



Efficacy Of Homoeopathic Medicines On Gram Negative Bacteria In Chronic Lower Urinary Tract Infection Among The Paediatric Age Group 5-12yrs. A Prospective Single Experimental Uncontrolled Study

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ABSTRACT

Background : Urinary Tract Infection is high prevalent in school-aged children that has marked impact on the quality of life of those affected and conventional treatment options are usually palliative and recurrences are more common. It represents the most common bacterial infection in children more than two years of age.

Objective: A prospective , single blind , experimental uncontrolled study to evaluate the efficacy of Homoeopathic Medicines on gram negative bacteria in lower urinary tract infection among the paediatric age group 5-12yrs by using comparison of bacterial growth in before treatment urine culture reports and after treatment urine culture reports

Material and Methods: A 18 months study was conducted on patients coming to OPD and IPD of KKC Homoeopathic Medical College and Hospital, Puttur, Tirupathi dt, Andrapradesh. Cases of lower urinary tract infection were selected on the basis of bacterial growth in urine culture and clinical symptom. Clinical assessment were evaluated by ICIQ (International consultation on incontinence questionnaire score for Paediatric chronic lower urinary tract symptoms (CLUTS) and the urine culture reports were collected before and after treatment. 51 diagnosed patients were taken. Patients were called for follow up every 15 days for the clinical assessments and urine culture was taken once in a month patients were monitored up to 3 months.

Results: In lower urinary tract infection among the paediatric age group between 5 – 12 yrs at the end of study, P value shows that there was a significant effect of Homoeopathic medicine in the reduction of gram negative bacterial growth in urine culture. Out of 51 cases 66.67% (n=34) shows insignificant growth of bacteria and fully recovered from symptoms, 21.57 % (n=11) shows moderate growth of bacteria, 11.76% (n=6) shows significant growth of bacteria in urine culture.

Conclusion: Homoeopathic medicines are effective in reduction of gram negative bacteria in urine culture and improve the quality of life in paediatric age group 5-12yrs by removal of signs and symptoms.

INTRODUCTION

Urinary tract infection (UTI) is a prevalent medical issue in the pediatric population, causing distress for both children and their parents. It affects approximately 8% of boys and girls during early childhood and nearly 46% of adolescents, with females being more susceptible to infections. In neonates, presenting symptoms may include fever, irritability, and vomiting, while older children often exhibit frequency and dysuria, indicating a urinary tract infection. From a microbiological perspective, UTI is characterized by the proliferation of pathogenic microorganisms in the urinary tract, with infection

confirmed when such organisms are identified in the urine. Typically, a growth of $>10^5$ organisms per milliliter from a properly collected midstream urine sample is indicative of infection.

The most common microorganisms responsible for UTIs are gram-negative bacteria, with *Escherichia coli* accounting for 80% of cases. Other pathogens, such as *Proteus*, are linked to renal stone formation, while organisms like *Pseudomonas*, *Staphylococcus aureus*, and group B *Streptococcus* are often associated with genitourinary surgeries, catheterization, or recent antibiotic use. Enterococci are also recognized as a frequent cause of catheter-associated UTIs.

The prevalence of UTIs varies with age, peaking in young infants, toddlers, and older adolescents. It is estimated that up to 8% of children will experience at least one UTI between the ages of 1 month and 11 years. UTIs can lead to short-term morbidity, including fever, dysuria, and flank pain, as well as long-term renal complications, such as permanent kidney scarring. By the age of 7 years, approximately 6-8% of girls and 1.5-2% of boys have documented UTIs. During the first year of life, the male-to-female ratio for UTIs is 2.8:1. Beyond ages 1-2 years, there is a notable female predominance, with a male-to-female ratio of 1:10. UTIs are more frequent in females and uncircumcised male infants due to the shorter female urethral distance and the greater foreskin surface area in uncircumcised males. During the toddler years, the process of toilet training may lead to voluntary holding and bladder stasis, which can contribute to urinary tract infections.

