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Research Paper

Levels of some elements and health risk assessment of raw milk in Benghazi Area–Libya

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ABSTRACT : *Milk is a very important component of the human nutrient. The presence of toxic element in milk. lead to major health problems._ The present investigation was carried out on raw milk samples to determine concentrations of some major and essential traces elements (P, Ca, Mg, Cu, Fe, and Zn) Phosphorus was determined by spectrophotometry while the other five elements were measured by (FAAS). Toxic levels of both lead and cadmium metals in all raw milk samples were determined using (GFAAS), to evaluate the potential health risks of such metals to humans. A total of twenty-one samples of raw milk samples (cow and goat) were collected from six different farms within the area of Benghazi and its countryside. The limit of detection (LOD) of FAAS methods were 0.0792, 0.0147, 0.0024, 0.0178 and 0.0103 mg/l for Ca, Mg, Cu, Fe and Zn respectively.*
The analysed data revealed that the mean values in the examined raw milk of cows and goat's samples were (1702.36 and 1765.73) mg/kg phosphorus, (946.75 and 1385.90) mg/kg calcium, (246.84 and 153.06) mg/kg magnesium, (0.08 and 0.14) mg/kg copper, (0.74 and 0.59) mg/kg iron, (2.15 and 2.52) mg/kg zinc, (0.0002 and 0.0003) mg/kg cadmium, and (0.01 and 0.01) mg/kg lead. Contents of essential elements were found to be in the normal levels compared with the WHO. The mean concentration of lead in examined samples exceed the permissible limits recommended by WHO, The leads value of 0.02 ppm for all raw milk samples were below the recommended permissible limits by the WHO, but some results of cadmium had recorded higher values. Statistical analysis was performed using SPSS. The data were subjected to one-way ANOVA.
KEYWORDS: *milks essential elements, heavy metals, raw milk, food pollution, GFAA, Benghazi, Libya.*

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I. INTRODUCTION

Uncontrolled population growth, imbalanced industrial growth, excessive exploitation of resources with sheer disregard for the inherent capabilities of ecosystems, all have contributed to deepening the human crises and to widening the magnitude of damages to the environment. One of these crises, namely the environmental pollution, which can disturb the balance of ecosystems, threatens the health of humans and other organisms, and intensifies the loss of many vital resources [1].

Food contamination is a growing problem in today's world. Milk consumption, for example, as a widely consumed food source for all ages, especially in childhood, is receiving more attention than other food sources. [2]. Heavy metals are the most important pollutant in our food. Their presence in animal food increases the risk of diseases and potential complications. One of the health issues and environmental problems is the control of heavy metal pollution, of which arsenic, lead, cadmium, mercury, and zinc are of greater hazard for human and animal health [3].

Aalmost all the heavy metals in the body at concentrations higher than standard recommendations cause harmful effects, most commonly disorders of the nervous system, potentially causing genetic mutations, mental disorders, and carcinogenicity. Since heavy metals cannot be, like organic contaminants, degraded through chemical or biological processes in nature, However, their sustained lead and cadmium cause kidney

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damage and bone degradation because they affect the metabolism of calcium. Although some heavy metals such as phosphorous, chromium, copper, iron, zinc and others, in trace amounts, play important biochemical roles in many organisms., the toxic effects are observed at high concentrations. However, all those heavy metals can lead to damaged or reduced central nervous systems functions, lower energy levels, damage to blood composition, lungs, kidney, liver, and other vital organs. Long term exposure may result in slowly progressive physical, muscular, and neurological degenerative processes that mimic Alzheimer`s disease, Parkinson`s disease, muscular dystrophy, and multiple sclerosis [4].

Raw milk and dairy products are considered very poor sources of iron, zinc and copper [5]. The trace element contents of milk and dairy products depends on the stage of lactation, nutritional status of the animal, environmental and genetic factors, characteristic of the manufacturing practices and possible contamination from the equipment during processing [6].

Increased contents of copper in the human body haa harmful effect on the cardiovascular system. Excess copper exposure causes gastrointestinal bleeding, haematuria, intravascular haemolysis, methemoglobinemia, hepatocellular toxicity, acute renal failure, and oliguria [7].

