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Poojaben D Tanna
Department of Fish Processing Technology, College of Fisheries Science, JAU, Veraval, Gujarat, India

Durga C Fofandi
Department of Fish Processing Technology, College of Fisheries Science, JAU, Veraval, Gujarat, India

Yagnesh B Motivarash
Department of Fisheries Resource Management, College of Fisheries Science, JAU, Veraval, Gujarat, India

Corresponding Author:
Poojaben D Tanna
Department of Fish Processing Technology, College of Fisheries Science, JAU, Veraval, Gujarat, India

Processing and utilization of shark cartilage

Poojaben D Tanna, Durga C Fofandi and Yagnesh B Motivarash

Abstract
Shark cartilage contains a substance that inhibits the growth of new blood vessels and restricting the growth of tumor. Angiogenesis is a condition for the growth of a tumor and able to inhibit the formation of new blood vessels. Earlier, cartilage was considered as a possible natural source of antiangiogenic compounds due to its known a vascular nature. In recent time cartilage has multiple uses in certain health problems such as asthma, diabetic problem, allergies, acne, phlebitis, peptic ulcers, haemorrhoids, arthritis, psoriasis, diabetic retinopathy, neovascular glaucoma, rheumatism, AIDS etc. Today, various forms of shark cartilage are available in market which includes shark cartilage powder, cartilage pills and shark cartilage extract. Thus, the objective of this review is to describe the main basic and clinical investigations about shark cartilage.

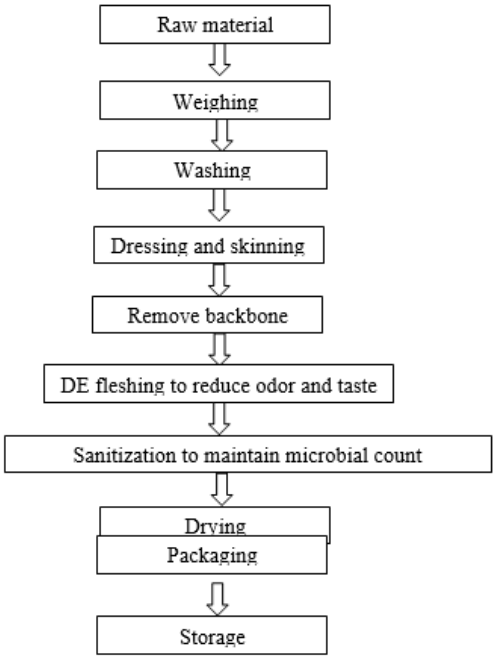
Keywords: Shark cartilage, angiogenesis, utilization and health benefits

Introduction
Sharks provide various beneficial products which include: meat, fins, liver, skin, cartilage and jaws and teeth. Regrettably, every year millions of sharks taken for their fins and their carcasses [1]. Global demand for sharks and rays derived products [2]. In China and Japan, Shark cartilage is used as food after sun drying. The shark cartilage is used in various ways which includes fin radials, pieces of jaw and the vertebral column. It is usually marketed dry as a cylindrical rod about 1 meter long with vertebral processes removed [3]. Generally, shark cartilage is obtained from freshly caught sharks and then cleaned, cut and dried [4].
In last few years, the market of shark cartilage has extensively increased and the price is quite high. India, USA, Japan and Australia are major producing and consuming countries of shark cartilage. In Hong Kong, Europe, China, Taiwan and Singapore the products with shark cartilage such as cartilage powder, capsule and tablet are sold.
Shark liver oil is made from deep-sea sharks where, shark cartilage is made from both deep-sea and tropical sharks. Shark cartilage obtained from blue shark is considered to be the best quality, as it is believed richer in chondroitin than those of other species. Chondroitin is an acid Mucopolysaccharides, which is present in most mammalian cartilaginous tissues and is used for different health issues.
The major production of cartilage powder, creams and capsules is produced by USA. These products are sold in the domestic market and exported to about 35 countries under a variety of brand names. The large portion of shark cartilage powder and capsule are produce from Japan and these products are exported to USA and Mexico and imported from the Australia, New Zealand and USA. In Japan, shark cartilage obtained from blue shark is used for the treatment of eye fatigue and rheumatism.

