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Detection of Formalin in Fish Collected from Different Fish Markets in Rajshahi City

Sarmin Akther and Salma Sultana

Department of Zoology, University of Rajshahi, Rajshahi-6205, Bangladesh

Abstract: Fish are one of the major sources of food and protein to human being and is called a national food. Bangladesh imports fish and fish products from neighboring countries. But it is evident from several studies that fish items in Bangladesh contain formalin which is a highly hazardous and carcinogenic chemical. In 6 (six) different local markets 10 (ten) species of fish were collected from March to August, 2016 in Rajshahi city in order to determine the level of intensity of formalin misuse to consumable fish. In Shaheb Bazar 5% of the total consumable fish contains formalin, whereas the amount of formalin in New Market Bazar was 3.33%, Kazla Bazar 3.33%, Talaimari Bazar 3.33%, Shalbagan Bazar 1.67% and Binodpur Bazar 1.67%. The highest percent of formalin was found in Shaheb Bazar (5%) and lowest in Shalbagan and Binodpur Bazar (1.67%).

Key words: Formaldehyde, Formalin, Detection, Fish.

Introduction

Fish is an important source of food and animal protein all over the world. In Bangladesh fish are considered as one of the main national food items. At present national average fish consumption is about 37g/day (13 kg year) (DoF, 2019). Fish consumption of Bangladesh was lower than both the national average of 37g and international requirements of 49g (MOF, 2019). About 90% of animal protein in our diet comes from fish and livestock. Fish items in Bangladesh contain formalin which is highly hazardous and carcinogenic chemical. Rahman *et. al.* (2012) conducted on the detection of formation on fish obtained from different markets of Sylhet by formalin detection kit. They reported 26 formalin treated fish out of 150 samples.

In Bangladesh, formalin treated fish were first captured from the traders in 2006 during an operation against impure food by a mobile court (Kausar, 2007). Imported fish from neighboring countries enter in the domestic market and it was reported that more than 80 metric ton of fish and fishery products enter into Bangladesh every day through the Teknaf border from Myanmar (Kibria, 2007). Attempt was taken to detect the extent of use of formalin in fish available in Rajshahi city. Reports suggest that formalin is added or sprayed to the fishes by the fish traders while transporting to domestic market chain to prevent spoilage and increase the shelf life (Yeasmin, *et. al.* 2010a; Hossain *et. al.* 2008; Haque and Mohsin, 2009).

Formaldehyde is a member of aldehyde family which is a very reactive chemical. The gaseous form of this chemical is known as formaldehyde and the liquid form is formalin (Noordiana, *et. al.* 2011). Formalin is a solution of 37% of formaldehyde (H-CHO) in water which is used as a preservative in medical laboratories, as an embalm fluid and as a sterilizer. Formalin is also used in treatment against fish disease caused by protozoa and fungi. Use of formalin in food for human being consumption is also banned in Bangladesh (Yeasmin, *et. al.,* 2010b). Recently, International Agency for Research on Cancer (IARC, 2006) has classified formaldehyde as a group-1

Corresponding Author: sarminhamim@gmail.com

carcinogen to human. According to the United States Environmental Protection Agency (EPA), maximum daily does reference (RFI) for formaldehyde is 0.2 ug/g body weight per day (Wang *et. al.,* 2007; Noordiana *et. al.,* 2011). Even who spray or inject formalin over a long time of period of will likely suffer health complications such as blindness, asthma and lung cancer (Hossain, 2011). Greg et. al. (2005) reported, formalin removed the oxygen present in fish. Uses of formalin in fish culture were reviewed by Schnick (1974), Phelps (1975) and Bill *et. al.* (1977) studied toxicity of formalin to fishes.

Formalin in consumable fishes in Rajshahi City is increasing rapidly. Recently, a Formalin Testing Centre (FTC) has been set up as a part of the training program like managing at top (MATT) for the senior government official under the auspices of the Bangladesh Public Administration Training Centre (PATC) and within few days this center identifies several formalin treated fishes (BSS News, 2009). This research conducted to justify the institute of formalin infestation in consumable fishes in Rajshahi city market and its effect or risk in human body.

Materials and Methods

The experiment was conducted from March to August, 2016. A cross section survey on status of awareness of consumers and traders regarding formalin in fish was selected in six markets *viz.* Shaheb Bazar, New market Bazar, Shalbagan Bazar, Talaimari Bazar, Kazla Bazar and Binodpur Bazar, of Rajshahi City during this period.

Collection of fish samples

Ten available fish species were selected such as Rui (*Labeo rohita*), Catla (*Catla catla*), Ilish (*Hilsa ilisha*), Silver Carp (*Hypophthalmichthys molitrix*), Boal (*Walago altu*), Telapia (*Oreochromic mossambicus*), Koi (*Anabas testudineus*), Sorputi (*Puntius sarana*), Bata (*Labeo bata*) and Taki (*Channa punctatus*). A total of 360 samples under ten fish species were collected from different fish markets in Rajshahi City for detection of formalin. During the study period; skin, fin and gill of fishes' ware collected in vials or polythene bags. Soon after collection, samples were brought to fisheries research laboratory, Department of Zoology, University of Rajshahi, and kept in a petridis with water for 15 minutes for the detection of formalin.

Formalin detection method

Qualitative detection of formalin was done by using the 'HI 3838 Formaldehyde Test Kit (Hanna Instrument, Japan)', according to manufacturer's protocol.

