IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 14, Issue 8 Ser. III (August 2020), PP 35-46
www.iosrjournals.org

Novel Trends to Reduce the Hazard of Some Environmental Pollutants on Milk and Dairy Products

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Abstract:
Toxic elements and pathogenic bacteria are important pollution found in raw milk, which is the need for investigations of preventing contaminated milk, therefore, the present study objective was to evaluate the reduction of toxic elements and microbiological pollution in raw camel milk by Moringa oleifera Lam. seed husks after chemical and thermal treatment. Moringa oleifera Lam. seed husks were used after three treatments (T1) without treatments ,T2 (methylation) and T3 (carbonated) and analysis FTIR before and after treatment and SEM for filters and analysis elements analyzed by ICP-AES (Inductively coupled argon plasma), and microbiology, Data were analyzed by SPSS software version 16.0, The results of the present study showed reduce or remove high frequency of heavy metals and microbiologically contaminated in raw camel milk collected from the different desert areas in Egypt by different biosorbent types of Moringa oleifera Lam. seed husks. Raw camel milk can reduce heavy metals and microbiology before production and storage..

Key Word*: Camel milk; reduce; heavy metals; microbiological poulution; Moringa seed husk*

Date of Submission: 12-08-2020 Date of Acceptance: 28-08-2020

I. Introduction

Camel milk provides many nutrients that are beneficial to human health and can provide a considerable share of human daily needs for different nutrients, particularly amino acids and medical reasons, such as metabolic and autoimmune diseases, and scientific research that contribute to treatment of diabetic diseases.[1] The toxicity of a number of these components to excessive levels, such as chromium (Cr), cadmium (Cd) , lead (Pb), etc., and the presence of these metals, in particular cadmium , lead and nickel, in the material over standard food influences to a variety of diseases, including neurological disorders , cancer and genetic disorders[2-3]. Consequently, the presence of metal residues in milk was of particular concern because newborns and children consume the milk widely. Residual heavy metal concentrations in milk can therefore be an indication of safety or environmental quality [4]. Heavy metal residues are highly toxic but many of them (e.g., copper and zinc) are essential enzyme activators. Specific approaches are applied to reduce toxins from the atmosphere such as manufacturing, mechanical, physical, and biological processes. Some trials observed pollutant reduction in the processing used for milk. In this communication [5].report on the preliminary studies on the application of low frequency (20 kHz) ultrasound for heavy metal (lead, mercury, and arsenic). Decontamination of milk without its physical, chemical and microbiological properties being impaired. Another study studied the effect of heavy metal milk processing in products; the results showed some variation in heavy metal retention (percent) in the experimented cheese types (Domiati, UF, and Ras cheese) showed some variation. Displayed some variability. The highest retention was obtained in UF cheese in Pb, Cd, Cu, and Zn, while rock bottom retention was obtained in fresh Ras cheese and also decreased during storage. No decrease was observed with regard to the Pb amount in yoghurt other than that in raw milk. Further concentration of milk fat to butter and ghee decreases the percentage of all heavy metals retention levels [6]. [7], however, made comparable between cow yogurt and buffalo milk to reduce heavy metals, found that metal levels decreased significantly as a result of increased acidity and bacterial activity in the yogurt production system, the reduction in iron , copper, manganese , zinc, lead , cadmium and chromium in cow yogurt milk 0.50-15 per cent, while yogurt buffalo milk 0.40-15 per cent and nickel , cobalt and tin levels was 50-100 per cent in cow yogurt milk and 25-50 per cent in yogurt buffalo milk. And other studies have shown that certain lactobacillus species use heavy metals in their metabolism, by absorbing heavy metals from products. They are then biologically absorbed and removed by bonding heavy metals with certain lactobacilli-specific proteins (LAB) [8]. The decontaminant activity of probiotic microorganisms is related to fermentation, antibiosis, and therefore the ability of the microbial cell membrane to bind to the contaminant. Exploiting the chemical decontamination potential of microorganisms will be further leveraging its presence in the food industry.[9] [10], investigated the effect of some dietary medicinal plants which may decrease the amounts of lead excreted in animal milk, and their findings showed that cumin, white

turmeric and mango turmeric may decrease the amount of lead in milk and its products by 98, 36, 99, 33 and 99, 37 percent respectively. And on the other hand, retaining (percentage) of heavy metals in cream from starting quantities in milk. [6]. Considering the above issue, there are many forms of work for the production and implementation of new technology to extract heavy metals from the atmosphere, which can be regarded as one of the most effective and low cost techniques in the biosorption cycle. The main benefits of bio-sorption over traditional forms of treatment include low expense, high performance, reducing chemical or biological sludge, no extra nutrient needs, and the ability for bio-sorbent regeneration and metal recovery. These promising agricultural waste materials are used in the natural form or after certain physical or chemical modifications to remove metal ions.[11]. In another research, rice husk altered with different levels of sodium bicarbonate was used to absorb low levels of cadmium in aqueous settings [12]. *Moringa oleifera* Lam. Seed husks can have great adsorption capacity as they are generally agro-industrial residues, this plant has many uses for food, medicinal and therapeutic purposes, cosmetic preparation and mechanical lubricants, water therapy and effluent therapy, with almost all its components (leaves, flowers , seeds, roots, and bark) [13]. Moringa has been cited as an alternative biosorbent for removing contaminants such as Ni (II), Cu (II), Cd (II), mercury, pesticides, and colouring [14]. In addition, about the alteration of *Moringa oleifera* seed husks to extract pesticide diuron from the aqueous atmosphere or even comprehensive studies of *Moringa oleifera's* pathways for diuron biosorption. [15].The aim of this study was evaluate the *Moringa oleifera* seed husks can be reduce or removed of polluted milk.

