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## DETECTION OF LEAD (PB) AND ALUMINUM (AL) METAL AS CONTAMINANT IN FOOD PREPARED BY USING LOCALLY MANUFACTURED COOKED POTS (HALA) IN KOSTI CITY, SUDAN

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### Abstract

The objectives of this study are to assess the quantities of Aluminum; lead released into the food from locally manufactured cooked pots (Aluminium pots) in Kosti market. Seven types of pots (Pistons, Cartels, Kettles, Kettles + trays, Pepsi cans, Atmonia and Steel) which is locally manufactured cooked pots (Hala) were used. Amount of Al and Pb that leaked into the food from locally manufactured cooked pots were assessed by using Atomic Absorption Spectroscopy. The results were indicated that highly significance amount of Aluminum and lead which were leaked into the food that prepared by locally manufactured cooked pots (Hala).The analysis of urine for 10 selected randomly individuals that used locally manufactured cooked pots (Hala) for preparation their food were indicated highly amount of Aluminum and Lead in their urine.

Keywords: Hala, Lead contamination, Heavy metals and copper

## **Introduction**

In Sudan, people were collected and sorting out of Pepsi cans for locally manufacturing cooking pots. Metals and alloys are used as food contact materials, mainly in processing equipment, containers and household utensils. In the addition some metals are reused locally through certain processes for manufacturing of some cooking pots. These locally manufactured cooking pots may contain some alloys which are dangerous for human life.

Cooking pots as food utensils are considered as food contact materials. Many toxic elements could be released from cooking pots into the prepared food, if they are not lined with some alloys. Exposure to these elements had been toxic in case total amounts of these alloys exceed the recommended exposure limits or bring about an unacceptable change in the composition of the foodstuffs (Abou – Arab, 2001 and Glanze, 1996). The aluminum pots were manufactured locally from alloys that collected from anywhere as scrap and sold to local small factories; it was recycled under poor condition and without protective. Then some data should obtain to prevent food contamination by some element such as Al and Pb. These alloys were manufactured from a mixture of heavy metals which are present in manufactured car's cylinders, pistons, crankshaft, soft- drink tins and some other metals after they are recycled. People who have low income were used these aluminum pots for preparation their food. Lead can affect every organ and system in the body, the lead is considered as toxicity of the nervous system both in adults and children (ATSDR, 1997, Dupler, 2001) Lead exposure also causes small increases in blood pressure and anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death, In pregnant women, high levels of lead exposure to may cause miscarriage, chronic. It is reduced the fertility in males (Golub, 2005). The lead affect hem synthesis in the human body (Jaffe, *et al.*,2001), In addition the lead inhibits the action of porphobilinogen synthase and ferrochelatase, it was prevented porphobilinogen formation which is incorporated of iron into protoporphyrin IX which is the final stage for heme synthesis. It causes ineffective heme synthesis and subsequent microcytic anemia. The low levels of lead acts as calcium analog, interfering with iron channels during nerve conduction (Cohen, *et al.*, 1981). Aluminum is not a heavy metal, but high environmental exposure of Al accumulative had negative effects

such as Alzheimer's disease (Anon, 1993). The recommendation level of Aluminum and Lead in prepared food was 0.2 and 0.01 mg/l, respectively (Cohen, *et al.*, 1981).

The objectives of the present study are assessed level of Al and Pb in food that prepared by locally cooked pots (Hala).

## **Materials and Methods**

### **Material**

Aluminum pots were collected from place in which was manufactured locally in Kosti City. The aluminum pots were usually manufactured from a mixture of heavy metals after recycling process for Pistons, Cartels, Kettles + trays , Kettles, Pepsi cans, atmonia and Steel material. Then determinate the level of Al in food that prepared by locally manufactured cooked pots. Seven types of locally manufactured cook pots from Pistons, Cartels, Kettles+ cylinder, Kettles + trays, Pepsi cans, Atmonia and Steel materials. Plate 1 and 2 were shown sorting out of material. Plate (3) shown local manufacture cooked pots.

