Volume-1 | Issue-3 | December-2018 | ISSN - 2617-4421 (Print) | ISSN - 2617-7188 (Online) |
East African Scholars Journal of Medical Sciences
(An Open Access, International, Indexed, Peer-Reviewed Journal)
A Publication of East African Scholars Publisher, Kenya
www.easpublisher.com

Original Research Article

The Study of Bacteriological Quality of Raw Camel Milk in Middle Region (Sajir). Kingdom of Saudi Arabia

Ahmed Elemam Mohamed Elhaj*, Sanad .M. AlSobeai
Univesity of Shaqra, Sajir College of Arts and Sciences, Shaqra Univesity, Kingdom of Saudi Arabia

*Corresponding Author
Ahmed Elemam Mohamed Elhaj
Article History
Received: 14.11.2018 | Accepted: 05.12.2018 | Published: 30.12.2018

Abstract: This study was carried out to determine the aerobic bacterial contamination of raw camel milk. In fact, most of the raw camel milk is consumed directly after milking from she camel milk, without any heat treatments without being pasteurized. The aim of the present study were to assess the microbial quality of raw camel milk. A total of thirty milk samples were collected aseptically from different she camel farms in Sajer region. All samples were sent to a laboratory for bacteriological examination. The main bacterial species were isolated as the follows: *Bacillus* spp, *Staphylococcus epidermidis ,Erischechia coli, Salmonella* spp, *Pantoea* spp and *Klebsiella* spp, most of them have a public health importance**.** The main objectives of the present study were to assess the quality changes of raw camel milk by detection of many of pathogenic bacteria. Bacterial pathogens pose serious health risks for people who were consumed raw camel milk which causing severe illness in humans, including diarrhea, vomiting and abdominal cramps**.**
Keywords: Camel Milk, *Klebsiella* spp, *Escherichia coli ,Salmonella* spp.

INTRODUCTION

The camel milk consumption is very popular in Saudi Arabia at Sahara and sub-Sahara region. There is a traditional belief in the Middle East and especially in Saudi Arabia that the consumption of fresh camel milk helps in the prevention and control of many human diseases like Tb, liver fibrosis. Over 300 million people worldwide have diabetes and this most likely will rise to 500 million within the next 20 years. Seventy-five percent of people with diabetes live in low- and middle-income countries and according to prognostics Africa will experience a largest increase in the next generatio (Ajamaluddin *et al*., 2012) recently, it has been reported that camel milk can have such properties. The camel milk it is known as medicinal and dietary food. In Saudi Arabia increasing demand of camel milk farms, especially around the towns by growing urbanized populations is stimulating the development of in camel milk (Bernard *et al*., 2014). Camel milk is consumed freshly without heating or pasterulization. Although, most camel milk is consumed raw or in the form of fermented milk, commercial farms supply fresh pasteurized milk in Saudi Arabia Bactrian camel milk is used for making cheese, butter and yoghurt in (Mongolia Ellen & Anthony 2013). Many of bacterial associated with camel milk and some of them are harmful for human and causing severe illness. (Abeer *et al*., 2012) reported that, isolation of 5 *Salmonella spp*., 12 *E. coli* and 2 *Listeria monocytogenes* from a total of 185 camel's milk samples collected from Sinai, Aswan and Sharqia Governorates. The samples included composite milk from the individual camel udders, bulk milk from collection and market centres, faeces, and soil and water samples. Of the 196 samples tested, 43% (84/196) were found to contain *Salmonella* species. Out of the 84, only 31% (26/84) was positively identified as S. *enterica. S. enterica* was found in all the sample categories that represented the camel milk production environment (Sepehr, 2012).The samples of camel milk about 57 out of 150 raw milk samples were found to be contaminated with *Staphylococcus spp*. with maximum count of 3.20 x105 cfu/ml and mean value of 7.70x103 ±2.60x103 .

MATERIALS AND METHODS.