II. Material And Methods

Sampling:

First trials survey was carried out in Desert Research Center Stations in Egypt from different area were collected positive analysis samples. Appropriate amount of each sample was prepared and stored at -20 ºC until the time of analysis.

Biosorbent preparation and characterization:

M. oleifera (MO) seeds were collected in Desert Research center ,Cairo Egypt The husks enveloping the MO seeds (h-MO) were removed and washed thoroughly with double deionized water in order to remove the adhering dirties. Then, the husks were dried at 60°C for 24h(T1), ground in a commercial blender and shorted using a sieve shaker, the particle size of 0.5mm was retained for further experiments, as was the particle size at which most of the particles was retained (42.5%)the sieved material were chemically treated in two steps. First, the sample were mixed with 0.1M methylic alcohol for 2h and repeatedly washed with deionized water until obtaining a colorless supernatant. Then, the husks were dried at 60°C for 24h again. After this, the material was mixed with 0.1M nitric acid for 4h and repeatedly washed with deionized water once again until obtaining a supernatant of approximately pH 7(T2). Second step, a thermal treatment was performed after the chemical treatment in an electric furnace (Jung Furnace 10.012) at 300°C for 1h. The standard KOH solutions of molar concentration of 0.25 M, 0.5 M was used as the activating agent for carbonized sample (T3). Thereafter, it was covered and allowed to soak for 24 h so as to allow the char to become activated. The resulting mixture was filtered and the residue thoroughly washed with distilled water until it has a pH close to 7 after which it was oven dried at 60°C for 24 h to remove moisture. This whole process removes inorganic and organic matter from the sorbent surface, extractable products, as functional groups that may interfere in the interaction of the contaminant with the surface of the biosorbent and increases the surface area according to [16].The functional groups present in the Moringa seed husk were characterized using a **Fourier transform infrared (FT-IR) spectrometer** (Nicolet is50,Thermoscientific)). The adsorbent samples were mixed with KBr at a ratio of 1:100 (w/w) to produce tablets. The spectral range varied from 4000– 400cm-1. Spectra of the sorbent before and after the sorption procedure were studied

Scanning electronic microscopy (SEM):

The surface morphology of the material was evaluated by scanning electron microscopy (SEM). The microscopic imaging of the neat and the doped SA beads with different nonmaterials was conducted using scanning electron microscope (SEM), FEI, Quanta 250 FEG (Netherlands) Type. operating at 25kV.

Design experimental:

Evaluate of Moringa seeds husk (filters) on raw camel milk, after passed raw camel milk by biosorption, were analysis before and after filtering. The pH value of the raw milk was adjusted to achieve pH6.5, temperature 25°C and dosage (60 g/L) before the start of the experiment The effect of the following parameter was studied contact time (0, 5,15, 30 and 45 min) and analysis elements in milk before and after.

Each test was repeated twice to improve the reliability of the results and suitable contact time and type of filter used to detect microbiological count in milk after passed in the filter.

Methods:
Metals Content and pH: The pH value was measured by using Knick-Digital pH meter model 646.
Metals were extracted from the milk and milk products according to [17].
Heavy metals analysis:

Preparation of milk sample:

Wet digestion method using acid was used to digest milk samples. 1ml of milk sample was added into crucibles containing 10 ml 65% nitric acid. They were kept on a hot plate and contents were allowed to evaporate until 1 ml of solution was left. Te solution was left to cool down and later, 5 ml of perchloric acid was added to the same solution and again kept on the hot plate. White fumes were let to evaporate until 1ml solution was left in the crucible. The digest was finally diluted with deionized water up to 25 ml. The samples were further analyzed by ICP-AES (Inductively coupled argon plasma-6500Duo, thermo scientific, England. [18]. The percentage of heavy metal removal for each biosorption test was determined by the following equation:
% removal = (C0 - Ct) / C0 × 100.where C0 and Ct are the concentrations of the heavy metal in the solutions (mg L-1) at the beginning of the test and at a time t, respectively.

Fixed bed column studies:

For preparing the fixed bed column reactor, a glass tube (200ml) was used. Moringa seed husk was packed between Filter paper (No 1) in order to prevent any loss of adsorbent and to give mechanical support to the adsorbent bed. The weight of the adsorbent used in this experiment was 6g /100 ml. In this experiment, a defined concentration of raw milk, and put 100 ml raw milk manual in the column at different contact times (5 to 45 min). The samples were collected from the fixed- bed column for analysis. The fixed bed column is presented in Fig. (1)

Microbiological analyses:

Viable cell counts were performed by the standard pour-plate method after serial dilutions in saline solution(0.85% w/v) in the following conditions: Aerobic total count (ATC) was carried out on plate count agar incubated at 37°C for 72 h; LAB on de Man, Rogosa and Sharp (MRS) (30°C for 48 h) [19].

Enumeration of total coliforms was obtained using Violet Red Bile Agar medium (VRBA, Biokar Diagnostics, Beauvais, France) after incubation of 24h at 30°C. [20].

Salmonella was detected according to the method of [21].Pre enrichment medium (Buffer peptone water)-Enrichment broth (Rapport-vassiliadis) (RV)-Xylose Lysine Descoxychalate(XLD) agar (Himedia)-Triple sugar iron agar (TSI) were used, incubated at 35oC for 24hr.API 20E Test System was used for diagnostic.

Enterococci were counted on Slanetz and Bartley Agar (BIO-RAD, Marnes-la-Coquette, France) after incubation for 48 h at 44°C, [22]. The dilution factor was recorded as colony forming unit per ml (cfu/ml)

Statistical Analysis:

The data were analyzed by ANOVA according to the appropriate experimental designs and reported as means (±standard deviations), which were separated by Duncan's New Multiple Range Test at $p \leq 0.05$ and least significant difference (LSD) test using SPSS computer program, version 16.0 (SPSS Inc.). All analyses and measurements were repeated in triplicates**.**

III. Result

Characterization of Biosorbent.

