REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
VOLUME - 10 | ISSUE - 5 | FEBRUARY - 2021

SEASONAL VARIATION OF CHEMICAL HAZARDS FROM WHITE SHRIMPS *(PENAEUS INDICUS)* DURING PROCESSING IN SEAFOOD PROCESSING INDUSTRY

Ayub M. Shaikh
Associate Professor, Dept. of Zoology,
I.CS.College,Khed Dist- Ratnagir.(MS.).

ABSTRACT

*The **white shrimps (Penaeus Indicus)** was studied to determine Pesticides, Antibiotics, Heavy metals, Histamines, PSP and DSP during processing in sea food Industry. The studied pesticides were slight increases in winter while constant in monsoon and summer. Amongst Antibiotics; oxolinic acid increased in winter whereas near about similar concentration in monsoon & summer. Regarding heavy metals i.e. cadmium, lead and Nickel concentration increased in winter while Histamine increased in summer.*

In studied chemical hazards increased concentration probably due to flow of fresh water toward sea which brings heavy load of pesticides used for rice forming, Mango(Alphonso) cultivation, seasonal impact including reproductive activities and other agricultural processes along with manmade activities. These pesticides, antibiotics & heavy metals takes times to enter in marine animal physiology that is up to winter season so sample taken in winter season might be showed higher concentration of chemical hazards even some sample showed increased concentration during summer might be due to exceeded evaporation.

KEYWORDS: *(Penaeus Indicus), chemical hazards, Seasonal variation.*

INTRODUCTION

Chemical contamination can happen at any stage in food production and processing. Chemicals can be helpful and are purposefully used with some foods. Such as pesticides on fruits and vegetables. Chemicals are not hazardous if properly used or controlled. Potential risks to consumers increase when chemicals are not controlled or the recommended treatment rates are exceeded. The presence of a chemical may not always represent a hazard. The amount of the chemical may determine whether it is a hazard or not. Some may require exposure over prolonged periods to have a toxic effect. Regulatory limits are set of some of those contaminants.

In a review on chemical residue concerns in seafood, Price (1992) concluded that risk from chemical contaminants in commercially harvested fish and shellfish is low and not a problem. Risk from chemical residues (mercury, selenium, dioxins, PCPs, kepone, chlordane, dieldrine and DDT) are primarily a concern with recreational fish and shellfish, caught in coastal waters and (possibly) in highly polluted waters.

In a one more review, Smith and Gangolli (2002) similarly concluded that organochlorine levels in fish intended for human consumption are low and probably below levels likely to adversely affect human health. However, they are of potential concern for two groups: populations for whom seafood form a major part of the diet and infants and young children who consume substantial quantities of oily fish.

A large section of a committee report concerned with Seafood Safety in U.S. (Ahmed, 1991) has been devoted to occurrence of chemical contamination and related health risks.

Antibiotics are used in aquaculture as prophylactics, as growth promoters and in the treatment of diseases. Prophylactic use of antibiotics is defined as the administration of antibiotics in advance of disease occurrence and this is a common practice in shrimp hatcheries in Asia to reduce the incidence of diseases (GESAMP, 1997). A review report (Graslund and Bengtsson, 2001) stated the widespread prophylactic use of antibiotics in both shrimp hatcheries and in shrimp ponds in Southeast Asia. Antibiotics are usually administered in aquatic feeds and most commercial shrimp feeds contain antibiotics (Flaherty *et al*., 2000). In contrast, antibiotics are not used either as prophylactic agents or as growth promoters in temperate water aquaculture production in Europe and North America (Alderman and Hastings, 1998). In recent years the use of antibiotics has fallen dramatically in the over all world. This is largely as a result of the successful development and use of vaccines against the principle fish pathogens.

In the present investigation an attempt has been made to study the seasonal variation of chemical hazards in **white shrimps *(Penaeus Indicus)*** during processing in sea food processing Industry.