Zinc toxicity is rare but at concentrations up to 40 ppm, it may induce toxicity characterized by irritability, muscular stiffness, and pain. Acute toxicity results in gastric distress, and reduction in immune function [8].

Phosphorus and calcium are interrelated because hormones, such as vitamin D and parathyroid hormone (PTH), regulate the metabolism of both minerals. In addition, phosphorus and calcium make up hydroxyapatite [9]. The combination of high phosphorus intakes with low calcium intakes increases serum PTH levels, but evidence is mixed on whether the increased hormone levels decrease bone mineral density [10-12]. Increased phosphorus retention often leads to chronic kidney disease (CKD). This systemic condition is characterized by abnormal metabolism of phosphorus, calcium, PTH, and/or vitamin D; abnormal bone turnover, mineralization, volume, growth, or strength; and vascular or another soft-tissue calcification [13].

In addition, recent studies reported that some heavy metals, such as chromium, lead, manganese, and cadmium, might impact on the development of the nervous system [14]. Perinatal exposure to air pollutants, including Pb, and Mn, was linked to an increased risk of autism spectrum disorder (ASD) with stronger associations for boys [15].

A recent study has among measured 59 elements and metals, 16 elements including iron, copper, zinc, and selenium were detectable in all amniotic fluid (AF) samples, while eight elements, including mercury and silver, were not detectable in any AF samples. The metals of interest such as chromium, lead, arsenic, manganese, and cadmium were detected in 98.9%, 34.1%, 22.7%, 18.2%, and 12.5% of the AF samples, respectively. Similar levels of elements and heavy metals between ASD cases and controls were observed [16].

The aim of the present study was to assess the level of essential and non-essential metals in raw milk samples. Some random cattle’s farm was selected in area of Benghazi city in Libya, and the results were compared with that of other published studies.

II. Studies of milk in Libya

There are insufficient published studies on the analysis of milk consumed by Libyan peoples, with exception of few studies including Aflatoxin M1 detection in milk and other dairy products sold in Libyan cities markets, [17], in addition to some studies on the physicochemical and nutrition values in several pasteurized milk and long-life milk sold in Misurata city markets in Libya [18]. One of this few research is our previous study that concerned with the determination of lead and cadmium in different types of milk samples collected from selected markets in city of Benghazi-Libya [19].

In addition to these studies, research was conducted in 2014 on the physical and chemical parameters and the contents of trace elements in the milk of cows, goats, camels and sheep in the city of Misurata [20]. 108 samples of raw milk (cow, camel, goat) and homemade dairy products were collected. From some areas of Libyan cities, including Janzour, Tripoli, Karimiye, Tajoura and Tobruk. Another study in 2008 were carried out to determine the levels of lead and cadmium in raw cow's milk, samples collected from different farms in the Benghazi region, this study concluded that the raw cow's milk that was tested were not affected by environmental pollution, and it is consumption by human been causes no Toxic damage by these elements [21].
However, no attempts have been done to investigate the presence of chemicals in raw milk of Benghazi city markets. Therefore, the purpose of this study was to determine the pH values, ash contents and to determine the levels of essential major element such as phosphorus, which is measured by spectrophotometer, calcium, magnesium, and the essential tracs elements such as copper, iron and zinc were measured by Flame Atomic Absorption Spectrometer (FAAS). The two toxic metals (cadmium and lead) were measured using Graphite Atomic Absorption Spectrophotometer (GFAAS). The obtained levels of the analysed samples will be compared with the other literature data of a similar samples and compared with the maximum limits permitted by WHO.

III. MATERIALS

3.1 Samples Collection

Samples of raw cows and goats milk were collected in July. 2013 from six different farms: (Geminis, Alnawagia, Sedikhlifa, Mlitania, Alabiar, and Alrajma); villages around Benghazi city of Libya. Each sample were thoroughly mixed to get homogenous and to be representative, all samples were labeled to identify the source, site, and date of collection then preserved in freezer.