The Fourier transform-infrared spectra (FT-IR) spectra analysis of raw *M. oleifera* seed husks (T1) , acid activated treatment of *M. oleifera* seed husks(T2) and activated carbon of *M. oleifera* seed husks (T3) of elements (before and after sorption) were conducted to investigate changes in the vibration frequency of the adsorbent functional groups.. The FT-IR spectra represent a number of adsorption bonds that identifies the type of chemical bonds (functional groups), indicating the complex nature of the adsorbent as shown in Fig.2. Figure 3 shows the micrograph of the electronic survey Moringa seed husks. Shape of this material shows a relatively heterogeneous and relatively porous matrix. This structure facilitates ionic adsorption processes, Because of the gaps, and most importantly, its presence for the protein component in the seed. Therefore, based on these properties, can be related to these substances a pro forma profile is sufficient to hold metal ions.

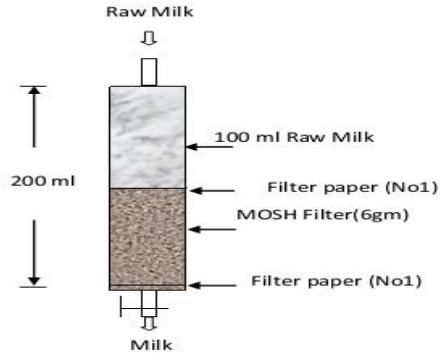


Fig.(1). Schematic diagram of column.

