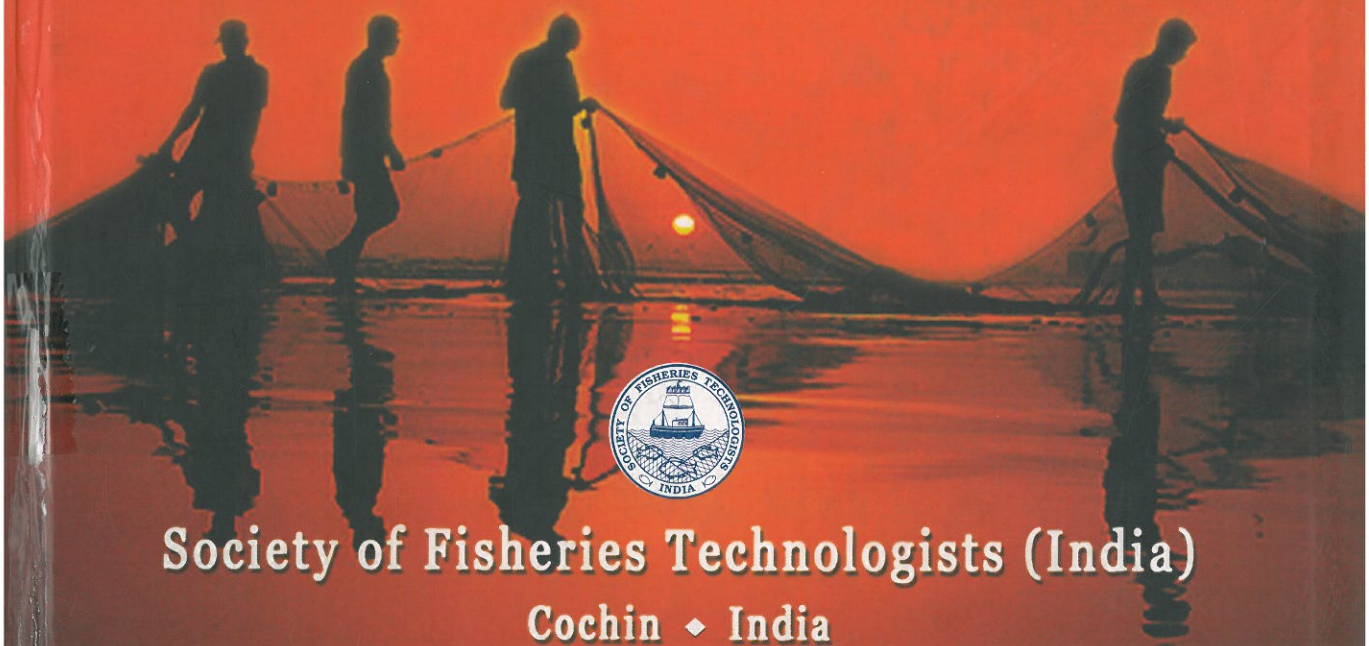
Coastal Fishery Resources of India

Conservation and Sustainable Utilisation



Society of Fisheries Technologists (India)
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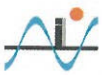


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Potassium Supplemented Fish Products

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Introduction

Common salt plays a key role in fish processing. It is used both in the traditional fish processing and in modern fish and shrimp processing. Salted or cured and dried fish contains very high salt content. For preparation of edible fry or fish curry, one has to wash the salted fish for leaching out the excess salt. Medical research has linked over-consumption of dietary sodium with adverse health conditions such as high blood pressure. Recent studies by Strazzullo *et al.* (2009) say that salt reduction requires regulation by the governments. The connection between excessive salt reduction and cardiovascular disease and stroke has been established by scientific studies. Average consumption of salt in most western countries is 10 g a day, and the difference between highest and lowest intake levels is around 5 g. The WHO advises that adults consume no more than 5 g per day, but many governments consider 6 g to be realistic target. Meta-analysis conducted by Strazzullo *et al.* (2009) based on 13 published studies on habitual salt intake and stroke and cardiovascular diseases rates in the USA, Japan, Finland, The Netherlands, Scotland and Taiwan, has indicated that a 5 g reduction in salt intake is associated with a 23% percent difference in stroke rates and a 17% difference in the incidence of cardiovascular disease. The researchers estimated that eating less salt could avert 1.25 million deaths from stroke and almost 3 million deaths from cardiovascular disease.

Numerous studies have demonstrated that a low-potassium, high-sodium diet plays a major role in the development of cancer and cardiovascular disease (heart disease, high blood pressure and strokes) (Jansson, 1991; Khaw and Barret-Connor, 1987). Conversely, a diet high in potassium and low in sodium protects against these diseases. In the

case of high blood pressure, it can even be therapeutic (Skrabal *et al.*, 1981; Macgregor *et al.*, 1982). Excessive consumption of dietary sodium chloride (table salt), coupled with diminished dietary potassium, is a common cause of high blood pressure. A new study (Nowson *et al.*, 2009) indicates that salt reduction may also have benefits for bone health in women at risk of osteoporosis. Several studies show that sodium restriction alone does not improve blood pressure control in most people and that it must be accompanied by a high potassium intake (Skrabal *et al.*, 1981; MacGregor *et al.*, 1982; NRC, 1989). Hence, there is an urgent need to reduce sodium in fish processing by substituting the Na^+ ion with another positively charged ion in order to develop low sodium fishery products.

