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Article

Effects of induced arsenocosis on skin, intestine, lungs and gizzards of broilers

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Abstract: The study was conducted to determine the level of accumulation of arsenic concentration in lungs, intestine, gizzard and skin of broilers. Forty eight apparently healthy day-old "Star-bro" broiler chicks (already vaccinated with Marek's disease vaccine in the hatchery) were reared up to 34 days. All chicks were reared in the same brooder up to 7 days of age and then all broiler chicks (48) were divided into 4 different groups; Group-A, Group-B, Group-C and Group Control each consisting of 12 chicks. Birds of Group-A, B, and C were given 1, 0.5, and 0.25 ppm arsenic, respectively mixing with drinking water (distilled water). No arsenic treatment was given in the Control Group. Two birds from each group were selected randomly for slaughter at the day of 14, 21, 28, 30, 32 and 34, respectively. Body weight was noted down and external examination was performed before post mortem examinations. After collection, the samples were prepared by a series of steps such as, washing, drying and digestion; finally arsenic was detected by atomic absorption spectophotometric method. The mean highest arsenic concentration in lungs, intestine, gizzard and skin were 1.027±0.1265 ppm in Group-B, 0.422±0.0228 ppm in group-A, 0.2885±0.032 ppm in group-B, 0.3198±0.057 ppm in group-A (in all case n=6), respectively. In this study it was found that the level of arsenic in lungs, intestine, gizzard and skin is greater than that of the maximum permissible level in drinking water (0.05ppm, WHO). From the findings of the present study gives an indication of severe human health hazards caused by arsenic through animals as well as agro based human food which is still unnoticed.

Keywords: arsenic; broiler; organs and skin; spectophotometric

1. Introduction

Arsenic is a poisonous element that can pollute water, land, crops and the overall environment, ultimately affecting human health and wellbeing. Arsenic is a metalloid and can exist in various allotropes. Arsenic and its compounds, especially the trioxide, are used in the production of pesticides, treated wood products, herbicides, and insecticides (Jones *et al*., 2007). Arsenocosis is found in human and animals after drinking of arsenic contaminated water and feeds which are grown in arsenic contaminated soil. Arsenic contamination of groundwater is a problem that affects millions of people across the world (*Lechtman*, 1996). Humans may be exposed to arsenic through food, water and air. Exposure may also occur through skin contact with soil or water that contains arsenic. It is suggested that the uptake of significant amounts of inorganic arsenic can intensify the chances of cancer development, especially the chances of development of skin cancer, lung cancer, liver cancer and lymphatic cancer (Das *et al*., 2002). Finally, inorganic arsenic can damage DNA. Arsenic cannot be mobilized easily when it is immobile (Rahman *et al.*, 2008). Arsenic can enter into food chain causing wide spread distribution throughout the plant and animal kingdoms (Kile *et al*., 2007). The evidence of arsenic calamity in animal feed chain is scarce. Contamination of animal feed by arsenic is a newly uncovered disaster on a massive scale (Sapkota *et al*., 2007). This possesses a potential dietary risk to human, although little research has focused on food as an additional source of arsenic exposure. Food may contribute up to 30-50% of

the total dietary intake of arsenic when feed is generated from arsenic contaminated sources (Naidu *et al*., 2006). The arsenic disaster of Bangladesh has been called the most terrible environmental catastrophe of the twentieth century. WHO described the condition as "the largest mass poisoning of a population in history" (WHO, 2001). It was estimated that 61 out of 64 districts and about 29% of the total tube wells in Bangladesh are contaminated with arsenic (Khan *et al*., 2006; Chakraborti *et al*., 2010) and about 85 million people are at risk of drinking arsenic contaminated water and foodstuffs (Wahidur, 2006). In a recent report (Chakraborti *et al*., 2010) showed that hand tube wells of the tableland and hill tract regions of Bangladesh are primarily free from arsenic. Arsenic is an approved animal dietary supplement and is found in specifically approved drugs added to poultry and other animal feeds. Although several research groups have begun to elucidate the effects of arsenic use in animal feed on its environmental concentrations in areas where animal waste has been land applied (Jackson *et al*., 2006; Stolz *et al*., 2007). Roxarsone (3-nitro-4-hydroxyphenylarsonic acid) is frequently used as additive in poultry industry to control coccidial parasites. It increases arsenic accumulation in chicken meat and adds arsenic in our environment (Wallinga, 2006). Researchers from the National Institutes of Health and the USDA's Food Safety Inspection Service reported alarmingly high levels of arsenic contamination in the broiler flesh (Lasky *et al*., 2004). It is assumed that arsenic ingested through chicken pose potential risks to human health.