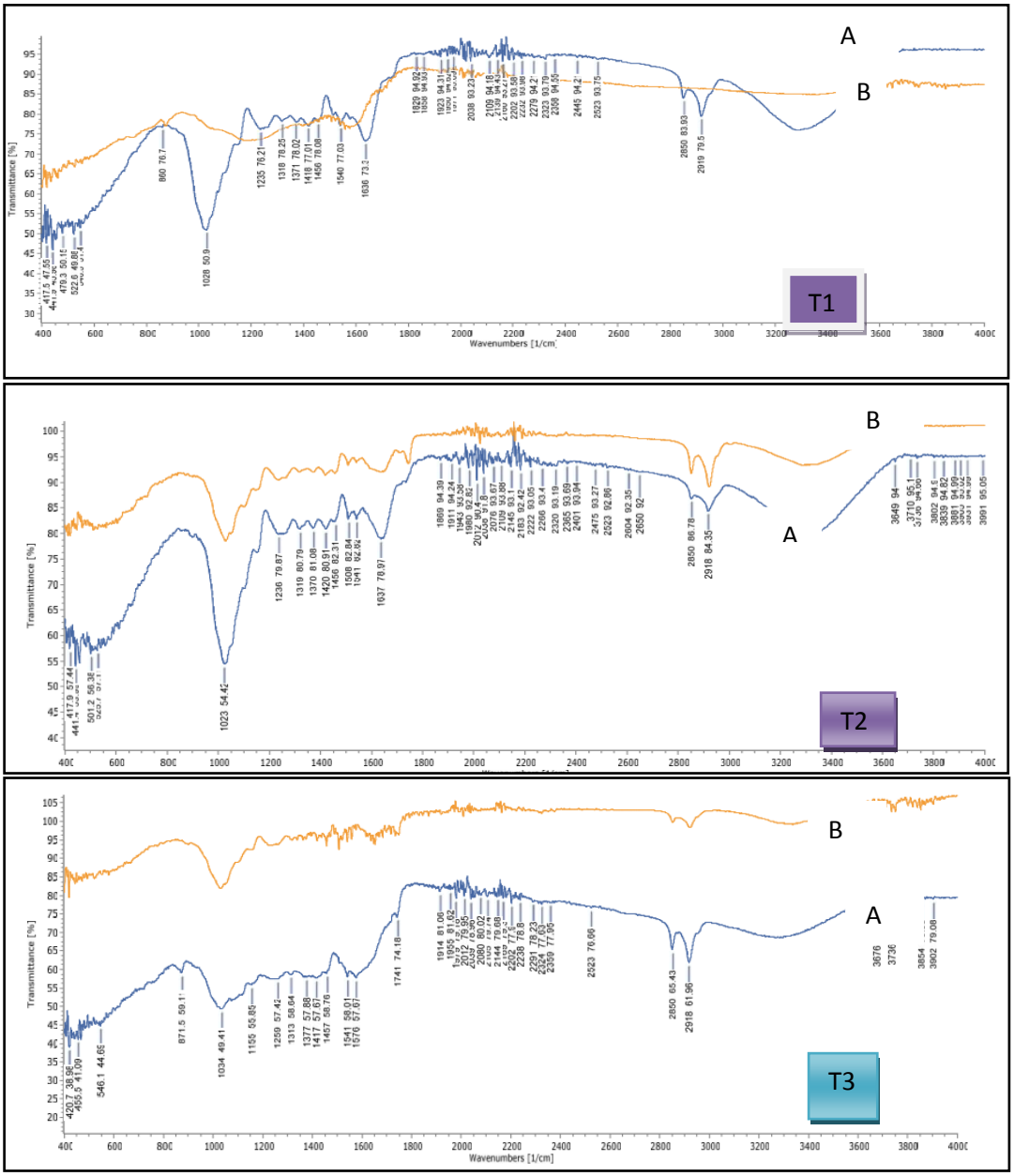


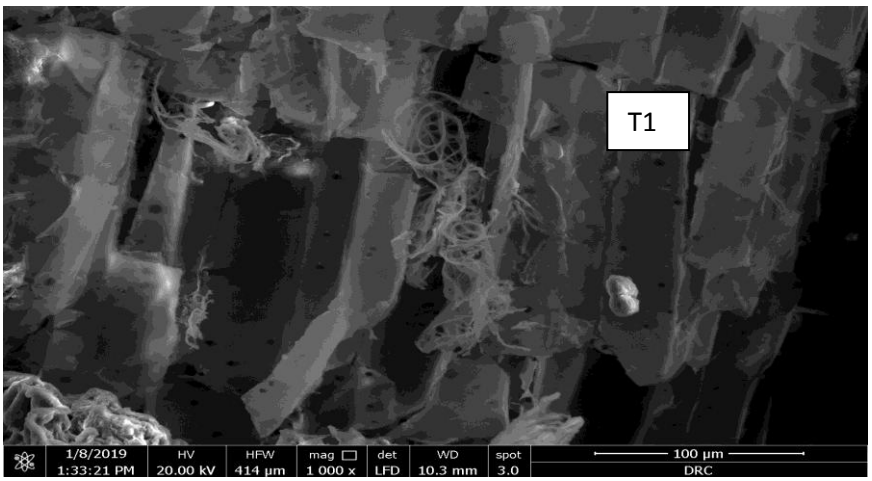
Fig. 2 FTIR of (T1) Raw *Moringa olefera* seeds husk (T2) *Moringa olefera* seeds husk treatments, (T3) Activated carbon of *Moringa olefera* seeds husk B (before treatment.), A (after treatment).

Fourier transforms infrared spectroscopy (FTIR):

The FTIR analysis presented in Figure (2)indicated broad band at 3290 cm $^{-1}$ representing bonded –OH groups , in raw *M. oleifera* seed husks (T1) after treatment the broad band (T2) in 3336 cm $^{-1}$ while carbon *M. oleifera* seed husks (T3) 3853, 3750, 3675 and3337 cm $^{-1}$ can be attributed to the stretching of OH- bonds presented in proteins, fatty acids, alcohols, phenols and carbohydrates, [23-25] Fig 1(T1) the peak around 2324 cm $^{-1}$ corresponds to the O=C=O stretch. The peak around 2226 and 2209 cm $^{-1}$ corresponds to the C≡ N suggest the presence of Nitriles. The peak around 2160 cm $^{-1}$ N=N=N stretching suggest the presence of Azide. The peak around 2152 cm $^{-1}$ corresponds to the C=C=O stretch. The peak around 2107 cm $^{-1}$ corresponds to the N=C=O stretch. The peak around 1743 and 1636 cm $^{-1}$ corresponds to the C=O group. The peak around 1540 cm $^{-1}$ corresponds to the NH Binding. The peak around 1507 and 1418 cm $^{-1}$ corresponds to the C=C aromatic rings. The peak around 1316 and 1235cm $^{-1}$ corresponds to the C=O stretch.suggest the presence of carboxylic acids, and the band at 1028 cm $^{-1}$ can be attributed to aromatic C-H in plane beds. [26]. According to the FTIR spectra, it can be concluded that the surface of the biosorbent possesses a wide variety of functional groups. This agrees with the work of [27].who state that sub-products generated by agriculture usually have different functional groups, such as alcohols, aldehydes, ketones, carboxylates, phenols, and ethers, possibly due to the presence of lignin and cellulose in their composition. As shown in Fig. 1(T2), the FTIR spectroscopic analysis indicated broad band at 3336 cm^{-1}, representing bonded OH groups. The band observed at 2921–2852 cm^{-1} was assigned to the aliphatic C–H group. The peak around 1623 cm-1 corresponds to C≡N. The peak observed at 1771,1648 and 1733 cm^{-1} corresponds to C=O stretch, while the peak at 11489,1472,1418, 1362 and1318 cm^{-1} corresponds to the symmetric bending of C-H bond. Also, the peak observed at 1227 cm^{-1} corresponds to the C-O stretching, at1153 -1030 cm^{-1}- corresponds to S=O stretching, at 900 cm^{-1} corresponds to –C=C bending(Alkene), while the peak observed at 520 cm^{-1} corresponds to C-C. As also shown in Fig. 1(T3), the FTIR spectroscopic analysis indicated broad band at 3853,3750,2675 and 3648 cm^{-1}, representing bonded –OH groups. The band observed at about 3337 cm^{-1} was assigned to the aliphatic C–H group (Fatty acid, Protein and Carbohydrate. The peak around 1595-1506 cm^{-1}-1 corresponds to the C=C stretch. The peak observed around 1188 cm-1 corresponds to S=O, while the peak observed at 872-756 cm^{-1} corresponds to the C–H bending. Figs. 1(T1,T2 and T3), the spectral analysis of raw and, acid activated *M. oleifera* seeds husk and Carbon activated indicated that mostly the bonded –OH groups, and C=O stretching will be involved in adsorption.There were clear band shifts and intensity decrease at 3336, 1648, 1318, 1227,520 cm-1, respectively. The changes in FTIR spectra confirmed the effect of acid activation on raw *M. oleifera* (Fig. 1(T2). The shifts in the spectra show that *M. oleifera* seeds husk will be a useful adsorbent in the removal of heavy metals. This also correlates with many other works reported in the literatures [28-30].

Scanning electronic microscopy (SEM):

Figure (3) shows the images obtained from SEM. The SEM analysis was carried out with the aim of exploring the surface morphological characteristics of the biosorbent material, [31]. From the images, it can be seen that the material presents a heterogeneous surface morphology showing a relatively porous nature, with asymmetric pore distribution, which can provide a high internal surface area and indicates that the material has favourable characteristics for the biosorption process in aqueous solutions. It is also possible to observe that the material has a very fibrous characteristic inherent to the chemical constitution of MO seed husks, which are rich in cellulose and lignin. [32].



