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Effect of Watery Ginger Extract on some Bacteria Isolated from Urinary Tract Infections and Compared to Antibiotics

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Abstract:

The study aimed to know the pathogens that infect the urinary tract and the study of their sensitivity to antibiotics as well as compare the effect of aqueous extract of ginger with the impact of antibiotics on the growth of bacterial isolates. Sixty three clinical urine samples were brought to microbiology laboratory at the Department of Community Health. The urine samples were cultured on the appropriate media and then carried out biochemical tests after that the Api 20 used to confirm the diagnosis. The results were showed isolation and identification of the bacterial isolates (*E.coli* 58.7%, *P. mirabilis* 28.5% and *K. pnumonae* 20.6%). Also the results of the use of antibiotics (cefamandole (30mcg), streptomycin (10mcg), Piperacillin (10mg), Ceftizoxime (5mcg), rifampin (5mcg), the *E.coli* and *P .mirabilis* were resisted the influence of the antibiotics while the K. pnumonae was sensitive to cefamandole, streptomycin and resistant toother antibiotics. The results of the use of an aqueous extract of ginger (50% and 100%) concentration were showed the obvious effect on the growth of the bacteria isolated.

Introduction:

Urinary tract infections are considers Of infection in large common in humans. The most cases are caused by A few number of bacteria, E. coli isolates in particular are responsible for 80% of the UTI (1). These strains are found in the normalflora of the intestinal tract, skin, andvagina. However, under individualpredisposing conditions they can multiplyrapidly and are capable of adheringto uroepithelial cells, producinginfection (2).

Escherichia coli is enterobacteriacae that causes most common intestinal inflammation and difficult to treat by antibiotics because the resistant of it (3).

Proteus, one of the opportunistic pathogens that infect human and animal intestines and cause a variety of disease and infections of the urinary tract(4).As well as colonize surfaces urinary catheter and cause meningitis for newborn babies and arthritis(5).

Klebsiella is non-motile, gram negative, lactose fermenting,

encapsulated, return to the Enterobacteriaceae (6). It has even replaced *Escherichia coli* in some centers as a nosocomial pathogen. It causes urinary tract infection, pneumonia, septicemia , rarely diarrhea, and pyogenic infections, (7).

The use of antibiotics are increasingly lead to get resistance from the bacteria (8). So it has to be an alternative to chemotherapy, a treatment by plant extracts that are a few side effects(9).

Ginger (*Zingiberofficinale*) is a medical plant which has been broadly used all over the world, since antiquity, for a wide array of unrelated ailments including arthritis, cramps, rheumatism, sprains, sore throats, muscular aches, pains, constipation, vomiting, hypertension, indigestion, dementia, fever and infectious diseases (10).

This study was aimed to : 1.The isolation and identification of the causative agent of urinary tract infection from urine samples.

2.Determination of Ginger extractas antimicrobial agent against pathogenic bacteria (*Escherichia coli* ,*P. mirabilis and K. pnumonae*) and compared with the efficiency of different antibiotics.

Material and methods:

Clinical study : Urine samples were collected from 63 clinical samples from patiant that found in Teaching AL-Karama Hospital in was sit province. Urine samples were collected in sterile tubes. Immediately ,following collection, the samples were transported to the laboratory in kut technical institute by cooling box.

Culturing: All urine samples from clinical cases were cultured on blood agar and Macconky agar and incubated at 37°C for 24 hrs. Diagnosis depend on morphological character (shape ,color and size) of colony, then suspected isolates sub cultured on Macconky agar and examined via gram stain, also cultured on slant nutrient agar for biochemical testing. Diagnosis of isolates according to (11). Api-20E system (Analytical profile index for Enterobacteriaece test) was done to confirm the diagnosis.

Antibiotic assay:

Antibiotic sensitivity of bacterial isolates were done by Bauer's and Kirby's disc diffusion method (12).Bacteria were grown in nutrient broth and cultured on Mueller Hinton agar by swabs after that the antibiotic discs were put on media and pressed gently followed by overnight incubation. The antibitics that were tested included cefamandole (30 mcg), streptomycin (10 mcg), Piperacillin (10mcg), Ceftizoxime (5mcg), rifampin (5mcg).

Antimicrobial assay

The antimicrobial activity of ginger water extract against several human causative agent was detected by agar diffusion method. The bacterial isolates were used *(p. mirabilis, E. coli* and *K. pnumonae)* incubated at 37°C for 24-48 hrs. Loops from each culture were transported separately in 5 ml sterile saline solution tube to prepare suspens on of each cultur. with culture suspension was pourd into four plats, labeled and allowed to solidify. After solidification of the media on plates, the

wells were cut in each plate usng sterile borer. 0.1 ml of 50% and 100% concentration of ginger extract to be tested was poured into different wells and the plates were incubated at 37°C for 24 hrs. After incubation the plates were showed for the found of inhibition zone.

