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**ASSESSMENT OF SOME SELECTED MEDICALLY IMPORTANT METALS FROM
VIPERIDAE AND ELAPIDAE FAMILY SNAKE VENOM OF SINDH**

**NAEEM-UL-HAQUE QURAISHI¹, ALLAH BUXGHANGHRO^{*2}, IRSHAD HUSSAIN
GHANGHRO³, TAJ MUHAMMAD JAHANGIR⁴, MUHAMMAD BUX BHURGRI¹,
ZAHOOR AHMED KHOSO¹, SAUD AHMED¹**

Anti-Snake Venom/Anti-Rabies Serology laboratory, Sakrand Shaheed Benazir Abad¹,
Institute of Biochemistry, University of Sindh, Jamshoro², Water Testing & Surveillance
Laboratory, LUMHS³, Jamshoro, Institute of Advanced Research Studies in Chemical Sciences,
University of Sindh, Jamshoro⁴

***Corresponding author: Prof. Dr. Allah Bux Ghanghro, Institute of Biochemistry,
University of Sindh, Jamshoro, allah.bux@usindh.edu.pk; 923003049628**

ABSTRACT

Medically important groups (families) of venomous snakes are found in Sindh province of Pakistan i.e. *elapidae* (*Najanaja* & *Common Kraits*) and *viperidae* (*Russell's Viper* & *Echis Carinatus Socherueki*). Snake venom contains many constituents and medically important nontoxic components. However, through present research and detailed investigation determine important biological properties of the venom and concluded that the medically important and biologically active components are present in venoms of snake among common snake families at Pakistan in Sindh, and results becomes advantageous in the field of medicines and beneficial for curative purpose. Whereas metals was found in *Najanajai*-e 207ug/g of Zn and K were found in 189ug/g in higher concentration, higher concentration of Na was in 13.1 mg/g in saw scaled viper, 1.64 ug/g of Ni in Russell's viper, Cu (8.07ug/g) and Fe (15.92ug/g) was found in *Najanaja* and 0.58 ug/g Mn was found in Kraits.

Keywords: Metals, Elapidae, Snake, Venom, Family, Sindh

INTRODUCTION

The common poisonous snakes found in Pakistan. *Elapidae* family Cobras, *Krait*, *viperidae* family *Viper*, *Persian Horned Viper*(1). In South Asia, four common venomous snake species bite cases were recorded and majorly affected areas of the south Asian region countries are Srilanka, Bangladesh, India and Pakistan. Most of the toxic snakes belong to *elapidae* and *viperidae* family. *Elapidae* family snakes Black Cobra (*Naja naja*) local name is “Karo”, *common krait (Bungarus caeruleus)* whereas *viperidae* family Snakes are *Russell’s viper (Daboia russelii)*, *Saw-scaled viper (Echiscarinatus Socherueki)*(2,3,4). Several inorganic elements have been known for their defined function as enzymatic cofactors (5). Many enzymes in snakes venoms like Phospholipase A₂, nucleotides, metalloprotease, depend on inorganic elements for their activities (6). The activity of Crotoxin is calcium dependent in *crotalus aurissus* venom. (7) removing the divalent metal cations (Ca, Mg and Zn) from snake venoms destroy their hemorrhagic activity (8,9). Determined the amount of Calcium, Potassium, magnesium, Sodium and Zinc by atomic Absorption from the venom of *Elapidae* families. (10), Gitter applied neutron activation analysis for copper

and zinc from the venom of *Najanaja*, (11). It has been shown that the hemorrhagic activity of snake venoms can be related to the presence of ions like Ca, Mg and Zn. Friederich and Tu analyzed by atomic absorption venoms from snakes of different geographical origins and found the metals Ca, Mg, Zn, Na and K in all of them (10). Bjarnason and Fox also pointed out that metals can play important roles in the venom protein structure stabilization. The determination of inorganic components in snake venoms could be important from the point of view of the biochemical characterization of snake species and also contribute in pharmacological role of venom. The analytical determination of the elements: Br, Calcium, Chlorides, Cobalt, Cs, Potassium, Sodium, Rb, Sb, Selenium and Zinc were found in the venoms with different concentrations (8,12). Snake venoms are used in the production of snake antivenom as hyper immunizing antigens. Snake venoms are complex substances that, depending on the species, can contain a variety of toxins. Toxin components can include proteases, nucleases, phosphodiesterase, and other enzymes which disrupt physiological processes and cellular integrity. The venom toxins are largely classified as neurotoxins,