A total of thirty samples of milk from apparently healthy she camel's (Camelus dromedarius) camels .All samples were collected aseptically from different farms in Sajer area west of the capital of Kingdom of Saudi Arabia (Riyadh). All samples were collected in small sterile bottles and were insulated in ice box. Then transported directly to the laboratory of Microbiology, possible to ensure there no any contamination during sampling. All samples were examined bacteriologically and were cultures on different solid bacterial cultures as Blood agar, MacConkey agar medium and Deoxycholate citrate agar (DCA).The purified isolates of bacteria were identified according to the criteria include: cultural characteristic of isolates; shape, colour, odour,

elevation, margin, consistency, growth and size of colonies. The colonial characteristic on the different and selective media and haemolysis of blood agar; Gram's stain reaction; motility; aerobic growth. Then the plates were incubated at 27°C for five 24 days. The plates were examined and all pure isolates were preserved, marked and examined by automated machine as use of Vitek analyser for routine bacterial identification for performed to confirm findings. The specific test as agglutinin test were done for *Salmonella* spp (serotyping test for *Salmonella* spp.) based on Uk Standards for Microbiology Investigations (Identification of Enterobacteriaceae) (Standards 2015).

RESULTS

In the present study, the main groups of isolated bacteria were Gram- positive bacteria which represented (36.6%) while Gram-negative bacteria which were represented (53.33%) of the total samples as shown on Diagram-1. Pathogenic bacterial species isolated from milk samples were: *Bacillus cereus* (11,1%), *Erischechia coli* (25,9%), *Salmonella spp* (11,1%), *Pantoea agglomeras* (7,4%) and *Klebsiella oxytoca* (22,2%) and *Staphylococcus epidermidis* (22.2%), as shown on the (Diagram-2). The percentages of the total isolates and biochemical reaction was shown in Table-1. On MacConke's agar medium the *Salmonella spp* is non lactose fermenter and the bacterial colonies are colorless. Moreover, on TSI medium shows the positive result of (H_2S and gas production, red slant and yellow bottom): yellow=glucose fermentation, blackness bottom: H_2S production, red slant: negative sucrose and lactose fermentation (Figure-4). *Bacillus cereus* have large colonies and β hemolysis on blood agar medium. *Erischechia coli*& *Klebsiella oxytoca* have a pinkish colony: lactose fermented bacteria (Figure 2 & 3). The antibiotic sensitivity test was carried out and the results as shown in Table-1. The result of antibiotic sensitivity tests which were done for *Pantoea agglomeras* was shown sensitive to Amickacin and Ertapeneme. Meanwhile, they are resistance to Cefazolin ,Cefoxitine, Cefuroxime and Cephalothin. The result of sensitivity test for *Erischechia coli* is sensitive only to Amickacin and very resistance to other tested antibiotics. *Klebsiella oxytoca* is sensitive for tested antibiotics. The antibiotic sensitivity test result for *Salmonella* spp is resistance to Amickacin, Cefazolin, Cefuroxime, Cefoxitine and Cephalothin, and sensitive only to Ertapenem.

Fig-1: Shows *Salmonella* spp on xld medium (black colonies)

Fig-2: Shows the *Klebsiella* species on and MacConkeys' agar

Fig-3: Shows the *E.coli* pecies on and MacConkeys' agar

Fig-4: Shows the positive result of TSI (H2S and gas production, red slant and yellow bottom) (Salmonella spp).The interpretation is: yellow=glucose fermentation, black=H2S production, red slant =negative sucrose and lactose fermentation

Table-1: Shows the antibiotic sensitivity test for some isolates bacteria (R= Resistance to Antibiotic S = Sensitive to Antibiotic)

