Available online on www.ijppr.com
International Journal of Pharmacognosy and Phytochemical Research 2010; 2(2); 36-39

ISSN: 0975-4873

Research Article

A Comparative Study on Galactogogue Property of Milk and Aqueous Decoction of *Asparagus racemosus* in Rats

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ABSTRACT

A traditional belief regarding mode of administration of *Asparagus racemosus* (AR) says that Ksheerpaka (milk decoction) of *Shatavari (Asparagus racemosus*) is more potent as galactogogue than any other form of dosage.In view of this that milk decoction of AR can stimulate more milk production in lactating females, experiments were performed to determine the potentiality of it over aqueous decoction of AR as galactogogue in rats. Female rats that received oral doses of milk decoction of AR (100mg/kg body weight) during their first lactation produced about 27% more milk than controls (P<0·05). Pup weight gain was also significantly higher than that in the control group. Aqueous decoction of AR in same dose produced only 6% more than control. This study demonstrates that the milk decoction of AR is potent as compared to aqueous decoction of AR.

INTRODUCTION

The genus Asparagus has been recently stirred from the subfamily *Asparagae* in the family Liliaceae to a newly created family *Asparagaceae*. The Asparagus genus is considered to be of medicinal importance because of the presence of steroidal saponins and sapogenins in various parts of the plant[1]. Asparagus is the Greek word for "stalk" or "shoot". About 300 species of Asparagus are known to occur in the world. Some of the European species to be mentioned are *A.officinalis, A. sprengeri* and *A. acutifolius*[2] .Among the several species of 'Asparagus', *Asparagus racemosus, Asparagus gonaclades* and *Asparagus adsendens* grown in India and among them in traditional systems, *Asparagus racemosus* is the one most commonly used as medicine. In Ayurveda it is known as shatavari as its name indicate it is the drug which helps a female in such a way that she may possess hundred husbands. Though this is far from reality but it indicates strong utility of *A. racemosus* for female reproductive system. This herb in Ayurvedic medicine used for female rejuvenation and female problems[3,4] , including: Amenorrhea, dysmenorrhea, endometriosis, infertility, leucorrhea, menopausal symptoms (particularly mood swings and fretfulness), menorrhagia, menstrual disorders, miscarriage or habitual abortion, pelvic inflammatory disease and sexual debility[4,5] and it is also used as a rejuvenator, promoter of strength, breast milk and semen, for cough, dyspepsia, edema, rheumatism, chronic fevers, an aphrodisiac, cooling tonic, antispasmodic, diarrhea and dysentery[6,7] thirst, sunstroke,[3] *A. racemosus* is useful in leprosy, epilepsy, haemorrhoids, tuberculosis, nephropathy, ophthalmopathy, scalding of urine, and depraved condition of vata and pitta[8] . It is a well-known Ayurvedic rasayana (adaptogen).[9] Other traditional uses: Arthritis, headache, toothache, stomachache[10] and peptic ulcers[11]. Food uses: Roots are candied to provide a confectionary[6]. Beneficial effects of the root of A. racemosus are suggested in nervous disorders, dyspepsia, diarrhoea, dysentry, tumors, inflammations, cardiac debility, hyperdipsia, neuropathy, hepatopathy, cough, bronchitis, tumour, hyperacidity and certain infectious diseases[12]. The above cited descriptions suggest that claim made by classics regarding therapeutic potential of *Asparagus racemosus* is undoubtedly marvelous and there is no contrary to modern phyto-pharmacological evalution. A traditional belief regarding mode of administration of *Asparagus racemosus* is still unrevealed, this belief says that Ksheerpaka (milk decoction) of *Shatavari (Asparagus racemosus*) is more potent as galactogogue than any other form of dosage.

