

DIURETIC EFFECT OF POWDERED *CERASUS AVIUM* (CHERRY) TAILS ON HEALTHY VOLUNTEERS

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ABSTRACT

In this study, the diuretic activity of powdered cherry stalk was evaluated in 13 healthy volunteers by means of their water balance. In addition to biochemical parameters, such as urinary electrolyte concentration, osmolality and any adverse reaction were determined. The capsules of cherry stalks were administered at an equivalent dose of 2.0 grams of the plant per person. Urinary biochemical determination was made of concentration of electrolytes (sodium, potassium, chloride and calcium), urinary volume and osmolality by standard laboratory procedures. Statistical evaluation was performed by Student's *t* and Wilcoxon rank tests. After administration of cherry stalk, the mean of urine calcium, sodium, chloride, and urine volume increased, but the amount of urine potassium and urine osmolality did not change. No adverse reaction was observed. Powdered *C. avium* stalk increased mild urine volume confirming thus the claimed diuretic effect of the herb. Administration of cherry stalk caused urinary sodium and chloride rising less than loop diuretics but higher than the others. Because of rising calcium excretion, it should be used with cautious in those with urolithiasis.

Keywords: *Cerasus avium*; cherry stalk; healthy volunteers; diuretic, biochemical parameters.

INTRODUCTION

Cerasus avium (L.) Moench (syn. *Prunus avium* L.) is a tree from family Rosaceae, its fruit stalks (cherry tails) are sold by herbal druggists in Iran and are used as decoction to relief of renal stones, edema and hypertension. Mild diuretic effect of the stalks has been reported in Iranian Traditional Medicine documents (Amin, 2005; Kirtikar and Basu, 2001; Zargari; Pharmacopoeia) due to the high content of flavanoids and potassium (MirHaydar, 1993). Fresh cherry has antioxidant activity (Seeram *et al.*, 2001) and the extract of its fruit stalks may reduce inflammations (Blazso *et al.*, 1994) and affect on cardiovascular system and smooth muscle (Hetenyi *et al.*, 1969; Hetenyi *et al.*, 1969). Diuretic activity of some plants was investigated, previously. Lemus *et al.*, are evaluated on diuretic activity of an *Equisetum bogotense* tea in healthy volunteers (Lemus *et al.*, 1996). In order to evaluate the potential diuretic effect of *Elephantopus scaber* and *Alpinia speciosa*, a clinical trial was carried out in ten healthy volunteers and their effects compared to placebo. The only significant finding ($p < 0.05$) was a slight diuresis with *A. speciosa*. No effect on electrolytes or renal function parameters was observed, and this probably excludes any renal tubular or glomerular effect from these substances (Laranja *et al.*, 1991). Also, potential diuretic effect of *Elephantopus scaber*, *Alpinia speciosa* and *Tradescantia diuretica* were evaluate. The only significant data were a light increase in diuresis ($p <$

0.05) with *A. speciosa*. Authors didn't find any effect in electrolytes excluding therefore, a tubular effect of these teas in modifying Na, K, Ca, P and uric acid excretions (Laranja *et al.* 1992). In this study, the diuretic activity of powdered cherry stalk was evaluated in 13 healthy volunteers by means of their water balance. In addition to biochemical parameters, such as urinary electrolyte concentration, osmolality and any adverse reaction were determined. As far as we know, no scientific data have been published supporting the effect of cherry pedicel on diuresis.

MATERIAL AND METHODS

The fresh and dried cherry stalks were purchased from herbal markets in Tehran (Iran), on March 2007; a voucher sample has been deposited at the Laboratory of Medicinal Plants, School of Pharmacy, Shaheed Beheshti University (M. C.), Iran. The plant material was powdered and was dropped in capsules. Each capsule was contained ~330 mg of powdered cherry stalks.

The double blind study was performed on 13 (8 females, 5 males) healthy volunteers (aged 20-40 year old) following medical examination in the Ali-Asghar Hospital, Tehran. They haven't congestive heart failure, hypertension or any other related diseases. The consent was taken from all participants. The volunteers were divided in two groups, randomly. The capsules of cherry stalks were administered at an equivalent dose of 2.0 grams of the plant per person, 2 capsules (size 000) every

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Table 1: The amount of urinary parameters and demographic data at start of study presented as mean (\pm standard deviation)

	Female (n= 8)	Male (n=5)	P value
Age (yr)	28 (\pm 5.15)	32 (\pm 3.81)	NS
Weight (kg)	54.50 (15.90)	81 (13.30)	0.01
Urine calcium (mg/dl)	119.13 (90.53)	133.40 (102.25)	NS
Urine sodium (mEq/L)	104 (52.73)	136.20 (45.39)	NS
Urine potassium (mEq/L)	41.31 (27.39)	46.40 (13.16)	NS
Urine chloride (mEq/L)	106.38 (46.26)	115.40 (36.94)	NS
Urine osmolality (mosm/kg/H ₂ O)	786.25 (271.43)	728.80 (204.44)	NS
Urine volume (ml)	745.63 (334.76)	908 (272.27)	NS

