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The Healing Properties of SCORPION VENOM: A Blessing FOR HUMAN Betterment

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Abstract: Scorpion venom additives have multifaceted orientation in opposition to bacterial, viral, fungal infections and other neuronal disorders. In historical technology, venoms are taken into consideration as poisonous substance. However, it is now utilized as a helpful medicine to treat specific illnesses and disorders, such as antibacterial, anti-rheumatic, etc. venomous creatures are found all over the planet, with the exception of frigid places. We are killing scorpions, since it's sting was poison however this toxin can likewise utilized as a medication. When scorpion venom is at its ideal concentration, it shouldn't have any negative effects, but when it exceeds that point, it becomes toxic. By drawing this conclusion, the study shows that even though scorpions are hazardous, their venom is beneficial to us, and we can feed and raise them for economic gain rather than killing them. Furthermore, because scorpions are a plentiful source of raw materials in our environment, we should appropriately utilize them rather than kill them.

Keywords **- Venom, Antitubercular activity, bioactive components, toxins**

I. INTRODUCTION

Scorpions are a very old species of creatures; they started out as terrestrial animals some 300 million years ago, and they've been around ever since. With the exception of Antarctica, they are found all over the world and on all continents. They have evolved to survive in a range of settings, including high elevations, deserts, rainforests, and caves.
Some species of scorpions are endemic, reliant on the natural circumstances of their native habitats, and confined to small populations with constrained ranges.

Venoms were once thought to be dangerous substances. However, it is now a valuable pharmaceutical used to treat a variety of illnesses and ailments and is also a component of several cosmetic preparations. For excellent reasons, most people desire to stay away from scorpions. A scorpion's venom, however, contains much more than just a poison. In truth, scorpion venom has a number of applications that might be utilized to save rather than end lives, similar to snake venom. For instance, proteins from scorpion venoms can be utilized to make immune system suppressants and anti-malarial medications. Additionally, an amino acid from scorpion venom can make it easier for doctors to spot deadly malignant tumors. Currently, researchers have identified a type of scorpion venom which contains two compounds that can kill bacteria resistance to Antibiotics.

Researchers synthesized the chemicals in the lab after isolating them from the scorpion venom. The synthetic form was then administered to mice. Unfortunately, the costliest liquid on Earth is scorpion. 3.7 liters costs about $38,585,507.46 (per gallon).
Only 2 mg of venom are produced by scorpions at a time.
In order to cut the price and ensure that everyone can afford the treatments, it is therefore important to produce a synthetic version of these venoms.

Researchers are investigating the use of scorpion venom as potential painkillers as well as the use of a peptide from scorpion venom to suppress immune responses, allowing it to be utilized in the treatment of auto immune sickness, in addition to using them to fight off anti-bacterial resistant infections. Even cancer is beginning to feel the Scorpions
sting. A drug called VIDATOX is obtained from blue scorpions.

It's possible that scorpion venom won't always be effective in curing cancer. Chlorotoxin, a protein included in the venom of the Death Stalker Scorpion, has been used by researchers to create a so-called tumor paint. Only malignant brain cells are attracted to the molecule, which then lights them up via a fluorescent tag on the poison. This makes it possible for medical professionals to

identify the precise site and amount of malignant growth in the body. In addition to stopping bone loss, scorpion venom is effective in treating osteoarthritis and rheumatoid arthritis. A 71-year-old Cuban man stated in 2011 that he suffers from physical aches and pains because he allows scorpions to bite him at least once a month. due to the absence of substantial.

Due to a shortage of sufficient quantities of scorpion venom to analyze, current research on the substance is moving very slowly. Despite the sluggish pace of research, it may ultimately alter how we diagnose and treat illness and serve as a vital weapon in the fight against the spread of superbugs that have dangerously high levels of antibacterial resistance. The speed of these significant research topics may accelerate as synthesis techniques advance, bringing desperately needed therapies closer to patients' hands.

FAMILY OF SCORPIONS

Actually, there are 1500 separate species and subspecies of these animals spread across 16 groups, all of which have maintained nearly the same shape. The families Buthidae includes the genera Androctonus, Buthus, Mesobuthus, Buthotus, Parabuthus, and Leirus, which are found in North Africa, Asia, the Middle East, and India. These scorpion species are important medically. While Tityus spp. are prevalent in Central and South America and the Caribbean, Centruroides spp. are found in the Southwest of the United States, Mexico, and Central America. There are frequent claims that scorpion stings are harmful in these many parts of the world where scorpionism is seen as a public health issue.