MATERIALS AND METHODS:

To determine Chemical hazards samples were collected from Sea food processing Industry and analysed at middle of each season such as monsoon (August) , winter (December) & summer (April) by following the methods AFSSA , FRACE , AOAC 1995a , 1995b , 1995c (General Multiresidue & Gas chromatographic method) were as Heavy metals by AAS FP4 Perkin Elemr (AOAC 1995d , 1995e , 1995g) while PSP , OSP by HPCL (AOAC 1995n)

The following chemicals hazards **from P. indicus** were examined

1. Pesticides: -BHC (Benzene hexachloride), Aldrine, Dieldrine, Endrine, DDT (Dichlor-Diphenyl Trichlore.)
2. Antibiotics :- Chlorophinicol, Tetracyclin, Oxy-Tetracylin, Oxolinic acid, Nit rofurazone.
3. Heavy metals :- Arsenic, Cadmium, Lead, Nickel, Chromium,
4. Histamines.
5. PSP (paralytic shelfish poisoning)VI)
6. DSP (Diarrhoetic shell fish poisoning)

RESULTS AND DISCUSSION:

The results are presented in table no. 01-03

To study in MONSOON season, the samples were collected for chemical hazards in middle week of August.

Pesticides:- BHC was found to 0.12ppm, Endrin & DDT was found to 0.15ppm & 0.2ppm respectively.

Antibiotics:- only oxalic acid was found to 0.1ppm while chlorophinical,Tetracycline, Oxytetracyline & Nitrofurozone were not detected.

Heavy metal:- Cadmium & Nickel were found to 0.25ppm & 20ppm respectively & Lead was not detected. PSP, DSP & Histamine were not detected.

For WINTER season, the sample were collected to estimate chemical hazards in middle week of December.

Pesticides:- BHC, Endrin & DDT found to 0.18ppm, 0.16ppm & 0.3ppm respectively. Aldrin & Dieldrin were not detected.

Antibiotics:- only oxolinic acid was found to 0.15ppm where as remaining studied Antibiotics were not detected.

Heavy metal:- Cadmium found to 0.3ppm & Nickel found to 28ppm while Lead was not detected. PSP, DSP & Histamine were not detected.

For SUMMER season, the samples were collected to estimate chemical hazards in middle week of April.

Pesticide:- BHC, Endrin & DDT were found 0.15ppm, 0.12ppm & 0.2ppm respectively while Aldrin & Dieldrin were not detected.

Antibiotics:- All studied Antibiotics were not detected except oxolinic acid which was found to 0.15ppm.

Heavy metal:- Cadmium was found to 0.35ppm. PSP, DSP & Histamine were not detected.

Problems related to chemical contamination of the environment are nearly all man-made. The ocean dumping of hundreds of millions tons of waste material from industrial processing, sludge from sewage treatment plants, draining into the sea of chemicals used in agriculture and raw untreated sewage from large urban populations and industries all participate in contaminating the coastal marine environments or freshwater environments. From here the chemicals find their way into fish and other aquatic organisms. Increasing amounts of chemicals may be found in predatory species as a result of biomagnification, which is the concentration of the chemicals in the higher levels of the food chain. Or they may be there as a result of bioaccumulation, when increasing concentrations of chemicals in the body tissues accumulated over the life span of the individual. In this case, a large (i.e. an older) fish will have a higher content of the chemical concerned than a small (younger) fish of the same species. The presence of chemical contaminants in seafood is therefore highly dependent on geographic location, species and fish size, feeding patterns, solubility of chemicals and their persistence in the environment.

In a review report on chemical residue concerns in seafood, Price (1992), concluded that risk from chemical contaminants in commercially harvested fish and shellfish is low and not a problem. Risk from chemical residues (mercury, selenium, dioxins, PCPs, kepone, chlordane, dieldrine and DDT) are primarily a concern with sport caught fish and shellfish, caught in coastal waters and (possibly) in highly polluted waters.Nevertheless, a large section of a committee report concerned with Seafood Safety in U.S. (Ahmed 1991) has been devoted to occurrence of chemical contamination and related health risks.