Four samples of examined raw cow's milk numbered 1-C, 2-C, 3-C and 4-C and three samples of examined raw goat milk numbered 1-G, 2-G and 3-G were tested for the essential major element (Phosphorus, calcium and magnesium), traces elements such (Zn, Fe and Cu), and the two toxic elements (Pb and Cd).

3.2 Reagents and solutions

All used reagents were annular grade. Deionized water was used for the preparation of all solutions. The working standard solutions were prepared by diluting the stock solutions (1000 mg/l) of each used element. All glassware's used were soaked in 10% nitric acid overnight, rinsed thoroughly with deionized water, then oven-dried before use.

3.2 Sample digestion

For the digestion of samples, approximately 10 gr of raw milk was digested with 10 ml of (65%) HNO_3 and 3ml of (30%) H_2O_2. The digestion flask was heated gently until frothing subsided. The sample was then heated to dryness, dissolved in deionized water and filter with No.42 Whatman filter paper. The solution was made up to volume in 50 ml volumetric flask.

3.3 Determination of physical parameters of milk samples Hydrogen number (pH)

The pH of each sample was measured using a pH meter (JENWAY Model 3150). The measurements were taking by immersing electrode in the supernatant solution, and when the meter has stabilized the pH is recorded [22].

3.4 Determination of Chemical Parameters Determination of Ash content

3g of raw milk sample was Weighed in well-dried silica crucible, kept it into muffle furnace maintained at 550±20°C for four hours till the formation of grey ash, the muffle was switched off, when the temperature fallen down , the crucible was transferred to a desiccator for , cooling down completely ,and then weighed [23].

Calculation of ash percentage:

Ash % = {(W2 –W1)/ Ws} x100 W2 = weight of crucible with ash.
W1= weight of empty crucible. Ws = weight of sample (3g).

IV. METHOD OF ANALYSIS

Analysis: Digital pH meter (JENWAY mode 3150) was used to measure the pH of the sample solutions. Muffle furnace (CARBOLITE AAF 1100) was used to ash the milk samples.

4.1 Elements determination

All the filtered samples were analyzed for their metal contents by using graphite furnace atomic absorption spectroscopy (VARIAN, GTA 120). The absorbance of Cadmium and Lead are measured at the wavelengths 228.8 nm and 283.3 nm respectively.

4.2 Digestion procedures

For the determination of metals, most instrumental techniques require the samples to be prepared destructively before analysis taking place. Unless they were removed, organic matter and other components present in the samples would interferes with the analytical process. Organic matter is usually removed from these samples by oxidation process using oxidizing acids. Finally, the analysis was taking place by Atomic Absorption Spectrophotometer according to the parameters showing later.

4.3 Procedure (A): For Calcium, Magnesium, Copper, Iron, Zinc, Cadmium and Lead in Milk

10 grams of raw milk was measured into clean dry Pyrex digestion flask. 10 ml of 65% nitric acid was added, followed by the addition of 3 ml of 30% hydrogen peroxide. The digestion flask was heated gently until frothing subsided. The sample was then heated to dryness, dissolved in deionized water and filter with No.42 Whatman filter paper. The solution was made up to volume in 50 ml volumetric flask. Calcium and magnesium were determined by adding 2 ml lanthanum oxide to 1 ml of sample solution. The volume is then complete to 100 ml of deionized water [24-26].

4.4 Procedure (B): For Phosphorus in raw Milk Samples

2grams of raw milk sample is transferred into 50 ml digestion flasks and 10 ml 65% nitric acid is added, the contents of flask were heated for 20 min.. Then, the sample is cooled at room temperature, adding 5 ml perchloric acid and heated vigorously till the white fumes appeared and the sample volume reduced to 2-3 ml. The content then dissolved in deionized water and filtered with No.42 whatman filter paper. The final volume was made to 50 ml by adding deionized water. After adjusting the pH of the sample solution between (6-7), 5ml is mixed with 5ml ammonium molybedate and 5ml sodium vandate. The volume is then complete to 25 ml using deionized water the resulting solution is yellow complex compound that is used to determine the absorbance at the wavelength of 470 nm [27].