### **Methods**

#### **Measurement of Al and Pb in food prepared by local manufactured cook pots**

Assessment **Al and Pb** which are released in cooked food from different types of local manufacture cooked pots was performed under laboratory conditions by using Atomic Absorption Spectral Photometer (nov AAS300).

#### **Assessment the urine of people that prepared their food by using Aluminum pots**

Forty plastic vials of 50 ml were used for collected the urine for analysis. Nitric acid added to each sample to dissolve metals present in each urine test. Ten grams of each sample were taken and diluted with distilled water up to 100 ml to obtain homogeneous supernatant. Then Lead, Aluminum in sample urine was determined by using Atomic Absorption Spectrophotometer.

### **Statistical Analysis**

Data was collected separately and analyzed to determine the level Al and Pb in Human, Analysis of data was done using “F” test to determine significance between means by using the analysis of variance (ANOVA).



**Plate 1: Sorting out of different materials before process of manufacture of pots**



**Plate 2: Sorting out of different materials before process of manufacture of pots**



**Plate 3: Show different types of local manufactured cooked pots**

## **Result and Discussion**

### ***Al and Pb level in food prepared by using local manufactured cooked pots***

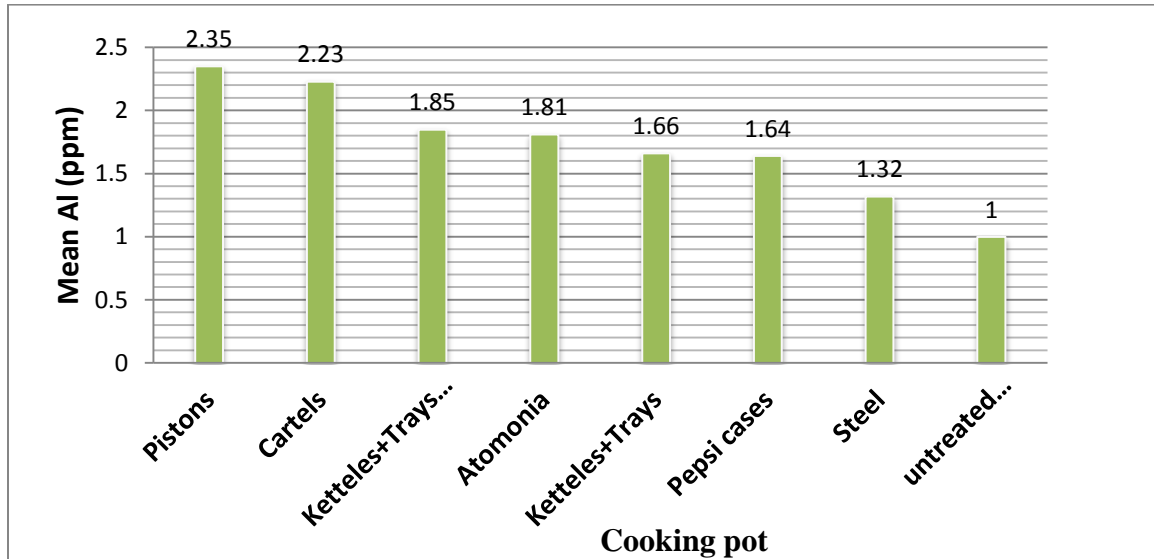
Figure (1) shown that level of Al in food cooking in Pistons, Cartels, Kettles, Kettles + trays, Pepsi cans, Atmonia and Steel was 2.35, 2.23, 1.85, 1.81, 1.66, 1.64 and 1.32 ppm, respectively. While level of Al in control food is 1 ppm. These results were shown that level of Al in all local manufactured cook pots is greater than 0.2 mg; l which was recommended by (Cohen, *et al.*, 1981). Therefore, incidence for leaked Al metal into food prepared by local manufactured of seven pots were assessed quantity which are exceeded recommended level in WHO (1993). Then accumulation of Al metal within body of human had negative effects such as Alzheimer's disease which reported by (Cohen, *et al.*, 1981).