Isolates / Antibiotic	*Pantoea agglomeras*	*E.coli*	*Klebsiella oxytoca*	*Salmonella spp*
Amickacin	**S**	**S**	**S**	**R**
Cefazolin	**R**	**R**	**S**	**R**
Cefoxitin	**R**	**R**	**S**	**R**
Cefuroxime	**R**	**R**	**S**	**R**
Cephalothin	**R**	**R**	**S**	**R**
Ertapenem	**S**	**R**	**S**	**S**

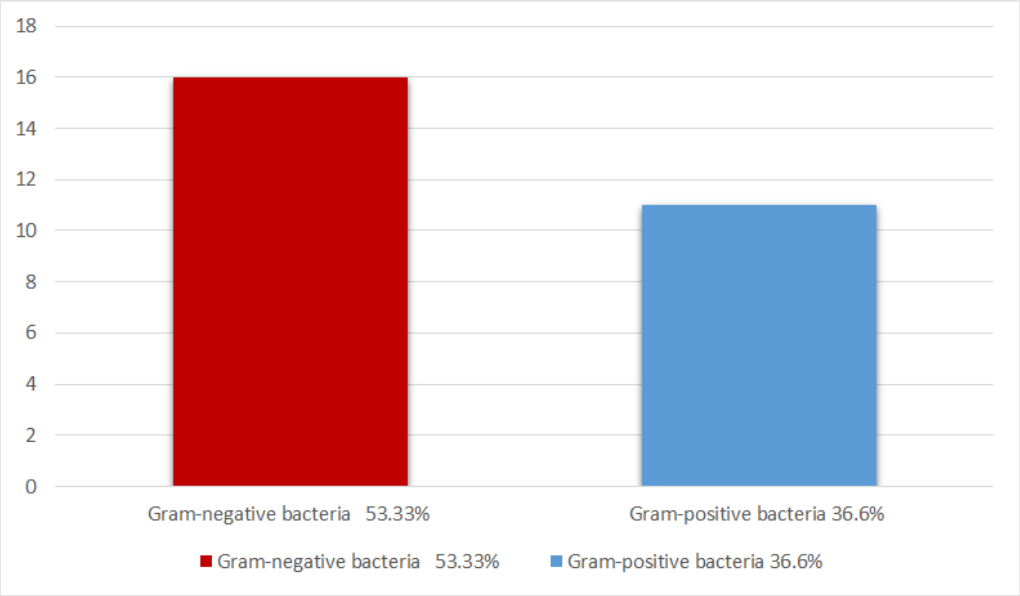

Diagram-1: Shows the total no of bacterial isolates

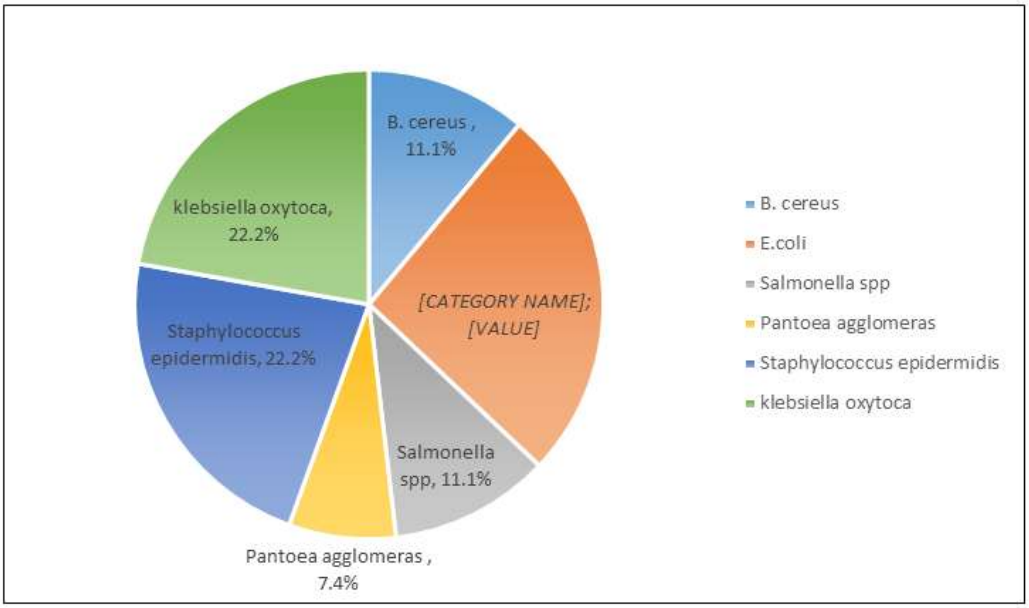

Diagram-2: Shows the total percentage of bacterial species

DISCUSSION

In the present study revealed that the raw camel milk is good medium for many bacteria and harbor most harmful and non pathogenic bacteria. Interestingly, the bacterial microbes were not flowed directly from the udder but in fact the contamination of milk was happened duo to many factors as cross-contamination of camel's milk either from the animal itself during normal defecation or from the dirty nails of workers or by using dirty utensils during milking .The important aims of the present study, were to assess the microbial quality of raw camel's milk. The fact that it is mainly consumed in its raw state (boiling of the milk is not common as it is known to remove its "goodness"), the high ambient temperature and the lack of refrigeration facilities in many arid areas are the main reasons for hygienic problems (Valérie, 2007). (Mahima *et al.*, 2017) reported that the total samples of bacterial isolates were 14.5% samples show the presence of *E. coli*, 12.9% show *Salmonella*, 8% show coagulase positive *Staphylococcus* and 2% show coagulase negative *Staphylococcus*. 85.5% of the total milk samples were free from these food borne bacteria. Importantly, *staphylococcus aureus* was identified in only 22 samples out of 57 *Staphylococci* with an average of 7.30x102 ±2.60x102 while the maximum count was 2.20x104 cfu/ml in the present study the main bacterial isolates were (Muhammad *et al.*, 2018)