In school-aged children, UTIs are common, and conventional treatment options are primarily palliative, with recurrence being frequent. UTIs represent the most prevalent bacterial infection in children older than two years. Normally, urine is sterile; however, bacteria can occasionally enter the urinary tract from the skin around the rectum and genitals, traveling up the urethra to the bladder. This can result in infection and inflammation of the bladder, known as "cystitis," causing swelling and pain in the lower abdomen and side.

If the bacteria ascend further through the ureters to the kidneys, a more serious kidney infection may develop, typically accompanied by pain and fever. Kidney infections are considerably more severe than bladder infections.

FACTOR PREDISPOSING TO URINARY TRACT INFECTION

- Female Gender
- Lack of personal hygiene
- Improper bowel habit
- Usage of common toilets
- Less water intake
- Obstruction
- Vesico-ureteric reflux
- Bacterial virulence factors

CLASSIFICATION OF URINARY TRACT INFECTIONS:

Acute infections of the urinary tract can be categorized into two general anatomic types:

1. Lower Urinary Tract Infections which includes urethritis, cystitis, and prostatitis.
2. Upper Urinary Tract Infections which Includes acute pyelonephritis, intra-renal and perinephric abscess, and renal tuberculosis.

CLINICAL FEATURES:

The typical presentation of a urinary tract infection is cystitis, characterized by the following classic symptoms:

1. Severe Dysuria : Often described as "scorching" or "like peeling barbed wire," particularly intense towards the end of urination.
2. Increased Urinary Frequency : Including nocturia, which helps differentiate cystitis from other causes of daytime frequency.
3. Urgency : A strong sensation of needing to urinate immediately to prevent incontinence.
4. Urge Incontinence : Leakage of urine that occurs alongside the strong desire to urinate.
5. Strangury : A feeling of needing to urinate despite having just done so, with burning sensations during urination.
6. Offensive Odor : Urine may have a strong or fishy smell.
7. Macroscopic Hematuria : Especially common in women under fifty, though less frequent in girls or older women.
8. Constant Lower Abdominal Pain : Pain may extend beyond the genital area to include the back. Physical examination often reveals tenderness in the suprapubic region.
9. Non-Specific Malaise : Symptoms such as general body aches, nausea, fatigue, and irritability.

10. Prominent Systemic Symptoms : Manifestations like a temperature exceeding 38.3°C (101°F), nausea, and vomiting typically indicate a concurrent renal infection, as does costovertebral angle tenderness. However, the absence of these findings does not rule out the possibility of infection being limited to the bladder and urethra.

In urethritis:

Approximately 30% of women with acute dysuria and frequency may not be easily differentiated from those with cystitis. In urethritis, pain is typically more pronounced at the beginning of urination and decreases with urine flow. Discharge from the urethra may contain pus (yellowish-green) if gonococcal organisms are involved, or mucus (clear) when other organisms are present.

DIAGNOSIS:**Urine culture:**

The diagnosis of a urinary tract infection (UTI) necessitates the culture of urine. The simplest method involves obtaining a clean-voided midstream urine specimen. If a patient is unable to provide a clean-voided specimen, urine may be collected through suprapubic aspiration or catheterization. In symptomatic patients, bacteria are typically present in urine in large quantities ($>10^5/\text{mL}$). In asymptomatic patients, two consecutive urine specimens should be examined bacteriologically before therapy is initiated, demonstrating $>10^5$ bacteria of a single species per milliliter in both specimens.

In blood:

In pyelonephritis : Leucocytosis is present, and the erythrocyte sedimentation rate (ESR) is increased, In perinephric infection : Mild leucocytosis and elevated ESR are observed. In cystitis : Mild leucocytosis is present.

Localization of infection:

Differentiating between upper and lower urinary tract infections is crucial, as the response to treatment and ultimate prognosis depend on the infection site. The gold standard for diagnosing upper urinary tract infections is the culture of urine obtained from each ureter through direct catheterization during cystoscopy.

