Research article

Detection of some heavy metals (Pb, Cd, Ni and Hg) in some animals meat of local markets

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Abstract

The present study involved detection for concentration of some heavy or toxic metals which have pathological effect on the human population if consumed contaminated meat with these metals (60) samples collected for goat meat (n=30) and camel meat (n=30) from butchers shops of markets districts (Al-Hamza, Al-Daghara and Afak) in Al-Qadisiyah province whose slaughter the animals from these districts only. The result showed a significant variance ($p \leq 0.05$) in concentrations of (Hg, Cd and Ni) in goat meat were (0.0820, 0.1197 and 0.1099 mg/kg) respectively while Cd concentration not recorded significant variation studied districts. While the concentration of Hg and Pb recorded significant variance ($p \leq 0.05$) in camel meat in Al-Daghara district compare among study district were (0.1200 mg/kg and 0.3477mg/kg) respectively and we did not show dramatic a significant variance in Pb and Ni concentrations in the study regions. With regarded of animal factor we showed significant variance ($p \leq 0.05$) in concentrations of Pb and Ni in goat meat compared with camel meat were (0.9975 mg/kg and 0.5960 mg/kg) respectively while the concentration of Hg and Cd was not recorded significant variance between meat of goat and camel .

Keywords: Pb, Cd, Ni, Hg, Goat, Camel meat.

Introduction

Meat is an important part of human food as well as a common origin of an expanse of nutrients, but it may also contain toxic metals. Although the levels of these toxic materials in muscle is, mostly low but they represent a serious threat to public health because residues commonly cannot be seen (1). Camel is a meat product. Camel's meat is characterized by low fat content, is highly nutritious, and has the potential to be used to combat high blood pressure, respiratory diseases, hyperacidity, pneumonia, the potential of camel meat in helping to meet projected world food shortages, and currently farming for camel meat in Asia, Africa, Latin America and Australia is undergoing significant expansion. (2), and meat of goats constitute the majority of the world's meat production systems. Goat meat comprises 63

percent of all red meat that is consumed worldwide. Currently, goats are the main source of animal protein in many Middle Eastern nations and North African Goats are important in Southeast Asia, the Caribbean, and other tropical regions (3). Feeding animals to feed contaminated with heavy metals results in the deposition of these minerals in the tissues of the animal's body and its various organs (4). When the person takes these contaminated parts, this will have an effect on human health Where caused heavy metals occasionally serious problems for human population no less than bacterial pathogens where environmental saturation with heavy metals reaches to human with contaminated food and drinking water (5). Also Deposition of some heavy metals in meals during processing as residues (6). The

development of processing technology lead to increase the chances of food contamination with heavy metals (7). Toxic residues in meat tissues can be sediments from variety sources including pesticides and animals drugs and fodder or agricultural or industrial substances (8). Specific elements as vanadium, tungsten and cadmium are not toxic unless they reach to greater quantities that lead to metabolic anomalies. Heavy metals such as mercury, lead and plutonium are toxic metals that have accumulated in meat can cause serious damage (9) some of metals considered as essential as iron, zinc and copper (10). Toxic heavy metals have bioaccumulative characteristic in body lead to profound biochemical and neurological changes (11) animals in grazing in contaminated farms and water or air entering in his tissues without any clear symptom or diseases and seen as healthy (12). The present study monitoring on two breeds of animals (goat and camels) because the develop consuming these in Al-Qadisiyah Province.

Materials and Methods

Ethical approval

The Animal Ethical Committee of Veterinary Medicine College, University of Al-Qadisiyah, Iraq, has approved the present study under permission No: 415

Sample collection :sixty samples collected from butchers shops in markets of (Al-Hamza district, Daghra district and Afak

district) in Al-Qadisiyah Province of goat(n=30) and camel (n=30) these shop slaughtering the animals which breeding in this district only. Preparation of the samples : After weight equal amount for all samples then dried by laboratory oven at 60 °C to get equal weights for all samples and grind with stainless steel grinder after that storing the powder in plastic container, take (1) gm from powder add 60ml Nitric acid and 40ml borichloric acid (13) then incubated solution in water bath at 70 °C for 3 hours with currently strength shaking digestion tube for complete digestion of samples .Complete volume with distilled water 10ml. (deionized water)then samples become ready for examination at room temperature. Determination of heavy metals: assessment concentration of heavy metals by using Pyeunican Spa/air – acetylene flame Atomic absorption spectrophotometric apparatus, for each metals specific hollow cathode lamp and the machine set at specific wave length for each assessed metals , heavy metals in tested tissues expressed with mg/kg of mass fresh. While Hg concentration change to double inorganic Hg by oxidation and the assessment with Atomic Absorption without flame by pumping with the mobile solution. (14) Statistical analysis: The data were analyzed by using the SPSS statistical program (IBM SPSS version 20) by one-way ANOVA test ($p \leq 0.05$) for compares leaser differences between means (15).