Galactagogues are medications or substances to assist initiation, maintenance and augmentation of maternal milk production. Mother's milk is important for survival, proper development and growth of the neonate. Milk is the only source of water, organic nutrients and minerals, to which the neonates has access. Colostrum (the first milk taken from the mammary gland after posturition) and mature milk contain non nutrient substances (such as anti bodies and bioactive factors) that are important for growth, development and survival of the neonate. Low supply of milk is one of the most common reasons given for discontinuing breast feeding. [13] Several medications have been used as galactogogues. These include metoclopamide, domperidone, and the antipsychotics sulpiride and chlorpromazine. All four of this work by blocking dopamine receptors and subsequently increasing prolactin levels.[14] All these drugs can have side effects including restlessness, mental depression, confusion, anxiety, or agitation. Some of the herbal drugs having the galactagogue activity are *Leptadenia reticulate, Ipomoea digitata, Glycerrhiza glabra, Centella asciatica, Bacopa monnieri, Anethum sowa, fenugreek etc*.[9]

Author for correcdondence:

Table-1 Comparison of aqueous and milk decoction of *Asparagus racemosus* on average milk yield and pups body weight

Treatment	Average milk yield (g/pup/day)	Average pups body wt (g/pup)
Control Vehicle 1ml	1.509±0.05468	7.637± 0.5971
Milk Decoction 100 mg/kg/body weight	1.875±0.1102**	11.07± 0.124
Aqueous Decoction 100 mg/kg/body weight	1.598±0.03152	8.186± 0.6120

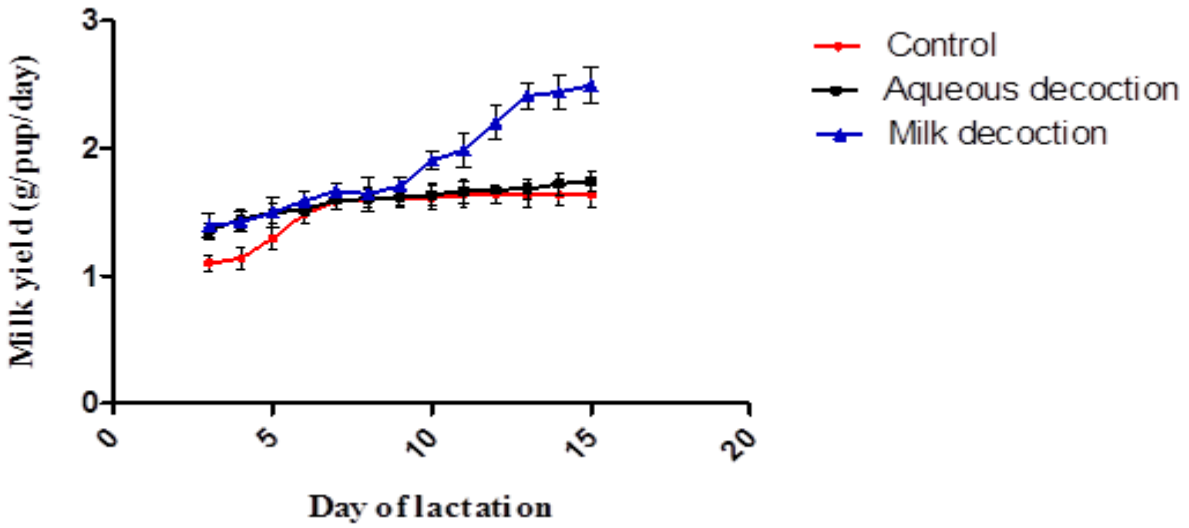

Fig. 1: Effect of aqueous decoction of AR with milk decoction on milk yield 18 h after gavage. Values are presented as means±S.E.M. A statistically significant difference was observed for the whole period for the group receiving milk decoction (P<0·01). Statistically significant differences are given compared to the control treatment (ANOVA followed by Bonferroni).

In present study experiments were performed to evaluate evidence for the benefit of decocting AR roots with using milk rather than water.

MATERIAL AND METHODS

Drug: Roots of Asparagus racemosus were procured from Raj and Co. Neemuch and were authenticated by botanist H. S. Chatree Professor of the Department of Botany, Govt. P G College, Mandsaur (M.P). A voucher specimen of the same (BRNCP/a/006/2006) has been deposited in the Department of Pharmacognosy, B R Nahata College of Pharmacy, Mandsaur.The roots of the plant was washed under running tap water to remove adhered dirt, followed by rinsing with distilled water, shade dried and pulverized in a mechanical grinder to obtain coarse powder. The dried powdered root material (10 gm) was placed in a stainless steel pot and pour over the 40 ml milk and 320 ml water (1:8). The mixture should be brought to a below boiling point and simmered until the total volume has reached till evaporation of water (320 ml). The decoction should be taken off of the heat and strained through nylon sieve into a jug. At room temperature the extract was concentrated under reduced pressure. Following the same manner shatavari root was decocted in water, with friezing the same solvent quantity.