Buthidae Family:

Characteristics: Buthidae is one of the largest and most diverse scorpion families, known for its venomous species. These scorpions typically have slender, elongated pincers (pedipalps), thin tails (metasomas), and often possess a thin, elongated stinger. Their bodies can range from light brown to dark black, often with distinctive patterns.

Distribution
Buthidae scorpions are cosmopolitan, found in various parts of Africa, Asia, the Americas, and the Middle East. Some well-known members include the deathstalker (Leiurus quinquestriatus) and the Indian red scorpion (Mesobuthus tamulus).

Venom: Many species within this family possess potent venom, which can be neurotoxic, affecting the nervous system and causing symptoms such as intense pain, muscle spasms, and even death in severe cases. The severity of envenomation varies among species.

Scorpionidae Family:

-*Characteristics*: Scorpionidae scorpions are typically characterized by their robust bodies, thick tails (metasomas), and large, powerful pincers. Their pedipalps are well-developed and often used for capturing prey. These scorpions can be quite large and intimidating.

-*Distribution* They are commonly found in arid and desert regions of Africa, Asia, and the Americas. Prominent members of this family include the Emperor scorpion (Pandinus imperator) and the Giant Desert Hairy scorpion (Hadrurus arizonensis).

-*Venom* While their venom can be painful and cause localized swelling, it is generally less potent than that of Buthidae scorpions. Envenomation by Scorpionidae species is rarely life-threatening to humans.

Vaejovidae Family

Characteristics: Vaejovidae scorpions are often small to medium-sized with slender tails (metasomas) and pincers. Their exoskeletons can be granular or rough in texture. Some species exhibit striking patterns.

Distribution Predominantly found in North and Central America, these scorpions are well-adapted to arid and semi-arid environments. Notable members include the Arizona bark scorpion (Centruroides sculpturatus) and the Devil scorpion (Vaejovis spinigerus).

Venom While venom potency varies among species, envenomation by Vaejovidae scorpions is typically not life-threatening to humans. However, it can cause localized pain and discomfort.

Diplocentridae Family:

Characteristics: Diplocentridae scorpions are characterized by their robust bodies, broad pedipalps, and often have distinctive ridges on their exoskeletons. They may possess elongated tails (metasomas) and tend to be burrowers.

Distribution: Mainly found in the Americas, especially in tropical and subtropical regions. Species like the Florida bark scorpion (Centruroides gracilis) are members of this family.

Venom: While some species have venom capable of causing localized pain and discomfort, they are generally not considered medically significant to humans.

VENOMS

It is Known as poisons, venoms are elaborate combinations of bioactive substances that have evolved on more than 30 distinct animal kingdom occurrences on occasion.
Toxins are frequently incredibly focused in their activities and capable of inducing a wide several different pharmacological effects. They can act by ion-channels, for instance, by obliterating through interfering with cellular processes or metabolic mechanisms, hematological that could result in paralysis discomfort, tissue necrosis, and disturbances.

Insect venoms have spent a lot of time studying to comprehend their consequences of physiology from the perspective of development of envenomation treatment. Nonetheless, the high the specificity and strength of some poisons make them useless. valuable as test subjects or potential candidates for the creation of innovative treatments.

In recent decades, the study of transcriptomics has altered our understanding of the variety and make-up of animal venoms. Venom transcriptome research largely focuses on analyzing the relative expression levels of mRNA-transcripts to determine the composition of venom.

The scorpion uses its venom for capturing prey and defending itself. The venom is made up of various components, including mucopolysaccharides, hyaluronidase, phospholipase, serotonin, histamine, enzyme inhibitors, and neurotoxic peptides.
The signs of scorpion envenomation are determined by the symptoms presented by victims. These symptoms are usually complex and can be mainly attributed to the hyperactivity of the autonomic nervous system.

The venom contains neurotoxic peptides that cause symptoms during envenomation by interacting with ion channels. These peptides have the potential to cause significant damage to the nervous systems of both vertebrates and invertebrates. Ion channels are gated pores that can be regulated by binding or changes in voltage gradient. This gradient is responsible for nerve and muscle excitation, hormonal secretion, cell proliferation, sensory transduction, salt and water balance control, and blood pressure regulation .Scorpion toxins are highly specific and have a strong affinity for receptor proteins involved in normal ion channel functioning. They have been used as pharmacological tools to study both normal and abnormal channel functioning in disease states.

Characterizing the constituents of scorpion, snake, and spider venoms is now achievable thanks to advances in fractionation, chromatography, and peptide sequencing [12–14]. The identification of peptide toxins and structural study of the toxins can be used to define the venoms, and they have also shown to be some of the most effective and selective antagonists for voltage-gated channels permeable to K+, Na+, and Ca2+ [15–17]. The pathophysiological responses that the neurotoxic peptides and small proteins cause include membrane instability, blockage of the central and peripheral nervous systems, and changes in the activity of smooth or skeletal muscles.