Measurement of Urinary Enzymes :

In patients with pyelonephritis, urinary lactic acid dehydrogenase (LDH) activity was elevated in 25% of cases. There was also slightly higher β -glucuronidase activity in patients with renal infections compared to those with bladder infections.

Kidney and Bladder Ultrasound:

An ultrasound test examines the kidney and bladder using sound waves. This test reveals shadows of the kidney and bladder that may indicate certain abnormalities. However, it does not detect all significant urinary abnormalities and cannot measure kidney function effectively. Bladder wall thickening may be observed in cystitis.

Voiding Cysto urethrogram (VCUG):

This test examines the urethra and bladder as the bladder fills and empties. A visible liquid is introduced into the bladder via a catheter. The bladder is filled until the child urinates, allowing the detection of abnormalities inside the urethra and bladder. The test also assesses whether urine flow is normal during bladder emptying.

Intravenous Pyelogram:

This test evaluates the entire urinary tract. A visible liquid is injected into a vein, allowing it to travel to the kidneys and bladder, highlighting possible obstructions.

PREVENTION:

1. Prophylactic measures to be adopted by women with recurrent urinary tract infections:
Fluid intake of at least 5 lit/day, Regular emptying bladder (3 hour intervals by day and before sleep), complete emptying of bladder, double micturition if reflux present (the patient should be advised, particularly before retiring for the night, to empty the bladder and then attempt to empty the bladder a second time approximately 10-15 minutes later). Drink a lot of fluids, such as herbal teas and water. Avoid sweetened fruit juices and other sweetened drinks.
2. Cranberries and blueberries contain substances that inhibit the binding of bacteria to bladder tissue.
3. Vitamin C (250 to 500 mg two times per day) makes urine acidic, which inhibits bacterial growth. In addition, drinking several glasses of water each day also serves to flush the bladder of bacteria.
4. Wipe front to back after urinating or a bowel movement. To prevent bacterial contamination of the vaginal area from the anal area, wipe with toilet paper from front to back after urinating or defecating. Cleansing the vaginal and rectal area with soap and water also decreases the potential

for bacterial transfer. Washing the area following each use of the toilet is helpful, especially for women with recurrent infections. You may find Tucks Wipes or a squirt bottle filled with warm H₂O helpful for cleansing between showers and baths.

Effective treatment reduces symptom duration and the risk of progression to upper UTIs. Homeopathic remedies can be beneficial alternatives to conventional medications for uncomplicated UTIs in children, promoting quicker symptom resolution, cost-effectiveness, and ease of administration.

Several homeopathic remedies are available for UTIs in the pediatric population, including Cantharis, Apis mellifica, Thuja, Nitric Acid, Arsenicum album, and Lycopodium. These remedies often address symptoms such as intolerable urgency, tenesmus, violent paroxysms accompanied by cutting and burning sensations in the renal region, painful urges to urinate, cutting pains before and after urination, and urine that scalds and is expelled drop by drop, along with a constant desire to urinate.

AIM:-

To study the efficacy of homoeopathic medicines on the gram negative bacteria in chronic lower urinary tract infection among the Pediatric group 5-12 yrs.

STUDY OBJECTIVES:-

- To evaluate response to homoeopathic treatment in growth of gram negative bacteria in Urinary culture.
- To evaluate response to homoeopathic treatment in chronic lower urinary tract infection among the pediatric age group 5-12yrs.

MATERIALS AND METHODOLOGY

The proposed study has been designed to study the efficacy of homoeopathic medicines on the gram negative bacteria in chronic lower urinary tract infection among the Paediatric age group 5-12 yrs.

STUDY SETTINGS

The study will be conducted in the paediatrics OPD/IPD and Pheripheralcentres operating in the KKC Homoeopathic Medical College, P.R.Mangalam,Puttur, Tirupatidt, Andrapradesh

STUDY DURATION

The study was undertaken for the period of 18 months (From 1st enrolled case till last visit of last case in the study)

STUDY DESIGN

This was a prospective experimental uncontrolled study. A total of 51 patients were enrolled in the study. Voluntary written informed consent taken from all participants parents prior to their registration in the study. In this study researcher only knew that which patients has given which medicine in the dispensing section. The Homoeopathic medicines given to the enrolled patients based on the presenting symptoms of the case and the totality of symptoms as outlined in the case recording Performa followed by repertorization. Patients Follow up was done in the interval of every 15 days and urine culture was done in the interval of every one month for 3 months.