Animals: For experiments, mature albino rats were procured from Institutional Animal house, BRNCP Mandsaur, The animals were housed under standard laboratory conditions (25±2^0 C and RH 60±5 %) maintained under a natural light and dark cycle with free access to food and water *ad libitum*. Animals were acclimatized to laboratory conditions before the experiment. Each animal was used only once. All the experiments were carried out between 0900 to 1500 h. The experimental protocols were approved by the Institutional Animal Ethics Committee (IAEC) and conducted according to the Indian National Science Academy guidelines (icmr.nic.in/ bioethics/INSA_Guidelines.pdf) for the use and care of experimental animals.

Experimental Set-up: Eighteen lactating dams weighing 200–225 g at the beginning of lactation and suckling eight to nine pups were used for this experiment. Females were divided into three experimental groups and treatment was given as given below.

1. Group I: Normal control, given with vehicle orally.

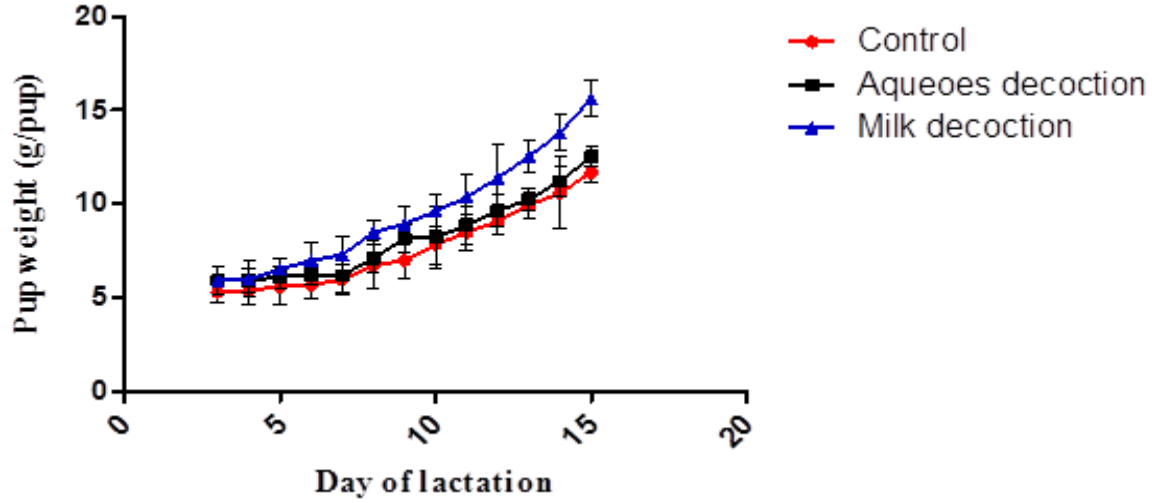

Figure 2 Effect of aqueous decoction of AR with milk decoction on pup weight after 18-h gavage. Values are means±S.E.M. A significant difference was observed between the milk decoction treated group and the controls (at least $P<0{\cdot}05$). (Student's *t*-test followed by Bonferroni correction)

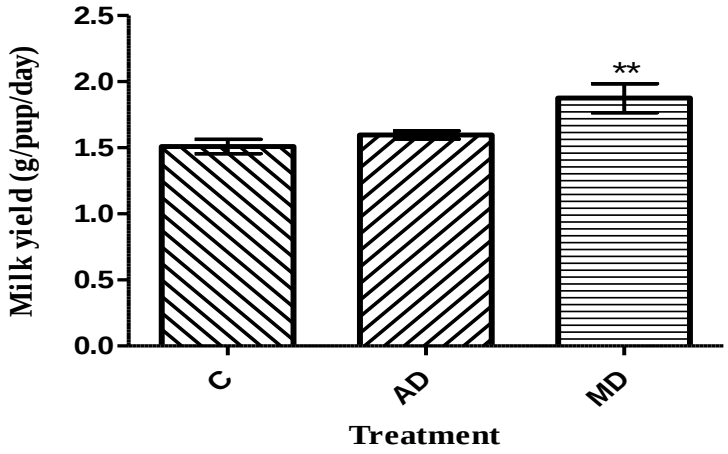

Figure- 3 Effect of aqueous decoction of AR with milk decoction on Mean milk yield per day . Values are means±S.E.M. ** indicates statistical significance ($P<0{\cdot}01$) (Student's *t*-test followed by Bonferroni correction).