2. Materials and Methods

2.1. Site of the experiment

The birds were reared in an isolated poultry shed, under the department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh, Bangladesh. The length and width of the shed was 25 and 15 feet.

2.2. Cleaning and disinfection of house

The room was thoroughly washed by sweeping and washing with tap water using hose pipe. The room was disinfected with a phenolic disinfectant (phenyl) and allowed to dry. Then the shed was again disinfected by spraying a quaternary ammonium derivative containing 40% N-alkyl dim ethyl benzyl ammonium chloride (Timsen^{TM}) from Eon Animal Health Products Ltd., Dhaka, Bangladesh @ 1gm/4 liter of water.

2.3. Fumigation

Newly prepared brooder and required wire cages, water and feed trays were placed in the poultry shed. All windows were closed and then the shed was fumigated with formalin (Emark) and potassium permanganate (Ronas Chemicals Ind. Co. Ltd., China) @ 40 ml formalin in 20 gm $KmnO_4$ for each 100 cubic feet area). Two days before placing the chicks the shed was properly ventilated.

2.4. Management of the experimental birds

Forty eight apparently healthy day-old chicks "Star-bro" broiler chicks (already vaccinated with Marek's disease vaccine in the hatchery) were purchased from a local dealer (in kewatkhali) Nourish poultry and Hatchery Co. Ltd., Dhaka. The chicks were reared in the poultry shed up to 34 days of age. Strict bio-security was maintained. Entry of unauthorized persons was extremely restricted.

2.4.1. Layout of the experiment

All chicks were reared in the same brooder up to 7 days of age under strict management. At 7 days of age, all broiler chicks (48) were divided into 4 different groups each consisting of 12 chicks. The birds were grouped as shown in Table 1.

Table 1. Grouping of birds with arsenic concentration.

Group	Number of Birds	Arsenic Concentration (ppm)
Group-A	12	1
Group-B	12	0.5
Group-C	12	0.25
Group-Control	12	Only distilled water

2.4.2. Vitamins and electrolyte supply

A combined preparation of vitamins and minerals @ 1 gm/5 liter distilled water (Square Premix Broiler from Square Pharmaceuticals Ltd., Agrovet Division, and Dhaka, Bangladesh) was administered to the birds daily.

2.4.3. Feeding and water supply

For the first two days the birds were maintained on suji (a coarse flour of wheat) which was then replaced by commercial starter feed, and then grower and finisher feed supplied by the Nourish Feed and Hatchery Ltd., Dhaka, Bangladesh. Arsenic was administered to the birds mixing with distilled water up to culling the flock. Vaccination was performed and vaccination schedule is summarized in Table 2.

Table 2. Vaccination schedule.

Age (days)	Name of the Vaccine	Name of the company	Dose	Route
7	BCRDV (Newcastle L-63)	Square Pharmaceuticals Ltd., Agrovet Division, Dhaka, Bangladesh	One drop	Eye
11	Gumboro (Bangla GUMBORO VAC)	FnF Pharmaceuticals Ltd., Dhaka, Bangladesh	One drop	Eye

2.5. Sample collection and preservation for atomic absorption

The gizzard, intestine, skin and lung were collected after post-mortem of broiler for several days. After collection of samples, samples were kept in the deep freeze within zip type polythene bags. Immediately after collection of sample, these were washed individually several times in physiological saline to remove clotted blood and debris. Each organ was weighed separately. Extra tissues from each organ were removed. For arsenic determination these tissues from each bird were taken separately in zip-type polythene bags, perfectly marked and stored at -20ºC until chemical analysis.

