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Mini Review

Bromelain as a Therapeutic Option for Treatment of Neuropathic Pain

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Abstract

Peripheral neuropathy effects 100's of millions of individuals and causes significant pain. Treatment option have been limited and medications often cause significant side effects limiting their use. Certain supplements have been demonstrated some benefit to patients with neuropathic pain with decreased pain and improved nerve function. Bromelain is one of these supplements and we review the benefits of using bromelain to patients with neuropathic pain.

Keywords: Bromelain; Nerve; Neuropathy; Neuropathic Pain; Supplement

Introduction

Peripheral neuropathy is a general term usually describing damage to the nerves of the peripheral nervous system. This is a common condition and affects 25-30% of Americans. Up to 70% of patients with diabetes may eventually have neuropathy. Peripheral neuropathy is typically caused by metabolic disorders, trauma (nerve compression), hereditary disorders, infection, drugs, poisonous substances, or sometimes side effects of medications. It usually affects the hands and feet, causing weakness, numbness, tingling and pain; however, the symptoms depend on the type of nerves affected (motor, sensory or autonomic). Motor nerves carry signals from your brain to your muscles. Damage to the motor nerves is associated with weakness, cramps, and spasms. Sensory nerves carry messages from various senses such as touch, smell, sight, hearing and taste to your brain. Damage to the sensory nerves is associated with numbness, tingling and pain. Medications are often prescribed however, these only control pain pathways and do not help correct underlying issues within the nerve cell causing neuropathy. These medications often have side effects which limit their use. For example, Gabapentin is often prescribed for nerve pain however over half of patients will not have worthwhile pain relief but may experience adverse events [1]. Bromelain is a supplement that provides significant anti-inflammatory effects as well as decrease pain associated with neuropathy and may provide a safer more effective treatment option.

Discussion

Bromelain is a proteolytic enzyme that is found in pineapple. Although bromelain is found in all parts of the pineapple, the highest concentration is found in the inedible stem which requires extraction and then can be consumed in a supplement form. Bromelain has proteolytic action in breaking down proteins into smaller peptides and amino acids. However, research has shown that is has significant anti-inflammatory activity and improves antioxidant status. Bromelain improves key regulatory pathways involved in maintaining a healthy balance of low inflammatory prostaglandins and adequate anti-inflammatory prostaglandins. Bromelain inhibits COX-2 expression and inactivates NF-kB which are critical in the process of developing an inflammatory response. Bromelain also increases key regulatory pathways such as NRF1 and NRF2 which increase antioxidant enzymes and decrease neuropathic pain.

Bromelain has been studied extensively in the field of compression neuropathy. In animal models of chronic nerve constriction, bromelain normalizes certain regulatory factors such as NRF1 and NRF2 which are normally deactivated because of the compression

causing nerve pain [2]. This increased activity stimulates production of antioxidants, leading to decreased pain. The effect of bromelain was more significant than treatment with the common prescription gabapentin.

Injury to peripheral nerves is also associated with an increase in COX-2 with a subsequent elevation in PGE2 and subsequent inflammation [3-5]. NF-kB regulates neuronal COX-2 gene expression and increased levels of NF-kB are associated with increased COX-2 levels [6]. Bromelain inhibits expression of COX-2 by blocking activation of NF-kB [7].

Studies using animal nerve compression models demonstrate a significant improvement in reducing a key regulatory pathway (NF-kB) causing inflammation which led to clinical improvement such as decreased nerve pain [8,9]. Bromelain reverses the pain associated with a nerve constriction injury and in fact has led to greater pain relief than the commonly prescribed medication gabapentin [8]. When adequate doses of bromelain were used, the nerve structure appeared to be completely healed with normal appearance comparable to a group that did not have a constriction injury. Bromelain also corrects the electrolyte imbalances which occur with nerve compression injury leading to decreased nerve pain and improved nerve function [10].

Human clinical trials have used bromelain along with other supplements which have been effective at optimizing nerve function and reducing neuropathic pain. Patients with early-stage carpal tunnel syndrome were placed into two groups who both received formal therapy, however one of the groups also took an oral supplement containing acetyl-L-carnitine, α-lipoic acid, quercetin, bromelain, pantothenic acid, C and B1 and B2 and B6 and B12 vitamins [11]. There was a statistically significant improvement in nerve function based on nerve studies as well as sleep quality in the group who took the supplements. Our group has also evaluated the role of appropriate supplementation on the effects of recovery after carpal tunnel surgery [12]. All patients had undergone an endoscopic carpal tunnel release; however one group also took the NeuroGen nerve supplement which contain bromelain in addition to other supplements which have proven to benefit nerve function and decrease inflammation such as Methylcobalamin, Acetyl-L-Carnitine, N-Acetyl Cysteine, Benfotiamine, Vitamin D, Vitamin B6, Curcumin, R-Alpha Lipoic Acid and Serratopeptidase. The group who took the supplement starting 5 days before surgery and continued after surgery demonstrated significant improvement in pain and greater grip strength at 2 weeks follow up after surgery. Less people required pain medications in the supplement group as well.

Conclusion

Bromelain is a supplement that could provide significant therapeutic options for treatment of neuropathic pain. It does appear to offer more superior anti-inflammatory effects than the typical prescription medication gabapentin. Bromelain has been used along with other supplements known to improve neuropathic pain and may provide a synergistic effect. This could provide enough relief to prevent surgery in mild cases of nerve compression syndromes such as carpal tunnel syndrome and when surgery is needed may help to improve outcomes and speed recovery.

Acknowledgement

None.

Conflicts of Interest

None.

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