Results and discussion:

Clinical study :Sixty three urine samples which were collected 37 *E.coli* isolates were isolated (58.7%), 18 *Proteus mirabilis* were isolated (28.5%), 13 *K. pnumonae* were isolated (20.5%) as in table 1.

Table 1: No. of bacterial isolates from urine sample

Bacterial isolates	No. of urine samples	No. of positive samples	Percentage %
E. coli	**63**	**37**	**58.7%**
P. mirabilis	**63**	**18**	**28.5%**
K.pnumonae	**63**	**13**	**20.5%**

The results shown isolation and identification of *E. coli* in a percentage of (58.7%) positive results from urine sample. The results of the present study were in agreement with other researchers (13), who mentioned that (43.47%) of UTI due to *E.coli*. In the United States for instance, each year about (11%) of women tested at least one urinary tract infection (14). In Kenya, (24%) prevalence of UTI was recorded with more females which infected (15).

The results were obcerved isolation and identification of *Proteus mirabilis* (28.5%) from urine sample. The results of the present study were in agreement with other investigators (16) who showed that (12%) of UTI due to *Proteus mirabilis*. Other researchers also approved that proteus are the third causetive agents of UTI after *E. coli and Kleibsellapneumoniae* (5).

These results were showed isolation and identification of *Klebsiella pneumonia* (20.5%) from urine sample. our results agreement with (17) which isolation the bacteria from urine sample in India also the results similar to (18), all urine isolates which is similar to (19).

The results of biochemical tests:

"The diagnostic based on biochemical test that shown in (table 2). it had shown that all isolate respond to catalase and cimon citrate test being the sole source to carbon and this result is similar to(20). These diagnostic isolate give a positive test to methyl-red and a negative one to vogous- proskaure because of not composing Acetyl-Methyl Carbinol out of the moleculer decomposition of sugur and this is identical with (20). Concerning the indol test ,the result was negative for all isolates under study ;and this test is also used to distinguish between *P. mirablis*and the rest of its genus while the positive result is by composing red ring due to the decomposition of the

amino acid (tryptophane) and conversed to indol. Also the isolates gave a negative result to oxidase test because of being unable to produce oxidase enzyme (21)".

"All the isolated *Klebsiella pneumonia* were non motile, Gram negative straight rods, arranged singly or in pairs. Morphological examination revealed that their colonies were large, circular, convex, grayish white and mucoid on nutrient agar. While on MacConkey s agar, lactose fermenting (pink) colonies was detected. All strains were nonmotile and gave negative results for oxidase, indole, methyl red, gelatin liquefaction.

On the TSI test, *K. pneumoniae*strains produced acids both in butt and slant along with gas production, while they showed positive result for citrate utilization. and the results were elucidated" in (table2).

Table(2): Biochemical tests of bacterial isolates from urine samples .

biochemical tests	*P.mirablis*	*K. pnumone*	*E.coli*
Catalase	+	+	+
Oxidase	-	-	-
Vogous-Proskaur	-	-	-
Indole	-	-	+
Methyl Red	+	-	+
Citrate Utilization	+	+	-
Urease	+	-	-
H2S Production	+	-	-
Groth on TSI medium	**Acid/Alkaline**	**Acid/acid**	**acid**

Antibiotic sensitivity testing and Gingerextract:

The result of susceptibility test for *Proteus mirabilis, E.coli and K. pnumonae isolates* against five antibiotics which includes cefamandole (30mcg), streptomycin (10mcg), Piperacillin (10mg), Ceftizoxime (5mcg), rifampin (5mcg) as in table 3.

Table3: antibiotic sensitivity test of bacterial isolated from urine samples

Antimicrobial agents	Zone inhibition *Proteus mirabilis*	Zone inhibition *E.coli*	Zone inhibition *K.pnumonae*
cefamandole	-	-	**4mm**
streptomycin	-	-	**7mm**
piperacillin	-	-	-
rifampin	-	-	-
cefixime	-	-	-

Antibiotic suensetivity test for (5) vary antibiotics by disc diffusion method recorded by (NCCLS) guide line was perfrmed for the bacterial isolates. The isolates (*Proteus mirabilis*, *E.coli*) were resistant to all five antibiotic, this might be due to the produce of β- lactamase enzyme (cefamandoie, ceftizoxime, piperacillin) by the isolates or inability to diffuse across the bacterial outer membrane (22). These results agreement with (20, 23).