in the present study the bacterial isolates wee *Bacillus cereus, Erischechia coli, Salmonella spp, Pantoea agglomeras, Klebsiella oxytoca and Staphylococcus epidermidis* (11,1%), (25,9%), (11,1%), (7,4%), (22,2%), (22.2%) respectively. Nonetheless, (Noreddine 2008) reported the dominance of *enterococci* with *Enterococcus faecalis* as the main representative species. Besides *Enterococcus,* other genera including *Pediococcus* (28.2%), *Streptococcus* (4%), *Lactococcus* (8%) and *Leuconostoc* (1%). In the present study the main representative species included *Escherichia coli* species (25.90%) that may be due to the bad hygiene in small and large camels'farms or due to uncleaned utinsseles. In the present study *Salmonella* (11,1%), have been detected in raw camel milk this results is validated with the trsults reported by (Thatayaone *et al.*, 2018), *Salmonella* species was detected in two of the ten camel milk samples (20%) . However, the studies did not always mention whether the strains involved were able to produce toxins. A study revealed relatively high incidence of bacterial contaminants in camel's milk in Egypt, presumably because of poor application of basic hygienic standards by camel herders (Hanaa and Abeer 2015). (Gitao *et al.*, 2017) reported that the bacterial microorganisms isolated from the milk samples alongside the coliforms included: *Staphylococcus species* [90.10% = 346 samples], *Streptococcus species* [84.90% = 326 samples] and *Bacillus* species [45.83% = 176 samples] of the 346 *Staphylococcus* species isolated, 91 [23.70%] were coagulae-positive. The results reborted by (Matofari *et al.*, 2013) shows microbial load at different levels of the camel milk chain. 66% of raw milk samples from farm environment had microbial load of less than 105 cfu/ml. The results suggest that at the farm, the camel milk is less contaminated as compared to recommended standards for milk acceptance for processing, this finding is support my present results.