4.4.1 The calibration curve for phosphorus determination

To obtain working standard solutions of phosphorus concentrations of 0.0, 5.0, 7.5, 10, 12.5, 15 ppm, are prepared from 50 ppm phosphorus solution by transferring 0.0, 2.5, 3.75, 5.0, 6.25, 7.50 ml into series of six volumetric flasks and adding 5ml ammonium molybdate, and 5ml sodium metavanadate, then the volume is completed with deionized water.

4.5 Major and trace metals analysis

Concentrations of calcium, magnesium, copper, iron, and zinc were measured in all raw milk samples using FAAS. By flame composition, C2H2/Air, burner type 50 mm, background correction D2-lamp

Table (1): Instrumental conditions for determination of major and trace elements by FAAS

parameter	Ca	Mg	Cu	Fe	Zn
Wavelength	422.7	285.2	324.8	248.3	213.9
Slit width	1.4	1.2	1.4	0.2	0.5
Burner height (mm)	7	7	7	8	9
Lamp current(mA)	2.0	3.0	2.0	4.0	2.0
Hollow cathode Lamp type	Ca-Mg	Ca-Mg	Cu-Zn	Fe	Cu-Zn

4.5.1 The calibration curves for calcium, magnesium, copper, iron, and zinc determination

The linear relationship between absorbance and concentration were established according to Beer's-Lambert law. The working standard solutions of calcium concentrations, including 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00 mg/l were prepared from 100 mg/l calcium intermediate solution by mixing 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00 ml, with 2ml lanthanum oxide into a series of seven 100ml volumetric flasks and diluted with deionized water to the mark. The La^{+3} is strongly bound by the phosphate, freeing the calcium ions to be detected during the FAAS analysis [25].

A series of standard solutions were prepared with the concentrations 0.00, 0.10, 0.20, 0.30, 0.40, 0.50 mg/l from 100 mg/l magnesium intermediate solution by mixing 0.00, 0.10, 0.20, 0.30, 0.40, 0.50 ml, with 2 ml lanthanum oxide into a series of six 100 ml volumetric flasks and diluted with deionized water to the mark.

Working calibration solutions of the different elements were prepared from stock solutions (1000 mg/l). The working standard solutions of copper concentrations were prepared by adding 0.00, 0.10, 0.20, 0.30, 0.40 and 0.50 ml from 50 mg/l copper intermediates solutions into a series of six 100ml volumetric flasks and diluted to the volume mark with deionized water.

The working standard solutions of Iron and Zinc concentrations were prepared by adding 0.00, 0.10, 0.20, 0.30, 0.40, 0.50 and 0.60 ml from 100 mg/l Zinc and Iron intermediates solutions into a series of seven 50 ml volumetric flasks and diluted with deionized water to mark.

4.5.2 Toxic metal analysis

Concentrations of cadmium and lead were determined in all samples using the GFAAS with the parameters shown in the table (3).

Table (3): Instrumental conditions for determination of toxic elements by GF-AAS

Parameter	**Cd**	**Pb**
Wavelength (nm)	2228.8	283.3
Lamp current (mA)	8	10
Drying step (℃)	500	800
Atomization step (℃)	2200	2400
Cleaning step (℃)	2400	2500

Slit width 0.5mm and 20 µl of sample

4.6 Quality control

The methods reliability for estimation of Zn, Cu, Fe, Mg, and Ca in milk samples by AAS technique has been checked by analyzing standard reference milk sample (A-11) obtained from the International Atomic Energy Agency (IAEA) (100). The experiments were repeated if it found higher than the limit of 1% repeatability. Following formula was used for measuring the recovery percentages of spiked milk samples:

V. Results and discussion

5.1 Control tests (physio-chemical parameters of raw milk samples)

Hydrogen number (pH)

The milk usually has a pH range between 6.50 - 6.70). Values higher than 6.7 denoted mastitis milk and values below pH 6.5 denote the presence of colostrum or bacterial deterioration So, measuring milk acidity is an important test used to determine the milk quality. Because milk is a buffer solution, considerable acid development may occur before the pH changes.

