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Original Research Article

Evaluation of Bisehri booti (*Aerva lanata*) for anti-inflammatory, analgesic and steroidal activities.

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ABSTRACT

Objective: Bisehri booti (*Aerva lanata*) is an effective traditional medicine used for the treatment of various disorders. This study aimed to investigate the anti-inflammatory, analgesic and steroidal activities in albino rats.

Methods: Four groups of five animals each were administered normal saline, hydrochlorothiazide, aqueous extract of Bisehri booti, and juice of Bisehri booti, respectively. Different test is used to asses these activities such as Carrageenin-Induced Rat Paw Oedema Test, Eddy's Hot Plate Test and Analgesiometer Test etc.

Results: The aqueous extract and juice of A. lanata significantly reduced inflammation in animals treated with 15mg/100g and 20mg/100g of extract and juice, respectively. The test drug did not produce a significant increase in reaction time during the entire testing period for analgesic activity. The thymus/body weight values were significantly reduced in all test groups, with the juice being more effective than the aqueous extract.

Conclusion: The study demonstrates that *A. lanata* (Bisehri booti) has noteworthy anti-inflammatory and steroidal properties, which validates its traditional use for these activities in Tibb-e-Unani. This research establishes the foundation for promoting the drug from the side-lines to the forefront of the medical field, thereby propelling the advancement of the Unani system of medicine.

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INTRODUCTION

The folk drugs or ethnic drugs are generally considered to include the drugs used by tribal and rural communities and the drugs used in traditional systems of medicine like Tibb-e-Unani, Ayurveda etc. because these drugs are of herbal origin. But this in not Justified as Tibb-e-Unani and some other traditional systems of medicine are sophisticated systems, having a systemic pharmacology which is based upon a systematic and comprehensive physiology and pathology that cannot be put at par with unspecialized, fragmentary and uncompiled drug information prevalent among forest dwelling and rural communities, simply because most of the drugs of traditional medicine happen to be of herbal origin. However, certain drugs are on the borderline in that they are widely used among rural communities but find only a stray mention in the texts of traditional systems of medicine. The scientific studies of such drugs may not only identify valuable agents but will also serve to develop the traditional systems of medicine, shifting the peripheral drugs to the main-stream of these systems.

Bisehri booti (*Aerva lanata*) is widely used among rural communities of India and Sri Lanka, but is mentioned only by a few physicians of Tibb-e-Unani. It is used as a

diuretic and anthelmintic agent and is employed for the treatment of headache, diarrhoea, sore throat and cough etc. in Sri Lanka [1]. In Bihar, it is used by common people for white urine, diarrhoea and snake-bite. Jain (1976), Asolkar et al. (1992) and Nadkarni (1976) reported the diuretic and anthelmintic effect of this plant [2-4]. Some Unani physicians have reported it to be useful in albuminuria, haematuria, renal and vesicular calculi and prostatitis [5-6]. Thus, the most important medicinal use of this drug seems to be in Nephrotic Syndrome like condition. One such plant is used by certain Unani physicians of Western U.P. under the name of Bisehri booti. Afaq et al. (1991) Identified this plant to be *Aerva lanata* [6]. Although Aerva lanata is mentioned by Nadkarni (1976) and Kirtikar (1987) but they have not mentioned the term Bisehri Booti as one of its vernacular names [4,7]. Therefore, Afaq et al. (1991) was the first to establish that Bisehri Booti is Aerva lanata. Aerva lanata has been subjected to some scientific studies [6]. Udupihille et al. (1986) have studied various parts of this plant systematically for diuretic activity. They have reported that the fresh flowers of plant possess the strongest diuretic activity [8]. It is reported that the plant produces hypotensive effect in experimental studies, while there are conflicting reports regarding its cardiac effect and it is claimed to possess negative chronotropic and extrasystole, at a dose level of 50 mg/kg. In hypodynamic frog heart preparation in dose level of 1-3 mg/ml of perfusion fluid, it produced positive inotropic effect [9]. As mentioned earlier its most important medicinal use in Tibb-e-Unani as well as in folk medicine is in Nephrotic Syndrome like conditions. As most of the existing drugs for Nephrotic syndrome are effective because of their steroidal activity, therefore, Bisehri booti should be studied for these effects. Since steroidal agents have metabolic effects also, therefore, the scientific study of Bisehri booti should include an evaluation of its metabolic effect. The drug is also used by common people for headache, and worm infestation, so it needs to be tested for analgesic and anthelmintic activity also. In the light of above considerations Bisehri Booti (*A. lanata*) was tested for anti-inflammatory, analgesic and steroidal activity. The anti- inflammatory activity was studied by Carrageenin Oedema Test, analgesic activity by Eddy's hot-plate Test and Analgesiometer Test, steroidal activity by Thymus Regression Test. Since the Unani physicians use the juice of whole plant, therefore, it was used in the present study also. There are obvious difficulties in the use of the juice of the plant, therefore, the aqueous extract of the whole plant was also studied with the view of comparing its effect with the juice and thereby identifying the extract as a more convenient formulation if it was found to be equipotent with the juice. The Unani clinical dose of Bisehri booti (*A. lanata*) is 20mg/kg of the juice, so it was converted into the corresponding rat dose by multiplication with 7 [10]. The value thus obtained was rounded of to 15 mg/100g of juice and this was used as one of the doses in the study. It is widely felt that the doses reported in Unani texts are generally on the lower side and this is one of the reasons for the failure of therapy with these drugs, therefore, a slightly higher dose that is 20mg/100g of the juice was also studied. The aqueous extract yield was 1/10th of the crude drug W/W. Since the juice yield is also nearly of the same order W/W, therefore, the aqueous extract of Bisehri booti was also studied at the same doses as that of the juice 15mg/100g and 20mg/100g in albino rats.

