Determination of the level of trace elements (copper, lead, cadmium, zinc) and the level of cholesterol and triglycerides in some frozen meat imported in Tikrit markets

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Abstract
This study was conducted with the aim of identifying the chemical composition and pollution resulting in some heavy metals, as well as determining the level of cholesterol and triglycerides imported in eight types of imported meat in Tikrit markets. The results of the study showed that there were significant differences p<0.05 in the humidity level, as it recorded the highest level of moisture in samples The sausage was 73% (%) compared to other samples, while protein and fat, as well as ash, had high rates. In this study, the element of lead (Pb), copper (Cu), cadmium (Cd) and zinc (Zn) showed the concentration of lead and copper in Gum and chicken liver have the highest proportions with a lead score of 3.81 3.74 (ppm) while copper (1.70, 2.92) ppm compared to other samples, as well as for camium and zinc, recorded high levels, and the highest level of cadmium was (2.46) ppm in chicken liver, while zinc recorded its highest level ( 4.97, 4.48) ppm in both chicken liver and meat burger, and cholesterol and triglycerides also recorded significant differences between samples used in the study p<0.05 as the highest level of cholesterol (126.23, 127.40) reached in both sadomasochore and flesh couplers In other samples, the triglyceride level reached its highest level (113.50) in meat burger.

Key word: Nutrients, Cholesterol, Triglycerides.

1. Introduction
Animal foods, especially red meat, and their products are good foods with high nutritional value because they contain major and minor mineral elements and rare elements such as zinc and selenium. Meat is an important source in human nutrition because it contains fatty acids that are both saturated and saturated, as it contains high levels of high-nutritional value proteins, i.e. It supplies the body with a very good combination of essential amino acids necessary for human health and safety [1,2], and food quality and safety are major global health concerns in all its development. Scientist [3,4]. Mineral elements are natural components of the environment, but human activities, especially industrial processes, have a large role in the widespread spread of these toxic elements and their accumulation in breeding and plants. Animals that feed on these plants tend to accumulate heavy mineral elements in Miranda tissue[5]. Food is the main source of human exposure to heavy metals, and meat and meat products constitute an important part of the human diet. Although the muscle content of heavy metallic elements is generally low, these elements accumulate cumulatively Higher in secondary organs such as the liver and kidneys [6], after lengthy studies conducted by the World Health Organization and these studies indicated that low levels of some minerals such as cobalt and cadmium can cause disease in humans [7]. WHO 2000 Taking excess doses of these elements may constitute a greater risk to public health and that many mineral elements are necessary for human and animal feeding, including iron and copper, because they constitute a large part of the infrastructure of enzymes and vitamins. However, when their proportion exceeds certain limits, they become harmful. On human health, it was done The setting of the maximum limits for mineral elements by the European Union and other countries for meat products, and monitoring programs have been implemented in many countries with the aim of avoiding the distribution of foodstuffs that could pose a risk to human health. The minimum level of cadmium and lead in poultry meat is 0.05 mg / kg and 0.1 mg / Kg on the basis
of wet weight and for the liver, the maximum is 0.5 mg/kg, and given the low prices of imported meat products as is the case with some fresh meat products and the increase in the consumption of imported meat and the lack of knowledge of procedures and laws and ways to protect these products in Iraq, the study of coloring that the environmental in imported food sources did not receive attention, especially the concentrations of heavy metals, and because of the scientific and cultural importance of this issue, this study came to assess the heavy mineral elements, cholesterol and triglycerides, and to know if these minerals exceed the upper limit allowed internationally, as provided by organizations International such as the WHO and the Food and Agriculture Organization (FAO) [8].

2. Materials and methods

This study was conducted in the Department of Food Science at the Faculty of Agriculture / Tikrit University for the period from 9/25/2019 to 4/1/2020 where meat was purchased from local markets for Salah ad-Din Governorate (Tikrit, Al-Alam), where the sample adopted the random layer in the collection Meat samples from a different origin (chicken breast, chicken burger, sausage, sadomasochistic thigh, chicken crunch, chicken steak, chicken liver, meat burger) Each weighs approximately 500 to 1,200 g. It was transported to the laboratory and is fresh and placed in the refrigerator on Temperature 8 o'clock until the tests are done.

2.1. Chemical composition

2.1.1. Estimation of moisture content

The percentage of moisture in imported meat was determined based on the method A.O.A.C (2004) using a known weight of imported meat up to 10 g and placed in glass containers and dried in an electric oven at a temperature of (105) m until the weight stabilized and three replicates.

2.1.2. Fat estimate

The percentage of fat in the imported meat samples was determined according to the method mentioned in [9] by using Soxhlet extraction units by taking a known weight from the dried imported meat samples and using the petroleum ether solvent for extraction. The fat quantity was calculated with three replications.

2.1.3. Estimate the protein

The total nitrogen in imported meat was estimated based on the [9], method, using the Micro kjeldahl method and using concentrated sulfuric acid to digest the samples. The distillation process was performed using boric acid with a Bromocresol green guide. A correction was performed with 0.1N of HCL and using a conversion factor (6.25) to extract the protein content in the imported meat samples [10]:

$$\% \text{ Of protein} = N \times (nitrogen \times 6.25)$$

2.2. Determination of ash and some mineral elements

Ash was estimated in the imported meat by taking 2 g of imported meat in a known ceramic weight, then transferred to the incinerator with a temperature of (600 m) until the weight stabilized and obtaining a white or gray powder. After the incineration was completed, the eyelid was transferred and the weights fixed. The ash weight can be estimated according to the following formula :

$$\text{Ash weight} = \text{empty batch weight} + \text{sample weight before incineration} - \text{weight after incineration}$$

$$\text{Ash} % = \text{ash weight} / \text{sample weight} \times 100$$

According to the applied method [9], by atomic absorption device in the laboratory of the Department of Chemical Engineering - Tikrit University.