Table (4): Physio- chemical properties of milk samples

Type of raw milk	**pH**	**Ash%**
cow's milk	6.02	0.66
goat's milk	6.26	0.70

In general, the pH of raw cow and goat milk samples was within the normal pH range of the milk except for the sample of raw cow's milk which recorded a value of (6.02 ± 0.48) which was considered slightly below the normal value. Ash content in raw cow's milk sample is matches to that reported by Enb et al., 2009 [28]. Also, ash content found in goat's milk was to some extent resamples that reported by Mahmood and Usman., 2010[29].

5.2 Analysis of essential major elements

5.2.1 Raw cow's milk analysis

Determination of the essential major elements (phosphorus, magnesium, and calcium.) in raw cow's and goat's milk are illustrated in table 5.

As list in table (5) show that. The essential elements such as phosphorus, magnesium and calcium in raw cow's milk samples in ppm. Figure (1) revealed that the amount of phosphorus is ranged from 1136.36 to 2281.47 ppm with a mean amount of 1702.36±503.03 ppm. This finding is nearly identical to that reported by Birghila et al., 2008 [30] and by Tizhooshet al., 2016 [31]. Magnesium is ranged from 103.45 to 323.35 ppm with an average of 246.79±98.09 ppm. This result agreed with the values reported by Tizhooshet et al., 2016 [31], and it was almost similar to that concentration reported by Elbagermi et al., 2014 [20].

The calcium concentrations in raw cow's milk samples were ranged from 624.00 to 1137.0 ppm with a mean value of 946.75±238.88 ppm. These results are lower than that reported by Sikiric et al., 2003 [32] and Malbe et al., 2010 [33].

Table (5): Essential major elements (mg/ kg) in examined milk samples

	Mean of Conc. (mg/kg)						
	Raw cow's milk				Raw goat's milk		
	1-C	2-C	3-C	4-C	5-G	6-G	7-G
Phosphorus	1136.36	2281.47	1923.08	1468.53	2648.60	1092.66	1555.94
Magnesium	323.40	290.82	103.53	269.61	149.04	119.33	190.81
Calcium	1137	624	908	1118	1619.5	1382.5	1155.7

5.2.2 Raw goat's milk analysis

Three samples of examined raw goat milk 1G, 2G, and 3G were tested to determine essential major element (phosphorus, magnesium, and calcium).

Phosphorus concentration in raw goat's milk samples were recorded in Table (5) and illustrated in Figure (1), revealed that the concentration of phosphorus was ranging from 1092.66 to 2648.60 ppm. with an average of 1765.73±79.90 ppm. These results are samples to that reported by Strzal⁄kowska et al., 2008 [34].

Data of magnesium in goat's milk samples is 153.02±35.94 ppm, in a range (119.25–190.80) ppm. This result agreed with those values reported by Younis et, al., 2016 [39], and slightly higher than those levels that reported by Elbagermi et al., 2014 [20], and Meshref et al., 2014 [35].

The results illustrated that the average concentration of calcium was 1385.90±231.92 ppm. These results varied from 1155.70 to1619.50 ppm, and they are higher than the values reported by Strzal⁄kowska et al., 2008 [34]. But lower than that reported by Rodriguez et al., (2001) [35].

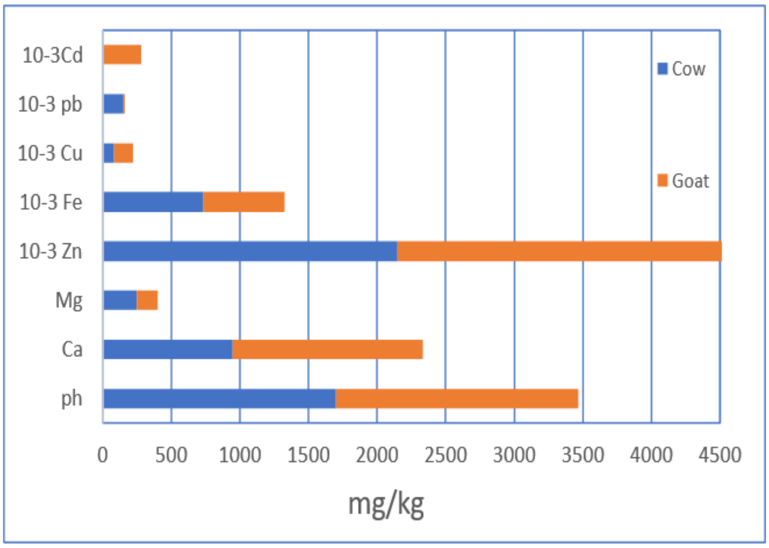

Fig 1: The result of essential major, traces and toxic elements for cow's and goat's raw milk