2. Group II: Received milk decoction of Asparagus racemosus in dose of 100 mg/kg p.o.

3. Group III: Received aqueous decoction *Asparagus racemosus* in dose of 200 mg/kg p.o.,

Milk yield and Pups body Weight [15]: All animals were treated daily, starting on the evening of day 2 of lactation. The decoction was administered orally with a gavage syringe each day at 1800 h. Milk production was estimated 18 h after gavage. Milk production was measured from day 3 to day 15 of lactation. Milk yield and body weight of dams, and weight gain of pups were measured each day with an electronic balance (Shimadzu, AUX220) accurate to 0·01 g. Every day during the study period, the pups were weighed at 0700 h (w1) and subsequently isolated from their mother for 4 h . At 1100 h, the pups were weighed (w2), returned to their mother and allowed to feed for 1 h. At 1200 h, they were weighed (w3). Milk yield 18 h after the gavage was estimated as w3 – w2. Daily milk yield was corrected for weight loss due to metabolic processes in the pup (respiration, urination and defecation) during suckling. The value used was (w2– w1)/4. This value was then multiplied by the number of suckling hours per day and added to the daily suckling gain.[16] Daily weight gain of pups was calculated from the pup weight at w2.

STATISTICAL ANALYSIS

Statistical analysis of data was done in GRAPHPAD prism version 4.01 using Bonferroni's Multiple Comparison Test.

RESULT

Milk Yield: Milk production of both groups receiving milk and aqueous decoction of AR was higher than that of the control group, as illustrated in Fig. 1, Milk yield

increased from 1.100±0.0675, 1.353±0.06667 and 1.397±0.09116g/pup per day to about 1.633±0.09888, 1.743±0.08433 and 2.497±0.1430 g/pup per day for the controls, and those receiving 100 mg/kg body weight milk and aqueous decoction of AR respectively. The differences observed were significant from day 2 until the end of treatment, in particular for the milk decoction group (ANOVA followed by Bonferroni, $P<0{\cdot}01$). The mean milk yield as shown in table-1 was 1.509±0.05468, 1.598±0.03152 and 1.875±0.1102** g/pup per day over the experimental period respectively (Student's *t*-test with Bonferroni correction at least $P<0{\cdot}05$).

Body weight: All pups gained weight during the study period (Fig. 2) and the rate of weight gain for the milk decoction group was significantly higher than that for the control. Body weight increased from 5.2950±0.5560 to 11.680±0.56270 g/pup per day for the controls, from 5.9250±0.76380 to 12.530±0. 0.51290 g/pup per day for those receiving 100 mg aqueous decoction, and from 5.9230±0.71490 to 15.6200±0. 0.905400 g/pup per day for those receiving 100 mg/kg milk decoction of AR. The mean body weight per pup as shown in table-1 was 7.637± 0.5971, 8.186± 0.6120 and 11.07± 0.124 for Control, aqueous and milk decoction treated group respectively.

DISCUSSION

Milk yield estimations for rats by means of pup weight and weight gains have been used in several studies. [15, 16, 17] It was reported that the milk production rate measurement in rats is difficult[15], this is cumbrous also. Though shatavari was established lactogenic drug, it has to be noted that the purpose of this study was basically to compare milk and aqueous decoction of AR. As expected, milk production was higher in the treated animals than in the controls, but significant increase was found in milk decoction. In addition, milk yield appears to be significantly stimulated about 24 h after administration of the extract and the pup growth rate was significantly improved. However, the suggestion can be confirmed only by studying the composition of the milk. Likewise, extract of *Asparagus racemosus* has been observed to stimulate milk production in buffaloes.[17] The possible reason in difference of lactogenic activity is due to quantitative difference in active constituents present in milk and aqueous decoction of AR.In conclusion, it can be stated that milk decoction of AR effectively stimulates milk production in the rat. Therefore, the traditional belief that Ksheerpaka (milk decoction) of Shatavari(Asparagus racemosus) is more potent as galactogogue than any other form of dosage may be valid.

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