cytotoxins, myotoxins, and cardiotoxins. Venomous snake bites may cause a variety of symptoms, including pain, swelling, tissue necrosis, hypotension, and neuromuscular collapse, blood clotting dysfunction, respiratory paralysis, kidney failure, coma and death (13).

MATERIALS & METHODS

Venom Collection

Species under studied snakes common name Black Cobra (*Naja naja*) local name is known as “Karo”, Common Krait (*Bungarus caeruleus*) whereas viperidae family Snakes are (2) were identified and classified according to standard criteria. Venoms from each species of snakes were extracted, by squeezing the glands and collected in Beakers. Whereas the front fangs of snakes stood completely extended by opening the snake’s mouth and applying frontal compression to the quadrato-articular joint after that the yellowish liquid material were collected in labelled beakers (14). Snake venom of the selected species and desiccant (silica gel or calcium chloride) were put into the vacuum desiccator, covered with a layer of gauze and sealed at room temperature. Snake venom is seen to be the block sizes or particles yellowish in color crystals by vacuum desiccation. (15).

Acid Digestion of the Venom For Metal Analysis.

Acid Digestion Samples were digested in Conc. HNO₃ samples were heated upto dryness. Volume make up with deionized water the samples were filtered, the filtrate was analyzed. The selected metals were determined by atomic absorption spectroscopy (Perkin Elmer Analyst AA-800) technique available at Hi-Tech central resource laboratory/ IARSCS, University of Sindh, Jamshoro. All the results were taken in mg and ug per gram against blank the instrument was also calibrated with different concentration of the particular metal standards. Each metal were analyzed at particular wavelength. The instrumental conditions for metal analysis were set as per reported standard methods(10).

RESULTS

The venom of four common species (Najanaja, Kraits, Russell’s viper, Saw Scaled Viper) venom were analyzed for 07 elements (Na, K, Zn, Ni, Cu, Fe, Mn) by atomic absorption method. Results are shown in the Table 1.

Zinc, Copper and Iron found in the highest concentration in the Elapidae and viperidae species. The significant difference were found in the Najanaja, Kraits, Russell’s viper and Saw Scaled viper venom.

Nevertheless, Nickle and Manganese present in higher concentration in both snake species. exhibited lower concentration in viperidae than Elapidae family. Sodium and potassium

Table 1: Assessment of metal ions by atomic absorption spectrophotometer

SNAKE SPECIES	Na(mg/g)	K (ug/g)	Zn (ug/g)	Ni(ug/g)	Cu (ug/g)	Fe (ug/g)	Mn (ug/g)
Najanaja	9.9±0.25	189±0.25	207.04±0.20	0.76±0.15	8.07±0.19	15.92±0.20	0.104±0.15
Kraits	9.3±0.36	187±0.20	92.8±0.25	0.35±0.15	7.11±0.76	3.98±0.63	0.584±0.32
Russell's viper	11.8±0.20	164±0.25	71.2±0.50	1.64±0.32	6.176±0.10	4.48±0.36	0.0032±0.35
Saw Scaled Viper	13.1±0.36	134±0.20	70.88±0.40	1.29±0.32	4.936±0.41	3.68±0.20	0.096±0.26
F statistics at df= 11	93.72	37370.3	152671.1	23.18	72.52	512.46	0.237