5.3 Determination of the essential trace element

5.3.1 Raw cow's milk analysis

Data listed in Table (6) and Fig. (1), illustrated that zinc detected in raw cow's milk samples have a mean value of 2.146±0.90 mg/kg, in range (1.25–3.34) mg/kg. These values are higher than that reported by Amer et al., 2005 [36] and Birghil et al., 2008 [30]. While it is lower than that reported by Malbe et al., 2010 [33] and Dawd et al., 2012 [37]. These results are within the range that reported by Bigucu et al., 2016 [38].

The rang of iron concentration in raw cow's milk samples recorded from 0.53 to 0.97 mg/kg with an average of 0.734 ±0.18 mg/kg. This level is nearly like those reported by Birghil et al., 2008 [30]. While it is lower than that reported by Sami and Amer, 2005 [36]and Malbe et al., 2010 [33]. But this level of iron concentration is higher than that reported by Sikiric et al., 2003 [32].

The average concentration of copper level was 0.08±0.037 mg/kg, in the range from 0.05 to 0.13 mg/kg. This level is almost similar to that reported by Enb et al., 2009 [28]. While this copper value is lower than that reported by Akele et al., 2017[40], Birghil et al., 2008 [37]and Malbe et al., 2010[33].

Table (6): Essential trace elements (mg/ kg) in examined milk samples

Element	Mea Conc. (mg/kg)						
	Raw cow's milk				Raw goat's milk		
	1-C	2-C	3-C	4-C	5-G	6-G	7-G
Zinc	1.73	2.27	3.34	1.25	4.22	0.89	2.45
Iron	0.97	0.71	0.53	0.73	0.61	0.61	0.56
Copper	0.05	0.13	0.05	0.10	0.16	0.11	0.15

5.3.2 Raw goat's milk analysis

Three samples of raw goat's milk numbered 1G, 2G, and 3G were tested for determining essential trace element (zinc, iron, and copper). These results displayed in Tables (6) and Figure (1).

From the data listed in Table (6) and Fig. (1) which demonstrates the determination of zinc in raw goat's milk samples shows that a mean value of 2.52±1.66 mg/kg, Zn, in range lies between 0.89 to 4.22 mg/kg. This result of zinc concentration nearly like those reported by Meshref et al., 2014 [35]. While this result is higher than that reported by Strzalⁱkowska et al., 2008 [34].

The iron concentration in examined raw goat milk samples were ranged from 0.56 to 0.61 mg/kg, with mean value of 0.590 ±0.03 mg/kg. This reported result is lower than the mean value obtained by Tizoashet et al., 2016 [31]. While it is close to that reported by Younus et al., 2016 [39].

From Table (6) and Figure (1) it is Noticed, that the copper concentrations in examined raw goat's milk samples were in a range of 0.11 to 0.16 mg/kg. The mean of these results is 0.139 ±0.025mg/kg; this result is lower than the reference value reported by Meshref et al., 2014 [35].

5.4 Analysis of toxic elements analysis

The determination the toxic elements (cadmium and lead) in raw cow's milk and raw goat's milk samples are demonstrated in table (7) and Figure 1.

Table (7): Concentrations of toxic metals (mg/ kg) in examined milk samples

Type of milk	Mean of Conc. (mg/kg)						
	Raw cow´s milk				Raw goat´s milk		
	1-C	2-C	3-C	4-C	1-G	2-G	3-G
Cadmium	0.10	0.20	0.20	0.10	0.01	0.20	0.60
Lead	0.002	0.021	0.008	0.009	0.004	0.005	0.013

5.4.1 Raw cow's milk

Results listed in Table (7) declared that the average concentration of Cd and Pb in examined raw cow´s milk samples were 0.15 and 0.01 mg/kg, respectively.