Epidermis single layered with a thin cuticle, more prominent at the ridges, the epidermal cells are squared, thin walled, and unlignified, in the region of ridges these tend to thick walled. Trichomes simple elongated multicellular, uniseriate and composed of interlocking cells. The cells of trichomes are thick, with pointed out-growth, short basal cells of trichomes have yellow wall. The cortex is 5-7 cells deep in the furrows and consist of isodiametric parenchyma with intracellular space. The primary vascular bundles in the young stem are numerous, small, collateral and open within inner phloem arranged in a ring typical of dicot stem. The stem shows secondary growth which later becomes abnormal by the production of conjunctive tissue in which one embedded the phloem and Xylem elements. The phloem groups lie above radial rows of vessels. The anamalous secondary growth of typical Amaranthus type is very clear. In the old stem four rings of secondary tissues found. The pith is larger in young stem composed of thin-walled parenchyma and reduced in old stem due to increase in the amount of second xylem, prismatic calcium oxalate crystals are also found in this region. The epidermal cells of the leaf are irregular in shape and have anomocytic type of Stomata. Trichomes are more in leaf than in stem, having same structure in stem, same transparent prismatic nature calcium oxalate crystal found in leaf too, but in less numbers [6, 12].

From the plant *A. lanata* the following compounds have been isolated namely Beta-sitosteryle palmitate besides Alpha-amyrin and Beta-sitosterol. Inorganic salts and free sugars were also found along with aforesaid compounds [13]. Hexaeosinol was also reported by Sastri, 1977 [14]. Some tannins and flavonoids are present in this plant [15]. Chandra, 1990 has added some more information by isolating new constituents, hentriacontane, Beta-sitosterol; and its D-glucoside,

Alpha-amyrin and betulin from dry plant material [16]. In 1991 four flavonoids, Beta-coumaroyl glycoside, two feruloylamides and other phenolic compounds besides 6 alkaloids were isolated and their chemical structures were elucidated [18]. The alkaloids are as follows: (1) Canthin-6-one and (2) Beta-corbolin-1-propionic acid have been found earlier, while, (3) 10-methoxy-canthin-6-one (4) 10- hydroxy canthin-6-one (5) 10-0-ß D-glucopyrano syloxycanthine-6-one and (6) 6-methoxy-ß-corbolin-1-propionic acid are new alkaloids.

These alkaloids, except the 2nd and 6th were also isolated from the root of this plant, by using the analogous methods. The 1-4 alkaloids were isolated from the chloroform extract, while 5th and 6th alkaloids from ethyl acetate extract [18]. Test for the presence of cellulose, lignin, sterol, cutin, subrin, protein, tanin and saponin were found positive, while test for presence of starch and fat were negative. The petroleum extract of dried plant was found to contain, terpenes, alkoloids, and phytosterol and were probably Beta-sitosterol, stigmasterol, and two compounds most probably to be kaempferol -3-galactoside, and kaempferol -3-rhamnogalactoside and kaempferol. The free sugars found in this plant were identified as Fructose, Galactose, Sucrose and Rhamnose [6, 19].

The roots, stems, leaves and flowers showed the presence of various functional groups such as amide, alcohols, aldehydes, carboxylic acids, nitro compounds, ethers, amines, phenols, alkyl halides, ethers etc. on FTIR analysis [20]. The leaves contain minerals such as K, Na, Ca, Mg, Zn, Fe, Mn [21]. The whole plant also contains essential trace elements such as calcium, silicon, magnesium, potassium, chloride, carbon, oxygen [22]. The roots possess good amount of gallic acid [23]. The roots extract also showed the presence of quinones, phenols, triterpenoids, phytosterols and phlobatannins [24]. On phytochemical screening aqueous extract of the stem showed the presence of 3,4,5-OH (gallic acid), apigenin-7-O-glucoside (apigetrin), quercetin-3-O-rutinoside (rutin) and 3,5,7,3,4,5-OH (myricetin) [25]. The GC-MS analysis of leaves, stems, roots, flowers and seeds displayed a plethora of compounds such as pyridine, hydroquinone monobenzyl ether, docosane, dotriacontane, (R,Z)-12-hydroxy-9-octadecenoic acid, 2-isopropyl-2,5-dihydrofuran etc. [26].