SELECTION OF SAMPLES

The patients were selected irrespective of gender, age group between 5-12yrs and either urban or rural. Patient who had urinary tract infection confirmed by the growth of gram negative bacteria in Urinary culture more than 1×10^5 in count were selected.

SAMPLE SIZE

51 were taken by simple random sampling method

INCLUSION CRITERIA

Ages: 5 - 12yrs, Both male & female, Patient suffering from Chronic Lower urinary tract infection, Growth of gram negative organism in urine culture

EXCLUSION CRITERIA

Use of Antibiotics treatment for urinary tract infection in past 08 weeks, Known case of congenital anomalies in urinary tract,Any other infectious disease,Any other Systemic illness

DIAGNOSING CRITERIA

Growth of gram negative bacteria count is more than or equal of 1×10^5 in urine culture

SELECTION OF TOOLS

- growth of gram negative bacteria in Urinary culture
 - Clinical assesment based on ICIQ (International consultation on incontinence questionnaire) score for Paediatric Chronic lower urinary tract symptoms(CLUTS)
- Above said tools were used as diagnostic tool.

OUTCOME ASSESMENT

Outcome was assessed on the basis of Urinary urine culture. After completion of the treatment, number of counts of gram negative bacteria in urinary culture was compared with the pretreatment number of counts of gram negative bacteria in urinary culture. Improvement in symptoms was recorded on every visit and clinical assessment done by ICIQ (International consultation on incontinence questionnaire) score for Paediatric Chronic lower urinary tract symptoms (CLUTS) in 15 days once, Urine culture report recorded once in a month.

Above diagnostic tools were used as a deciding factor to categorize the results as follows:

1. Cases with Recovered
2. Cases with Improved
3. Cases with Not Improved

OBSERVATION AND RESULTS

Age Incidence: Statistical study was done to identify the age group with highest incidence as shown in Table-1

sl.no	age in years	no.of subjects	percentage
1.	5 to 8	06	11.76%
2.	7 to 8	12	23.53%
3.	9 to 10	18	35.30%
4.	11 to 12	15	29.41%
	total	51	

As shown in table, maximum incidence of urinary tract infection was seen in the age group of 9-10yrs and 35.30% of the subjects (n=18); 29.41% subjects were in the age group of 11-12yrs (n=15); 23.53% of subjects were in the age group of 7-8yrs (n=12); 11.76% of subjects were in the age group of 5-6yrs (n=6);

Sex Incidence: Statistical study was done to identify the sex group with highest incidence as shown in Table-2

sl.no	sex of subjects	no of subjects	percentage
1	male	14	27.5%
2	female	37	72.5%
	total	51	

As shown in table, maximum incidence of urinary tract infection was seen in the cases of Females (n=37) and 72.5%; cases of Males (n=14) and 27.5%;

Epidemiological disribution: Statistical study was done to identify the epidemiological distribution with highest incidence as shown in Table-3

sl.no	location	no of subjects	percentage
1	rural	33	64.70%
2	urban	18	35.30%%
	total	51	

As shown in table, maximum cases (n=33) of urinary tract infection were seen in the rural areas and 64.70%; cases were seen in urban areas is 35.30% (n=18);

Predisposing Factors: List of common predisposing factors observed in the 51 case as shown in Table -4.

s.no	predisposing factors	no.of subjects	percentage
1	lack of personal hygiene	19	37.25%
2.	use of common toilets	13	25.50%
3.	improper bladder habits	09	17.64%
4.	less water intake	08	15.68%
5.	travelling	02	3.93%
	total	51	

