ORIGINAL RESEARCH PAPER

Ayurveda

NEUROPROTECTIVE EFFICACY OF SINDHUVARADI AGADA AGAINST BIFENTHRIN INDUCED NEUROTOXICITY-AN EXPERIMENTAL STUDY

KEY WORDS:

Dr Preetam. K. Lamani Associate Professor, Department Of Agadatantra, SVAMCH, Lingasuguru

Dr V. S. Hiremath Professor, Department Of Agadatantra, BVVS AMCH, Bagalkot

INTRODUCTION:

A neurological disorder is a disorder of the body's nervous system. Structural or biochemical perturbations in the brain, spinal cord or in the nerves leading to or from them can results in symptoms like paralysis, muscle weakness, poor coordination, loss of sensation, seizures, confusion, pain and altered levels of consciousness.[1] Disorders like Parkinson's disease (PD), Alzheimer's disease (AD) and Amyotrophic lateral sclerosis (ALS) accounts for significantly morbidity and mortality among the veterans and the general population.[2] Largely as a result of increased life expectancy and changing population demographics, neurodegenerative dementias and neurodegenerative movement disorders are becoming more common.[3]

Many age-related neurodegenerative diseases are characterized by accumulation of disease-specific misfolded proteins in the central nervous system. The connection between altered protein conformation and neuro degeneration was first established for prion diseases a decade ago but the creative use of animal models has proven that misfolded proteins are also at work in neurodegenerative disorders.[4]

Neurodegenerative diseases are a heterogeneous group of disorders that usually strike in mid-life and cause progressive loss of motor and cognitive function. They are characterized by the properties of the neuropathological lesions observed in the brain.[3,4]

Oxidative stress has long been linked to the neuronal cell death that is associated with certain neurodegenerative conditions. The release of oxygen and nitrogen free radicals has also been reported during the recovery phases from many noxious stimuli to the cerebral tissues. Free radical mediated oxidative stress results in strokes, trauma and chronic neurodegenerative disorders.[5]

Review Of Literature:

Sinduvaradiagada[7]

Sinduvaradiagada (consists of sinduv¡ra,¾v£t¡ (vac¡) and girikarnika (apar¡jita)) is explained in context of darvikara damsa. It states that with water it should be given to the person who is been bitten by darvikarasarpa (cobra). As explained previously hrudaya is main sth¡na of vata to accumulate and through research it is proved that the cobra venom have neurotoxins which affect brain and produces dysfunctioning of it.i Thus drugs of this formulation can be used in the cardiotoxicity which is a result of increased oxidative stress as all the drugs possess anti-oxidant activity.

Drug	Botanical Name	Parts Used	Ga³a	Karma
1.SINDHUVARA	itvitex negundo Linn	Àla (Root)	Vi½ aghna, Krimighna.	µthahara, Vi½ aghna Mutrajanan, Balya.
2.VACHA	Acoruscalamus Linn	Kanda (Rhizome)	T» ptighna, sajnasthapana, lekhana, Arshghna,vamana.	Sangyasthapana, vamana, mutrajanana.
3.GIRIKARNIKA	iclitoria ternatesa Linn	Mula (Root)	¾irµvir£cana, vayasth¡pana,	µthahara, Vishaghna Mutrajanana

Bifenthrin:

Bifenthrin is an insecticide in the pyrethroid family. Pyrethroids are manmade versions of pyrethrins, which come from chrysanthemum flowers. Bifenthrin is used on various agricultural crops and in homes. Bifenthrin was first registered for use by the United States environmental protection agency (u.s. epa) in 1985. Products containing bifenthrin come in many forms, including sprays, granules, and aerosols. Bifenthrin interferes with the nervous system of insects when they eat or touch it. It's more toxic to insects than it is to people because insects have lower body temperatures and smaller body size.