Results

A total of 360 fish were tested for the experiment (Figure 1) among which Rui (*Labeo rohita*) and Catla (*Catla catla*) were found to be mostly affected by formalin collected from six different fish markets of Rajshahi City. Sixty (60) fish samples were collected and tested from each market. It was found that 3 fish (*L. rohita, C. catla,* and *H. ilisha*) were contaminated with formalin (about 5.00% of) in Shaheb Bazar. Two (2) fish were contaminated with formalin (about 3.33%) in New Market, 2 fish were contaminated with formalin (about 3.33%) in Kazla Bazar, 2 fish were contaminated with formalin (about 3.33%) in Talaimari Bazar, 1 fish was contaminated with formalin (about 1.67%) in Shalbagan Bazar and 1 fish was contaminated with formalin (about 1.67%) in Binodpur Bazar. It was observed that large fishes were mostly contaminated with formalin for long time preservation but small fish were free from formalin.

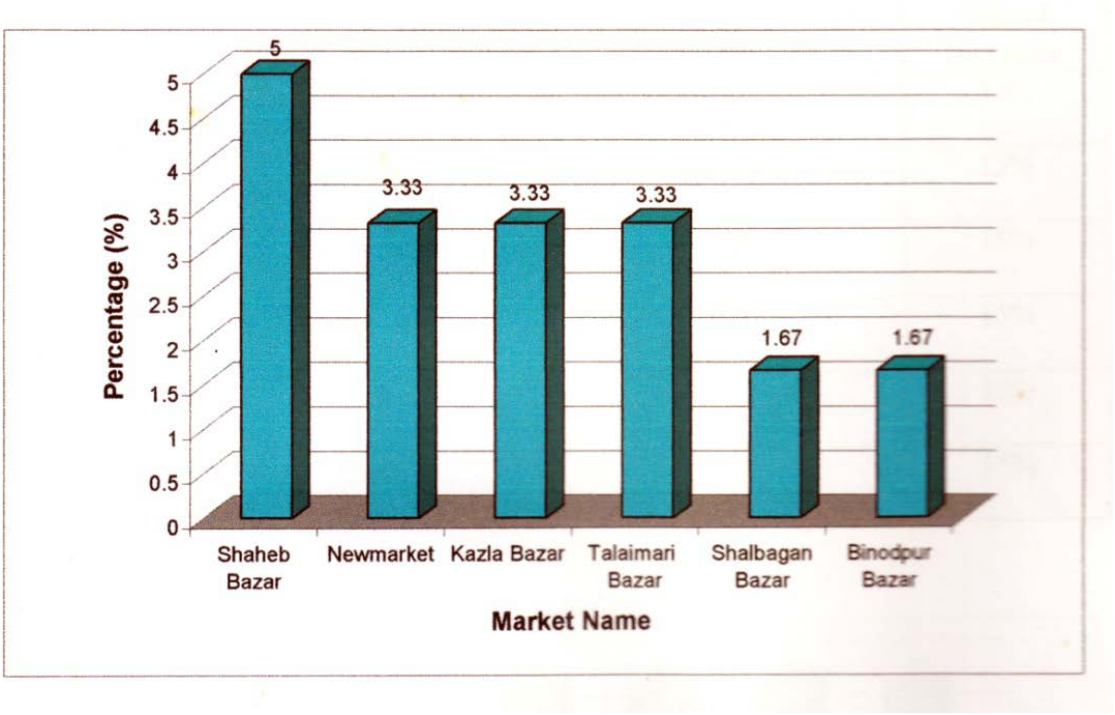

Fig. 1. Presence of formalin in fishes collected from different fish markets

Discussion

In 2011, the National Toxicology Program, an interagency program of the Department of Health and Human Services, named formaldehyde as a known human carcinogen in its 12th report on carcinogen (National Toxicology Program, 2011). Though it is harmful and potential source of health hazard to human. Some fish traders are engaged in treating fish with formalin. It was found that the intensity of formalin use varies from market to market and species to species. Current study showed that comparatively big fish species were in high percent of formalin in it.

There was no imported Rui and Catla fish found in 6 markets of Rajshahi City. Haque and Mohsin (2009) observed almost 5% shops of total consumable fishes contained with formalin in the fish market of Dhaka City. Yeasmin *et. al.* (2010) in Mymensingh found evidence of formalin in imported Rui and Catla ranging from 0.5% to 1% but not in local verities. Uddin *et. al.* (2011) who made formalin detection in fish samples which are collected from Dhaka City, Bangladesh, reported that 70% Rui fish were contaminated with formalin and that almost 30% of fish samples contained formalin. Rahman *et. al.* (2012) reported that 26 formalin treated fish out of 150 samples in Sylhet city which 16% in Modina market, 26% in Ambarkhana, 13% in Lal Bazar, 23% in Kazir Bazar and 6% in Tucker Bazar, which is much higher than the present study.

Formalin is an effective preservative that rapidly penetrates the tissue. It is frequently used as one of the most common preservatives for fish which very much harmful for human health continuous addition of formaldehyde through fish in human body may cause uncontrolled cell growth or cancer in any part of the body like stomach, lung and respiratory system. Therefore, regulatory bodies should take necessary steps to minimize and stop formalin treatment in preserving fish. The current study involves a small number of samples to detect formalin in fish in local market of

Rajshahi City which gave us a comprehensive picture to understand the extent and magnitude of the scenario.

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