2.6. Materials and methods for arsenic detection

The experiment was carried out for the detection of arsenic in skin, lung, intestine and gizzard of broilers at the Arsenic Detection and Mitigation (ADM) Laboratory, Department of Pharmacology, BAU, Mymensingh, Bangladesh. The following methodology was adopted.

2.6.1. Reagents and chemical used in digestion

i. For all purposes in the laboratory 18 Ω Millipore water was used.
ii. Nitric acid (69%), ARISTAR VWR international limited. Poole BH15 1TD, England.
iii. Perchloric acid (70%), AnalaR® VWR international limited. Poole BH15 1TD England.
iv. Filter paper, Whatman No. 41

2.6.2. Reagents and chemical used in analysis

i. Sodium borohydride powder 98+ % ACROS ORGANICS New Jersey, USA: 1-800-ACROS-01 Geel Belgium.
ii. Sodium hydroxide pellets, BDH, AnalaR® BDH laboratory supplies. Poole BH15 1TD, England.
iii. Ascorbic acid MERCK Merck KGaA, 64271.
iv. Ethanol.
v. Chloroform (extra pure grade).
vi. Xylene.
vii. Formaldehyde (37%).
viii. Hematoxylin crystal.
ix. Paraffin (56-58ºC).
x. Sodium *meta*-arsenite (pro analysi grade), Darmastadt, Germany.
xi. Hydrochloric acid: specific gravity 1.18 AnalaR® VWR international limited. Poole BH15 1TD, England.

2.6.3. Instruments

Instruments used are listed below:

i. Four digit balances, KARL KOLB, Model D-6072, Scientific Technical Supplies, Germany was used for sample weighing.

ii. Diamond aluminum foils 37.5 sq. feet USA and Ashburn joint venture consumer product.
iii. Acid dispenser Dispensette® MERCK 1-5 ml No. 707644 made in Germany.
iv. Measuring cylinder 1000 ml and 250 ml.
v. Volumetric Flask E-MIL BORO A50 (0.10-0.50 ml) made in England.
vi. Plastic bottle via plastic Ltd., Bangladesh.
vii. Block digester (M-24 plazas/samples, JP Selecta, Spain) was used for sample digestion.
viii. Electronic woven, Memmert GmbH+Co.KG, D-91126, Schwabach, FRG Germany.
ix. Atomic absorption spectrophotometer (AAS), hydride generator (HG), PG instrument Ltd., U.K were used for quantifying arsenic content.
x. Autoclave, Jeio Tech, China.

2.6.4. Digestion

At first the digestion tube was washed by brush with water. Then tube was dried in the electronic oven at 70^0 C. The weighing balance was prepared with reference weight (100g) to measure the sample s individually. 5 ml acid was added in the ratio of 3:1(69% nitric acid: 70% percholoric acid) in the different organs. Then tube was placed in the digestion chamber for 12 hours. The tube was heated at 100^0 C for one hour. After heating the sample was kept at 150^0 C for one to two hours up to dissolution of the particles. Again heating the tube at 180^0 C until becoming light color. Then heating up to 200°C almost disappear the color. Temperature at 250-300°C up to reduction of volume 1.5-2 ml and it appears at greenish color.

2.7. Arsenic detection

Concentrations of arsenic in digested samples were determined using atomic absorption spectrophotometer (AAS), model PG–990 equipped with a computer with atomic absorption (AA) Win software (PG Instruments Ltd., UK) following pre-reduction with KI and KBH_4 to generate AsH_3 (Samanta *et al*., 1999). The instrument was coupled with a Flow Injection Hydride Generator (FI-HG); model WHG – 103A, (PG Instruments Ltd., UK). All measurements were made in ppb. Quantification of arsenic was performed by spiking samples with standards at different concentrations.