METHODOLOGY

Study Design: Animal Experiment Study

IAEC NO:-REF:HSKCP/IAEC-19/2021

(a) Preparation Of Sindhuvaradi Agada:

Collection of plant samples:

The ingredients (stem bark) of Sindhuvaradi Agada were procured from natural habitat and Local drug suppliers. They were dried under shade and used for the studies.Raw drugs for preparation of formulation were procured from available sources and authentication was carried out in AYUSH approved Drug Testing Laboratory. Preparation of Sindhuvaradi Agada was done as per classics and observations were noted.

Table No 1: Organoleptic Characters of Sindhuvaradi Agada

SI No	Parameters	Sindhuvaradi agada
1	Colour	Autumn gold
2	Odour	aromatic
3	Taste	Pungent,bitter
4	Consistency	hard

Preliminary Phytochemical Screening Of Sindhuvaradi Agada:

Sindhuvaradi agada was evaluated for preliminary phytochemical analysis of organic and inorganic compounds by using the following standard methods. The screening was carried out at BVVS HSK College of Pharmacy, Bagalkot.

Table – 2 Standard Methods of preliminary phyto chemical constituents (PPC)

SN	PPC	Standard Method
A.	Organic constituents:	
1.	Alkaloids	Mayer's Test
2.	Carbohydrates	Molisch's test
3.	Anthraquinones	Bontrager's test
4.	Tannins	Lead acetate test
5.	Saponins	Foam test
6.	Flavonoids	Ferric chloride test
7.	Glycosides	Legal's test

8.	Terpenoids	Salkowski test
9.	Phenols	ferric chloride solution (5%)
10.	Steroids	Liebermann burchard reaction
11.	Proteins	Biuret test
B.	Inorganic constituents:	
1.	Carbonates	Chemical test with HCL
2.	Sodium	Flame test
3.	Potassium	Flame test
4.	Chloride	Chemical test with AgNO3
5.	Sulhate	Barium Chloride (BaCl2) test
6.	Aluminum	Chemical test with Ammonium Acetate
7.	Magnesium	Chemical test with NH3 Solution
8.	Calcium	Chemical test with Acetic Acid & Potassium Ferrocyanide
9.	Phosphate	Chemical test with FeCl3
10.	Iron	Chemical test with Potassium Ferrocyanide
11.	Iodine	Silver Nitrate (AgNO3) test
12.	Lead	Chemical test with Sodium Acetate
13.	Ammonium Salts	Chemical test with NaOH Solution
14.	Barium Salts	Chemical test with HCL & H2 SO4

Table

SI NO	PARAMETERS	Sindhuvaradi agada
1	PH at 5% aqueous solution	7.21
2	Loss on drying	2.80
3	Total ash	6.71
4	Acid insoluble ash	4.94
5	Water soluble extract value	39.42
6	Alcohol soluble extract value	22.31

Histopathology Results:

Effect of SVA against bifenthrin induced in rats. Photograph of brain section of different treatment groups stained with haematoxylin and Eosin. Plates; A: Normal group, B: Bifenthrin group, C: (SVA + Bifenthrin) group; In B plate there was more vacuoles seen, density of cells decreased, architecture completely altered, also haemorrhage and neuronal cell death was observed in striatum. There is significant reversal of damage observed in (SVA + Bifenthrin) group protection in treated groupwas mostly comparable with Normal group (A).
Effect of Sindhuvaradi agada on neurobehavioral assessment.

The results of this study revealed the potential neuro protective activity of Sindhuvaradi agadain behavioural assessment the severity of convulsionswere gradually increased in Bifenthrin groupas compared to normal groupand the Sindhuvaradi agada treated group shows significant recovery as compared to control group.

The muscular co-ordination of the rats measured by rotarod apparatus, the fall off time is significantly increased in Bifenthrin groupas compared to normal group and Sindhuvaradi agada treated group shows significant decrease in fall off time as compared to bifenthrin group.

The severity of ptosis in bifenthrin group was gradually increased as compared to normal group, and the significant decrease in ptosis was observed in treated group with Sindhuvaradi agada as compared to bifenthrin group.

Effect of Sindhuvaradi agada on histopathological studies In histopathological studies the bifenthrin group showed marked infiltration of neutrophils, intracellular space increased and more vacuoles seen, density of cells decreased, architecture completely altered, also haemorrhage and neuronal cell death was observed in striatum. A significant decrease in infiltration of neutrophils, intracellular space, recovered architecture and decreased necrosis was observed in Sindhuvaradi agada treated groups.