In present study the Concentrations of chemical contaminants in P.indicus fluctuate according to the time of year.The pattern for inorganic compounds is 'biological dilution', when shrimp reach sexual maturity; this occurs when the amount of contaminants remain the same, but the organism's body mass increases, and thus chemical hazards concentrations fall. This has been observed for various studied chemical hazards in P. indicus. The highest concentrations are recorded in winter at sexual maturity hence risk to humans is therefore greatest at the moment of sexual maturity. Similar observations were found to

Claisse (1992), Amiard et al. (1986), Amiard and Berthet (1996), Devier et al. (2005) and Butler (1973).

Table No. 01
Chemical Hazards
Species:- White Shrimps (Penaeus indicus)
Sample collected from 14 to 21 August.

	Test	Result	Acceptable Level	Remark
Pesticide ppb/ppm	BHC	0.12 ppm	0.3 ppm	Satisfactory
	Aldrin	N. D.	0.3 ppm	- do -
	Dieldrin	N. D.	0.3 ppm	- do -
	Endrin	0.15 ppm	0.3 ppm	- do -
	DDT	0.2 ppm	0.5 ppm	- do -
Antibiotic ppb/ppm	Chlorophinicol	N. D.	Absent	- do -
	Testracyline	N. D.	0.1 ppm	- do -
	Oxytetracyline	N. D.	0.1 ppm	- do -
	Oxolinic acid	0.1 ppm	0.3 ppm	- do -
	Nitro furozone	N. D.	Absent	- do -
Heavy metal ppb/ppm	Cadmium	0.25 ppm	1 ppm	- do -
	Lead	N. D.	1.5 ppm	- do -
	Nickel	20 ppm	80 ppm	- do -
PSP(mμ/g)		N. D.	80 μg 100 gm	- do -
DSP(mμ/g)		N. D.	Absent	- do -
Histamine ppm		N. D.	100 ppm	- do -

Table No. 02
Chemical Hazards
Species:- White Shrimps (Penaeus indicus)
Sample collected from 14 to 21 December.

	Test	Result	Acceptable Level	Remark
Pesticide ppb/ppm	BHC	0.18 ppm	0.3 ppm	Satisfactory
	Aldrin	N. D.	0.3 ppm	- do -
	Dieldrin	N. D.	0.3 ppm	- do -
	Endrin	0.16 ppm	0.3 ppm	- do -
	DDT	0.3 ppm	0.5 ppm	- do -
Antibiotic ppb/ppm	Chlorophinicol	N. D.	Absent	- do -
	Testracyline	N. D.	0.1 ppm	- do -
	Oxytetracyline	N. D.	0.1 ppm	- do -
	Oxolinic acid	0.15 ppm	0.3 ppm	- do -
	Nitro furozone	N. D.	Absent	- do -
Heavy metal ppb/ppm	Cadmium	0.30 ppm	1 ppm	- do -
	Lead	N. D.	1.5 ppm	- do -
	Nickel	28 ppm	80 ppm	- do -
PSP(mμ/g)		N. D.	80 μg 100 gm	- do -
DSP(mμ/g)		N. D.	Absent	- do -
Histamine ppm		N. D.	100 ppm	- do -

Table No. 03
Chemical Hazards
Species:- White Shrimps (Penaeus indicus)
Sample collected from 14 to 21 April.

	Test	Result	Acceptable Level	Remark
Pesticide ppb/ppm	BHC	0.15 ppm	0.3 ppm	Satisfactory
	Aldrin	N. D.	0.3 ppm	- do -
	Dieldrin	N. D.	0.3 ppm	- do -
	Endrin	0.12 ppm	0.3 ppm	- do -
	DDT	0.2 ppm	0.5 ppm	- do -
Antibiotic ppb/ppm	Chlorophinicol	N. D.	Absent	- do -
	Testracyline	N. D.	0.1 ppm	- do -
	Oxytetracyline	N. D.	0.1 ppm	- do -
	Oxolinic acid	0.15 ppm	0.3 ppm	- do -
	Nitro furozone	N. D.	Absent	- do -
Heavy metal ppb/ppm	Cadmium	0.35 ppm	1 ppm	- do -
	Lead	0.5 ppm	1.5 ppm	- do -
	Nickel	30 ppm	80 ppm	- do -
PSP(mμ/g)		N. D.	80 μg /100 gm	- do -
DSP(mμ/g)		N. D.	Absent	- do -
Histamine ppm		N. D.	100 ppm	- do -