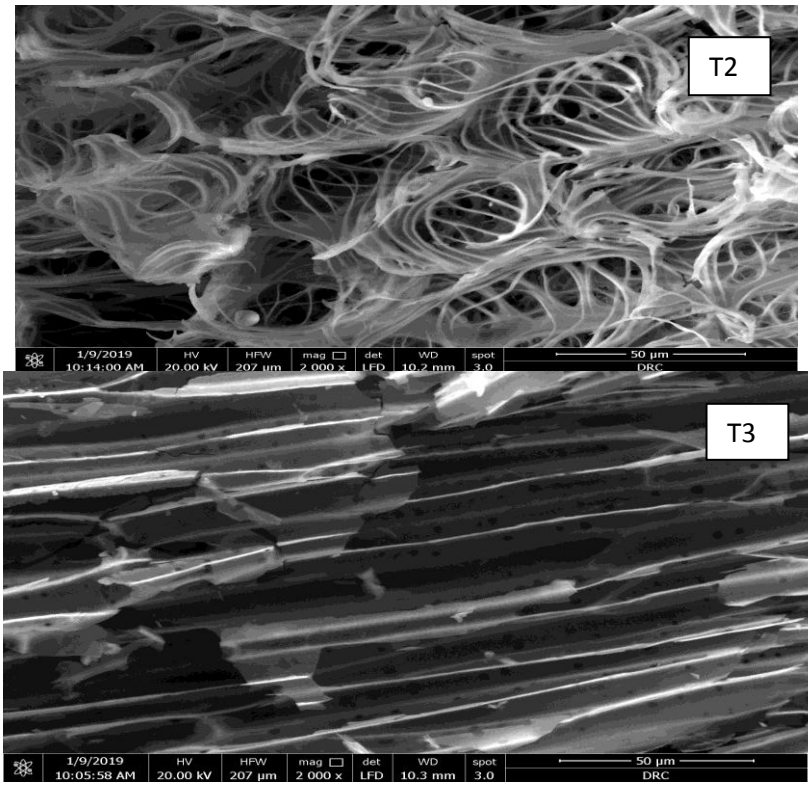


Fig. 3 The SEM micrographs of (T1) Raw *Moringa olefera* seeds husk (T2) *Moringa olefera* seeds husk treatments, (T3) Activated carbon of *Moringa olefera* seeds husk (magnification x1000).

Elementals of raw camel milk:

The levels of elements of raw camel milk are shown in table (1). The results show a higher concentration of heavy metals in the milk, the average concentration (in ppm) of cadmium, (0.171±0.053), lead, (0.799 ± 0.464), Cobalt (00.356±0.171), chromium, (0.707±0.681), Copper,(0.773±0.609), Zinc(2.473±0.579), Molybdenum (1.085 ± 0.812) , and Nickel (0.159±0.0674). The toxity induced by excessive levels of these elements are well known, as it poses serious threats to consumer's health [33]. These pollutants transmitted directly or indirectly to food commodities, so due to the rapid increase in industrial and agricultural activities.

Pb concentration of our raw camel milk samples 0.799 ppm are high compared with the permissible maximum limit for Pb of 0.02 mg/kg was reported by international dairy federation [34-35].The high concentration of Pb in milk might be explained by the pollution of the environment with metal ,lead (Pb) alkyl additives into petrol are combusted and emitted into the atmosphere and can be responsible for high concentration of lead in some vegation,road side,soil,air,water and plant [36].

Toxic metals such as lead (Pb) and cadmium (Cd) are common air pollutants and are emitted into the air as a result of various industrial activities.[37].There no specific limits for Cd prents high toxicity and has adverse effects on human health [38]. Cd has 0.171 ppm in our samples.

Cu: 0.773 ppm copper as an essential trace elementa is necessary for the adequate growth, integrity of the cardiovascular system, elasticity of the lungs neuronendcrine and iron metabolism [39]. Cu is important of milk quality products because, its effect on oxidation of lipids .if Cu and Fe higher than 1.5 ppm in milk do not allow a long storage of cream and butter[40].

Zn: The average value of Zinc in raw camel milk 2.473ppm is higher than recommended by [41].0.3-1.0 ppm.

A verage concentration of chromium 0.707 ppm. The major possible source of chromium in dairy products is the contamination from used refrigeration brines and detergents containing compounds of chromium [[42]. Acommon source of chromium exposure is from food. Total chromium levels in most foods typically range from <10 to 1,300 µg/kg, with the highest concentrations being found in meat, fish, fruits, and vegetables [43]. Average Cadmium concentrations were comparable to values reported in the literature and were below the maximum limit of 0.500ppm [44].

Table 1: Elements in raw Camel milk and permissible limit.

Elements	Raw camel milk	Permissible Limit
Silver,ppm (Ag)	0.129±0.039	
Barium, ppm (Ba)	0.151±0.045	
Cadmium, ppm (Cd)	0.171±0.053	0.0026 ppm©
Cobalt, ppm (Co)	0.356±0.171	80 ng/kg(ppt) ©
Chromium, ppm (Cr)	0.707±0.681	2.5ppb©
Copper, ppm(Cu)	0.773±0.609	0.01 mg/kg(ppm) ©
Zinc, ppm (Zn)	2.473±0.579	0.328 mg/kg(ppm) ©
Titanium,ppm (Tl)	4.645±1.167	
Aluminum, ppm (Al)	6.072±2.702	
Biroum,ppm(Bi)	3.288±0.075	
Vanadium, ppm (V)	0.103±0.093	
Molybdenum,ppm (Mo)	1.085±0.812	4.2 ppb©
Nickel,ppm (Ni)	0.159±0.0674	2.5 ppb©
Lead, ppm (Pb)	0.799±0.464	0.02 mg/kg (ppm) ©
Strontium, ppm (Sr)	0.706±0.439	

© = (IDF Standard , 2001)

Microbiological analysis of raw camel milk:

Table no2 Shows Microbiological analysis in raw camel milk ,total bacterial count (T.B.C.) was varied from 2.5 to 8.76 $\log_{10}$ CFU/ml with average 5.53±0.13 $\log_{10}$CFU/ml all samples 100% positive (28/28) ,these results agree with [45-47]. A total of coliform 21 out of 28 (75%) of raw camel milk tested were found to be contaminated with coliform maximum count of 5.35 $\log_{10}$CFU/ml with mean count value of 2.46±0.15 $\log_{10}$CFU/ml in table (2),agreement with [48].Out of 5 samples positive for *Salmonella spp*.,17.9% found from 28 samples tested, with mean count 2.59 ±0.11 $\log_{10}$CFU/ml , a similar results was also reported by[49] reported that from 196 samples tested ,84 were found to contain *Salmonella spp*. The results showed the 57.1 of samples were to be contaminated with *Enterococcus spp* with mean 2.26 $\log_{10}$CFU/ml with maximum count 4.72 $\log_{10}$CFU/ml and 42.9% samples tested positive.

Table no 2: Microbiological analyses (Log10 CFU/ml) of raw camel milk.

Treatment	positive		Mean	Std. Dev	Minimum	Maximum
	No	%				
Total bacterial count	28	100	5.53	0.13	2.5	8.76
Total coliform count	21	ic75.0	2.46	0.15	0	5.35
Salmonella spp.	5	17.9	2.59	0.11	0	5.28
Enterococcus spp.	16	57.1	2.26	0.24	0	4.72

Therefore, from previous results, an attempt was made to experiment with the possibility of reducing or removing heavy metals and microbes by passing milk on a filter from treated Moringa seed husks.

Effect of Contact Time on Heavy metals Removal:

The effect of contact time is shown in Fig. 4.This figure indicates the effect of contact time on biosorption capacity of moringa seed husk for heavy metal ions was investigated for a fixed adsorbent concentration (60 g/L) at temperature 25°C , with pH 6.5 at interval of contact time (0, 5,15, 30 and 45 min). From the obtained results, it is observed that the percentage of removal of heavy metal ions increases sharply with contact time in the first 5 min.This is due to the presence of large number of vacant sites. As the time proceeds, the removal decreases due to the accumulation of metal ions on the vacant sites until it approaches equilibrium. Therefore, further increase in contact time did not enhance the biosorption removal, and the optimum contact time within(T1) 45 min for silver(74%), copper(56%), Vanadium(72%), nickel(80%), Strontium(64%), Barium(57%), Titanium(58%), Molybdenum (51%) and Lead

(76%), and (T2)45 min for silver(74%), 30,45-min for Barium(57%),30,45-min for copper(56%), 30-min for Titanium(59%), 30-min for Vanadium(73%), 30-min for Molybdenum (51%) 45-min for nickel(80%) 30,45-min for Lead (76%), and 30 min for Strontium(66%), and (T3)45 min for silver(71%), 30--min for Barium(65%),30,45-min for copper(56%), 30-min for Titanium(59%), 30,45-min for Vanadium(72%), 45-min for Molybdenum (55%),30- 45-min for nickel(61%), 30,45-min for Lead (68%), and 30 min for Strontium(85%), as shown in Fig.4.

. The rapid change in the rate of heavy metals removal might be due to the fact that initially all active sites on the adsorbent surface were largely available and the solute concentration gradient is high . Further increase of contact time after 30 min did not increased the heavy metals sorption and the adsorption were found to be equilibrium at 30 min. Effect type of filter and contact time on % reduce of elements showing in Fig (4) found all reduce elements as different percentage by all type filters. Thus, 30min and 45 min were considered as the optimum time for achieving the maximum removal and fiter modified moringa seed husk (T2) suitable for remove elements. From our results suitable contact time for reduce some elements 30 min,

