CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF

PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.821062

Available online at: http://www.iajps.com *Research Article*

EVALUATION OFANTI HYPERTENSIVE EFFECTS OF AQUEOUS ETHANOLIC EXTRACT OF *HALOXYLON SALICORNICUM* IN ANIMAL MODELS

Mohammad Siddique [1*], Marvi [2], Shafi Muhammad [2], Bashir Ahmed [1], Ghulam Sarwar[1], Asim Khan [1], Gul Muhammad[1], Munir Ahmed [1], Sohail Riaz [1]

[1] MPhil Scholar, Faculty of Pharmacy University of Balochistan.

[2]Assistant Professor, Faculty of Pharmacy University of Balochistan.

Abstract:

Background: Hypertension is serious chronic conditions that can be treated with herbs. One of these herbs is Haloxylon salicornicum which is being used for many therapeutic purposes from years.

Aim and objectives: The present study aims to evaluate the antihypertensive effects of aqueous ethanolic extract of in animal glucose induced hypertensive model.

Methods and materials: Aqueous extracts of Haloxylon salicornicum (AEEHS) were administered orally to glucose induced hypertensive rats for 21 days and its antihypertensive effects were determined by monitoring the systolic, diastolic blood pressures and heart rates of rat models.

Results: Orally administered AEEHS showed significant reduction in systolic blood pressure, diastolic blood pressure and heart rate as compared to amlodipine.

***Conclusion:** These findings suggest that AEEHS can be used as antihypertensive remedy and needs more study to investigate its potent effects.*

Corresponding author:

Mohammad Siddique,
MPhil Scholar,
Faculty of Pharmacy,
University of Balochistan, Saryab Road,
Quetta, 87300,Pakistan.
siddiquehasani@gmail.com
Phone Number: +92-300-3830692

QR code

Please cite this article in press as Mohammad Siddique et al, ***Evaluation of Anti Hypertensive Effects of Aqueous Ethanolic Extract of Haloxylon****, Indo Am. J. P. Sci, 2017; 4(06).*

INTRODUCTION:

Life style related diseases including cardiovascular, metabolic and malignancy are increasingly serious public health problems. One of the major public health issue faced by developing countries is cardiovascular diseases most notably hypertension and pre hypertension symptoms [1]. Many factors contribute for this chronic disease including hypervolumia, peripheral resistance in CVS and many more that raise blood pressure [2]. This factor either alone or in combination is responsible to increases the blood pressure. Several pharmacological and non pharmacological treatments are available to counter to hypertension. Anti hypertensive can be produced with various medicines, food and herbs [3, 4].*Haloxylon salicornicum* plant has been used traditionally for therapeutic purposes for many years in Districts of Quetta and Panjpai in Balochistan, Pakistan. It is widely distributed in Egypt, Palestine, Jordan, Iraq, Kuwait, Iran, and Pakistan[5].*Haloxylon salicornicum* is belongs to the family Chenopodiaceous which is locally known as "Lana" or "Khar", found as common shrub in desert areas of Pakistan[6]. There are five species of genus *H. salicornicum* are found in Pakistan[5]. *Haloxylon salicornicum* is a diffuse shrub, pale, much branched, almost leafless, 25-60 cm heighted, with woody stem [5]. According to Some native people this plant is poisonous; this is because of the lack of sufficient knowledge. Traditionally The plant's anti-inflammatory properties are used externally on insect stings [7]. Locally, the ashes of this plant are used for inflammation.. A metabolic extract of this plant showed strong cytotoxicity in brine shrimp lethality test[8]. Its decoction is widely known to have antiseptic and anti-inflammatory effect. Its anti intestinal ulcer properties has been accepted and adopted in practices by traditional healers [6]. Three alkaloids and a pyranone derivative have so far been reported from this species [9, 10]. Different alkaloids have been isolated from this plant. Around 80 identified alkaloids from this genus, 10 belong from this plant. Other genus Haloxylon, haloxynine, halosaline, haloxine, anabasine and smipine are source of 5% of total alkaloids. Some of these alkaloids are known to be strongly antagonistic at nicotinic acetylcholine receptors. One of the alkaloids isolated is: piperidyl alkaloid called "haloxynin" has also been isolated and characterized from *H. salicornicum*. [11]. Antifungal and cholinesterase inhibiting activities have been assessed during pharmacological screening of this fraction revealed.