2.8. Analytical procedure

The carrier gas pressure was used as energy source. Diluted (1%, v/v) HCl was used in the carrier stream to sweep the sample at the mixing coil where it reacted with a solution of 1.5% KBH_4 (w/v) stabilized in 0.3% NaOH. Blank solution was calibrated before measuring the sample solution. In every analysis set first two data of blank was ignored. The sample, carrier liquid and KBH_4 solution suction port was placed in respective solution. Then the start key of the HG was pressed. The sample solution, the carrier liquid and KBH_4 solution were automatically and quantitatively sucked in. The carrier liquid carrying the sample solution and KBH_4 began their permanent flow and the reaction takes place after their convergence. The carrier gas into the gas-liquid separation tube brings along the resultant and the mixed gas enters the electric quartz absorption-tube atomizer. The resulting absorption of the lamp radiation was proportional to the arsenic concentration. The sample was replaced after getting the result. Real concentration of the sample was measured from the following formula:

$$\text{Arsenic concentration (ppm)} = \frac{\text{Amount of concentration x Volume}}{\text{As per sample weight x 1000}}$$

2.9. Statistical Analysis

The data were analyzed statistically using one way ANOVA test as described by Professor Fisher (1935).

3. Results

Table 3 demonstrated that before inducing arsenocosis the weight of birds of group-A was lowest among three groups. But the weight of birds was increasing day by day after inducing arsenocosis which was highest in group-A (2180g) among three groups after 34 days and lowest weight was found in the group-control.

Table 3. Weight measurement.

Age (days)	Average weight of the birds (gm)			
	Group-A	**Group-B**	**Group-C**	**Group-Control**
07	278	310	289	295
14 (1st Slaughter)	670	691	640	650
21	980	1112	1120	1017
28	1643	1657	1667	1785
30	1790	1690	1671	1493
32	1822	1445	1750	1510
34	2180	2150	1890	1590

The following post mortem lesions were found at the age of 34th days of

Group–A

a. Severe hemorrhage found in skin (Figure 3)
b. Severe hemorrhage found in intestine (Figure 2)
c. Severe congestion found in lungs (Figure 1)
d. Gizzard was normal (Figure 4)

Group–B

a. Mild hemorrhage found in skin.
b. Severe hemorrhage found in the upper part of intestine.
c. Mild congestion in lungs.
d. No lesion found in gizzard.

Group–C

a. Less hemorrhage found in intestine.
b. Less hemorrhage also found in skin.
c. Gizzard and lungs were apparently normal.

Group–Control

a. Mild hemorrhage in intestine.
b. No lesion found in skin.
c. Lungs were apparently normal.
d. No lesion was found in gizzard.

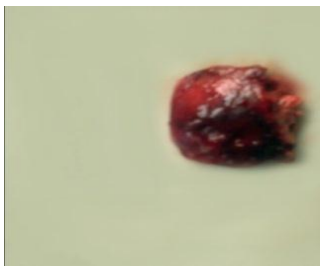

Figure 1. Congested lung of group A at 34 days.

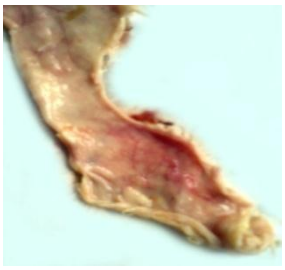

Figure 2. Hemorrhagic intestine of group A at 34 days.

Figure 3. Hemorrhage of group A in skin at 34 days.

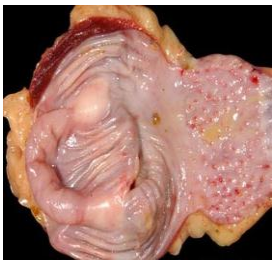

Figure 4. Hemorrhage of group A in gizzard at 32 days.