Tibb-e-Unani: Hakeem Abdul Qadir (1931) in his book "Mujarrabat-e-Qadri" has recommended the use of Bisehri-Booti for renal and vesicular calculi [5]. Some reputed physician of Tibb-e-Unani of Aligarh and Amroha use this plant with good effect in other ailments too, like albuminuria, haematuria and prostatitis [6, 12]. The root is claimed to be demulcent diuretic and useful in strangury in Ayurveda [7, 27]. The whole herb is considered Sitayam and used in Rikta-pita (Haematamasis) and Diabetes [28].

Tripathi et al, studied the effect of alcoholic extract of A. lanata on anaesthetized rat blood pressure, ECG, and on isolated frog heart preparation. In the dose of 10mg /kg the extract lowered the BP but produces no changes in ECG pattern. In higher doses i.e. 50mg/kg it produced negative chronotropic effect and extrasystole. In frog heart preparation in the dose of 1-3mg/ml of perfusion fluid it produced inotropic effect. In acute reserpenized preparation of frog heart positive inotropic effect was also observed. In another study different parts of plant; flower, leaf, stem and root, were tested in two forms; raw plant and dry plant at various doses for its diuretic property. It was seen that fresh plant extract significantly elevated the urine output. Raw flowers extract was found to be most effective in diuresis when compared to other parts of raw plant and dried form. The extract obtained from the fresh flower induced an intense diuresis. The extract obtained from the raw stem, leaf and root of the plant produces a less intense diuresis. Extract of equivalent quantity of dried parts of the plant give rise to a less intense diuresis [9].

The above study shows that *A. lanata* has highly potent diuretic activity, while dried *A. lanata* has moderate diuretic activity. It suggests, that drying may have destroyed or partially transformed the diuretic factor. The flowers of the plant appear to contain the higher concentration of diuretic factor; however, leaves, roots & stem have diminishing diuretic effect in descending order [8].

MATERIAL AND METHODS

The test drug namely Bisehri booti (*A. lanata*) was obtained from the herbarium of Department of Ilmul Advia, A.M.U., Aligarh, after proper identification in the light of botanical information. The test drug was used for experimental study in two forms, i.e. aqueous extract and fresh plant juice.

Extract: The drug was collected in the month of October, dried in air and powdered. The powder then was extracted for 6 hours, in distilled water. The extract was filtered and the solvent was evaporated on water bath. The extract obtained was 1/10th of the air-dried plant.

Juice: The Juice was made from fresh plant at the time of experiment; the fresh plants were collected, crushed and squeezed with the help of a special squeezer.

Animal Study

(I) Study for Anti-inflammatory Activity:

Carrageenin-Induced Rat Paw Oedema Test

The effect of test drug on Carrageenin Induced Oedema in rat paw was studied by the method of Winter et al, [29]. Albino rats of either sex weighing 150-200gm were divided into 6 groups of 6 animals each. The thickness of right hind paw of the animals was measured by electronic micrometer. Group I served as the plain control and the animals were administered with only the vehicle i.e. distilled water. The animals in Group II were administered with the standard drug i.e. Piroxicam in the dose of 0.25 mg/100gm, orally. Animals in Group III and IV were administered with the aqueous extract of A. lanata in the dose of 15mg/100gm and 20gm/100gm, respectively, and Group V and VI were administered with the juice of the whole plant in the dose of 15mg / 100gm and 20mg /100gm, respectively, by oral route. One hour later all the animals were injected with 0.05ml of 1% suspension of Lambda type carrageenin in normal saline under the plantar aponeurosis of the right hind paw. The thickness of the right hind paw of the animals was again measured 3 hours after the injection of carrageenin. The percentage inhibition of inflammation in the test and standard groups, in comparison with the plain control group was calculated by the formula described by Newbould [30]. The mean paw thickness of test, standard and control animals was also statistically analysed and compared by Student's "t" Test.