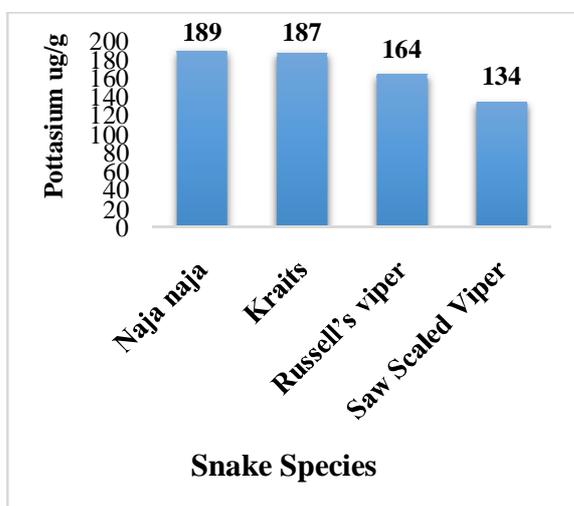


Figure1: Estimation of potassium (P=1.17)

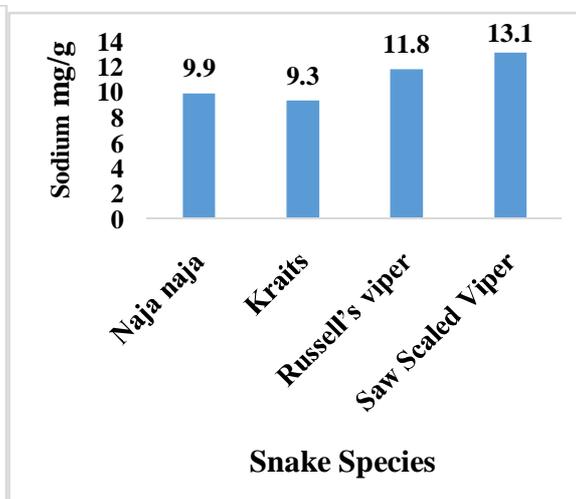


Figure 2: Estimation of sodium (P=0.17)

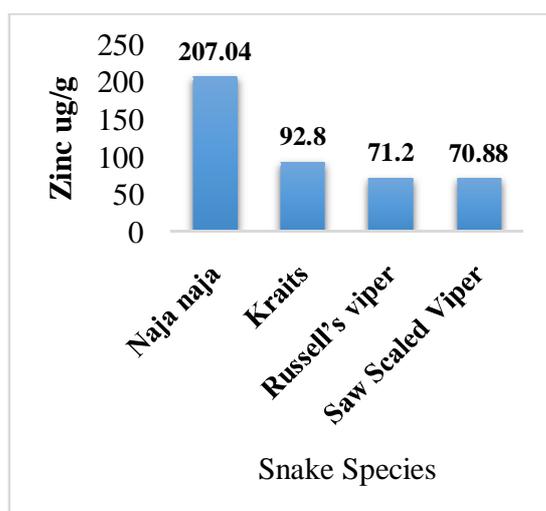


Figure 3: Estimation of zinc(P=0.00)

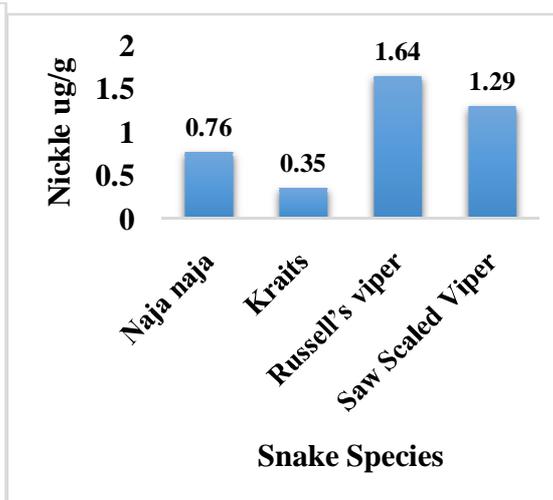


Figure 4: Estimation of nickle (P=0.00)