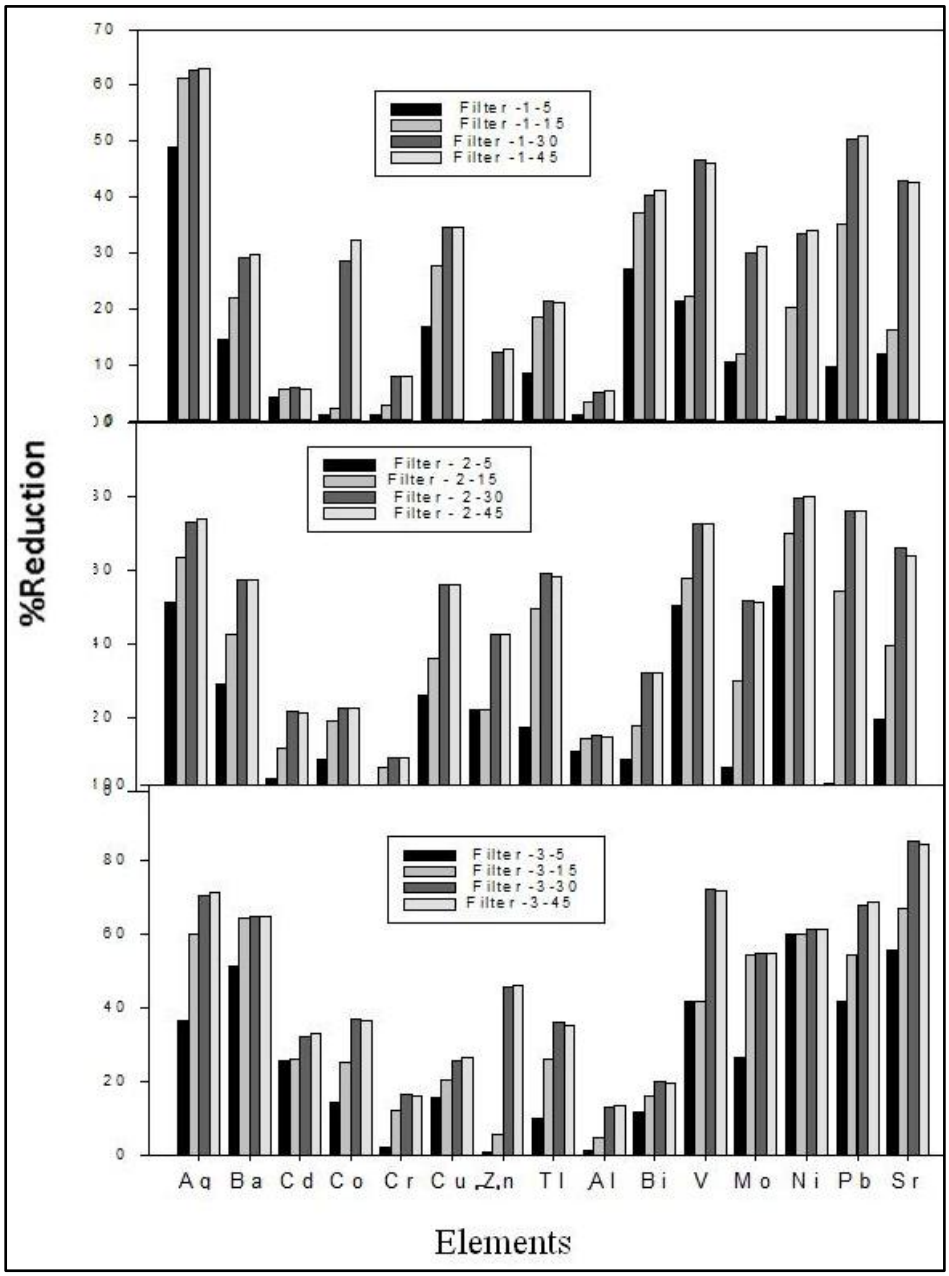


Fig no.4 Effect of *Moringa olefera* seeds on raw camel milk toxic and essential heavy metals in raw camel milk.(T1) Raw *Moringa olefera* seeds husk (T2) *Moringa olefera* seeds husk treatments, (T3) Activated carbon of *Moringa olefera* seeds husk.

Effect Moringa Seed Husk on microbiological of raw camel milk:

The effect of moringa Husk on microbiological of raw camel milk is shown in Fig. 5 and table.2.A fixed adsorbent concentration (60 g/L) at temperature 25°C , with pH 6.5 at contact time (30 min). From the obtained results, at a total bacterial count of 5.53 $\log_{10}$ CFU/ml , coliform count 2.46 $\log_{10}$ CFU/ml, *Salmonella* spp. count 2.59 $\log_{10}$ CFU/ml and *Enterococcus* spp.count 2.26 $\log_{10}$ CFU/ml in control samples. After treatments, the results obtained the total bacterial count reduction 2, 3 and 2.1 logs in T1, T2 and T3 respectively. The low count of coliform and *salmonella* spp in T3 moringa seed husk (activated carbon). So detect microbiological count in this time.Figure 5 and 6 shows the effect moringa seed husk treatments on microbiological count. So the treatment (T-2) had maximum reduction of microorganism in order to prepare by methylation and give to much adsorption surface in filter comparable another treatments

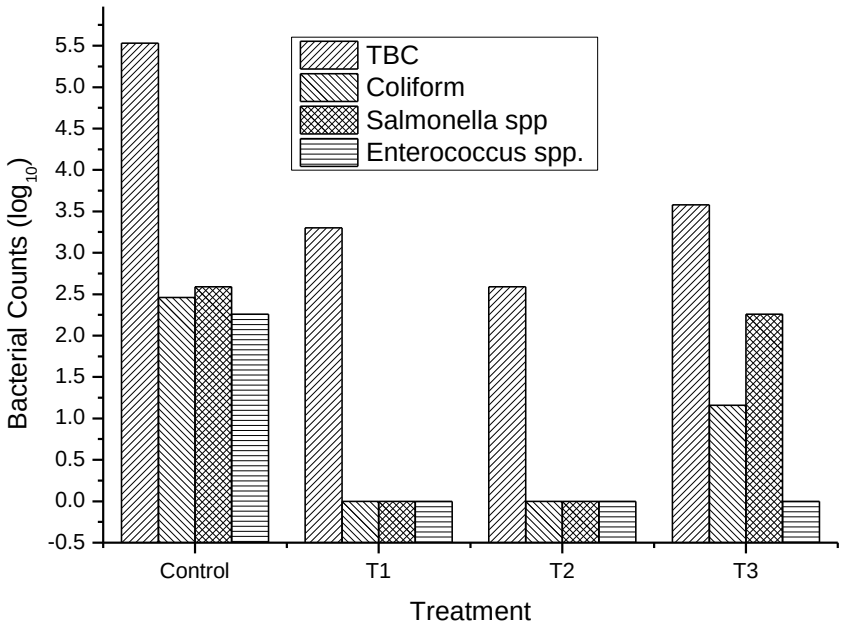


Fig. no5 Microbiological analyses (Log_{10} ± SD CFU/ml) of raw camel milk treated with moringa seed husk. (T1) Raw *Moringa olefera* seeds husk (T2) *Moringa olefera* seeds husk treatments, (T3) Activated carbon of *Moringa olefera* seeds husk.