As shown in table, Lack of personal hygiene observed as predisposing factors in maximum cases (n=19) and 37.25%, Use of common toilets observed in 25.50% (n=13); Improper bladder habits observed in

17.64% (n=9); Less water intake observed in 15.68% (n=8); Travelling factor observed in cases 3.93% (n=2);

Incidence of Presenting complaints: The statistical study of 51 cases, the presenting complaints are shown in the Table-5;

s.no	symptom	no.of subjects	percentage
1	burning, frequency of urination	16	31.37%
2.	burning, frequency, urgency in urination	09	17.65%
3.	burning, frequency in urination with fever	11	21.57%
4.	burning, increased frequency, scanty urine	05	9.80%
5.	burning, frequency in urination with lower abdomen pain	7	13.72%
6.	burning, frequency, offensive urine	3	5.89%
	total	51	

As shown in table, Burning ,frequency of urination observed as presenting complaints in maximum cases (n=16) and 31.37%; Burning ,frequency of urination with fever observed as presenting complaints in 21.57% (n=11); Burning ,frequency and urgency of urination observed in 17.65% (n=9); Burning ,frequency of urination with lower abdomenpain observed in 13.72% (n=7); Burning ,frequency and scanty urination observed in 9.80%(n=5); Burning frequency and offensive of urination observed in 5.89% (n=3).

Clinical Assessment as per ICIQ Questionnaires :

Clinical assessments done as per the ICIQ (International consultation on incontinence questionnaire) score for Paediatric Chronic lower urinary tract symptoms(CLUTS) in the 51 case as shown in Table -6.

s.no	results	no.of subjects	percentage
1	mild	13	25.50%
2.	moderate	27	52.94%
3.	severe	11	21.56%
	total	51	

As shown in table, Children completed the questionnaires, then clinical assessment done as per the scores of questionnaires and observed as maximum cases(n=27) under the moderate level(52.94%); Mild cases are 25.50% (n=13) and severe cases are 21.56% (n=11).

Remedies Prescribed: The statistical study of 51 cases, the prescribed remedies are shown in the Table-7;

s.no	name of the remedies	no.of subjects	percentage
1	ars.alb	03	5.89%
2.	lycopodium	04	7.84%%
3.	cantharis	13	25.50%
4.	acid.nit	02	3.93%
5.	thuja	05	9.80%
6.	apis	09	17.65%
7.	terebinth	03	5.89%
8.	sulphur	02	3.93%
9.	bryonia	02	3.93%
10.	nux.vom	02	3.93%
11.	pulsatilla	01	0.2%
12.	phosphorus	01	0.2%
13.	staphysagria	01	0.2%
14.	chomomilla	01	0.2%
15.	sarsaparilla	01	0.2%
16.	nat.mur	01	0.2%
	total	51	

As Shown in the table total of 16 remedies were totally prescribed to 51 subjects, out of cantharis was the highest given remedy to 25.5%subjects (n=13), followed by apis mellifica which was given to 17.65% subjects (n=9), Thuja to 9.80% (n=5) , Lycopodium to 7.84% (n=4) , Ars. Alb to 5.89% (n=3) ,

Terebinth to 5.89% (n=3), nux vomica, byonia, sulphur, nitric acid to 2 subjects (n=2) each and pulsatilla, Phosphorus, natrummur, chamomilla, staphysagria, sarsaparilla to 1 patient (n=1) each.

Results of treatment:

In the statistical study of 51 cases, Results of the treatment summarised in Table- 8.

s.no	results	no.of subjects	percentage
1	recovered	41	80.4%
2.	improved	6	11.8%
3.	not improved	4	7.8%
	total	51	

As shown in table, after the homoeopathic treatment maximum cases (n=41) were recovered from the complaints and 80.4%, 11.8% (n=6) cases were improved from the complaints and 7.8% of cases (n=4) were not improved..

