INTERNATIONAL JOURNAL OF
INTEGRATIVE AND
MODERN MEDICINE

Comparative Analysis of the Diuretic Activity of Various Forms of the Drug From Medicinal Plants of the Flora of Uzbekistan

A. A. Gaybullaev, S. S. Kariev, Sh. M. Khalilov
Department of Urology and Andrology, Center of the Development of Professional Qualifications of Medical Workers, Tashkent, Uzbekistan

Annotation: From the medicinal plants of the flora of Uzbekistan, a diuretic collection and an alcoholic extract from the collection have been developed for the treatment of patients with urolithiasis. The drugs have shown promising results for the prophylaxis and metaphylaxis of calcium urolithiasis. The next stage in the improvement of the officinal form of the collection was made hydrolyte. A comparative study of the diuretic activity of various forms of the developed phytopreparation in the experiment was carried out. The results showed the presence of a strong diuretic effect in all forms of the drug.

Keywords: herbal diuretics, phytopreparations, hydrolyte, experiment on rats.

Relevance. Urolithiasis in the developed countries of the world occurs in 4-5% of the adult population and has a stable growth trend. Without prevention, relapses of stone formation develop in 50-60% of patients [1, 2, 3]. The leading causes of stone formation are considered to be functional and metabolic disorders, the correction of which requires long-term medication. Despite the expansion of the range of effective synthetic medicines, herbal diuretics occupy a significant place in the treatment and prevention of this pathology [4]. Throughout the history of mankind, the plant world has been a source of valuable medicines. By the mid-20s of the twentieth century, medicines made from plants accounted for 70-80% of all medicines and even today a third of drugs are extracted from plant raw materials [5]. In recent decades, the number of studies has increased to assess the effectiveness of phytopreparations in urology, and in particular for the metaphylaxis and prevention of urolithiasis. Herbal preparations are the most physiological and do not have negative properties with prolonged use [4, 6, 7, 8, 9, 10]. The other side of the issue is that there is not a single drug among them that would fully meet the requirements for the prevention and metaphylaxis of urolithiasis [11]. In the process of studying the anti-lithogenic properties of representatives of the local flora, a diuretic collection from medicinal plants of the local flora, as well as an extract from this collection for the treatment of urolithiasis, was developed at the Department of Urology and Andrology of the Center for the Development of Professional Qualifications of Medical Workers of the Ministry of Health of the Republic of Uzbekistan (CRPCMR). But the convenience of storing the infusion and the presence of alcohol in the extract gave rise to the creation of an official, non-alcoholic form of the drug – hydrolate. It is quite expected that the properties of the drug will change due to a change in the technology of preparation. In this regard, it is necessary to study the properties of the new drug, especially with prolonged use.

Purpose: To study the diuretic abilities of the hydrolate from the medicinal collection.

Research materials and methods. The study was conducted on 40 mongrel male rats, aged 8 weeks. The experimental animals were acclimatized to a room temperature of 22°C with cycles of 12 hours of illumination and 12 hours of darkness in vivo conditions. They were then randomly divided into four groups of 10 each. All rats received standard nutrition throughout the course of the study and had free access to drinking water [12]. The duration of the experiment is 30 days. At the end of each week of the experiment, the rats were placed in metabolic chambers to measure OSD. At the same time, each animal was weighed. Group No. 1 was a control group, per os rats were injected 3 times a day with 5 ml of distilled water. Group No. 2 - rats per os were injected 3 times a day with 1.5 ml infusion from the collection diluted with distilled water to a volume of 5 ml. Group No. 3 - per os rats were injected

3 times a day with 1.5 ml of 40% alcohol extract from the collection diluted with distilled water to a volume of 5 ml. Group No. 4 - per os rats were injected 3 times a day with 1.5 ml of hydrolate solution from the collection diluted with distilled water to a volume of 5 ml. The composition of the collection includes Flowers of yarrow (Flores millefolii), Roots of licorice (Glycyrrhiza glabra) and Immortelle of Samarkand (Helichrysum agepagium). The hydrolate from the collection was obtained by hydrodistillation. The plants were dipped into water, brought to a boil and the resulting condensate was collected.