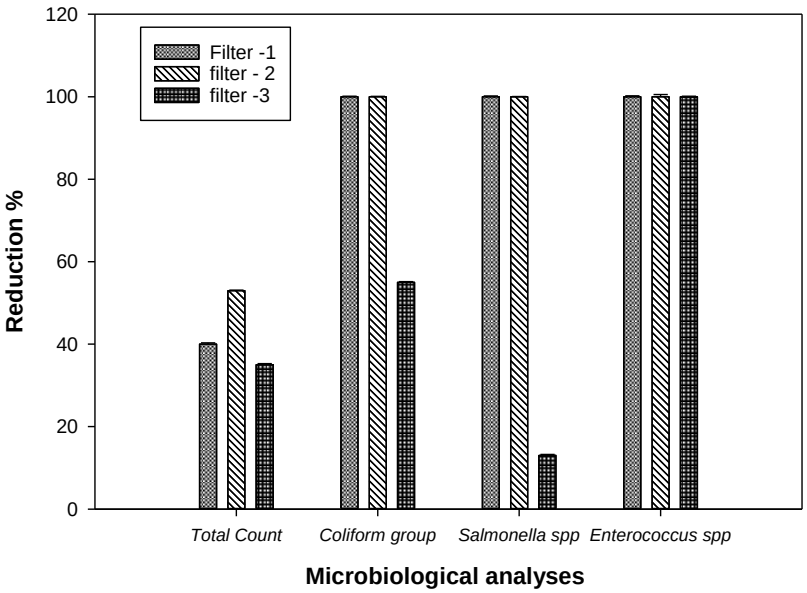


Fig.6 Effect of *Moringa olefera* seeds on microbiological reduction % of raw camel milk. (T1) Raw *Moringa olefera* seeds husk (T2) *Moringa olefera* seeds husk treatments, (T3) Activated carbon of *Moringa olefera* seeds husk.

IV. Discussion

The results of this this study showed have the highest concentration of **Cadmium(Cd)** (0.171±0.053ppm), **Cobalt (Co)** (0.356±0.171 ppm), **Cromium (Cr)** (0.707±0.681ppm),**Zinc (Zn)** (2.473±0.579ppm), **Molybdenum (Mo)**(1.085±0.812ppm), **Nickel (Ni)** (0.159±0.0674ppm) and **Lead (Pb)** (0.799±0.464ppm).All heavy metals concentration measured in all raw camel milk samples are greater ,who and codex alimantarius permissible limits.It may be important to know the biological transfer factor from the contents of heavy metals in feed , soil or water to milk in order to explain the results obtain in this study. [50]. Esimattion of the biological transition factor from content in drinking water to cow's milk. [51]. Bio-conversing factors estimated the feed contents of Pb and Cr in raw milk. Raw camel milk microbiological quality from results found high coliform counts and Enterococcus sp , Salmonella and total bacterial counts.The high Total bacterial count of samples could be likely attributed to improper handling of the samples during collection, transportation, or even during storage [47]. Thus, raw camel milk can be consumed it may be a potential public health concern and may cause food borne illness,and natural antimicrobial agents can only provide limited protection against specific pathogens. Existence of coliforms and Enterococcus may not necessarily indicate a direct fecal contamination of milk, but is an indicator of poor sanitary practices during milking and handling processes[52]. The lower Salmonella were found in samples testes (raw camel milk) dose not mean food born illness may not be causes,the sources of the pathogen constitute the risk factores that may be associated with in the environment , milk handers, equipment, water, soil are sources of salmonella in the enveroment camel milk production [49]. Produce high quality milk and safe milk must be great importance to the economy of farm and dairy industry sustainability in Egypt.

Effect *M. oleifera seed husks* on reduce heavy metals and microbiological in raw camel milk:

The literature shows that an aqueous heterogeneous mixture of *M. oleifera* seed husks presents various functional groups, mainly amino and acids groups. These groups have the ability to interact with metal ions, which is dependent on the pH. An increase in metal adsorption with increasing pH values can be explained on the basis of competition between the proton and metal ions for the same functional groups, and a decrease in the positive surface charge, which results in a higher electrostatic attraction between the surface and the metal [53]. The pH value of the point of zero charge for the proposed adsorbent was within the range of 6 to 7. Thus, above this pH range the surface of the sorbent will be negatively charged and will adsorb positively charged species [54]. Higher reduction rate were observed for both T1 raw seed husk and T2 seed husk treatment with methylation because these adsorbed more protein and bioactive compounds as Flavonoides , diterpenes , Triterpenes and a lkloids, this groups demonstrated antimicrobial activity against G(+),G(+) and yeast strains as compared with T3 this results agree with[55-58].

V. Conclusion

Results of this study demonstrate that the adsorption of metals onto moringa seeds husk is a potential solution to the problems associated with raw camel milk treatment. using Moringa seeds husk as biosorbent for removal or reduce some metals and microbiological pollution. The morphological observation with different type of the Moringa seeds husk (T1,T2 and T3) has shown that it has a spongy structure with a high number of pores, which makes it ideal to be used as natural biosorbent. The contact time between biosorbent and raw camel milk is about 30 and 45-min for both heavy metals, since adsorption capacity keeps constant after this time. And the other hand , the Moringa seed husk success for remove *Salmonella* spp, Coliform and *Enterococcus* spp., and reduce total count 53%,so, moringa seed husk is a suitable biosorbent for improve quality for safe raw camel milk . More studies are needed to investigate the effectiveness of biosorbent of *Moringa oleifera* Lam. seed husks on function chemical composition, technological product properties, another contamination (pesticides) and control of microbiological contamination in products.

VI. Recommendation

After the success of Moringa seed husks to reduce some heavy metals and remove microbial contaminants, so we recommend doing this experiment on a large scale in farms, then cooling, then transfer it to dairy factories to complete milk processing (cooling, heat treatment, fermentation and ……etc) for making other products from it such as ice cream, yoghurt drink and cheese. Therefore, the products manufactured in this way are completely safe and completely free from toxic elements, pathological microbes or any other contaminants.

Acknowledgments

The present study was carried out in the 'Division of Animal Production, Animal Breeding Department, Desert Research Center (Egypt). Author would like to thank the dairy processing unit staff for providing the equipment's of collecting camel milk samples from different area in desert research center in Egypt.

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