Growth of organism in Urine culture:

In the statistical study of 51 cases, Growth of Gram negative bacteria in urine culture after the treatment summarized in Table- 9.

s.no	growth of organism in culture	no.of subjects	percentage
1	insignificant growth	37	72.55%
2.	moderate growth	9	17.65%
3.	significant growth	5	9.80%
	total	51	

Significant Growth: $\geq 10^5$, Moderate Growth: $10^4 - 10^5$, Insignificant Growth: $< 10^4$

As shown in table, after the homoeopathic treatment, in maximum cases (n=37) were found Insignificant bacterial growth after the treatment and 66.7%. 21.57% (n=9) were found Moderate growth and 9.80%, (n=5) were found significant growth in urine culture

Table 10: Patient distribution according to effect of Homoeopathic medicines on presenting complaint of urinary tract infection before and after the treatment

s.no	clinical presenting complaints	cases (n=51)			
		before treatment	after treatment		
			recovered	improved	not improved
1.	burning, frequency of urination	16	13	2	1
2.	burning, frequency, urgency of urination	9	8	0	1
3.	burning, increased frequency, scanty urination	5	3	2	0
4.	burning, frequency of urination with lower abdomen pain	7	6	1	0
5.	burning, frequency, offensive urine	3	0	1	2
6.	burning, frequency of urination with fever	11	11	0	0
	total	51	41	6	4
	p value	0.004			

P=0.004 value depicts significant that maximum patients (n=37) were relieved from their presenting complaints after the homoeopathic treatment.

Table 11: Patient distribution according to effect of Homoeopathic treatment on clinical assessment as per ICIQ (International consultation on incontinence questionnaire score for Paediatric Chronic lower urinary tract symptoms (CLUTS) in urinary tract infection.

s.no	clinical assessment	cases (n=51)		
		after treatment		
		recovered	improved	not improved
1.	mild	13	0	0
2.	moderate	23	3	1
3.	severe	5	3	3
total		41	6	4
p value		0.011		

P=0.011 Shows significant that maximum number of cases (n=41) recovered from all the categories, Improved cases is 06 and 4 cases were not improved as per the clinical assessment by ICIQ (International consultation on incontinence questionnaire score for Paediatric Chronic lower urinary tract symptoms (CLUTS) in urinary tract infection.

Table 12: Patients distribution according to the effect of Homoeopathic medicines on gram negative bacterial growth count in urine culture after the treatment.

S.N O	BACTERIAL GROWTH	Cases (n=51)		
		AFTER TREATMENT		
		RECOVERED	IMPROVED	NOT IMPROVED
1.	Significant growth	0	0	5
2.	Moderate growth	0	9	0
3.	Insignificant growth	37	0	0
TOTAL		37	9	5
P Value		0.000		

P=0.000. Shows significant that insignificant bacterial growth seen in maximum number of recovered cases (n=37) after the treatment. Moderate growth seen improved cases (n=9) and significant growth seen in not improved cases (n=5)

CONCLUSION

- Female children were predominantly affected than male children
- In the age wise distribution, maximum numbers of children were between the age group of 9-10 yrs.
- P value depicts (p=0.517) no marked difference between the children from rural and urban areas in the factors predisposing the urinary tract Infection are lack of personal hygiene, less water intake, travelling, Improper bladder habit and use of common toilet.
- P value (p= 0.003) shows significant that the burning and frequency of urination is a maximum and common clinical presentation among the paediatric age groups between 5- 12yrs.
- In the improvement of quality of life of children, P(p=0.004) value shows significant changes after the homoeopathic treatment in presenting complaints of urinary tract infection after the treatment.

- P value (0.011) shows significant that there is a complete recovery of maximum patients from the complaints after the periodical clinical assessment was done by using ICIQ- CLUTS questionnaires among the children.
- P value (0.020) exhibits significant that there is a insignificant growth of bacterial growth in urine culture after the periodical clinical assessment was done by using ICIQ- CLUTS questionnaires among the children.
- A Wilcoxon signed-rank test indicated that a homoeopathic treatment course elicited a statistically significant change in bacterial growth among the children with urinary tract infections (UTIs). Specifically, the mean bacterial growth score was significantly reduced (Mean value of 2.63) after the treatment compared to before the treatment.
- Since the overall change in growth count of gram negative bacterial colonies before and after the treatment was significant and accept that there is a effect of Homoeopathic medicines on the gram negative bacteria in chronic lower urinary tract infection among the Paediatric age group 3-12 yrs.
- The research question was thus answered and the objectives also attained.