CONCLUSION

In conclusion, according to the present study, the finding of harmful pathogenic bacteria such as *Salmonella spp, Pseudomonas* and *Klebsiella* species which had been isolated from raw camel milk.Therefore the raw camel milk can pose a major health problem for humans and can cause severe illness in humans ; tuberculosis ,brucellosis food poisoning, and meningitis. Meanwhile, some cases causing severe symptoms like nausea, abdominal cramp, vomiting and diarrhea.Accordingly, the our advises was then made, that the raw camel's milk should be proper filtered, good handling, avoiding the cross contamination and treated by pasteurization before drinking.

ACKNOWLEDGMENTS

I wish to express my thankfulness and gratitude to Dr Algaseem University, KSA; for his help during laboratory work and results findings.

REFERENCES

1. Abeer, A. A., Gouda, A. S., Dardir, H., & Ibrahim, A. (2012). Prevalence of some milk borne bacterial pathogens threatening camel milk consumers in Egypt. *Global Vet*, *8*, 76-82.
2. Asfour, H. A., & Anwer, A. M. (2015). Some Bacteriological and Immunological Studies on Camel's Milk. *Alexandria Journal for Veterinary Sciences*, *47*(1).
3. Eberlein, V. (2007). *Hygienic status of camel milk in Dubai (United Arab Emirates) under two different milking management systems* (Doctoral dissertation, lmu).
4. Elhosseny, M., Gwida, M., & Elsherbini, M. (2018). Evaluation of physicochemical properties and microbiological quality of camel milk from Egypt. *J Dairy Vet Anim Res*, *7*(3), 92-97.
5. Ellen, M., & Anthony, B. (2013). Milk and dairy products in human nutrition. Food and agriculture organization of the United Nations. Rome, Italy, 88. http://www.fao.org/food/nutrition
6. Faye, B., Madani, H., & El-Rouili, S. A. (2014). Camel milk value chain in Northern Saudi Arabia. *Emirates Journal of Food and Agriculture*, *26*(4), 359-365.
7. Gitao, C. G., Wanjohi, G. M., Bebora, L. C., & Muchemi, G. M. (2017). Camel Milk Quality and Bacterial Contamination along Market Chain in Wajir and Garissa Counties of Kenya. Garissa Counties of Kenya. *Journal Veterinary Sciences medicial Research*, 4(10): 1114.
8. Makgoeng, T., Seifu, E., Sekwati-Monang, B., & Sonno, K. (2018). Composition and microbial quality of camel milk produced in Tsabong, south-western Botswana.
9. Malik, A., Al-Senaidy, A., Skrzypczak-Jankun, E., & Jankun, J. (2012). A study of the anti-diabetic agents of camel milk. *International journal of molecular medicine*, *30*(3), 585-592.
10. Matofari, J. W. (2013). Analysis of microbial quality and safety of camel (Camelus dromedarius) milk chain and implications in Kenya. *Journal of Agricultural Extension and Rural Development*, *5*(3), 50-54.
11. Science and Technology, Botswana University of Agriculture and Natural Resources, Private Bag 0027, Gaborone, Botswana.
12. Sepehr, S. (2012). Prevalence of *Salmonella enterica* Contamination of Camel Milk in Iran. *Research Journal of Biological Sciences*, 7(4),195-199.
13. UK standards for microbiology investigations. (2015). Identification of Enterob- acteriaceae Standards unit National Infection Service Public

Health England 61 Colindale Avenue London NW9 5EQ: 4, 12 :34.

14. Verma, M., Prakash, S., & Prakash, A. (2017). Incidence of E. coli, Salmonella and Staphylococcus in Camel Milk Collected from Bikaner District, India.
15. Verraes, C., Claeys, W., Cardoen, S., Daube, G., De Zutter, L., Imberechts, H., ... & Herman, L. (2014). A review of the microbiological hazards of raw milk from animal species other than cows. *International Dairy Journal*, *39*(1), 121-130.