Table 4. Effect of different treatment of arsenic in gizzard in broiler birds.

Group	Arsenic in gizzard ((ppm)					
	Day 7	**Day 14**	**Day 28**	**Day 30**	**Day 32**	**Day 34**
Control	0.021±0.00	0.03^{c}±0.01	0.26^{a}±0.04	0.33^{b}±0.00	0.17^{d}±0.02	0.34±0.00
A	0.083±0.03	0.36^{a}±0.07	0.18^{b}±0.00	0.40^{a}±0.00	0.23^{c}±0.00	0.25±0.00
B	0.051±0.02	0.15^{b}±0.00	0.17^{b}±0.00	0.38^{ab}±0.00	0.48^{a}±0.01	0.50±0.14
C	0.199±0.09	0.35^{a}±0.01	0.18^{b}±0.01	0.15^{c}±0.00	0.39^{b}±0.01	0.45±0.00
P value	0.09	0.00	0.05	0.00	0.00	0.07
Sig.	NS	**	*	**	**	NS

Means with different superscripts within the same column differ significantly. * = Significant at 5% ($p<0.05$) level of probability, ** = Significant at 1% ($p<0.01$) level of probability, NS = Not significant ($p>0.05$).

Data of the Table 4 demostrated the comparison of arsenic level in gizzard, group-B showed the highest concentration of arsenic among the four groups. In the Table 4, there is no significant with each other at 14 days and 34 days. Group control is significant with group C. At 28 days, there is no significant difference among group A, B, C but control is significant with A, B, C. At 30 days, group A and C are significant with group B; but there is no significant among group A and B. Group A is significant with group C and C is significant with group B at 32 days. Highest concentration was found in group B at 34 days and lowest was in Group Control on day 14.

Table 5. Effect of different treatment of arsenic in skin in broiler birds.

Group	Arsenic in skin ((ppm)					
	Day 14	**Day 21**	**Day 28**	**Day 30**	**Day 32**	**Day 34**
Control	0.077±0.03	0.09±0.04	0.21b±0.00	0.23±0.00	0.24^{d}±0.01	0.49±0.00
A	0.159±0.07	0.24±0.11	0.24^{a}±0.00	0.26±0.00	0.42^{b}±0.00	0.60±0.14
B	0.080±0.03	0.13±0.06	0.20^{b}±0.00	0.25±0.01	0.38^{c}±0.00	0.43±0.01
C	0.082±0.03	0.13±0.06	0.21^{b}±0.00	0.24±0.01	0.52^{a}±0.03	0.64±0.01
P value	0.396	0.340	0.030	0.195	0.000	0.123
Sig.	NS	NS	*	NS	**	NS

Means with different superscripts within the same column differ significantly. * = Significant at 5% ($p<0.05$) level of probability, ** = Significant at 1% ($p<0.01$) level of probability, NS = Not significant ($p>0.05$).

Data of the Table 5 demonstrated the comparison of arsenic level in skin among the four groups. Group-C showed the highest concentration of arsenic. In the lettering table, there is no significant within four groups at 14 days, 21 days, 30 days and 34 days. At 28 days, there is no significant difference among group control, B and C but group A is significant with others. There is significant difference among four groups at 32 days. The lowest concentration of arsenic was in control group at 14 days and highest concentration in group C at 34 days.

Table 6. Effect of different treatment of arsenic in intestine in broiler birds.