Figure (2) shown that level of Pb in food cooking in Piston, Cartels, Kettles + Trays + ----, Atmonia, Kettles + Trays. Pepsi cans and steel was 4.93, 4.43, 2.73, 1.78, 1.30, 1.14 and 1.0 ppm, respectively. While level of Pb in control food is 1.0 ppm. These results were indicate that level of Pb in all types of food prepared by local manufactured cook pots is greater than 0.01 mg\l those values recommended by (Cohen, *et al.*, 1981). Therefore, incidence for leaked Pb metal into food prepared by local manufactured of seven pots were assessed quantity which are exceeded recommended level in that reported by Then accumulation of Pb metal within body of human had negative effects such as toxicity of the nervous system which reported by (ATSDR, 1997, Dupler, 2001) Then Al and Lead element leaked into food from local manufactured cooked pots were to be higher than the acceptable level. These high amounts of Al and Pb exceeding the standard levels may induce variable symptoms of different diseases such as muscular and neurological degenerative processes that mimic Alzheimer's disease, Parkinson's disease, muscular dystrophy, and multiple sclerosis Allergies.

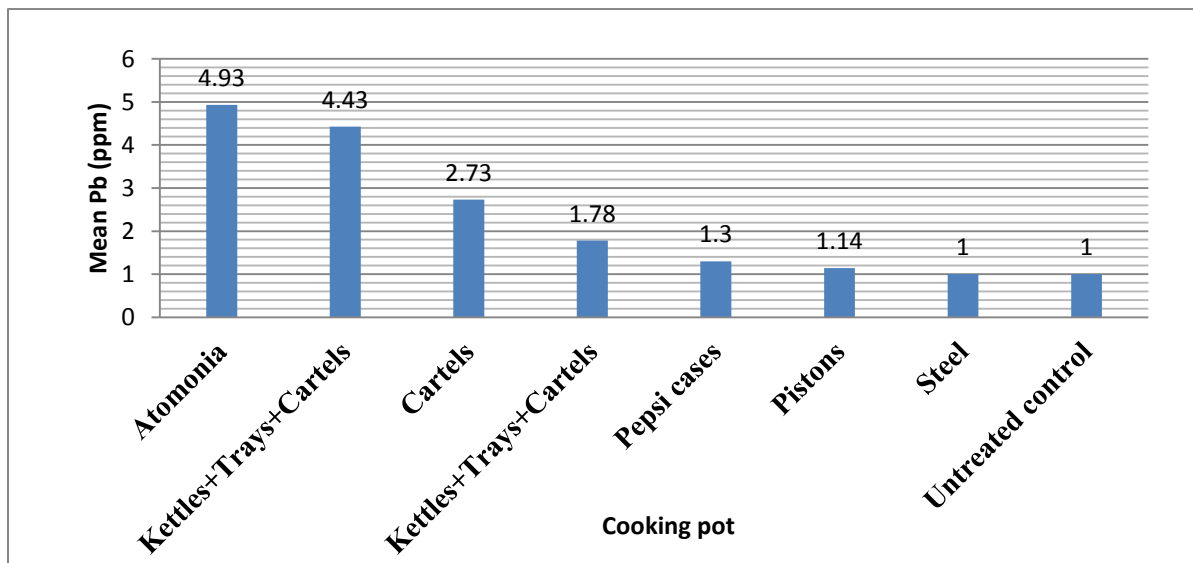
### ***Al and Pb level in urine of people prepared their food by using local manufactured cooked pots***

Figure (3 and 4) indicated that level of Pb and AL in urine of ten individual life in Kosti city was varied from 1.3 – 3, 2 and 0 – 0.6 mg\l, respectively These findings for Pb level are indicated that level of Pb within body of individual that used local manufacture cooking pots for prepared their food were greater than recommended level [9], but the level of Al element