It is crucial to comprehend the mechanisms of action and compare the pharmacological properties with the various structures of scorpion poisons. These toxins are in charge of getting past the hosts' defense mechanisms, including proteases and/or major local pH fluctuations that may be brought on by inflammation states brought on by the animal bite itself.

Venom-based drugs: A natural weapon

In actuality, venoms date back to the earliest stages of the evolution of life on Earth, and 15% of animal species are poisonous. Venomous creatures actively deliver toxins. The neurological and circulatory systems are the primary targets of venom. Venoms that target the nervous system alter ion channels, whereas venoms that target the vascular system have an impact on blood coagulation.Animal venom peptides are well known for their therapeutic properties, which include a variety of mechanisms of action and great selectivity towards the targeted cells.

Being the second most fatal disease in the world, cancer has undergone a variety of treatments, some of which use chemically created substances that are very toxic and harm healthy cells. Additionally, cancer cells are becoming highly resistant to the available medications, creating opportunities for the creation of novel anticancer medicines with reduced toxicity, side effects, and drug resistance. In this field, a number of peptides are being sold to treat cancer and are also used in combination therapies.

Bioinformatics analysis and in vitro biological tests showed that gonearrestide is among the series' most effective anticancer peptides. On human cancer cell lines, this peptide exhibited broad-spectrum anticancer action. This peptide's anticancer mechanism has been studied, with a focus on how it affects the colorectal cancer cell line HCT116. To determine the variations in signaling pathways, full gene expression profiles in HCT116 cells were performed using NGS RNA sequencing in both the presence and absence of the peptide. It was discovered that the mechanism of action and target was the induction of cell cycle arrest in G1 phase by inhibiting cyclin-dependent kinases 4 (CDK4) and up-regulating the expression of cell cycle-related genes.

Through the inhibition of cyclin-dependent kinases 4 (CDK4) and up-regulation of the expression of cell cycle regulators/inhibitors cyclin D3, p27, and p21, the cell cycle is arrested in the G1 phase. Since it is outside the focus of this work, details of the examined peptides' structures are not presented here, however they can be found in the supplemental information of
The venom of Buthus martensii Karsch (BmK) has been reported to possess peptide combinations that exhibit both anticancer and analgesic properties. The first BmK peptide to have analgesic action was isolated by Wang et al. Since then, a number of BmK peptides having both anticancer and analgesic properties have been discovered
.

Insecticidal

The current situation places a high focus on the development of molecules having insecticidal action against a wide spectrum of insect problem species. Smith JJ et al. [101] studied the venom of the scorpion Liocheles waigiensis in light of this. A new toxin peptide called U1-liotoxin-Lw1a, or U1LITX-Lw1a, was identified and studied by the researchers. Its structure is made up of 36 amino acids.

The peptide is the first natural peptide to adopt the disulphide-directed -hairpin (DDH) fold and the first member of the fourth structural fold that peptides derived from scorpion venom will adopt. Additionally, this peptide showed extremely strong insecticidal activity against a variety of insects. The peptide first caused appendages to twitch intermittently, especially in crickets, and the level of paralysis changed depending on the dosage. In addition, contractile paralysis in blowfly larvae was dose-dependent.
But how does this Scorpion venom work? Instrument OF Activity OF Toxin Now that you comprehend how muscles work, we should take a more critical look what toxin does inside your cells. Scorpion toxin contains a tiny protein chain called chlorotoxin, just 36 amino acids long.

This little protein however, makes an extremely strong difference. It is impeccably formed to obstruct chloride channels and prevent chloride particles from entering muscle cells. Without these particles conveying messages advising your cells to unwind, the muscles in your body all flex without a moment's delay and loss of motion sets in.A PC model of scorpion toxin. The tones show the different amino acids that make up the protein particle. The state of a protein is vital. This makes it workable for a protein to collaborate with different proteins and portions of the cell. It resembles having two bits of a riddle that fit together, or like having the right key for a specific lock. On the off chance that a protein isn't collapsed accurately, it doesn't have the right shape and doesn't fit with parts of the cells. Scorpion chlorotoxin, for instance can be collapsed in something like 256 distinct ways. However only one of these works accurately to impede chloride diverts in your muscle cells Researcher get tests of toxin by tenderly crushing a snake's jaws.