(II) Study for Analgesic Activity

(a) Eddy's Hot Plate Test

The analgesic activity of *A. lanata* was tested by the Hot-plate Test of Woolfe and Mac-Donald [31], as modified by Eddy and Leimbach [32]. Albino rats of either sex weighing 100-150 g were used for the study. They were divided into 4 groups of 10 animals each. Group I and II were administered with aqueous extract of *A. lanata* in the dose of 15mg/100gm and 20mg/100gm respectively, and Group III and IV administered with the juice of *A. lanata* in the dose of 15mg/100gm and 20mg /100gm, respectively. The reaction time was measured by placing the animals on the hot-plate at 55.5 C and recording the time taken to respond (licking of fore-paw or jumping), by a stop watch. The initial reaction time was determined before drug administration. The reaction time was again tested after the drug administration at 20 minutes intervals. The reaction time in each group at various intervals of testing after the drug administration and the initial reaction time were statistically analysed and compared by Student's "t" Test.

(b) Analgesiometer Test

The test drug was evaluated for analgesic activity by the Analgesiometer Test by the method of Davies, et al, [33]. Forty albino rats of either sex, weighing 100-150gm, divided into 4 groups of 10 animals each. The initial reaction time of each rat was determined so that it lay between 4-7 seconds and the corresponding variac, reading was noted. The variac was set at the same point for subsequent testing of a particular animal. The animals in Group I and II were administered with 15mg/100gm and 20mg/100gm of the aqueous extract of the plant, while Group III and IV were given 15gm/100gm and 20gm/100gm of the juice of the plant, by oral route. The reaction time was tested at intervals of 15 minutes for 120 minutes. The reaction time at each post treatment interval within a group was compared with the initial reaction time by Student's "t" Test.

(III) Study for Steroidal Activity

The test drug was studied for steroidal effect by the method of Stephenson [34], modified by us. Albino rats of both sexes weighing 40-60 g were divided into 6 groups of 10 animals each having equal distribution of sexes and such that the total weight of animals in various groups was approximately the same. The animals in Group I served as the plain control and were administered with normal saline, by oral route, twice a day for 3 days. The animals in Group II were treated with the standard drug viz. 200 micrograms of hydrocortisone divided into 6 doses, given twice a day for 3 days, by subcutaneous injection. The animals in Group III and IV were fed with the juice of the fresh plant twice a day, for 3 days, in the dose of 15mg/100gm and 20mg/100gm, respectively. The animals in Group V and VI were administered with 15mg/100gm and 20mg/100gm of the aqueous extract of the whole plant in the same manner. On the fourth day all the animals were sacrificed and the thymus gland was dissected out. The body weight and the weight of the thymus gland were recorded. The results were expressed as mg of thymus gland/100gm of body weight. The results were statistically analyzed by Student's "t" Test.

RESULTS

(I) Carrageenin-induced Rat Paw Oedema Test

The test was carried out in albino rats by the method of Winter et al, [29]. Albino rats of either sex weighing 150-200 g were divided into 6 groups of 6 animals each. The Thickness of right hind paw of all the animals was

measured by electronic micrometer. The animals in Group I and II were administered with distilled water and the standard drug piroxicam at the dose of 0.25 mg/100 g, respectively. Animals in group III and IV were administered with the aqueous extract A. lanata in the dose 15 mg/ 100 g and 20mg/100 g, respectively, and the animals in Group V and VI were administered with the juice of the whole plant in the dose of 15 mg/ 100 g and 20 mg/100g, respectively, by oral route. One hour later all the animals were injected with carrageenin under the planter aponeurosis of the right hind paw. The thickness of the right hind paw of the animals was again measured three hours after injection of carrageenin. The mean thickness in the control group was found to be 3.85 + 0.12 mm while in the standard group it be 2.032 + 0.08 which significantly was found to be 2.032plus minus 0.08 mm which was significantly lesser than the control ($p < .0005$) and amounted to 47.4% inhibition of the inflammatory oedema. In the test group treated with 15mg/ 100g and 20 mg/ 100g of the extract. The increase in the thickness was 2.684 + 0.09 mm and 2.614 + 0.08 mm, respectively, which was significantly lesser than the control ($p < 0.025$ and $p < 0.01$, respectively), and amounted to 30.2% and 32% inhibition of inflammation, respectively. In group treated with 15 mg/ 100 gm and 20 mg/ 100 gm of Juice, the increase in the thickness found be 2.29+0.11 was to mm and 2.201+0.12 mm, respectively, which was markedly significant i.e. $p < 0.0005$ in both cases and amounted to 40% and 42% inhibition of inflammation respectively. The results are presented in Table No.1.

(II) Study for Analgesic Activity Test

Eddy's Hot-Plate Test: The analgesic activity of Bisehri booti (*A. lanata*) was studied by the Hot-plate Test of Woolf and MacDonald [31], modified by Eddy and Leimbach, [32]. Albino rats of either sex weighing 100-150g, were divided into 4 groups of 6 animals each. The animals in Group 1 and 2 were administered with the aqueous extract of *A. lanata* in the dose of 15 mg/100g and 20 mg/100g, respectively, and the animals in Group III and IV were administered with Juice of *A. lanata* in the dose of 15 mg/100g and 20 mg/100g, respectively.