REFERENCES

1. Mulla NM, Anwar N. Randomised non controlled clinical study on UTI in paediatrics and its management with Homoeopathic medicines of 50 milliesmal scale. Available from: http://www.homoeobook.com.
2. Marc dante K. Nelson Essentials of Paediatrics. 8th ed. Reed Elsevier India Pvt Ltd; 2010.p. 612.
3. Harrison's Principles of Internal Medicine. 16th ed. McGraw Hill Medical Publisher; 2005.p. 1715.
4. Shah SN. API Textbook of Medicine. 7th ed. The Association of Physicians of India; 2006. p. 682-683.
5. Urinary tract infection in pediatrics: an overview. J Pediatr (Rio J). 2019 Nov 26; PMID: 31783012. doi: 10.1016/j.jpmed.2019.10.006.
6. Barola S, Grossman OK, Abdelhalim A. Urinary Tract Infections in Children. Treasure Island (FL): StatPearls Publishing; 2024 Jan. p. 18, 20.
7. Davidson's Principles and Practice of Medicine. 21st ed. Churchill Livingstone Elsevier; 2010. p. 469-470.
8. Asian guidelines for urinary tract infection in children. J Infect Chemother. 2021 Nov; doi: 10.1016/j.jiac.2021.07.014.
9. Goldman L, Schafer AI. Cecil Textbook of Medicine. 24th ed. Volume II. W.B. Saunders Company; 2004.p. 1792.
10. Department of Child and Adolescent Health and Development, World Health Organization. 2005. Publications of the WHO. World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.
11. Sharma S. Urinary tract infection in children: preventing the havoc in India. Int J Community Med Public Health. 2021;8:602. DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20215025.
12. Indian Pediatric Nephrology Group, Indian Academy of Pediatrics. Bagga A, Department of Pediatrics, All India Institute of Medical Sciences. Indian Pediatr. 2001;38:1106-1115.
14. Girianto PW. Parents' Knowledge of Genetic Care and UTI Events in Toddlers in the Children's Ward. J Appl Nurs Health. 2022;4(2).
15. Figueroa TE. Recurrent Urinary Tract Infections (UTIs) and Related Conditions. Nemours Children Health; Medically reviewed by Figueroa TE, MD.
16. Zemer VS, Cohen HA. Personal hygiene, environmental conditions, and toilet use of children in primary schools: A cohort study. J Pediatr Urol. 2023; doi: 10.1016/j.jpuro.2023.06.004.
17. Aerofilow Urology. The Impact of Dehydration on UTI Risk: What You Need to Know. Medically reviewed by Gronski S, PT. 2023 Mar 20.
18. Brenner BW, Rector F. The Kidney. 11th ed. Philadelphia: Elsevier Publisher; 2020. p. 13-14.
19. Choudhari NM. A Study on Materia Medica. Reprint ed. New Delhi: B Jain Publishers Pvt Ltd; 1997.
20. Pulie JH. Homoeopathy Domestic Physician. Reprint ed. New Delhi: B Jain Publishers Pvt Ltd; 1995.
21. Rave CG. Special Pathology and Diagnostics with Therapeutic Hints. Reprint ed. New Delhi: B Jain Publishers Pvt Ltd; 1992.

