METAL CONTAMINATION IN COMMERCIALLY IMPORTANT PRAWNS AND SHRIMPS SPECIES COLLECTED FROM DIFFERENT MARKETS OF MUMBAI (WEST COAST), INDIA

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INTRODUCTION

Seafood mainly fish, Prawns and shrimps consisting of fats and proteins obtained from seas around Mumbai serves as a vital diet to the population of Mumbai including satellite areas and coastal populations. These toxic heavy metal can cause dermatological diseases, skin cancer and internal cancers (liver, kidney, lung and bladder), cardiovascular disease, diabetes, and anemia, as well as reproductive, developmental, immunological and neurological effects in the human body (Rose *et al.* 1992) and (Lukawski et al. 2005). The Indian coast has a variety of sensitive ecosystem like lagoons, sand dunes, coral reefs, mangroves, sea grass beds and wetlands (Jaiswar, 2000). It has total length of the coastline is around 8014 Km which includes coastline of two groups of oceanic islands namely Andaman- Nicobars and Lakshadweep. India possess a vast Exculisive Economic Zonne of 20, 13,410 Sq. Km. and territorial waters of 1, 55889 Sq. Km. Among the marine states of India, Maharashtra is one of the leading state in fish production. Maharashtra has a total of 720 Km. of coastal line with 0.89 laks Sq. Km. of continental shelf. The major gears being operated from the state are trawnets, purse seines, gill nets, dolnets and hook and lines (Singh and Kuber, 1998). There are 406 marine fishing villages across the five coastal districts of Maharashtra, with a total of 65313 fisher households in the state. Total marine fish population in Maharashtra is 319397. A total of 23508 crafts are employed in marine fishing of which 13053 are mechanized, 3382 are motorized and the rest non-motorized gillnetters and the dolnetters account for 53% trawlers formed of 32% of the mechanized crafts (Anon -2006). The west coast of Arabian Sea in Maharashtra costal line enriches from Mumbai. The coastal areas between Mumbai are biologically most productive areas supporting a wealth of marine resources. There are numerous connections between the oceans, human activities, and human health effects. These connections may turn into more intimate in negative senses by coastal pollution (Hauke, et al., 2008). Almost sixty percent of the world's population, i.e. 3 billion people (lives on or within 100km of a sea coast) is facing huge health-related effects due to continuous changing coastal-configuration and pollution (Klein, Nicholls, & Thomalla, 2003). Hence it is necessary to monitor the concentration of these contaminants in fishes, prawns and shrimps and other seafood so that a warning signals can be given to the society in case the concentration levels cross the threshold limits. The available literature reveals that the inshore water of the above creeks around Mumbai possesses elevated levels of contaminants and their consistent inputs have resulted their high build up a marine organism particularly fishes, prawns and shrimps. Hence it is expected that the sea food available around Mumbai and Konkan including Sindhudurg may have elevated levels of pollutants. These contaminants if determined can lead to identify causes of disease or toxic effects which would be prevented in the population. However, in India, ***"Metal contamination in commercially important Prawns and Shrimps species collected from different markets of Mumbai (West coast) India*** "has not been seriously attended so far, hence only few reports are available on this topic. The toxicity levels in seafood particularly fish; Prawns and shrimps, the contamination in the diet and other relations with various symptoms have not been studied in India. At present the population of Mumbai and coastal population is severally suffering from lots of disorders

particularly respiratory and digestive due to air and drinking waters. Most of these causes have been identified and remedial measures have been taken up. However, toxic effect due to seafood contamination which is a main diet of majority of the population of Mumbai and coastal population is not primarily addressed and completely neglected. In fact the relevant toxic effect may be already prevalent in the society and most probably they may become severe in due course of time. Hence, the stage has already reached to address the problem in detailed and to dig the thought under the problem.

MATERIALS AND METHODS

a) Sample Collection

The Shrimps and Prawn samples of were collected from local markets of Mumbai city from June, 2012 to, December 2012. The Prawn samples, packed in propylene bags, were stored at – 20 ^{0}C in deep freeze in the Department of Zoology, S.S & L.S. Patkar College, Goregaon (West) Mumbai for further analysis.

b) Sample Digestion:

Five replicates of samples containing shrimps in a Petri dish were oven dried at 80°C for 2 days to get the dry weight (DW). For digestion, 1 mL of concentrated nitric acid 70% was added to the 1 gm of dry weight samples and wait for 24 h, the samples were digested in Kjeldal flask. This mixture was digested by heating the flask in a heating mantel, at 100°C for 2 h, and 30 % hydrogen peroxide was added to it intermittently till a pale yellow-colored solution was obtained. The digestion flask was further heated gently until frothing subsided and the sample was then heated to dryness. The residue so obtained was left to cool for half an hour and dissolved in 30 ml of deionized water and the solution was filtered using Whatman filter paper No. 42. The digested sample was quantitatively transferred into 50 ml flask, and then diluted with distilled water up to the mark and stored in a polypropylene bottle. The above procedure was repeated for all the other samples. All above chemicals used were of analytical grade.

c) Preparation of standard metal ion solutions:

Stock solutions (1µg / ml) of each of the metal ions were prepared using appropriate metal salt of AR grade quality in dilute hydrochloric acid. The working standards of these solutions were prepared by appropriate dilutions in distilled water.

d) Instrumentation:

The samples were analyzed on Inductively Coupled Plasma Atomic Emissions Spectroscopy (ICP-AES, Model ARCOS *from M/s. Spectro, Germany*) at the Sophisticated Analytical Instrument Facility (RSIC), Indian Institute Of Technology (IIT) Powai, Mumbai-400076, India.

CONCLUSION

From the above results, in the case of metal contamination, Mn, cobalt, nickel, lead, and cadmium was found to be high in Prawn and shrimp samples collected from all these markets. It can be assumed that the sea from where the Prawn and shrimp were collected might be receiving outfalls from industrial waste and sewage from the city as it faces the open Arabian Sea. The levels of heavy metals such as copper, zinc, iron and chromium in Prawn and shrimp samples collected from Kolaba markets were within permissible limits. These elemental toxicants may be transferred to man on consumption of Prawn and shrimp obtained from the market. These heavy metals transferred to man through the consumption of Prawn and shrimp, pose health hazards because of their cumulative effect in the body. Therefore, it was concluded that the Prawn and shrimp are not heavily burdened with metals, but a danger must be considered depending on the agricultural and industrial developments in this region. The Prawn and shrimp from Arabian sea should be monitored periodically to avoid excessive intake of trace metals by human, and to monitor the pollution of aquatic environment. In view of these findings strict method of waste disposal control should be adopted to ensure the safety of the environment and safeguard our aquatic life.

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