The our results were showed the *Klebsiella pneumonia* moderately susceptible to cefamandole and streptomycin these results agreement with (24). Also the result of present study revealed *Klebsiella pneumonia* resistance to piperacillin, cefixime and rifampcin theses results similar to (25).

Ginger extract: The results of ginger extracts (50% and 100%) were shown in table 4.

Table4: Sensitivity of the isolates to ginger extract

Ginger extract	Inhibition zone		
	K.pnumonae	***Proteus mirabilis***	***E. coli***
Ginger 50%	**12mm**	**13 mm**	**14mm**
Ginger 100%	**13mm**	**15 mm**	**16mm**

The present study was done to shown the antimicrobial activity of ginger water extract, the result showed the effect watery Ginger extract on the *Proteus mirabilis*, *Ginger* 50% gave inhibition zone (13mm) while the Ginger 100% was (15mm), The result also recorded that water extract of *Zingiberofficinale* produced the large zone of inhibition on *Proteus mirabilis* these results agreement with (22), Our findings compare well with the findings of (26). The result showed the effect of Ginger (50%) gave inhibition zone (12mm) while the Ginger 100% was (13mm) on growth of *K.pnumonae*, these results agreement with (27) which showed the Ginger has direct anti-micrbial activity and thus can be used in treatment of bacterial infections. While the results of current study were observed the effect of water ginger extract on growth of *E. coli* that Ginger of 50% gave an inhibition zone of (14mm), while Ginger of 100% was (16mm). Antimicrobial agents with selective toxicity are especially useful as a chemotherapeutic agent in treating infectious diseases and may be a function of specific receptor requirement for drug attachment or it may based on the inhibition of biochemical events to the pathogen but not to the host (21).

References:

1-Kunin CM. Detection, prevention and management of urinary tract infections, 4th ed. Philadelphia, PA: Lea & Febiger;. p. 447. (1987)

2-Clarridge JE, Pezzlo MT, Vosti KL, Weissfeld AS. Laboratory diagnosis of urinary tract infections. Washington, D. C.: American Society for Microbiology; (1987).

3-Weil, A. Spontaneous Healing. New York: Alfred A. Knopf, (1995).

4-Sabubba, N. A. ; E. Mahenthiralingan and D. J. Stickler. Molecular epidemiology of Proteus mirabilis infections of the catheterized urinary tract. Clin. Microbiol. 41 (11): 4961–4965. (2003)

5-Stickler, D. J. Bacterial biofilms in patients with indwelling urinary catheters. Rev. Nature. Clin. Urol.11 (5): 598- 608. (2008)

6-Elmer W. Koneman, Stephen D. Allen, Willian M. janda, Paul C. Schreckenberger and Washington C. Winn. Color Atlas And Textbook Of Diagnostic Microbiology. 6th edition. Baltimore: Lippincott Williams Wilkins. (2006).

7-ArtiKapil. Ananthanarayan & Panikers Textbook of Microbiology.
9th edition. Chennai: Universities Press Pvt Ltd. (2013).

8-Abimbola KA, Obi CL, Alabi SA, Olukoya DK and Ndip RN. Current Status on biotypingantibiogram and plasmid profiles of E. coli isolates. East Afr. Med. J., 70: 207- 210. (1993).

9-Khulbe K and Sati SC.. Antibacterial Activity of Boennin ghausenia albiflora Reichb. (Rutaceae). Afr. J. Biotechnol. 8(22):6346-6348. (2009).

10-Kadnur, S.V., Goyal, R.K., Beneficial effects of *Zingiberofficinale* roscoe on fructose induced hyperlipidemia and hyperinsulinemia in rats. Indian journal of experimental biology, 43(12), 1161. (2005).

11-Macfaddin, J.F. Biochemical test for identification of medical bacteria .The Williams and wilkinsCo.USA. (2000).

12-Bauer, A.W., et al.. Antibiotic susceptibility testing by a standardized single disk method. Am. J. Clin. Pathol.; 45:493-496. (1966).

13-Hyams, K., A. Bourgeois, B. Merrell, P. Rozmajzl, et al. Diarrheal disease during Operation Desert Shield. N. Engl. J. Med. 325:1423–1428. (1991).

14-M.S. Donnenberg, J.B. Kaper. Enteropathogenic *Escherichia coli* Infect. Immun., 60, pp. 3953– 3961. (1992).

15-M.S. Donnenberg, J.B. Kaper, B.B. Finlay Interactions between enteropathogenic *Escherichia coli* and host epithelial cells. Trends Microbiol., 5, pp. 109–114. (1997).

16-Sosa, V.; Schlapp, G. and Zunino, P.. Proteus mirabilis isolates of different origins do not show correlation with virulence attributes and can colonize the urinary tract of mice. Microbiol. 152:2149-215. (2006).