Treatment with *A. lanata*, extract or Juice at the lower and higher doses produced no significant increase in the reaction time during the entire period of testing i.e. 2 hours. The results are presented in Table No. 2.

Analgesiometer Test: The test drug was also studied for analgesic activity by the analgesiometer test carried out by the method of Davies, et al, [33].

Forty albino rats of either sex, weighing 100 to 150 g, were divided into 4 groups of 10 animal each. The initial reaction time of each rat was determined so that it lay between 4 -7 second. The animals in Group I and II were administered with 15mg/100g and 20 mg/100 g of the aqueous extract, while the animals in Group III and IV were given 15 mg /100gm and 20mg /100g m of the Juice respectively. The reaction time was tested for 120 minutes after drug administration at interval of 15 minutes. The post treatment reaction time was not increased significantly in any of the 4 groups. The result is presented in Table No. 3.

(III) Study for Steroidal Activity

The steroidal activity of the test drug was studied by the method of Stephenson, (1954) modified by us. Albino rats of either sex weighing 40 to 60g and 1-2 months of age were divided into 6 groups of 10 animals each having equal distribution of sex and such that the total weight of animals in various groups was approximately the same. The animals in Group I served as the plain control were administered with normal saline, by oral route, twice a day, for 3 days. The animals in Group II were treated with the standard drug viz. 200mg of hydrocortisone, divided into 6 doses and given twice a day, for 3 days, by subcutaneous injection. The animals in Group III and IV were fed with the extract of plant twice a day, for 3 days, in the dose of 15 mg /100g and 20mg/100g, respectively, by oral route. The animals in group V and VI were administered with 15mg/100g and 20mg/100g of the Juice of the fresh plant in the same manner. On the 4th day all the animals were sacrificed and the thymus gland was dissected out. The body weight and the weight of the thymus gland were recorded. The results were expressed as mg of thymus gland/100gm of the body weight. In the control animals the thymus / body weight was found to be 274 ±16.858mg/100g while in the standard group it was reduced to 146±7.603mg/100g ($p<0.0005$). The decrease was statistically significant. The Thymus weight was found to be 250±2.258mg/100g was ($p<0.010$), 220±8.74 mg/100g ($p<0.010$), 233±13.601mg/100g ($p<0.010$) and 178±3.501mg/100g ($p<0.0005$) in animals treated with 15mg/100g and 20mg/100g of extract and 15mg/100g & 20mg /100g of Juice, respectively. Thus, the test drug reduced the thymus weight in a dose dependent fashion. The results are presented in Table No. 4.

Aerva lanata is known to possess Beta-sitosterol which is used as a hypocholesterolemic agent (Taylor, 1975) and to possess oestrogenic and anti-androgenic activity (Malini et al, 1990). However, there are no reports regarding its corticosteroidal-like activity. Therefore, the anti-inflammatory and anti-lymphoid activity of A. lanata, revealed in the present study, could be due to other compounds.

Table No. 1: Effect of Bisehri booti (*A. lanata*) on Carrageenan induced oedema in rat paw.

Groups	Thickness of the Rat Paw		Increase in the thickness of the paw in mm	% Inhibition of Inflammation	p-Value
	Before carrageenan injection	3 Hours after carrageenan injection			
Distilled Water	4.81 ± 0.16	8.66 ± 0.31	3.85 ± 0.12	-	-
Piroxicam (0.025 mg / 100 g)	4.860 ± 0.05	6.872 ± 0.26	2.032 ± 0.08	47.4 %	< 0.0005
Extract (15 mg/ 100 g)	4.79 ± 0.15	7.474 ± 0.023	2.684 ± 0.09	30.2 %	< 0.025
Extract (20 mg/ 100g)	4.843 ± 0.05	7.457 ± 0.25	2.614 ± 0.08	32.0 %	< 0.010
Juice (15mg/ 100g)	4.82 ± 0.06	7.111 ± 0.31	2.29 ± 0.11	40.0 %	< 0.0005
Juice (20 mg/ 100g)	4.89 ± 0.31	7.091 ± 0.24	2.201 ± 0.12	42.0 %	< 0.0005

n= 6

Table No. 2: Analgesic effect of Bisehri booti (*A. lanata*) (Eddy's Hot Plate Test)