Material and Methods

Various products, *viz.* fish powder, fish soup powder, ready to use frozen blocks, dressed chilled fish, freshwater fish chunks ready to eat snack items and dried fish products (Fig. 1), utilizing smaller size fishes such as silverbellies, goatfish, ribbonfish and sciaenids were prepared incorporating potassium chloride at 1% level. Sodium and potassium were determined using Flame Photometer (Systronics Model 128) and calculated as $mg.100g^{-1}$ material. The edible portion of food material was dry ashed, dissolved in dilute HCl, filtered and made up to a known volume, prior to analysis.

a: Freshwater fish chunks; b: Ready to use frozen goatfish; c: Ready to use dryfish; d: Ready to eat fish powder snack; e: Fish powder

Fig. 1: Potassium supplemented fish based products developed by CIFT

Results and Discussion

Potassium chloride is recognized as GRAS (Generally Recognized as Safe) compound by USFDA and an approved food additive by European Union (E number - E508). Dried fish was prepared without adding sodium chloride and replacing it with KCl. The K-supplemented (1% level) fish products contained potassium at about 2200-3000 $mg.100g^{-1}$. All the natural foods including fishes contain some levels of sodium and potassium in different proportions. There is no need to add more sodium salt. The potassium supplemented fish powder can be added to any curry preparations and thus getting the benefit of additional nutrients, fish proteins, calcium, phosphorus and other nutrients. By not adding extra sodium salt and consuming K-supplemented foods, the sodium intake is minimized and potassium salt intake is enhanced. Both beneficial effects of reduction of sodium and increase of potassium levels help in lowering of blood pressure in people with hypertension (Skrabal *et al.*, 1981; MacGregor *et al.*, 1982; Patki, *et al.,* 1990; Fotherby and Potter, 1992; Nowson *et al.,* 2009; Strazzullo *et al.*, 2009). The potassium and sodium content of selected marine and freshwater fishes and shellfishes are given in Table 1.

Murray (1996) has discussed the beneficial effects of potassium. Over 95% of the body's potassium is in cells and it is the third most abundant mineral in the body after calcium and phosphorus. In addition to functioning as an electrolyte, potassium is essential for conversion of blood sugar into glycogen, the storage form of blood sugar in the muscles and liver. Potassium deficiency produces fatigue and muscle weakness. Potassium plays major role in water balance and distribution, acid-base balance muscle and nerve cell functions, heart function, kidney and adrenal functions. A potassium deficiency is characterized by muscle weakness, fatigue, mental confusion, irritability, weakness, heart disturbances and problems in nerve conduction and muscle contraction. The amount of potassium lost in sweat is quite significant, especially with prolonged exercise in a warm environment. Researchers recommend a dietary potassium-to-sodium ratio of greater than 5:1 to maintain health. Physicians commonly prescribe potassium salts in the dosage range of 1.5 to 3.0 g per day. However, potassium salts can cause nausea, vomiting, diarrhea and ulcers when given in pill form at high dosage levels. When potassium levels are increased through diet alone, these effects are not present. Therefore, the best course is to use foods or food based potassium supplements to meet the human body's potassium requirements.

Table 1: Potassium levels in fish and shellfish

	Sodium, mg%	Potassium, mg%
Freshwater fishes		
Common carp	146	633
Silver carp	150	986
Grass carp	302	1358
Mrigal	148	985
Rohu	205	1232
Catla	273	1038
Marine fishes		
Pomfret	474	1580
Silverbellies	451	1563
Mackerel	259	1763
Ribbonfish	208	958
Rainbow sardine	163	1849
Seabass	961	1249
Kawa kawa	451	1563
Crustaceans		
Tiger prawn (cultured)	562	1327
Freshwater prawn	371	1236
Squilla	196	1044
Cephalopods		
Squid body meat	948	947
Squid body meat	882	588
Squid body meat (deep sea)	604	705
Cuttlefish	546	1478

Popularization of eating potassium rich foods and use of potassium supplemented fish products and will go a long way in improving the health conditions of our population especially the people suffering from the effects of hypertension / high blood pressure.

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References

Fotherby, M.D. and Potter, J.F. (1992) Potassium supplementation reduces clinic and ambulatory blood pressure in elderly hypertensive patients, J. Hypertens. 10: 1403-1408

Jansson, B. (1991) Dietory, total body and intracellular potassium-to-sodium ratios and their influence on cancer, Cancer Detect. Prevent. 14: 563-565

Khaw, K.T. and Barret-Connor, E (1987) Dietary potassium and stroke-associated mortality, N. Eng.l J. Med. 316: 235-240

MacGregor, G.A., Smith, S.J., Markandu, N.D., Banks, R.A. and Sagnella, G.A. (1982) Moderate potassium supplementation in essential hypertension, Lancet 2: 567-570

Murray, M.T. (1996) Encyclopedia of Nutritional Supplements. Prima Publishing, Rocklin, CA, USA: 564 p.

National Research Council (1989) Diet and Health, Implications for Reducing Chronic Disease Risk, National Academy Press, Washington, DC, USA

Nowson, C.A., Patchett, A. and Wattanapenpaiboon, N. (2009) The effects of a low sodium base-producing diet including red meat compared with a high-carbohydrate low-fat diet on bone turnover markers in women aged 45-75 years, Br. J. Nutr.102: 1161-1170

Patki, P.S. (1990) Efficacy of Potassium and magnesium in essential hypertension: a double-blind, placebo-controlled, crossover study, Br. J. Med. 301: 521-523

Skrabal, F., Aubock, J. and Hortnagl, H. (1981) Low sodium, high potassium diet for prevention of hypertension: probable mechanisms of action, Lancet 2: 895-900