smoking and many more reasons (2,7,8). It was found that more than 90% of the females suffering from LUTS do not seek any medical help for the same (3). In most cases, the exact cause of the lower urinary tract symptoms cannot be found and appropriate treatment cannot be given to the subjects. This makes LUTS a socioeconomic issue and makes it important to find solutions to deal with these idiopathic symptoms of the urinary tract.

The results of the study clearly show that the osteopathic intervention brought significant changes in the scoring of the symptoms. Compared to the baseline pre-intervention data, significant reductions were seen in the scores of all the questionnaires used, viz., the AUA Symptom Score Index, ICIQ FLUTS and HPMDQ. According to the pre-test score 15% subjects had severe symptoms and 85% had moderate symptoms, whereas the post-test score showed that symptoms were completely absent in 10% subjects and the rest 90% had mild symptoms after osteopathic intervention. This shift in severity of symptoms clearly indicates the effectiveness of osteopathic treatment in treating LUTS.

By finding the root cause of LUTS in young female subjects, the study brings up a new horizon of ideas relating different structures of the body to these symptoms.

The main structures that were treated during the study are: pelvic girdle (ilia, pubic symphysis, sacrum and coccyx), pelvic diaphragm, thoracoabdominal diaphragm, psoas muscle, peritoneum, abdominal and pelvic organs (uterus, ovaries, urinary bladder, kidneys, small intestine, liver), spinal column (mainly thoracolumbar), pituitary gland, sphenobasilar synchondrosis, and 4th ventricle. These structures can be related to the urinary tract symptoms experienced by females using anatomical and physiological pathways. These relations were mentioned by the anatomists and physiologists much before this study was conducted but were never used to relate these structures to Lower Urinary Tract Symptoms. Some of these relations and the explanation behind mentioning them as the root cause are mentioned below with some anatomical and physiological references.

The pelvic girdle is covered with a layer of connective tissue called the endopelvic fascia that is a mesh-like group of collagen fibers interlaced with elastin, smooth muscle cells, fibroblasts, and vascular structures. The urethra is supported by the anterior pelvic wall via its attachments to the levator muscles and endopelvic fascia (9). The pubourethral ligaments, which are a modification of endopelvic fascia, extend from the pubic bone to the urethra, and according to Some authors have a role in supporting the urethra and keeping the vesical neck closed (10). The urethropelvic ligaments, which are also modifications of endopelvic fascia and extend from the urethra to the levator muscles (pubococcygeus) and arcus tendineus of the pelvis, have also been seen on MRI scans (11). The uterosacral ligaments link the cervix and vagina with the sacral connective tissue, and according to a study, these ligaments play an important role in urinary incontinence (12). This forms the fascial relationship between the urinary tract and the pelvis (pubic bone, ilia, sacrum, and coccyx).

According to Barral, there is a continuation of ligaments from the pubic bone to the sacrum that connects the pelvic bone with the organs of the pelvis. This continuous ligament is termed as delbet lamina by him and it comprises of pubovesical - vesicouteral - uterorectal - rectosacral - uterosacral ligaments. (13) This forms a ligamentous relationship between the urinary tract and the pelvis (pubic bone, sacrum, and coccyx).

The lower urinary tract receives its parasympathetic nerve supply from the sacral plexus and, thus, dysfunctions of the sacral plexus, sacrum, or coccyx...
will have an effect on the functioning of the urinary tract. This forms a nervous connection between the urinary tract and the pelvis.

The 'hammock hypotheses explains that the basis for continence includes a quiescent bladder, functioning musculofascial support, and a functional urethral sphincter mechanism. The fascial attachments link the bladder and urethra to the pelvis and the vagina, and the muscular attachments connect them to the levator ani complex and pelvic diaphragm. Therefore, the urethral support is provided by a balanced fascial and muscular system as an integrated unit. This musculofascial structure provides a hammock onto which the urethra compresses during increased intra-abdominal pressure (14). The above-mentioned structures and hypotheses establish evident anatomical relations between the pelvic girdle (ilia, pubic symphysis, sacrum, and coccyx) and the urinary bladder and urethra and thus are shown to have a significant effect on the lower urinary tract symptoms of females. This explains the reduction in the lower urinary tract symptoms seen after treating the pelvic girdle in some subjects of the study.

The pelvic diaphragm is made up of the endopelvic fascia and the levator ani muscles. It is continuous with the pelvic organs and fascia (15). The pelvic diaphragm acts as a sling on which the urinary bladder neck and urethra are supported. According to DO James E. Farley, the pelvic diaphragm should move with the inspiration and expiration of the respiratory diaphragm. If this movement does not take place properly, then the pelvic diaphragm can affect the pelvic organs, causing them to put more pressure on the urinary bladder (16). According to Frymann, the pelvic diaphragm is a very important structure for people showing up with urinary tract symptoms and its movement depends on the structures that it attaches to, like the ilia, sacrum, and coccyx (17).

All these relations mentioned by anatomists and osteopaths explain the reduction of lower urinary tract symptoms in subjects of the study who were given pelvic diaphragm treatment.

The thoracoabdominal diaphragm has a major role in maintaining the abdominal pressure and maintaining the abdominal organs in the right place. Through its continuous movements, it performs a pumping action on the abdominal viscera and if this pumping action or toxicity of the diaphragm is altered, then it becomes difficult to maintain the abdominal organs in their respective places and then descend down, thus putting more pressure on the urinary bladder and urethra (15,16). Also, the diaphragm is related to the ligament of Treitz, which is the suspensory ligament of the duodenum. If this ligament is not suspending the duodenum in the proper way, then the entire small intestine descends and puts pressure on the bladder. Also, the duodenum is related to the ureters posteriorly and can also put unnecessary pressure on them (20).