However the antihypertensive activity of *Haloxylon Salicornicum* were never been reported before. The current study aims to evaluate the antihypertensive effects of aqueous ethanolic extract of in animal glucose induced hypertensive model.

MATERIALS AND METHODS:

Collection of the plant:

Approximately 4 kg of H. Salicornium was collected from Panchpai, Quetta in full groom season (i.e. from June - July 2016). Plant was identified by Dr. Shafi Muhammad, Assistant professor Department of Pharmacognosy, faculty of Pharmacy university of Balochistan, Pakistan.

Preparation of ethanolic extract

The plant was collected and dried under shade for 15 days. After drying, plant crushed by the help of mincer. Then the crushed plant material was soaked in air tight glass jar with 2 liter ethanol for 7 days with percentage yield of 10.1%. Solvent was filtered and evaporated by using Rotary evaporator; Dark green semi-solid extract was obtained.

Experimental Animals

Rats (250- 300 grams) of either sex not used before were acquired from Dow University of Health Sciences Karachi, Pakistan to use in this study. These animals were kept under controlled environmental conditions with room temperature 24+ 1°C with relative humidity of 54+ 10%, and twelve hourly light & dark cycle daily. The light cycle was maintained during 8:00 am to 08:00 pm. Animals were kept in typical enclosures (5 rats in each cage), fed on standard food and had easy access to water, throughout the whole research period. The diet utilization and alteration in body weight of the rats was monitored on daily basis. These rats were administered with 10% glucose in drinking water and in diet 48-57% for a week [12] to make them glucose induced hypertensive animal model. These rats were divided into 3 groups with five rats (n=5) in each group. Distribution of rats into groups was done randomly. Group 1(control group) was given glucose only, Group 2 (treatment group) was given glucose + aqueous ethanolic extract of *H. salicornicum* (AEEHS) and group 3(Standard group) was given Glucose + Amlodipine.

Measurement of systolic blood pressure (SBP), Diastolic Blood pressure (DBP) and Heart rate (HR)

The systolic and diastolic blood pressures were

estimated prior to administration of AEEHS and glucose and during 21 days of experiment by using a tail-cuff plethysmograph {Model 92, IITC Inc., Woodland Hills, USA}, coupled to Power Lab 4/25 data acquisition system coupled to a computer running Chart 5.3 software [13]. After modification in the blood pressures of the rats 8 readings of SBP, DBP of each conscious animal were recorded with median values. The systolic blood pressure was measured at 0, 3, 6, 9, 12, 15, 18 and 21th day of the treatment. This method of blood pressure measurement is documented to have 96% correlation with direct blood pressure [13].

The calculation of Heart rate was done by using online using cyclic measurements option of the Chart software. Rats were trained daily for ten days before starting the experiment.

Statistical analysis

The central tendencies of data were analyzed and presented as mean ± SD. For inferential statistics, the comparisons were performed by Student's *t* test. A level of $P < .05$ was considered as statistically significant.

RESULTS AND DISCUSSION

Effect on Systolic Blood Pressure

Table 1 shows Antihypertensive effect of AEEHS, and amlodipine on systolic blood pressure (SBP) in glucose induced hypertensive rats. After regular monitoring of systolic blood pressure, on 21st day the systolic blood pressure of control group, treatment group and standard group was 172.60 ± 3.60, 121 ± 4.67 and 115.20 ± 2.20 mmHg respectively which showed antihypertensive effect of AEEHS.