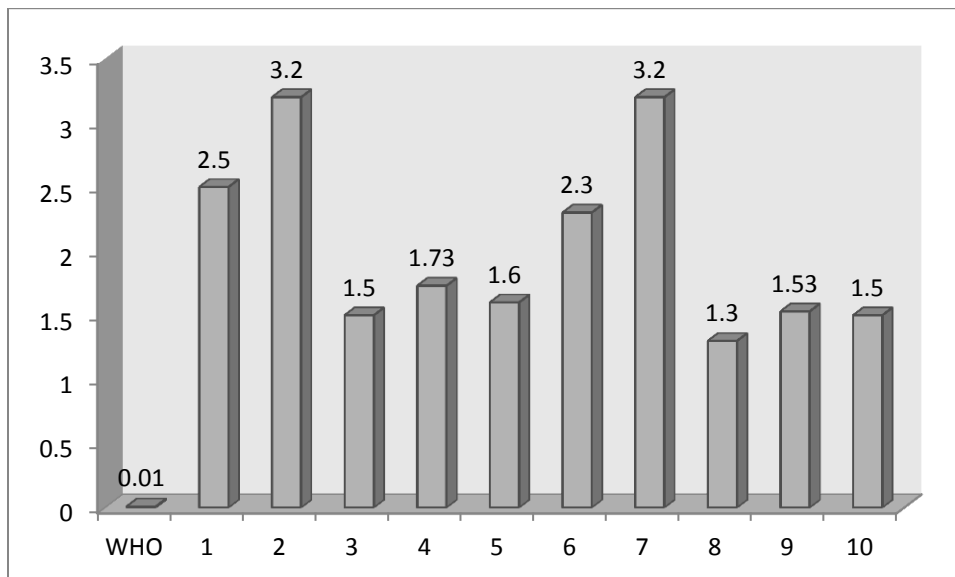
for 5 out of ten individual life in Kosti City are within the value recommended level (Cohen, *et al.*, 1981).



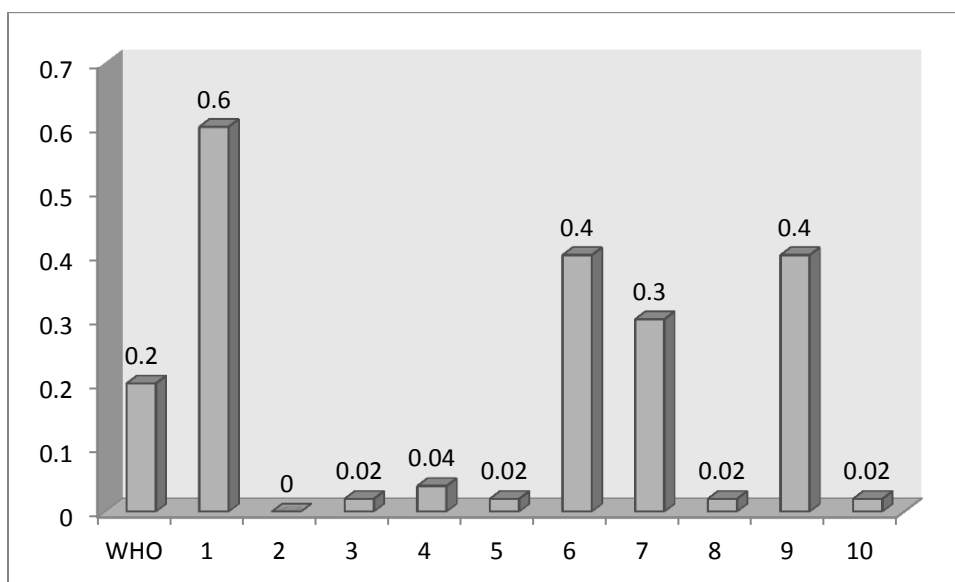
**Figure (1) Show level of Al in food prepared by seven types of local manufacture cooked pots**



**Figure (2) Show level of Pb in food prepared by seven types of local manufacture cooked pots**



**Figure (3) Show level of Pb (mg/l) in urine of people used local manufactured cooked pots compared with recommended level of Pb by WHO**



**Figure (4) Show level of Al (PPM) in urine of people used local manufactured cooked pots compared with recommended level of Pb by WHO**

## Conclusion

The Hala that manufactured locally are more contaminated with high amount of Aluminum (Al) and Lead (Pb). Therefore, Hala that manufactured locally without health control were containment with Aluminum (Al) and Lead (Pb).

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