Group	Arsenic in intestine (ppm)					
	Day 14	**Day 21**	**Day 28**	**Day 30**	**Day 32**	**Day 34**
Control	0.029±0.01	0.12^{c}±0.00	0.21^{c}±0.01	0.46^{a}±0.00	0.49^{b}±0.01	0.4^{c}±0.00
A	0.123±0.05	0.25^{a}±.00	0.31^{a}±0.01	0.42^{ab}±0.03	0.56^{a}±0.01	0.87^{a}±0.01
B	0.136±0.12	0.15^{c}±0.00	0.23^{b}±0.00	0.47^{a}±0.01	0.42^{b}±0.03	0.53^{b}±0.01
C	0.065±0.03	0.20^{b}±0.00	0.21^{c}±0.01	0.36^{b}±0.00	0.29^{c}±0.00	0.56^{b}±0.02
P value	0.495	0.000	0.004	0.012	0.001	0.000
Sig.	NS	**	**	**	**	**

Means with different superscripts within the same column differ significantly. * = Significant at 5% ($p<0.05$) level of probability, ** = Significant at 1% ($p<0.01$) level of probability, NS = Not significant ($p>0.05$).

Data of the table 6 indicated the comparison of arsenic level in intestine among the four groups. Group-A showed the highest concentration of arsenic. In the lettering table, there is no significant with each other at 14 days. There is no significant difference between group B and control group; group A is significant with other

groups at 21 days. There is no significant difference between control group and C; group A is significant with three groups at 28 days. There is significant difference group A and C and group control, A, B. But group A is significant with group C at 30 days. There is no significant difference between group control and B, group A and group C is significant with control and B at 32 days. There is no significant between group B and C, but group A is significant with three groups at 34 days.

Table 7. Effect of different treatment of arsenic in lung in broiler birds.

Group	Arsenic in lung (ppm)					
	Day 14	**Day 21**	**Day 28**	**Day 30**	**Day 32**	**Day 34**
Control	0.271±0.12	0.27^{d}±0.11	0.33^{c}±0.01	0.94^{c}±0.03	1.11^{b}±0.14	1.52±0.28
A	0.437±0.20	1.11^{a}±0.14	0.07^{d}±0.03	1.80^{a}±0.28	1.07^{b}±0.02	1.08±0.02
B	0.392±0.18	0.60^{b}±0.14	1.26^{a}±0.14	1.55^{b}±0.06	0.84^{c}±0.05	1.52±0.28
C	0.336±0.15	0.38^{c}±0.18	0.94^{b}±0.03	1.55^{b}±0.06	1.54^{a}±0.28	0.85±0.14
P value	0.794	0.016	0.000	0.018	0.053	0.078
Sig.	NS	*	**	*	*	NS

Means with different superscripts within the same column differ significantly. * = Significant at 5% ($p<0.05$) level of probability, ** = Significant at 1% ($p<0.01$) level of probability, NS = Not significant ($p>0.05$).

The data of the Table 7 demonstrated the comparison of arsenic level in lung among the four groups. Group-A showed the highest concentration of arsenic at 34 days. In the lettering table, there is no significant with each others at 14 days and 34 days. At 21 days, there is significant with each other. Group control is significant with C and with others; group B is significant with three groups at 28 days. There is no significant difference between group B and C at 30 days. At 32 days, there is no significant difference between group control and A; group B is significant with group C and group C is significant with group A.

Table 8. Mean highest arsenic concentration in different organs of different groups.

Organs	Group-Control	Group-A	Group-B	Group-C
Gizzard	0.1918±0.0176	0.2505±o.0218	0.2885±0.032	0.2865±0.0239
Intestine	0.2865±0.0108	0.422±0.0228	0.3226±0.0328	0.2808±0.0148
Lung	0.7402±0.1193	0.9278±0.1196	1.027±0.1265	0.7016±0.1423
Skin	0.2228±0.0183	0.3198±0.057	0.2450±0.0230	0.3036±0.028