Results and discussion.

Data on the study of diuretic activity during drug administration are shown in Table 1.

Infusion from the collection for 30 days increased diuresis by 50.94% on average. The maximum increase in diuresis was observed on day 30 to 77.02% of the initial value. The diuretic effect in this group has been reliable since the 14th day of phytotherapy.

The extract has a more pronounced diuretic effect and, on average, increased diuresis by 63.5%. The maximum increase in diuresis was observed on day 7 to 69.15% of the initial value. The diuretic effect in this group has been reliable since the 3rd day of phytotherapy.

The hydrolat also has a strong diuretic effect and increased diuresis by 57.84% on average. The maximum increase in diuresis was observed on day 30 to 119.5% of the initial value. The diuretic effect in this group has been reliable since day 7.

In the control group, the OSD remained stable in dynamics, without any significant changes. The stable increase corresponds to physiological standards with the growth of animals, the average increase in diuresis was 13.34% of the initial value.

Table.1. The effect of drugs on urination in rats (daily diuresis, M ± m, ml / day)

Group	Initial	3th day	7th day	14th day	30th day
Group 1 control	6,41±0,21	6,56±0,21	6,42±0,19	6,63±0,23	6,55±0,21
Group 2 infusion	5,88±0,32	7,70±0,36	7,21±0,45	9,97±0,21*	10,32±0,21*
Group 3 extract	5,51+0,29	8,49±0,33*	9,32±0,19*	9,17±0,24*	9,11±0,26*
Group 4 hydrolate	6,25±0,36	7,01±0,33	8,31±0,24*	10,42±0,18*	13,72±0,23*
*-p<0,05					

On day 30, the administration of AF to rats was stopped. It is important to know what is the duration of the diuretic effect of the drug after discontinuation of its administration (Table 2). In the control group (No. 1), the volume of daily urine did not change and remained at the same level. In the group (No. 2), where the experimental animals were given an infusion from the collection, the diuretic effect of the drug persisted for another 14 days. In the group (No. 3), where the experimental animals were given an alcohol extract from the collection, the diuretic effect of the drug remained the same for 14 days. In the group (No. 4), where the experimental animals were given hydrolate from the collection, the diuretic effect of the drug persisted only for 7 days.

Table. 2. The effect of drugs on urination in rats after discontinuation of phototherapy (daily diuresis, M = m, ml / day)

	The last day of phyto therapy	3th day	7th day	14th day	30th day
Group 1 control	6,55±0,21	6,6±0,22	6,4±0,35	6,8±0,5	6,5±0,41
Group 2 infusion	10,32±0,21	9,6±0,22	9,4±0,35	8,3±0,25*	9,1±0,41
Group 3 extract	9,11±0,26	8,39±0,37	8,01±0,43	6,91±0,33*	6,11±0,48*
Group 4 hydrolate	13,72±0,23	13,2±0,23	11,1±0,29*	8,7±0,33*	6,75±0,32*
*-p<0,05					

In addition, to assess the general condition (growth and development) of rats and the effect of drugs on the physiology of experimental animals, the dynamics of rat weight were studied (Table 3). This indicator in all groups increased with age and had no significant difference with the generally accepted criteria of normal development [12, 13].

There was a difference in weight gain between the groups in group 3 rats. This may be due to metabolic changes in the experimental animals due to the presence of alcohol in the extract. Which may also be the reason for the early manifestation of the diuretic effect in this group. Nevertheless, the absence of differences with the indicators of the control group and the literature data indicate the safety of long-term use of the studied drugs in relation to the physiology of experimental animals.