This is called 'snake draining'. In nature, creatures use toxin for self-protection or then again to get prey. In the lab, researchers are figuring out that venomous proteins can be utilized in medication. Scientists
have had achievement, for instance, in utilizing scorpion toxin to treat cerebrum growth in people. Rather than hurting
to solid nerve and muscle cells, toxin, for example, chlorotoxin can be utilized to impede signals from disease cells. Obstructing these signs keeps them from developing. Researchers have additionally found manners by which the impact of loss of motion can be useful for people. When a patient goes into a medical procedure, for instance, it's significant for their body to remain extremely still while the specialist plays out the activity. Indeed, even a minuscule development could cause an extremely large
botch! Thus, notwithstanding drugs that cause rest, patients are in many cases given medicates that cause impermanent
loss of motion while the specialist carries out the procedure. The more we find out about proteins and their shapes, the more we comprehend about what could turn out badly in our bodies also, why.
Knowing these assists scientists with planning better prescriptions and treatment Potential against the multiplication of carcinogenic cells: There have been claims that scorpion toxin can be utilized to treat malignant growth. Scorpion toxin is a complicated blend of peptides and proteins, the vast majority of which are neurotoxins. These poisons can tie and balance different particle channels (Ca^{2+}, Cl^{-}, K^{+} furthermore, Na^{+}) in volatile and non- volatile tissues. The trademark element of these peptides are to diminish cell multiplication and apoptosis and furthermore, to hinder many flagging cycles which bring about disease. Ky articulation and apoptosis are emphatically connected to potassium particle channels. The clinical meaning of toxin is owed to the presence of an expansive range of particle channel poisons.

Some creature toxin was effectively applied to treat bosom malignant growth. There are reports for the treatment of great many disease cases through the blue scorpion toxin (endemic to Cuba). The malignant growth cells are gone after by the protein chain which is available in the blue scorpion toxin. Different scorpion species in malignant growth treatment Blue (or red) scorpion (Rhopalurus junceus) is popular because of its antineoplastic movement in the Dominican islands also, Cuba. Its toxin keeps up with energy in disease patients and furthermore, goes about as a pain killer. The protein present in it can restrain the expansion and development of disease cells. The toxin of the Blue or Red Scorpion (Rhopalurus junceus) additionally lessens the force of agony what's more, reestablishes energy in disease patients. The toxin remove of Blue Scorpion can act as a calming, pain relieving and hostile to malignant growth specialist.

The toxin of Tityus discrepans scorpion contains two peptides, specifically neopladine and neopladine, which cause apoptosis in human bosom disease cells and show checked deserts. The toxin of Odontobuthus doriae has proteolytic catalysts. It has lactase dehydrogenase (LDH), which is a cytotoxic and apoptotic specialist and can lower cell suitability as it enacts the caspase-3 and depolarization of mitochondria. Proteolytic and gelatinolytic proteases, which act against
adenocarcinoma cell lines of human lungs are removed. from the scorpion Mesobuthus gibbosus.
By capturing S-stage and expanding receptive N intermediates, Odontobuthus doriae toxin advances apoptosis in human bosom disease cells. Peptides present in the toxin of Centruroides margaritatus cause a decrease in growth size. The cell cycle, cell multiplication, and cell development can all be impacted by different parts of scorpion toxin.

In Cuba, the utilization of Rhopalurus junceus as conventional medication has been accounted for the treatment of disease. The toxin from Indian dark scorpion (Heterometrus bengalensis) can initiate the restraint of K562 and U937 cell development; it additionally has the particular attributes of apoptosis like DNA corruption, chromatin buildup, and layer blebbing. The toxin of Leiurus quinquestriatus (Demise stalker scorpion) contains 36 amino corrosive peptides which block the chloride channels. Heterometrus bengalensis contains against proliferative and apoptogenic properties against ongoing myelogenous and bengaline. The Buthus martensia (Chinese red scorpion) toxin contains hyaluronidase (BmHYA1) which is liable for metastasis and diminishes the multiplication of bosom disease and has antineoplastic therapeutics with no poisonous incidental effects.

CONCLUSION

In the past, scorpion venom was not used in medicine since it was thought to be deadly and harmful.
However, the venom has undergone a rigorous extraction procedure to remove its hazardous effects thanks to substantial research and technological advancements.

Today, it has developed into a rich resource used by the pharmaceutical and cosmetic sectors to generate medications to treat a variety of human illnesses.
Given the prevalence of scorpions in our immediate area, it is worthwhile to consider whether a different strategy might be taken. One could look at the possibility of breeding scorpions for their valuable venom rather than unintentionally injuring these critters when they cross our path.

Applications for scorpion venom are numerous and include cancer prevention, immunotherapy, and pain management.

Researchers have identified distinct molecular components in the venom that, when isolated and purified, have amazing therapeutic qualities.
Utilizing this plentiful resource could make a substantial contribution to medical research developments for improving the medical status.

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