22. Shinghal JN. A Home Guide Quick Bedside Prescriber. 6th ed. New Delhi: Bjain Publishers Pvt Ltd; 1990.
23. Murphy R. Homoeopathic Medical Repertory. 1st Indian Edition. New Delhi: Indian Books and Periodicals Syndicate; 1994.
24. Schroyens F. Synthesis Repertorium Homoeopathicum Syntheticum. 8th ed. New Delhi: Bjain Publishers Pvt Ltd; 2002.
25. Allen TF. The Principles and Practicability of Boenninghausen's Therapeutic Pocket Book. Reprint ed. New Delhi: Bjain Publishers Pvt Ltd; 2000.
26. Clarke JH. A Clinical Repertory. Reprint ed. New Delhi: Bjain Publishers Pvt Ltd; 1997.
Kent JT. Repertory of The Homoeopathic Materia Medica. Reprint ed. New Delhi: Bjain Publishers Pvt Ltd; 2000.
27. Wilms EB. Epidemiology and Risk Factors of UTIs in Children—A Single-Center Observation. *J Pers Med*. 2023;13(1):38. doi:10.3390/jpm13010138.
28. Shanmugam S, Kandasamy SK. Clinical Profile and Risk Factors of UTI in Children - Study from Rural Part of Central Kerala. *Evid Based Med Healthc*. 2020;7(28):1328-31. doi:10.18410/jebmh/2020/282.
29. Nji CP, Assob JCN. Predictors of Urinary Tract Infections in Children and Antibiotic Susceptibility Pattern in the Buea Health District, South West Region, Cameroon. *Int J Pediatr*. 2020. doi:10.1155/2020/2176569.
30. Boon HA, Struyf T, Crèvecoeur J, Delvaux N. Incidence Rates and Trends of Childhood Urinary Tract Infections and Antibiotic Prescribing: Registry-Based Study in General Practices (2000 to 2020). *BMC Fam Pract*. 2022;23:174. doi:10.1186/s12875-022-01784-x.
31. Clinical and Microbial Etiology Characteristics in Pediatric Urinary Tract Infection. *Front Pediatr*. 2022. doi:10.3389/fped.2022.844797.
32. De Gennaro M, Niero M, Capitanucci ML. The ICIQ-Cluts: The First Screener Questionnaire for Lower Urinary Tract Symptoms in Children. *J Pediatr Urol*. 2009;5(1). doi:10.1016/j.jpuro.2009.02.116.
33. Pannek-Rademacher S, Jus M. Usefulness of Classical Homoeopathy for the Prevention of Urinary Tract Infection: A Case Series. *Indian J Res Homoeopathy*. 2014;8(1):31-6.
34. Pannek J, Pannek-Rademacher S, Jus MS, Wöllner J, Krebs J. Usefulness of Classical Homeopathy for the Prophylaxis of Recurrent Urinary Tract Infections in Individuals with Chronic Neurogenic Lower Urinary Tract Dysfunction. *Altern Ther Health Med*. 2018;24(4):40-6. doi:10.1080/10790268.2018.1440692.
35. Jyothi NS, Siddesha G, Justina M. Efficacy of *Chimaphila Umbellata* in the Treatment of Urinary Tract Infections in Adolescent Girls - A Single-Blind Randomized Control Study. *Int J Res Rev*. 2023. doi:10.52403/ijrr.20230465.
36. Shinde RE, Singh LS. Homoeopathy Approach in the Management of Urinary Tract Infection: A Systemic Review. *Revista Safer*. 2023. doi:10.7770/safer-V13N2-art3002.
37. Coelho CDP, Motta PD, Petrillo M, Iovine RDO, Dalboni LC, Santana FR, et al. Homeopathic Medicine *Cantharis* Modulates Uropathogenic *E. coli* (UPEC)-Induced Cystitis in Susceptible Mice. *Cytokine*. 2017;92:103-9. doi:10.1016/j.cyto.2017.01.014.
38. Chand KS, Kapoor P. Two Case Reports of Integrated Management of Antibiotic-Resistant Urinary Tract Infection. *Homeopathy*. 2020;109:97-106. doi:10.1055/s-0039-1696992.
39. Chukwudi L. Classical Homeopathy and Bacterial Urinary Tract Infections. *Medicine of the Romanian Academy*. 2017. [PubMed].