Table 3. Weight dynamics of experimental rats during phytotherapy (M±m, g)

Group	Initial	3th day	7th day	14th day	30th day
Group 1 control	213,3±3,1	214,1±3,3	256,2±3,1	292,4±4,3	326,6±2,5
Group 2 infusion	215,1±3,2	215,3±3,1	249,3±2,3	287,9±3,9	319,7±3,3
Group 3 extract	219,2±2,5	218,1±4,5	271,1±3,3	299,1±4,8	347,3±4,5
Group 4 hydrolate	212,1±4,2	214,0±4,1	247,3±2,7	279,5±3,9	321,8±3,7

Thus, the study of the diuretic activity of various forms of the developed phytopreparation in the experiment showed the presence of a strong diuretic effect in all forms of the drug. The presence of an alcoholic component in the extract may have caused an early manifestation of a significant increase in diuresis, as well as the achievement of maximum DD 7 days earlier than that of the infusion and hydrolate. The duration of DE in hydrolate was 7 days, shorter than in infusion and extract. Consequently, different cooking techniques have caused differences in effects.

Conclusion. Thus, the new form of the original domestic drug Li-tolit-A has a strong diuretic effect, and increases urination in the experiment by 57.8%. With a 30-day administration of the drug, it does not have a negative effect on the overall development of animals. Therefore, it can be used as a diuretic for the prevention and metaphylaxis of stone formation.

List of used literature

1. WHO methods and data sources for global burden of disease estimates 2000-2016 (Global Health Estimates Technical Report /2018.4) June 2018 http://www.who.int/gho/mortality_burden_disease/en/index.html

2. Guidelines EAU on Urolithiasis. Edn. presented at the EAU Annual Congress Amsterdam, 2022. ISBN 978-94-92671-16-5.
3. Medical Management of Kidney Stones: AUA Guideline. Margaret S. Pearle et. al., The Journal of Urology, 2014, Vol. 192: 316-324.
4. Butterweck V., Khan SR. Herbal Medicines in the Management of Urolithiasis: Alternative or Complementary? Planta Med. 2009; 75(10):1095–1103.
5. Ermolenko T.I. Prospects For The Use Of Phytopreparations In The Treatment Of Urolithiasis. Scientific bulletin. The Medicine series. Pharmacy. 2014. № 18 (189). Issue 27, pp.205-211.
6. Premgamone A, Sriboonlue P, Disatapornjaroen W, Maskasem S, Sinsupan N, Apinives C. A long-term study on the efficacy of a herbal plant, Orthosiphon grandiflorus, and sodium potassium citrate in renal calculi treatment. Southeast Asian J Trop Med Public Health. 2001; 32:654–660.
7. Melzig MF. Goldenrod – a classical exponent in the urological phytotherapy. Wien Med Wochenschr. 2004; 154:523–527.
8. Gaibullaev A.A., Dadabaev A.K., Kariev S.S. Choosing the optimal duration of the course of phytotherapy for oxalate urolithiasis. Methodological recommendations, 2009, 20.
9. Gaybullaev A.A., Kariev S.S., Tursunov B.Sh. The long-term treatment of calcium urolithiasis with herbal drug "Canephron N" // Abstracts of the 1st Meeting of the EAU Section of Urolithiasis (EULIS), 7-10 September 2011, London, United Kingdom. European Urology Supplement, Volume 10, Issue 7, October 2011, 503
10. Gaybullaev A., Kariev S. Effect of long-term Canephron® N treatment on urinary risk factors associated with idiopathic calcium Urolithiasis. Ärzte Zeitung Springer Medizin, 2013, Issue 34:16-20.
11. Kariev S.S. Improvement of methods of drug treatment of urolithiasis. The author's abstract. Doctoral (DSC) dissertation in medical sciences. Tashkent 2019, 36.
12. Trofimets E.I., Kotelnikova A.E., Kryshen K.L. Review of obtaining urine samples from laboratory animals. Laboratory animals for scientific research. 2021; 01: 30–47.
13. The reference book. Physiological, biochemical and biometric indicators of the norm of experimental animals. Edited by: Makarova V.G. St. Petersburg: LEMA Publishing House, 2013, 116.