Mean reaction time in seconds (Mean ± S.E.)							
Groups	After drug administration(in minute)						
	Initial	20	40	60	80	100	120
Extract (15 mg/ 100 g)	3.75 ± 0.28	3.68 ± 0.31	3.36 ± 0.23	4.00 ± 0.22	3.85 ± 0.38	3.29 ± 0.24	3.55 ± 0.31
Extract (20 mg/ 100g)	3.58 ± 0.32	3.56 ± 0.28	3.42 ± 0.30	3.10 ± 0.24	3.88 ± 0.21	3.55 ± 0.09	3.89 ± 0.33
Juice (15mg/ 100g)	3.33 ± 0.31	4.09 ± 0.23	3.14 ± 0.38	3.46 ± 0.25	3.23 ± 0.31	3.99 ± 0.24	3.28 ± 0.22
Juice (20 mg/ 100g)	3.49 ± 0.34	3.55 ± 0.31	3.68 ± 0.29	3.75 ± 0.33	3.39 ± 0.29	3.18 ± 0.19	3.79 ± 023

n=6

Table No. 3: Analgesic effect of Bisehri booti (*A. lanata*) Rat Tail Hot Wire (Analgesiometer) Test

Mean reaction time in second (Mean ± S.E.M.)									
		After drug administration (in minute)							
Groups	Initial	15	30	45	60	75	90	105	120
Extract (15 mg/ 100 g)	5.13 ± 0.39	5.38 ± 0.30	5.53 ± 0.29	5.30 ± 0.33	5.46 ± 0.21	5.24 ± 0.26	5.34 ± 0.39	5.46 ± 0.24	5.71 ± 0.38
Extract (20 mg/ 100g)	5.33 ± 0.35	5.29 ± 0.29	5.55 ± 0.24	5.25 ± 0.31	5.34 ± 0.26	5.76 ± 0.33	5.23 ± 0.30	5.65 ± 0.28	5.44 ± 0.36
Juice (15mg/ 100g)	4.66 ± 0.29	5.81 ± 0.31	5.22 ± 0.24	5.12 ± 0.23	5.45 ± 0.30	5.55 ± 0.29	5.16 ± 0.31	5.21 ± 0.26	5.09 ± 0.37
Juice (20 mg/ 100g)	5.33 ± 0.31	5.91 ± 0.32	5.42 ± 0.30	5.11 ± 0.28	5.27 ± 0.33	5.18 ± 0.27	5.72 ± 0.37	5.19 ± 0.35	5.34 ± 0.36

n=10

Table No. 4: Effect of Bisheri booti (*A. lanata*) on thymus.

Groups	Thymus Weight (mg/100g ± S.E.)	p-value
Plain Control (Distilled Water)	274 ± 16.856	<0.0005
Standard Control (Hydrocortisone (33.3µg/ 100g)	146 ± 7.603	<0.010
Extract (15mg /100g)	250 ± 2.258	<0.010
Extract (20mg/ 100g)	220 ± 8.74	<0.010
Juice (15mg / 100g)	233 ± 13.601	<0.010
Juice (20mg /100g)	178 ± 3.581	<0.0005

n=10

DISCUSSION

The aqueous extract and the juice of Bisehri booti (*A. lanata*) were studied, each at the dose 15mg/100g and 20mg/100g, in albino rats. The test drug was studied for anti-inflammatory activity by Carrageenin Oedema Test, analgesic activity by Eddy's Hot-plate Test and Analgesiometer Test and steroidal activity by Thymus Regression Test.

In the carrageenin oedema test the mean thickness of the right hind paw was found to be 3.8±0.12 mm in the control group, while in the standard group treated with 0.25 mg/100g of Piroxicam it was significantly decreased to 2.032±0.08 mm (p<0.0005) which amounted to 47.4% inhibition of the inflammatory oedema. In the animals treated with 15 mg/100g and

20mg/100g of aqueous extract and 15mg/100g and 20mg/100g of the juice it was significantly reduced to 2.684 ± 0.09 mm (p<0.025), 2.614±0.08 mm (p<0.010), 2.29 ±0.11 mm (p<0.0005) and 2.201± 0.12mm (p<0.0005) amounting to 30.2%, 32%, 40% and 42% inhibition of inflammation, respectively. Therefore, the present study shows that Bisehri Booti possesses stricking anti-inflammatory activity. The juice is much more effective than the aqueous extract. The higher dose of the extract and the juice are more effective than the respective lower doses. Thus, the present study shows that Bisehri booti inhibits inflammation in a dose dependent manner, hence its anti-inflammatory effect is a true pharmacological action.

The higher dose of the juice produces an inhibition of the inflammation which is quite close to the inhibition produced by the potent anti-inflammatory agent piroxicam. Therefore, the present study shows that Bisehri booti possesses a very striking anti-inflammatory activity.

Since carrageenin induced oedema is an acute inflammatory phenomenon, therefore, the present study indicates activity of Bisehri booti against acute inflammation. The aqueous extract and the juice of Bisehri booti (*A. lanata*) failed to produce any significant increase in the reaction time in both the tests at both the respective low and high doses. Therefore, the present study shows that Bisehri booti does not have analgesic activity at least of the opioid type.

