

Measurement of Lindane Residues in Tarom Rice Samples from Different Sari City Market Places of Iran

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Abstract: Lindane (gamma-hexachlorocyclohexane) is a synthetic chemical that applied for destroy of insects (insecticide). In agriculture sector in Iran, organochlorine insecticides such as lindane are mainly used for agriculture purposes, for example in rice-field to destroy the pests. lindane can remain in rice crop and creates health problem for human after eating rice because for its high stability and long life. In this study a sectional inspection was performed at Tarom rice crop of Sari city (Capital city of Mazandaran Province) for high rate of consumption of lindane in Mazandaran province of Iran. Trom Rice samples gathered form four Market places in Sari city (2010) and then used N-hexane as a solvent and after that gas chromatography method used for detection of lindane residues. The results showed that almost all samples had the lindane residues at ppb level and there was no significant different between samples ($p < 0.05$). The amounts are non-toxic but may lead to health problems such as liver disorder, and gastrointestinal cancer.

Key words: Lindane Residues · Insecticides · Tarom rice samples · Sari city · Iran

INTRODUCTION

There are many Chemical compounds that applied as pesticides. For more and widespread application of these agents in agricultural sectors, many concerns in environmental contamination resulted and it is found many deaths in each year related directly to the consumption of these compounds each year [1]. Lindane is a moderately toxic compound via oral exposure for animals and human. Effects of high acute exposure to lindane may include central nervous system stimulation, mental/motor impairment, and tonic (continuous) convulsions, increased respiratory rate and/or failure, pulmonary edema, and dermatitis. Other symptoms in humans are more behavioral in nature such as loss of balance, grinding of the teeth, and hyper-irritability. Most acute effects in humans have been due to accidental or intentional ingestion, although inhalation toxicity occurred (especially among children) when it was used in vaporizers. Lindane is very stable in both fresh and salt water environments, and is resistant to photo degradation. It will disappear from the water by secondary mechanisms such as adsorption on sediment, biological

breakdown by microflora and fauna, and adsorption by fish through gills, skin, and food [2-8]. The goal of this study is analysis of chlorinated hydrocarbon pesticide residues (Lindane) in Tarom rice of four market places of Sari by GC because in Iran a half of pesticides are used in Mazandaran province.

MATERIALS AND METHODS

Sampling: The Tarom rice samples gathered in four market places in Sari city, Capital of Mazandaran Province of Iran. Four places were Goharbaran Region, Kiyasar Region, Khazar Abad region, And Jouybar road. Sampling was carried out randomly and then 120 samples were taken almost between 10th August to 10th September, 2010 and immediately of Tarom the reaping. Nearly 500 g of Tarom the reaping was removed from each market place. Separately peeled off in factory, labeled and enclosed and then dispatched to laboratory [2].

Methodology: Sample preparation and poison extraction (in conformity with ICPS. WHO & ILO textbook) was performed under standard methods. Samples were washed

Table 1: The average of lindane in rice samples from four market places (P<0.05).

Studied Areas	Mean of Lindane (ppb)	SEM
Goharbaran Region	2.32	0.77
Kiyasar Region	3.66	0.56
Khazar Abad region	2.11	0.62
Jouybar road	3.21	1.11

3 times to remove all dust. Attention must be paid to avoid wetting the kernel of seeds. Samples were dried by sunlight perfectly. Dry samples were separately milled and this step was carried out two times for each sample to achieve better extracts. The 50 g of each grinded sample was transferred to Erlenmeyer 250 ml. In order to extract poisons, 100 ml N-Hexane was added to Erlenmeyer containing sample, because have aliphatic stretchers and appropriate solubility in organic solvents. Remaining of this procedure done exactly based on EPA method 8080 [8]. Statistical analysis on data performed by T-test for comparison of averages in different market places (p<0.05).

RESULTS AND DISCUSSION

The results showed that all of the rice samples have contaminated with residual lindane on a scale of ppb that has no oral acute toxicity [8]. According to Table 1, the mean of residual lindane in the rice samples from Kiyasar Region is more than the other areas; also according to Table 1, the mean of residual lindane in the rice samples from Goharbaran and Khazar abad areas have minimum amounts Sari. There is not significant differences between samples about the lindane residues (p<0.05). This result is logic because water use in the kiyasar areas are most from flowing water unlike the other areas that use well water for irrigation. More agricultural expansion and lands under rice cultivation in the noticed areas than others in addition to above reasons, lead to receiving more poison by flowing water and more contamination [2].

The results showed that lindane has a long half-life and too much stability in environment, more over it biomagnifying in fatty tissues, hence, long term using of products that contain residual poisons such as rice [1-3] can cause or lead to health complications such as liver disorders or even gastrointestinal cancer and so on and this can be consider as one reason of high incidence of GI cancers in Mazandaran. On the other hand, these results should be taken into consideration especially by farmers and responsible persons in agriculture offices [2]. Then, Measurement of poison residues in food products (agricultural, sea, and other products) should be regularly

performed according to per capita consumption of poisons. Establishment of reference laboratory, which was equipped with analytical apparatus such us GC, GC-Mass, and HPLC is very necessary. Health care organization such as fishiness agriculture, rice, environmental and the ministry of health investigational centers have to precisely identify environmental pollutions and determine better strategies to achieving wholesome foods. It is proposed for establishing the poison and environmental pollution information center to guide the people all the time and inform them about the control of toxicity. It is necessary to educating the province's farmers about the better using of poisons especially chlorinated poisons that their using has been abolished and finally measuring chlorinated poison residues in human (Milk, fatty tissue, blood, liver, etc.) should be done [1-3].

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