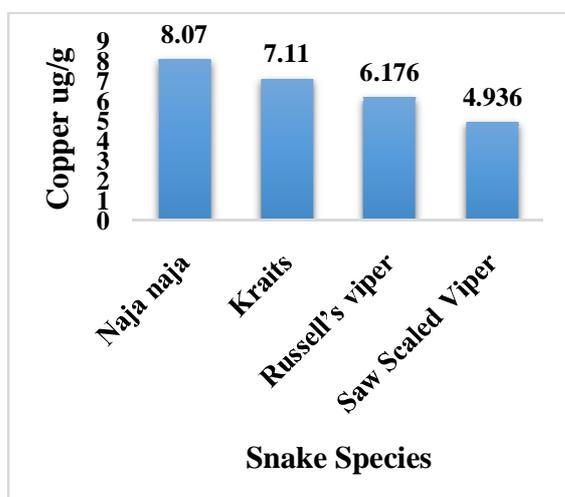


Figure 5 : Estimation of copper (P=0.42)

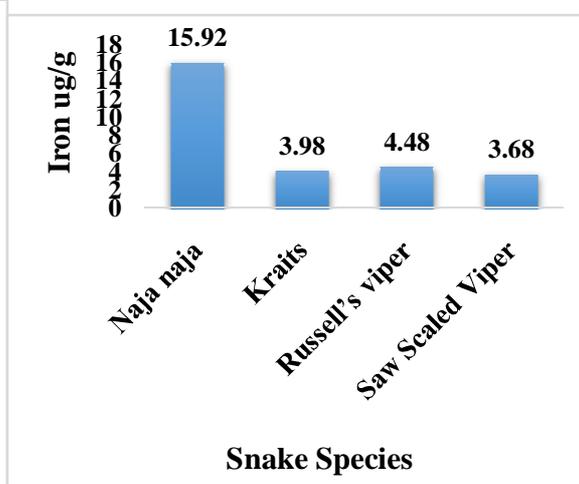


Figure 6: Estimation of iron (P= 1.04)

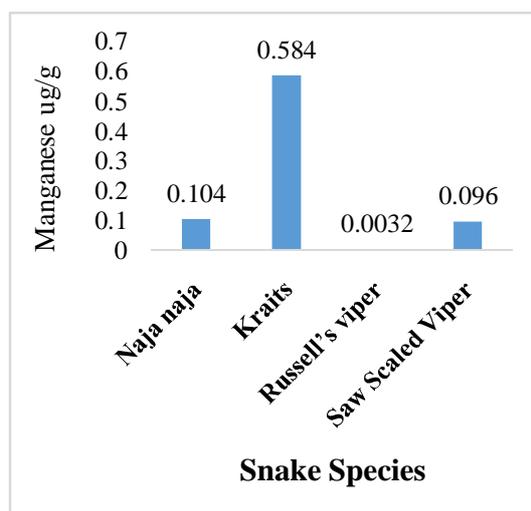


Figure 7: Estimation of manganese (P=0.86)

DISCUSSION

The previous research studies on venoms of different snake species determined the inorganic elements which may helpful for understanding biochemical characteristics of venoms, concentrations ranging from % (Na, K) to ppb (Co, Cs) and other elements were in the ppm range whereas the elements Mg, P, Al, La and Mn were not quantified yet. Other metal ions such as manganese and

calcium do not affect the activity of these enzymes. The inhibitory action of these ions might be related to capability to the reversibly bind to thiol groups of cysteines existing in the active particular site of the active enzyme and reducing that activity. Many pharmacological activities of LAAOs (L-Amino Acid Oxidases) are work together in the presence of some specific metal ions. Tu,1968 reported that the venom of various

colubrid snakes (mostly found in Malaysia) have important characteristic electrophoretic patterns depend upon different molecular weight and further they have similar complexities compared to venoms of the Elapid snake family (16).

CONCLUSION

It is concluded from present study that the medically important and biologically active components are present in snake venoms of the common families of snake at Pakistan in Sindh and these results will be advantageous in the field of medicines and beneficial for curative purpose. Whereas metals was found in enormous concentration in Zn detected from *Najanaja*, whereas higher K were found in high from *Common kraits*. Study suggested that the medically important and biologically active components are present in snake venoms of the common families of snake at Pakistan in Sindh and that will be advantageous in the field of medicines.

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