Since the test drug has anti-inflammatory activity which could be due to its steroidal activity and since it is used for renal disorders particularly Nephrotic Syndrome, where its beneficial effect could be due to its steroidal activity, therefore, it was studied for steroidal activity by Thymus Regression Test carried out by the method of Stephenson (1959) modified by us. Albino rats of either sex weighing 40-60 g and 1-2 months of age were divided into 6 groups of 10 animals each having equal sex distribution and approximately the same mean body weight. Group III and IV were administered with 15mg/100g and 20mg/100g of aqueous extract while group V and VI were administered with 15mg/100g and 20mg/100g of the juice, respectively, for three days. Group II serving as the standard group was administered with 200µ/100g of hydrocortisone divided into 6 doses given twice a day for three days by subcutaneous injection. The animals were sacrificed on the 4th day and the thymus gland was dissected out, the body weight and the weight of the thymus gland recorded. The results were expressed as mg of thymus gland /100 g of body weight.

The study showed that the thymus /body weight in the control group was 274 mg±16.85 6mg/100g while in the standard group it was reduced to 146 ±7.60/100g (p<0.0005). These values were seen to be significantly reduced in all the tests group viz. 250±2.256mg/100g (p<0.010) 220±8.74 mg/100g (p<0.010) 233±13.601mg/100g (p<0.010) and 178±3.158 mg/100g (p<0.0005) in animals treated with 15mg/100g and 20mg/100g of extract and 15mg/100g and 20mg/100g of juice, respectively.

The study, therefore, shows that the test drug possesses significant steroidal activity in a dose dependent manner. The juice is more effective than the aqueous extract. The high dose of the juice i.e. 20mg/100g reduces the thymus weight to an extent which is only moderately less than hydrocortisone. Thus, the study shows that the test drug possesses quite strong steroidal activity. The demonstration of steroidal activity also suggests that it is the probable mechanism of anti-inflammatory action of the test drug seen in the present study.

CONCLUSION

To conclude, the present study shows that Bisehri booti that is *A. lanata* possesses significant anti-inflammatory and steroidal effect.

By scientifically substantiating the use of Booti (*A. lanata*) for analgesic, anti-inflammatory and steroidal activities, the study provides the basis for shifting this drug from the periphery to the mainstream of Tibb-e-Unani, thereby making a significant contribution towards advancement of this system of medicine.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Trimen, H. A Hand Book to the Flora of Cylon. Part. III. M / S Bishen Singh Mahendra Pal Singh, New Cannaught Place, Dehra Dun, (1974) pp. 402-403.
2. Jain SK, Trafdar CR. Medicinal Plant-lore of Santals (A review of P.O. Bodding's work) Bot, (1970), 24, pp. 244.
3. Asolker LV, Kakkar KK, Chakre, OJ. Second Supplement to Glossary of Indian Medicinal Plants with Active Principles. Part - 1. Publication & Information Directorate (C.S.I.R.), New Delhi, (1992) pp. 27.
4. Nadkarni, K.M. Indian Mataria Medica. Popular Book Depot, Bombay, (1976), p.49.

5. Qadir, M.A. Mujarrabat-E-Qadri, Mohan Printing Press, Aligarh, (1930), p. 207.

6. Afaq, S.H., Tajuddin & Afridi, R.M. Bisehri Booti (A. lanata): Some Lesser Known Uses and Pharmaconosy Ethnobotany (1991), Vol.3, pp. 91-94.

7. Kirtikar, K.R. and basu, B.D. Indian Medicinal Plant Vol. IIIrd. International Book Distributors, Rajpur, Dehra Dun, (1987) pp. 206.

8. Udupihille, M. & Jiffry, M.T.M. Diuretic Effect of Aerva lanata with Water, Normal Saline and Corander as Control, Ind. J. Phy. Phar., (1986) 30, pp. 91-97.

9. Tripathi, H.C., Chandra, S. and Lal, J. Cardiovascular Effect of Aerva lanata. Ind. J. Pharma. (1985) 17, pp. 42.

10. Dhawan , B.N. , Duley , M.P. , Mehrotra , B.N. , Rastogi , R.P. and Tandon , J.S. Screening of Indian Plants for Biological Activity . Part IX , Indian J. Exp . Biol . (1980)18 , pp. 594.

11. Babber, S. and Dhengra, H.R. Folian Epidermal Studies in Amarranthus. Current Science, (1985) 54 (14), pp. 707-89.

12. Afridi, R.M. Pharmacognostical Studies of certain Unani Medicinal Plants. M.D. Thesis, Dept. of Ilmul Advia, AMU, Aligarh (1992).

13. Aiyer, V.N., Narayan, V., Sheshadri, T.R. & Vaidyasaran. Chemical Components of Some Indian Medicinal Plants, Indian. J. Chem. (1973) 11, pp. 89-90.