REFERENCES-

1. AOAC (1990).Official methods of analysis , association of official analytical chemicals, Washington, D. C. (U.S.A.).
2. APHA, AWWA AND WPCF. (1981). International standard methods for estimation of water and waste water (15th edition). American Public Health Association, American Water Works Association and Water Pollution Control Federation,Washington D.C. 270-430
3. APHA,AWWA, (1980). Standard methods for examination of water and waste water .14th edition USA.
4. AOAC 1995a Organochlorine and organophosphorous pesticide residues. Gas chromatographic method. Sec. 10.1.02, Method 985 .22 In Official Methods of Analysis of AOAC International, 16th ed., P.A. Cunniff (Ed.),p. 10-11
5. AOAC, 1995 b. Organochlorine and organophosphorous pesticide residues Gas chromatographic method Sec. 10.1.02, Method 985 .22 In Official Methods of Analysis of AOAC International, 16th ed., P.A. Cunniff (Ed.),p. 10-11 AOAC International, Gaithersburg, MD.
6. AOAC, 1995 c. Organochlorine and organophosphorous pesticide residues in fish Gas chromatographic method Sec. 10.1.02, Method 983 .21 In Official Methods of Analysis of AOAC International, 16th ed., P.A. Cunniff (Ed.),p. 11-12 AOAC International, Gaithersburg, MD.
7. Price, R.J. 1992. Residue concerns in seafoods. *Dairy, Food and Environmental Sanitation* 12, 139-143.
8. Smith, A.G. & S.D. Gangolli 2002. Organochlorine chemicals in seafood: occurrence and health concerns. *Food and Chemical Toxicology* 40, 767-779.
9. Ahmed, F.E. (ed) 1991. *Seafood Safety*. National Academy Press. Washington DC, USA.
10. GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (IMO/FAO/UNESCO/WMO/IAEA/UN/UNEP)). 1997. *Towards the safe and effective use of of chemicals in coastal aquaculture.* Reports and Studies GESAMP No 65. FAO, Rome, Italy.

11. Graslund, S. & B.E. Bengtsson 2001. Chemicals and biological products used in Southeast Asian shrimp farming and their potential impact on the environment - a review. *The Science of the Total Environment* 280, 93-131.
12. Flaherty, M., B. Szuster & P. Miller 2000. Low salinity inland shrimp farming in Thailand. *Ambio* 29, 174-179.
13. Alderman, D.J. & T.S. Hastings 1998. Antibiotic use in aquaculture. *International Journal of Food Science and Technology* 33, 139-155.
14. Claisse D (1992) Accumulation des métaux lourds et polluants organiques par les coquillages. In: Lesne J., editor. Coquillages et santé publique. Du risque à la prévention. ENSP. p 99-111.
15. Amiard JC, Amiard-Triquet C, Berthet B, Metayer C (1986) Contribution to the ecotoxicological study of Cd, Pb, Cu and Zn in the mussel Mytilus edulis. 1 - Field study. Mar Biol 90:425-431.
16. Amiard JC, Berthet B (1996) Fluctuations of cadmium, copper, lead and zinc concentrations in field populations of the Pacific oyster Crassostrea gigas in the bay of Bourgneuf (Atlantic coast, France). Ann Inst Oceanogr 72:195-207.
17. Devier MH, Augagneur S, Budzinski H, Le Menach K, Mora P, Narbonne JF, Garrigues P (2005) One-year monitoring survey of organic compounds (PAHs, PCBs, TBT), heavy metals and biomarkers in blue mussels from the Arcachon bay, France. J Environ Monit 7:224-240.
18. Butler PA (1973) Residues in fish, wildlife, and estuaries; organochlorine residues in estuarine molluscs, 1965- 1972. National Pesticides Monitoring Program. J Pestic Monit 6:238-362.