Results

The results showed for assessed metals of goat meat (Hg, Pb and Ni) were the significant variance in Afak district (0.0820mg/kg, 0.7096mg/kg and 0.1099 mg/kg) respectively while the Cd concentration not record significant variances among districts Table (1) while the camel samples tested recorded for (Hg, Pb) the high significant variance in Al-Daghra district were (0.1200 and 0.3477mg/kg) respectively. However, in Cd and Ni concentrations in

meat of camel not recorded significant variances in tested districts. Table (2). When regarded the concentration of metals in meat of each tested animals were (Pb and Ni) recorded highly significant variance in goat meat (0.9975 and 0.5960mg/kg) compare in camel meat were (0.4519 and 0.1683mg/kg), while the concentrations of Hg and Cd not recorded significant variance between each type of meat. Table (3) and Figure (1).

Table (1): Means $\pm$ SE of metals concentration in goat meat

district \ Mg/kg	Hg	Pb	Cd	Ni
Al-Hamza	0.0374 $\pm$ 0.029 A	0.1751 $\pm$ 0.05 A	0.1010 $\pm$ 0.043 A	0.2719 $\pm$ 0.041 A
Al-Daghara	0.0141 $\pm$ 0.005 A	0.1128 $\pm$ 0.022 A	0.0702 $\pm$ 0.021 A	0.2142 $\pm$ 0.020 A
Afak	0.0820 $\pm$ 0.001 B	0.79096 $\pm$ 0.132 B	0.1197 $\pm$ 0.006 A	0.1099 $\pm$ 0.005 B

Different letters in one column mean significant variance ($p \leq 0.05$)**Table (2): Means $\pm$ SE of metals concentration in camel meat**

district \ Mg/kg	Hg	Pb	Cd	Ni
Al-Hamza	0.0035 $\pm$ 0.000 B	0.1173 $\pm$ 0.206 B	0.1151 $\pm$ 0.014 A	0.1060 $\pm$ 0.008 A
Al-Daghara	0.1200 $\pm$ 0.000 A	0.3477 $\pm$ 0.206 A	0.0937 $\pm$ 0.025 A	0.0211 $\pm$ 0.008 A
Afak	0.0010 $\pm$ 0.000 C	0.0869 $\pm$ 0.011 C	0.0931 $\pm$ 0.044 A	0.0412 $\pm$ 0.018 B

Different letters in one column mean significant variance ($p \leq 0.05$)**Table (3): metals concentrations in both animals in all tested district**

animals \ Mg/kg	Hg	Pb	Cd	Ni
Goat	0.1335 A	0.9975 A	0.2909 A	0.5960 A
Camel	0.1265 A	0.4519 B	0.3019 A	0.1683 B

Different letters in one column mean significant variance ($p \leq 0.05$) **Figure (1): Metals concentrations in both animals in all tested district**

Discussion

Toxic heavy metals considered dangerous to human health because they don't destroyed during cooking processing and have bioaccumulation feature in human and

animal bodies and cause health hazards this also conclude by (9 and 16). In present study the all metals in meat of goat and camel recorded significant variance in containing of

toxic metals but they still under the limited tolerance concentrations this caused by grazing on plant watering from river which occasionally low level in metals, while the slightly high levels resulted from grazing and watering from Water of artesian wells which have highly concentration levels of heavy metals this agree with (17). Which conclude the area contain high level of heavy metals lead to contaminating plant and must investigation the source of contamination. The routinely examination of heavy metals concentration very important roles for human health to avoid risk hazardous as referred by

(18). The levels of toxic metals (Hg, Pb, Cd and Ni) in meat of goat and camels in some districts of Al-Qadisiyah Province were limits of safety standards as recommended by (19). The presence of these metals can create worries due to accumulative effect in the consumers' organs and lead to metals toxicity as referred by (20). We recommended the need to detect sources of pollution in local districts in Al-Qadisiyah Province to reduction of these sources with routinely examination of feedstuff for dentition levels of toxic metals.

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