Table 1: Antihypertensive effect of AEEHS, and amlodipine on systolic blood pressure (SBP) in glucose induced hypertensive rats.

Days	Systolic Blood Pressure (mmHg)		
	Glucose Control mean±SD	Glucose +AEEHS (500mg/kg) mean±SD	Glucose +Amlodipine (10mg/kg) mean±SD
0	142.06 ± 2.04	139.30 ± 2.06^{ns}	139.72 ± 3.05 ^{ns}
3	148.20 ± 1.77	130.60 ± 1.69	131 ± 2.02
6	153.20 ± 1.39	128.80 ± 2.06	123 ± 1.87
9	158.80 ± 1.16	129.60 ± 2.23	121.20 ± 2.31
12	161.60 ± 1.72	124.20 ± 2.85	123 ± 1.30
15	169.80 ± 1.48	123.80 ± 3.15	117.20 ± 1.96
18	170.20 ± 2.46	113.80 ± 3.73	115.80 ± 2.20
21	172.60 ± 3.60	121 ± 4.67	115.20 ± 2.20

Results are expressed as, means ± SD (n = 5), where, = ($p < 0.001$), ns = Non-significant vs. glucose control.

Effect on Diastolic Blood Pressure

Table 2 shows Antihypertensive effect of AEEHS and amlodipine on diastolic blood pressure of glucose induced hypertensive rats. After regular monitoring of systolic blood pressure, on 21st day the diastolic blood pressure of control group, treatment group and standard group 155.60 ± 4.00, 97.70 ± 4.47and 97 ± 2.63 mmHg respectively which showed equal antihypertensive effect of AEEHS in comparison with amlodipine.

Effect on heart Rate

Table 3 shows effect of AEEHS and amlodipine on heart rate of glucose induced hypertensive rats. After regular monitoring of systolic blood pressure, on 21st day the heart rates of control group, treatment group and standard group were 389.4±9.79, 286.4±7.87 and 341.2±9.91^{ns} bpm respectively which showed bradycardic effect of AEEHS in comparison with amlodipine.

Table 2: Antihypertensive effect of AAEHS and amlodipine on diastolic blood pressure (DBP) in glucose induced hypertensive rats.

Days	Diastolic Blood Pressure (mmHg)		
	Glucose Control mean±SD	Glucose +AEEHS (500mg/kg) mean±SD	Glucose +Amlodipine (10mg/kg) mean±SD
0	129.47 ± 2.71	122.15 ± 2.44 ^{ns}	127.50± 3.44 ^{ns}
3	134.20 ± 2.03	115.40 ± 0.73	116.10 ± 1.04
6	137.40 ± 1.08	116 ± 3.90	106.60 ± 2.43
9	145.40 ± 1.51	117.40 ± 1.62	104.50 ± 2.86
12	147 ± 2.33	107.50 ± 3.24	107.50 ± 2.43
15	153.10 ± 1.51	108.30 ± 3.46	98.70 ± 2.94
18	155.60 ± 2.16	97.70 ± 4.47	97.60 ± 2.12
21	155.60 ± 4.00	93.90 ± 5.87	97 2.63

Results are expressed as, means ± SD (n = 5), where, = (p < 0.001), ns = Non-significant vs. glucose control.

Table 3: Effect of AEEHS and amlodipine on the heart rate in hypertensive rats.

Days	Heart Rate (BPM)		
	Glucose Control mean±SD	Glucose +AEEHS (500mg/kg) mean±SD	Glucose +Amlodipine (10mg/kg) mean±SD
0	363±8.1	368.6±16.86	364 ± 5.33
3	374.6±11.07	325.4±5.11	351±10.04^{ns}
6	370.6±6.64	329±5.33	363.60 ±6.18^{ns}
9	378.4±11.29	338±8.51	371.6±13.23^{ns}
12	379.4 ± 10.56	301.6±9.37	335.8±8.3*
15	373.2±14.26	307.6±6.35	356.4±15.92^{ns}
18	393.2±9.76	291.8±7.94	342.6±10,12^{ns}
21	389.4±9.79	286.4±7.87	341.2±9.91^{ns}

Results are expressed as, means ± SD (n = 5), where, = (p < 0.001) = (p <0.01) , = (p < 0.05) and ns = Non-significant vs. control .*

Medicinal plants have been used worldwide for disease conditions from centuries. Herbs usually possess less adverse effects and are comparatively less expensive. Due to these properties a growing interest has been noted in the of herbal and bioactive compounds [14].