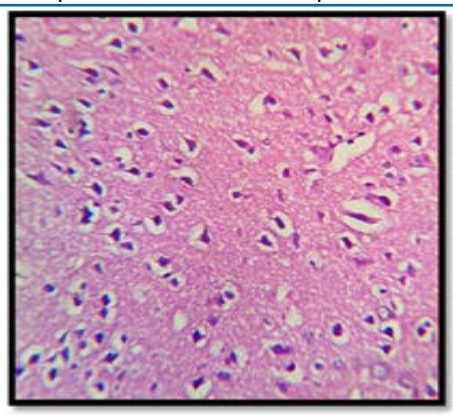

Figure 1 GROUP A

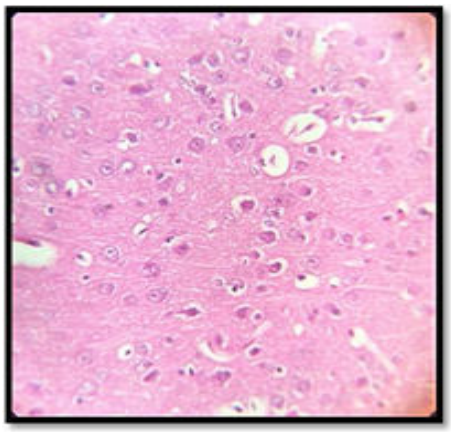

Figure 2 BENIFITHRIN GRP

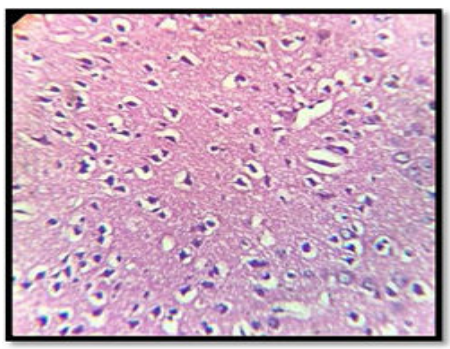

Figure 3 SVA+BENIFITHRIN GRP

CONCLUSION:

Pesticides play significant roles in the development and function of nervous systems including central and peripheral nervous systems. It is well known that pesticides target on the nervous systems by inhibiting an acetylcholinesterase, which can prolong the excitatory action of acetylcholine. Hallmark features of pesticide toxicity involved the damage of synaptic proteins, synapse formation, and finally resulted in the attenuation of neuronal circuit signaling. Pesticides can bind to various targets such as enzyme, receptor, channel, protein, and membrane that quickly disrupt the neurotransmission processes leading to behavioral alterations.

In this study there is significant reversal of damage observed in (SVA + Bifenthrin) group protection in treated group was mostly comparable with Normal group (A). A significant decrease in infiltration of neutrophils, intracellular space, recovered architecture and decreased necrosis was observed inSindhuvaradi agada treated groups. There is significant reversal of damage observed in (SVA + Bifenthrin) group protection in treated group was mostly comparable with Normal group (A).

REFERENCES:

1. J. M. Loots, et al, Effect Of Naja Nivea Venom On Nerve, Cardiac And Skeletal Muscle Activity Of Frog, Br J Pharmcol. 1973 March; 47(3): P- 576-585.
2. P.C.Sharma, et al, Database On Medicinal Plant Used In Ayurveda, CCRAS Publication New Delhi Reprint2002, Vol3, p450-71.
3. P.C.Sharma, et al, Database On Medicinal Plant Used In Ayurveda, CCRAS Publication New Delhi Reprint2002, Vol 1, p-469-97.
4. P.C.Sharma, et al, Database On Medicinal Plant Used In Ayurveda, CCRAS Publication New Delhi Reprint2002, Vol 1 p-22-31.
5. Droge W. Free radicals in the physiological control of cell function. Physiological Reviews. 2002;82:47–95. doi: 10.1152/physrev.00018.2001.