NS= Not significant

Table 2: The mean (SD) of urinary chemistry before and after prescribing *C. avium* stalk

	Placebo (n=13)	<i>C. avium</i> stalk powder (n=13)	P value	95% Confidence interval	
				Lower	Upper
Urine calcium (mg/dl)	124.61 (91.20)	181.15 (90.51)	0.0001	-79.04	-34.0
Urine sodium (mEq/L)	116.38 (50.73)	134.84 (45.65)	0.008	-31.12	-5.8
Urine potassium (mEq/L)	43.26 (22.4)	45.15 (16.98)	NS	-15.95	12.1
Urine chloride (mEq/L)	109.84 (41.52)	128.3 (34.12)	0.006	-30.39	-6.5
Urine osmolality (mosm/kg/H ₂ O)	764.15 (240.31)	857.15 (215.63)	NS	-241.21	55.2
Urine volume (ml)	808 (311.19)	1037.5 (338.29)	0.001	-258.19	-83.3

8 hours (for 24 hours). The administrated dosage was based on folk medicine. To other group had administrated placebo (corn starch). After a week, placebo group had administrated drug, and vice versa. The subjects didn't hospitalize during the study.

The evaluation was performed for 24 hours period after administration of last dose. The volunteers were submitted to standardization of their liquid intake and excretion. Drug consumption, alcoholic drinks or natural diuretic (coffee, tea) beverages were not permitted during the experience and food consumption was standardized by a dietary regime. The subjects weren't smokers. The diuresis for a 24 h period after administration of last dose was determined by measurement of diuresis from the first micturition after waking, until the last micturition before being awoken on the following day.

Medical controls were accomplished on each volunteer to evaluate their arterial pressure, body weight, adverse reactions (diarrhea, dizziness, cramps, vomits and hypotension). Urinary biochemical determinations were made of concentration of electrolytes (sodium, potassium, chloride and calcium) by flame spectrophotometer (USP XIII), while urinary volume and osmolality were determined by standard laboratory procedures.

Exclusion criteria were either history of hypertension or renal disease, endocrine disorder, vigorous exercises, drinking coffee, tea or alcoholic beverages, pregnancy,

menses or incorrect sample collection. Statistical evaluation was performed by Student's-*t* and Wilcoxon rank tests.

RESULTS AND DISCUSSION

As shown in Table 1, the values of urine parameters were not statistically different in both sexes. After administration of cherry stalk, the mean of urine calcium, sodium, chloride, and urine volume increased, but the amount of urine potassium and urine osmolality did not change (Table 2), the mean (\pm SD) of urine calcium was 124.6 mg (\pm 91) vs 181.1 mg (\pm 90), of sodium was 116.3 mEq/L (\pm 50.7) vs 134.8 mEq/L (\pm 45), of potassium was 43.2 mEq/L (\pm 22.4) vs 45.15 mEq/L (\pm 16.98), of chloride was 109.8 mEq/L (\pm 41.5) vs 128.3 mEq/L (\pm 34.1), volume 808 ml (\pm 311.1) vs 978.8 ml (\pm 338.2) and urine osmolality 764.15 mosml/kg/H₂O (\pm 240.3) vs 857.15 mosml/kg/H₂O (\pm 215.63), respectively. The average percentage of increment of urine calcium was five times as many higher than those of urine sodium and chloride excretion. This observation was the same for both females and males. No adverse reaction was observed.

Powdered *C. avium* stalk increased mild urine volume confirming thus the claimed diuretic effect of the herb. The administrated dosage was based on folk medicine. Whether higher or longer usage of it has more pronounced diuresis, was not studied.

Although 15% rising of sodium chloride excretion after powdered stalk might be comparable to carbonic anhydrase inhibitors, osmotics, thiazides or loop diuretics, the negligible urinary excretion of potassium was in favor of thiazide diuretic and the prominent urinary calcium excretion was against it. The expected sodium chloride excretion following loop diuretic is 25% but for the other mentioned diuretics is 5-10%. One day administration of cherry stalk caused urinary sodium and chloride rising less than loop diuretics but higher than the others.

The urine osmolality increased slightly which wasn't statistically significant, therefore; we presumed that it might have no osmotic effect. Loop diuretics usually impair urinary concentration and decrease urine osmolality that could not be shown during our short study.

Higher amount of urinary calcium after cherry stalk ingestion is sound like either loop diuretic or carbonic anhydrase inhibitor. In present study, urine bicarbonate was not measured. In Iranian Traditional Medicine, these stalks are administrated for treating of renal stones. Because of this observation showed the increment urinary excretion of calcium, sodium and chloride, we suggest that it should be used with precautions in those patients and also, in patients having any disorders associated with calcium, sodium and/or chloride deficiency. The mechanism of action of this herbal drug remains to be determined in further study. The results of this study suggest that cherry stalk could be used therapeutically as a mild diuretic agent.

ACKNOWLEDGEMENT

The authors sincerely thank from Pharmaceutical Sciences Research Center, Shaheed Beheshti University (M.C.), Tehran, Iran, for financially support and all the volunteers who took part in the study.

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