The current study showed a reduction in SBP, DBP and heart rate of glucose induced hypertensive rat model after 21 days administration of AEEHS. These hypotensive effects were not related with tachycardia instead they showed to slow down the heart rate. However, Mechanism of antihypertensive effect was not evaluated. The antihypertensive effects similar to amlodipine.

CONCLUSION:

The antihypertensive activity of AEEHS in current study suggests the AEEHS can be alternative to other antihypertensive medicines is remarkable but this plant extracts needs further investigation.

CONSENT

It is not applicable.

ETHICAL APPROVAL

An approval from Departmental Animal Research Ethics Committee according to national bioethical committee Pakistan was obtained.

REFERENCES:

1.Goldblatt, H., et al., Studies on experimental hypertension: I. The production of persistent elevation of systolic blood pressure by means of renal ischemia. The Journal of experimental medicine, 1934; 59(3): p. 347.
2.Takahashi, N. and O. Smithies, Human genetics, animal models and computer simulations for studying hypertension. TRENDS in Genetics, 2004; 20(3): p. 136-145.
3.Fatehi, M., et al., A pharmacological study on Berberis vulgaris fruit extract. Journal of ethnopharmacology, 2005; 102(1): p. 46-52.
4.Amos, S., et al., Hypotensive activity of the ethanol extract of Pavetta crassipes leaves. Biological and Pharmaceutical Bulletin, 2003; 26(12): p. 1674-1680.
5.Ferheen, S., et al., Haloxylines A and B, antifungal and cholinesterase inhibiting piperidine alkaloids from Haloxylon salicornicum. Chemical and pharmaceutical bulletin, 2005;53(5): p. 570-572.
6.Shafi, P., et al., Antibacterial activity of Syzygium cumini and Syzygium travancoricum leaf essential oils. Fitoterapia, 2002; 73(5): p. 414-416.
7.Parrotta, J.A., Mangifera indica L. Institute of Tropical, 1993.
8.Meyer, B., et al., Brine shrimp: a convenient general bioassay for active plant constituents. Planta medica, 1982; 45(05): p. 31-34.
9.Gibbons, S., et al., NMR spectroscopy, X-ray crystallographic, and molecular modeling studies on a new pyranone from Haloxylon salicornicum. Journal of natural products, 2000;63(6): p. 839-840.
10.Michel, K., et al., Alkaloids of Haloxylon salicornicum (Moq.-Tand.) Boiss. Acta Pharmaceutica Suecica, 1967; 4(2): p. 97-116.
11.El-Shazly, A., G. Dora, and M. Wink, Alkaloids of Haloxylon salicornicum (Moq.) Bunge ex Boiss.(Chenopodiaceae). Die Pharmazie-An International Journal of Pharmaceutical Sciences, 2005; 60(12): p. 949-952.
12.Midaoui, A.E. and J. de Champlain, Prevention of hypertension, insulin resistance, and oxidative stress by α-lipoic acid. Hypertension, 2002; 39(2): p. 303-307.
13.Bunag, R.D., Validation in awake rats of a tail-cuff method for measuring systolic pressure. Journal of Applied Physiology, 1973. 34(2): p. 279-282.
14.Tindle, H.A., et al., Trends in use of complementary and alternative medicine by US adults: 1997-2002. Alternative therapies in health and medicine, 2005; 11(1): p. 42.