14. Sastry, C.S.P. and Siraj, P.G. Analytical Studies Leading to Standardisation of Aerva lanata Juss (Ayurvedic Medicine) Indian J Pharmacy. 1977;6:174.

15. Yognarasimhan, S.N. Nair, K.V., and Murthy, K.R.K. Medico - Botany of Karnataka, Utilisation of Floristic of Kankapur Wealth for the Economic Development Taluk, Bangalore District. J. Econ. Texo, Bot. (1985) 6 (1), pp. 97-107.

16. Chandra, S., Sastry, M.S. Chemical Constituents of Aerva lanata . Fitotropia, (1990) 61 (1), pp. 188.

17. Gertruda Zapesochany, Vladimir Kurkin, Victor Okanov and Anatoly Miroshnikov: Canthin - 6 - one and Beta corboline Alkaloids from Aerva lanata . Planta Medica. 1991;58(2):192-196.

18. Maheshwari JK. The Flora of Delhi. Publication & Information Directorate (C.S.I.R.), New Delhi, (1963), pp. 294.

19. Collett , H., Flora Simlensis , A Hand Book of the Flowering Plants of Simla and the Neighbourhood. Calcutta & Simla . Thacker , Spink & Co. (1921), pp. 414.

20. Yamunadevi M, Wesely EG, Johnson MA. FTIR spectroscopic studies on Aerva lanata (L.) Juss. Ex Schult. Asian J Pharm Clin Res. 2012; 5:82-86.

21. Omoyeni OA, Adeyeye EI. Chemical composition, calcium, zinc and phytate interrelationships in Aerva lanata (Linn) Juss. ex Schult leaves. Orient J Chem. 2009; 25:485-488.

22. Ragavendran P, Arul Raj C, Sophia D, Starlin T, Gopalakrishnan VK. Elemental analysis of Aerva lanata (L.) by EDX method. International Research Journal of Pharmacy 2012; 3:218-220.

23. Vijayalakshmi R, Ravindhran R. HPTLC method for quantitative determination of gallic acid in ethanolic root extract of Diospyrus ferrea (Willd.) Bakh and Aerva lanata (L.) Juss. Ex Schultes-A potent Indian medicinal plants. Asian J Pharm Clin Res. 2012; 5:170-174.

24. Vijayalakshmi R, Ravindhran R. Preliminary comparative phytochemical screening of root extracts of Diospyrus ferrea (Willd.) Bakh and Aerva lanata (L.) Juss. Ex Schultes. Asian J Plant Sci Res. 2012; 2:581-587.

25. Kumar G, Karthik L, Bhaskara Rao KV. Phytochemical composition and in vitro antioxidant activity of aqueous extract of Aerva lanata (L.) Juss. ex Schult. Stem (Amaranthaceae). Asian Pac J Trop Med. 2013; 6:180-187.

26. Mariswamy Y, Gnanaraj WE, Antonisamy JN, Adaikalam AA, Jamesraj V. GC-MS studies on methanolic extracts of Aerva lanata L. Indo American Journal of Pharmaceutical Research. 2013; 3:2687-2717.

27. Dymock, W, Warden , C.J.H. Hooper, D. Pharmacographia Idnia Part - I – III. Principle Drugs of Vegetable Origin in Biritish India . Bishen Singh Mahendra Pal Singh , Dehra Dun, (1890), pp. 365.

28. Karnick, C.R. Some Aspects of Crude Indian Drug Plants in Ayurvedic System of Medicine for Madhumya (Diatbetes)

Actaphytotherapeutics , (1972) vol.8 , pp. 141-147.

29. Winter, C.A., Orahovats, P.D., Flatker, L., Lehman, E.G., and Lehman, J.T. Carrageenin Induced Oedema Hind Paw of Rats. J. Pharmacol. Expe. Ther. (1954) 3, pp. 152.
30. New Bould, B.B. Chemotherapy of Arthritis Induced in Rats by Mycobacterial Adjuvant. B. J. Pharma., (1963) 21, pp. 127-136.
31. Woolfe, G., and Macdonald, A.D. J. Phar. Exp. Ther. (1944) 133, pp. 400.
32. Eddy NB, Leimbach, D. Synthetic Analgesic. II. Dithienybutanyle and Dithienbutylanines. J. Pharmacol Exp Ther. 1953;107: 385.
33. Davies, O. L., Raventos, J., & Walpole, A. L. A method for the evaluation of analgesic activity using rats. British journal of pharmacology and chemotherapy, (1946) 1(4), pp. 255-261.
34. Stephenson N.R. Assay of Adrenocortical Hormons on the Thymus of the Weanling Rats. Canadian J Biol Physio. 1954;32:689.