4. Discussion

In this study, major gross changes were found in skin, intestine and sometimes lung during post mortem examination but there was no visible changes found in gizzard and sometimes lung. The average highest concentration of arsenic in gizzard was found in Group-B which is 0.2885±0.032 ppm (Table 8). The average highest concentration of arsenic in skin was found in Group-A which is 0.3198±0.057 ppm (Table 8). The average highest concentration of arsenic in lungs was found in Group-B which is 1.027±0.1265 ppm (Table 8). The average highest concentration of arsenic in intestine was found in Group-A which is 0.422±0.0228 ppm (Table 8), respectively. Though there were severe changes found in skin, intestine and lungs but arsenic concentration in these organs was comparatively low. In case of induced arsenicosis group B showed the highest concentration of arsenic in different organs among the three groups. This may be due to toxicokintics of arsenic by methylation. After absorption, arsenic is distributed throughout the body but tends to accumulate in the liver and kidneys. In domestic animals, arsenic does not stay in the soft tissues for a long period. It is rapidly excreted in saliva, milk, bile, sweat, urine and faces. After continuous intake, arsenic tends to accumulate in the bone, skin and keratinized tissues such as hair and hoof. Arsenic concentration in skin, intestine, gizzard and lungs was higher than acceptable level of arsenic in comparison with drinking water. Acceptable level of arsenic in drinking water was 0.05 ppm/L (WHO). Significantly increased ($p<0.01$) level of arsenic accumulation in the lung, gizzard, skin and intestine tissues following feeding of arsenic trioxide with drinking water to the broiler birds compared to control group during the whole study period. Islam *et al.* (2009) determined arsenic concentration in chickens and ducks. They showed that the distribution of arsenic concentration was highest in liver and lowest in faeces of chickens and ducks. But, this study does not agree with the result of them. The arsenic concentration also found in group-control and this is my be due to used of roxarsone as a growth promoter. After methylation process this roxarsone is converted into arsenilic acid and finally it is accumulated

as in little amount in various parts of the body (Huang *et al*., 2006). Variable concentrations of arsenic in chicken tissues under natural condition were reported by other investigators (Lasky *et al*., 2004: liver 330 to 430 ppb, muscle 130 ppb in USA; Mariam *et al*., 2004: liver 46.8±5.3 ppm, muscle 44.1±3.6 ppm in Pakistan). Conversely, Gacnik and Doganoc (2000) did not find arsenic residue in meat, liver and kidney samples of poultry during 1994-1998 in Slovenia. Wallinga (2006) tested raw chicken from supermarkets of Minnesota and California, USA and found 55% of the total 151 tested samples contained detectable levels of arsenic, ranging from 1.6 to 21.2 ppb. The present study suggests that presence of significant amount of arsenic in broiler tissues is an indication of intentional arsenic contamination (mainly by roxarsone) in poultry feed in Bangladesh. The poultry industry does not follow the safety use of roxasone. No established data is found for safety level of arsenic in meat, milk, egg, etc. until now. Arsenic contaminated drinking water and feed play an important role in the elevation of arsenic in tissues, eggs as well as excreta. The positive correlation is found between the arsenic contents of drinking water, feed and tissues support these findings. Human being has been suffering from arsenocosis due to drink arsenic contaminated water and intake ago-based foods.

5. Conclusions

Arsenic contamination is not only common in Bangladesh but also it is a global problem. Many of arsenic affected patients have been identified. If the people as well as animal continue to use arsenic contaminated water and feed may lose their health or die within a few decades. Level of arsenic concentration was determined by FI-HG-AAS method and found that the average concentration in Lungs, Intestine, Gizzard and Skin were 1.027±0.1265, 0.422±0.0228, 0.2885±0.032 and 0.3198±0.057 ppm (in all case n=6), respectively. These levels of arsenic are higher than that of the permissible level of arsenic in drinking water 0.05 ppm (WHO). This result gives an indication of severe human health hazards caused by arsenic through animals as well as agro based human food which is still unnoticed. So, immediate awareness should be heeded on agro-based animal and human food chain of arsenic prone areas in Bangladesh. More research in this respect should be done in Bangladesh to save the people as well as livestock.

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Conflict of interest

None to declare.

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