The diaphragm and the psoas muscles are related to the kidney. The kidneys lie posterior to the median and medial arcuate ligaments of the diaphragm and these ligaments are continuous with the fascia of the kidneys (fascia of gerota) as well (15). The kidneys lie just above the psoas muscle, and the psoas acts as a side rail for the mobility of the kidneys. The fascia of the psoas and kidneys also fuse together, providing a strong relationship between these structures (15). Therefore, the release of the thoracoabdominal diaphragm and psoas was expected to relieve the symptoms of the subjects in the study by affecting the entire urinary tract in multiple ways.

The pelvic organs are related to the lower urinary tract through the delbet lamina and their close anatomical association with the bladder and urethra (13). In a study, it was mentioned that in females, the vagina is more closely associated with the left ureter and disorders and diseases of the vagina can result in symptoms of the urinary tract (18). In a study, it was also mentioned that the vagina is attached to the bladder with a layer of mesh like connective tissue between both organs. And the uterus sits on top of the bladder and is related to it via a layer of fascia called the vesicouterine pouch (19). Another study mentioned that women with pelvic organ prolapse were prone to incontinence and other lower urinary tract symptoms (20).

All these studies show a very clear relationship between the pelvic organs (uterus, vagina, and ovaries) and the urinary tract. Based on the above-mentioned studies and the reduction of symptoms in this study on treating pelvic organs, we can state that pelvic organ disorders can be a cause of idiopathic lower urinary tract symptoms.

The spinal column may not be as simple as it appears to be. It affects a vast majority of organs depending on the segment considered. In this study, the thoracolumbar junction was treated in some subjects who had dysfunctions in that segment of the spinal cord. This relation between the thoracolumbar junction and urinary symptoms can be easily explained. The bladder and urethra receive their sympathetic nerve supply from the segments T10 to L2 and any dysfunction in this area can affect the functioning of the bladder (21). Also, this segment of the spinal cord is closely associated with the kidneys because of their topographical location. The fascia of the kidneys is continuous with these segments of the spine (15). These segments of the spine also form the attachment of the crura of the diaphragm and thus will alter the functioning of the diaphragm, which can affect the urinary tract (16).

Abdominal organs like the colon and small intestine are located just anterior to the ureters and can affect them if they are not in their proper position. Also, the abdominal organs are related to the pelvic floor via
fascial connections and have a direct impact on the lower urinary tract organs like urinary bladder and urethra (15). Studies show that if the peritoneum is not functioning well or if the abdominal organs are not suspended well in the abdomen, then they descend down and exert abnormal pressure on the bladder and urinary sphincters, causing certain symptoms (16). Also, the liver is the organ that receives the venous return from the entire abdomen via the portal vein. If there is congestion in the liver, then the backflow of venous blood takes place, which causes congestion in the entire abdominal and pelvic organs as well as in the vertebral column via the vertebral vein (13). Liver congestion can also cause pressure on the right kidney as it lies just posterior to the liver. Small intestines sit on the top of the uterus and bladder and retention of feces in the intestines or ptosis of intestine exert pressure on the bladder leading to urinary tract symptoms (22).

The treatment of the 4th ventricle also helped some subjects with their symptoms in this study. According to Liem, the mechanism of CV4 is via direct activation of cranial nerve nuclei in the floor of the fourth ventricle and also via its effect on the periaqueductal gray matter. Working on the 4th ventricle stimulates the circulation of CSF around the brain and the spinal cord and increases the parasympathetic tone in the body. According to the founder of osteopathy, AT Still, CSF is like a magic potion that provides nourishment to the entire central nervous system. It affects the entire autonomic nervous system and is closely associated with the urinary tract.

This study covered many structures of the body and in some way or another, explained all the principles of osteopathy that were mentioned by the founder of osteopathy, Dr. A. T. Still.

- The unity of function (the whole body is a unit)
- The body has the power to overcome the disease. (Body has a self-healing capacity)
- The structure and function are interrelated.
- Circulation of healthy blood is fundamental to our well being

CONCLUSION

This study shows that there is a significant improvement in the symptoms after the osteopathic intervention. It describes a new approach for treatment of lower urinary tract symptoms that focuses on the root cause and provides treatment without the use of any drugs. This study opens a new horizon of ideas related to such symptoms and the structure that could be causing them. Performing a differential diagnosis and treating the root cause showed promising results in all the subjects.

In this study the sample size was less and the long-term effect of the intervention could not be measured as the post-test scores were taken 10 days after the intervention. More similar studies can be performed to overcome these limitations. Also depending on the root cause found in this study a detailed study on each symptom individually, explaining the pathophysiology behind them can be done.

ACKNOWLEDGEMENTS

At this juncture I would like to thank many people with open arms. Without these people this research would not have been possible. I would like to express my sincere gratitude to the osteopathy professor, Mr. Juan Gullion for the immense knowledge of osteopathic techniques that he has provided me. I want to thank professor Tirthankar Ghosh and Dr. Dhiren Kumar Panda for giving me constructive suggestions for enhancing the quality of the research. A sense of gratitude is also owed to our parents and fellow colleagues and all the participants who willingly participated in this research. This research would not have been possible without their participation and cooperation.

CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

REFERENCES