2.3. Determination of cholesterol and triglycerides in meat

Standard solutions prepared by the company (Biomaghreb) were used. According to the contents proposed by the manufacturer, the Enzymatatic Colorimetric test (CHOD –PAP) was modified by taking a known weight of the
meat samples and within (0.1) grams. The samples were crushed with a ceramic mortar and added to it (5) Millilitre of distilled water with mixing the sample using a magnetic rotor to obtain a sample in solution and treated according to the following schedule: -

| Sample  | Standard  | Blank  | Sample  | 10mm | Blank  | Sample  | 10mm |
|---------|-----------|-------|---------|------|-------|---------|------|
| Working reagent | 1ml | 1ml | Working reagent | 1ml | 1ml |

The additions were made according to the above table, the absorbance was read using a device, and the absorbance was read using the Spectrophotometer type (APEL) along the wavelength of 530 nanometers according to the indication in the company’s work method (Biomaghreb (German), and the triglyceride cholesterol was estimated according to the following equation [11]:

\[
\text{OD Sample} = \frac{\text{OD Sample}}{\text{OD Standard}} \times \text{Cholesterol} \times n
\]

\[n = 200 \text{ mg/dl}\]

3. Results and Discussion

The results of Table (1) indicate the presence of significant differences \( P < 0.05 \) in the moisture level in the imported meat samples, as it amounted to 1.73 ± 73.00% in the sausage sample, while the chicken steak recorded the lowest humidity, which reached 1.85 ± 65.33%. These results are consistent with what the Romans reached. [12,13], that indicated that the percentage of moisture in frozen meat should be between 68 - 73%, as the results of the table show that there were significant differences \( P < 0.05 \) in the percentage of fat between the studied meat samples, as the fat percentage reached 1.15 ± 14.10, ± 0.25%) 14.85 compared to other imported meat samples, as it recorded low percentages of 0.00 ± 5.19 and 0.20 ± 6.19%, and this The percentage is lower than specified by the international specifications in a row, and these results are consistent with what reached by [12], which indicates that the percentage of fat in frozen meat should not be less than 9%. The results of the table show that there are significant differences \( P < 0.05 \) with the protein content of imported meat samples. For the studied species, the highest percentage of protein in meat burger samples reached 0.20 ± 18.85%, which is a good percentage with what is specified in the international specifications, where [13], stated that the protein percentage should not be less than 18%, while the ash content was within the limits Allowed and consistent with what came to him.

Table 1. shows the chemical composition of the studied meat samples calculated on the basis of dry weight.

| meat species     | Ash   | Fat   | Protein | Moisture percentage |
|------------------|-------|-------|---------|---------------------|
| Chicken breast   | 0.07± a 1.54 | 0.00± c 5.19 | 0.40± b 15.70 | 0.40± a 72.66      |
| Chicken burger   | 0.00± c 0.99 | 0.20± c 6.19 | 0.30± b 16.77 | 1.52± abc 70.00    |
| Sausage Chicken  | 0.04± c 0.87 | 0.84± b 11.67 | 0.15± b 16.88 | 1.73± a 73.00      |
| Armoy thigh sadist | 0.02± c 1.14 | 0.86± a 13.95 | 0.18± b 16.32 | 2.02± bc 66.66     |
| Crispy chicken   | 0.00± c 1.09 | 0.08± a 13.95 | 0.28± b 16.69 | 1.76± ab 71.66     |
| Chicken steak    | 0.31± bc 1.25 | 1.15± a 14.10 | 0.78± b 16.79 | 1.85± c 65.33      |
Estimate the level of cholesterol triglycerides Table (3) shows the level of cholesterol and triglycerides in the studied meat samples, as the liver of chicken contained the lowest percentage of cholesterol 88.03 mg / 100 g while the bracker bar showed the highest cholesterol level, reaching 1.75 ± 127.40 mg / 100 g, and the reason may be that only the red meat contains a higher level of fat, and the level of triglycerides was low in chicken burger and chicken breast, while the highest percentage of triglycerides (2.16 ± 116.36 mg / 100 g in chicken sausage, and these results are consistent with what [16].
### Meat Species and Lipid Levels

| Meat Species          | Triglyceride | Cholesterol |
|-----------------------|--------------|-------------|
| Chicken breast        | 1.33±c 87.90 | 1.22± cd 104.33 |
| Chicken burger        | 2.7± c 91.17 | 1.22± d 102.76 |
| Sausage Chicken       | 2.86± c 91.17 | 1.69± d 98.91 |
| Armoy thigh sadist    | 1.10± b 98.50 | 4.09± a 126.23 |
| Crispy chicken        | 2.16± a 116.36 | 4.24± b 113.606 |
| Chicken steak         | 2.22± b 98.96 | 2.51± bc 111.13 |
| Chicken liver         | 1.56± d 81.26 | 1.88± e 88.03 |
| Meat burger           | 1.71±a 113.50 | 1.75±a 127.40 |

### Conclusion

The results of the study recorded a high level of heavy metal elements and a high level of triglycerides and cholesterol. Therefore, the study recommends limiting the intake of imported meat.

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