Concerning the lead concentration, it was found that these results are slightly lower than those reported by Akele et al., 2017 [40], Zwierzchowski et al., 2019 [41], and Boudebbouz et al, 2021 [42]. This result of lead concentration is higher than that reported by Birghil et al, 2008[30]. While it is so close to that reported by Younus et al., [39].

In case of cadmium concentration all values are higher than all that obtained by Meshref et al, 2014 [35], Youns et al., 2016 [39] and Tizooshet et al, 2016[31]. While they are in the range of the results that published by Akele et al, 2017[40].

5.4.2 Raw goat's milk

Regarding Pb and Cd in examined raw goat´s milk samples result of Table (6) declared that the average concentrations were 0.01 and 0.27 mg/kg, respectively.

Lead concentration results were lower than the maximum limit of values established by the FAO/WHO, 2018 (0.02 mg/kg) [43].

Level of cadmium in examined raw goats' milk was higher than the maximum allowed limit that permitted by FAO/ WHO, and the obtained result was higher than the level that published by Ismail et al., 2017 [44]. But this level of cadmium was very low when compared with those reported by Zwierzchowski, 2019 [41], Aslam et al, 2011 [45], Elsherif et al, 2017 [46] and Safonov, 2020 [47].
Heavy metals enter the food chain by different ways. Sewage water used for irrigation, waste from manufacturing activities, and polluted soil also has high impact [48]. The importance of which is chemical fertilizers that are used as basic fertilizers for these farms such as phosphate and superphosphate fertilizers.
Major industrial uses of Cd are in electroplating, pigments and, particularly, plastics, plastic stabilizers, and Ni-Cd rechargeable batteries. [49].
The most important reason is the burning of plastic and rubber waste, which is unfortunately the method used to dispose of garbage in most cities in Libya. Smoking as well as excessive leakage of dyes and paints into the soil, may contribute to an increase in the level of cadmium in the milk [50].

VI. CONCLUTION

This study provides novel information on the physicochemical parameters and trace element contents of raw cow's and goat's milk in Benghazi- Libya and fulfils an important role by providing bibliographical sources on the level of the element's composition of raw cow's and goat's milk in Libya.

It can be concluded from the present investigation that all the examined samples were higher in raw cow's milk than that in goat' s milk. Analysis of raw milk indicates their contamination by some heavy metal residues, exhibiting a wide array of hazardous impacts on human health. For this reason, the results data of various types of processed milk products samples collected from Benghazi Markets in our research were high concentration of some trace elements such as Cu, Pd and Cd [19 and 51]. These are mainly due to the greater pollution of the environment, (air, water, and soil) and subsequently, these metals are taken by plants and animals and find their ways into milk, in addition heavy metals may contaminates milk and milk products during the production and processing. Bigucu et al.,2016 in Turkey indicated that future research should move on to investigate relation between environmental factors and feeding on the bio element composition of milk. Nevertheless, this study provided important information on the relation between environmental effects and quality standards of milk, and water [38].

VII. RECOMMENDATION

To reduce the dangerous impact of these pollutants and to protect human health, Strict and regular monitoring, and regulations of heavy metal residues in imported milk and dairy products should be carried out regularly in the various ports, which sometimes exceed the permissible limits on the farm to avoid contamination of milk through strict and regular monitoring of heavy metal residues.

a- Water used must be clean and contain the lower permissible limit of heavy metal.
b- Feeds of animal must be clean, from safe sources and of good quality.
c- Quality periodic analysis for feeds and water should be applied.
d- Application of phosphate fertilizer and sewage sludge as well as mineral salts for feeding should also be kept under control and the use of lead petrol should be banned.

From the previous results it's preferable that consumption of milk products should be as early as possible from the date of manufacture to reduce the migration of heavy metals form the container to the products during storage periods.
The farms if already exist in an industrial area; governmental rules should be applied to sanitary protection of the environment by a- Adding air filters. b- Disposal and treatment of sewage wastes.
Obligate the imported milk companies to make their container according to the international health specifications.

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