17-Manikandan C. and Amsath A.. Antibiotic susceptibility pattern of *Klebsiellapneumoniae* isolated from urine samples. *Int. J. Curr. Microbiol. App. Sci*2 (8): 330- 337. (2013).

18-Ravichitra K. N., HemaPrakash P., Subbarayudu S. and SreenivasaRao U. Isolation and antibiotic sensitivity of *Klebsiella pneumonia* from pus, sputum and urine samples. *Int. J. Curr. Microbiol. App. Sci*3(3): 115-119. (2014).

19-Shamweel Ahmad, Nami Fawazan Al- Juaid, Faris Q. Alenzi, Essam H. Mattar and Osama El- Sayed Bakheet. . Prevalence, Antibiotic Susceptibility Pattern and Production of Extended-Spectrum– Lactamases Amongst Clinical Isolates of Klebsiellapneumoniae at Armed Forces Hospital in Saudi Arabia. Journal of the College of Physicians and Surgeons Pakistan. 19(4): 264-265. (2009).

20-Philippon., A., Alert, G. and Jacoby, G. A..Plasmid- determined ampC- type β- lactamases. J Antimicrob. Agents. Chemother. vol. 42,pp. 1-11. (1989).
21-Omoya F.O. and F.C. Akharaiyi.. Mixture of Honey and Ginger Extract for Antibacterial Assessment on Some Clinical Isolates. *Int. Res. J. of Pharmaceuticals, 2(5):127-132*. (2012).
22-George, A., Jacopy, M.D., Silvia, L. and Munoz-Price, M. D.. Mechanisim of disease; The new β- lactamases. J. N. j. Med. vol.91,pp. 352-380. (2005).
23-Hyams, K., A. Bourgeois, B. Merrell, P. Rozmajzl, et al.. Diarrheal disease during Operation Desert Shield. N. Engl. J. Med. 325:1423–1428. (1991).
24-Kamatchi C., Magesh H., Uma Sekhar and Rama Vaidyanathan. Identification of Clonal Clusters of *Klebsiellapneumoniae* Isolates from Chennai by Extended Spectrum Beta Lactamase Genotyping and Antibiotic Resistance Phenotyping Analysis. American Journal of Infectious Diseases 5 (2): 74-82. (2009).
25-Knothe, H., P. Shah, V. Krcmery, M. Antal and S. Mitsuhashi,. Transferable resistance to cefotaxime, cefoxitin, cefamandole and cefuroxime in clinical isolates of *Klebsiellapneumoniae* and *Serratiamarcescens*. Infection, 11: 315-317. (1983).
26- Patmaraj S. Drug delivery. J. Nucl. Med. 7:91-95.
27-Tan BKH and Vanitha J. (2004). Immunomodulatory and Antibacterial Effects of Some Traditional Chinese Medicinal Herbs: A Review. Curr. Med. Chem., 11(11):1423-1430. (2000).

تاثير مستخلص الزنجبيل المائي على بعض الجراثيم المعزولة من اصابات القناة البولية ومقارنته المضادات الحياتية

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الخلاصة:
هدفت الدراسة الى معرفة المسببات المرضية التي تصيب القناة البولية ودراسة حساسيتها للمضادات الحياتية وكذلك مقارنة تاثير المستخلص المائي للزنجبيل مع تاثير المضادات الحياتية على نمو الجراثيم. تم جلب 63 عينة ادرار الى مختبر الاحياء المجهرية في قسم صحة المجتمع وتم زراعتها على الأوساط الزرعية المناسبة وبعد ذلك اجريت عليها الفحوصات الكيموحيوية ولتاكيد التشخيص تم اجراء فحص Api 20. اوضحت النتائج عزل وتشخيص الجراثيم التالية (*E.coli* بنسبة 58.7%، جراثيم *P. mirabilis* بنسبة 28.5% وجراثيم *K.pnumonae* بنسبة 20.6%). كذلك اوضحت نتائج استخدام المضادات الحياتية (cefamandole (30mcg), streptomycin (10mcg), Piperacillin (10mg), Ceftizoxime (5mcg), rifampin 5mcg) على الجراثيم المعزولة حيث تبين ان جراثيم *E.coli* وجراثيم *P. mirabilis* قاومت تاثير المضادات الحياتية بينما كانت جراثيم *K .pnumonae* متحسسه للمضادات الحياتية streptomycin, cefamandole ومقاومة لبقية المضادات الحياتية بينما اظهرت نتائج استخدام المستخلص المائي للزنجبيل وبتركيزين (50% و100%) تاثير واضح على نمو الجراثيم المعزولة.