Health benefits of shark cartilage
Instead of bone sharks have a skeletal structure; which is known as shark cartilage. Now days, the interest of people is developing in the use of shark cartilage due to their health benefits. Health supplements are also produced for pets and horses. Many claims, not scientifically proven, attribute to shark cartilage the role of being beneficial in cases of asthma, candidiasis, eczema, allergies, acne, phlebitis, peptic ulcers, haemorrhoids, arthritis, psoriasis, diabetic retinopathy, neovascular glaucoma, rheumatism, AIDS and above all cancer. Shark cartilage is considered beneficial in inhibiting the growth of tumours by impeding the vascularization of malignant tissues (angiogenesis). In addition to cancer and psoriasis, shark cartilage is now becoming widely accepted as an effective means for treating osteoarthritis and rheumatoid arthritis. A number of studies have demonstrated the effectiveness of cartilage as an anti-

Angiogenesis, "the formation of new capillary blood vesse1s from pre-existing ones" [5] Researchers, is required for solid tumors to grow. Inhibition of angiogenesis may either decrease the size or totally eliminate the tumor. Since cartilage is avascular tissue, and because the shark endoskeleton is composed almost entire1y of cartilage, it is believed to be a potent angiogenesis inhibitor and therefore a potential agent in the treatment of cancer [6]. Cartilage helps to increase the immune system of our body to destroy the cancer cells. The substances which block the tumor and help to grow the new blood vessels are made from cartilage.

Process flow chart



Utilization of shark cartilage

In Japan and China shark cartilage is used for food and may include any part of the cartilaginous skeleton. By far, the biggest market for shark cartilage is the pharmaceutical industry, which uses the dried and milled cartilage powder to make pills and capsules. Shark cartilage pills have been hyped as a cure for cancer, a claim subsequently proven to have no validity. However, shark cartilage is high in chondroitin and glucosamine sulfate, compounds effectively used in treating arthritis. Although dried cartilage is ineffective in treating cancer, certain biologically active compounds extracted from cartilage have shown promise in retarding tumor growth and may provide another potential pharmaceutical market [7].

Dried cartilage pills

Shark cartilage has been dried, powdered and delivered in pills or capsules. The use of shark cartilage pills is useful in the treatment of cancer in humans [8, 9]. These results were not surprising as the digestive system would breakdown any biologically active proteins in cartilage into the constituent amino acids before absorption through the gut lining [10]. However, cartilage in general is an excellent source of chonrdroitin and glucosomine sulfate. These compounds are useful in treating various forms of arthritis and to that end, shark cartilage capsules are marketed today.

Shark cartilage extracts

It has been known for many years that tumors require the development of blood vessels (angiogenesis) in order to grow and that some substances in cartilage could inhibit angiogenesis and retard tumor growth. Uses of shark cartilage as raw material because cartilage makes up to 6% of a shark's body weight and shark cartilage has been a readily available byproduct of shark fisheries.

Shark cartilage powder

Shark cartilage powder has been sold for the past 4-5 years for the treatment of patients with advanced (often terminal) cancer. Shark cartilage has long been thought to have potential cancer preventitive qualities and is commonly available in powdered and capsule/tablet form from health retailers. The current market for dry shark cartilage powder to be in excess of 100 Tons per year. The vast majority of the shark cartilage product sold throughout the world, however, is used as a therapeutic for the treatment of cancer and, to a lesser extent, inflammation (arthritis).

Conclusion

Shark cartilage is used for medicine comes primarily from sharks caught in the Pacific Ocean. It prevents the growth of new blood vessels needed for cancer to grow. It also prevents the growth of blood vessels to psoriasis lesions. This might help heal these wounds. Shark cartilage is most famously used for cancer. It is also helps for age related vision loss.Shark cartilage has anti-inflammatory, analgesic, anti-angiogenic, anti-tumoral, and immunomodulatory properties.

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