

Comparative Antimicrobial Study of Camel Milk and Urine against Some Animal Pathogens

Rehab Mohamed Atta El-Desoukey^{1*}, Bashayer S A Elbadah², Aahd M M Elqahtani², Maasoma A Elrezq² and Rana M Eloosemy²

¹Microbiology and Immunology Department, National Research Center, Giza, Egypt

²Biology Department, Faculty of Science and Humanities in Al Quwai'iyah, Shaqraa University, KSA

***Corresponding Author:** Rehab Mohamed Atta El-Desoukey, Microbiology and Immunology Department, National Research Center, Giza, Egypt.

Received: July 25, 2020; **Published:** August 26, 2020

Abstract

Camel's urine and milk has various utilizations, which are helpful for man and animals. Some investigation had demonstrated that camel's urine and milk lethally affects bacterial, there is next to no data about the antimicrobial impacts of camel urine on different microbial contaminating to animals. So, this investigation meant to look at between the antimicrobial effect of camel urine and milk against some animal important pathogens and to segregate microbes that may found in the camel urine and milk. Tests of camel urine and milk were tried for their antimicrobial action utilizing Mueller Hinton Agar. Look at its antimicrobial impact against certain microorganisms (*S. aureus*, *E. coli*; *Bacillus*, *Pseudomonas aeruginosa* and *Candida albicans*) The outcomes uncovered that the camel milk without bubbling have a substantial microbial development on supplement agar media anyway it was free subsequent to bubbling, since camel urine has no microbial development on supplement agar media or MacConkey agar with no treatment and the most elevated antimicrobial criticalness had from blended camel milk and urine against all analyzed microorganisms followed by urine alone followed by bubbled milk anyway unboiled milk had antimicrobial huge against just *S. aureus* and *C. albicans*. It has no impact against the inspected gram negative microscopic organisms. So, it could be concluded that the bubbled camel milk and camel urine have antimicrobial impact against pathogenicity instigated by *E. coli* and *S. aureus*, *Bacillus*, *Pseudomonas* and *C. albicans*. Additionally, camel milk has synergistic activity with camel urine which might be used to reduce the use of antibiotics and decrease bacterial antibiotic resistance.

Keywords: *E. coli*; *S. aureus*; *Bacillus*; *Pseudomonas*; *C. albicans*

Introduction

Microbes are the most widely recognized reason for irresistible sicknesses which take part in about portion of the passings in human and animals. Just as grimness and mortality because of the runs in many creating nations which go about as a significant issue, The diseases because of assortment of bacterial etiologic operators, for example, pathogenic *Escherichia coli* (*E. coli*), *Salmonella spp.*, and *Staphylococcus aureus* (*S. aureus*) are generally normal [1]. Also, fundamental parasitic diseases because of *Candida albicans* (*C. albicans*) have risen as significant reasons for horribleness and mortality [2].

Antibiotic resistance has become a worldwide concern. As multi-medicate safe microbe for the most part influence the clinical adequacy of many existing anti-microbials [3]. Camel name given to two types of well evolved creatures which are individuals from the family Camelidae in the request Artiodactyla. These are the Bactrian camel (*Camelus bactrianus*) and the Arabian or dromedary camel (*C. dromedarius*) [4].

Camels assume a significant job in the way of life of numerous networks, especially those in dry zones in the Middle East and the Arabian territory. Camels can adjust to climatic conditions. They are utilized in transport, sport, wellspring of meat and milk. Therefore, camels contribute in raising the economy and food security for people. It has been discovered that camel milk has antidiabetic, hostile to hepatitis and bactericidal [5]. The milk of well evolved creatures is secured to various degrees against microbial pollutions by characteristic inhibitory frameworks, including the lactoperoxidase/thiocyanate/hydrogen peroxide framework, lactoferrins, lysozyme, immunoglobulins and free greasy acids [6]. The focus and the action of every one of these antimicrobial frameworks/substances rely upon the creature species and on the phase of lactation. Camel's milk is accounted for to have a more grounded inhibitory framework than that of bovine's milk [7]. Specifically, the degrees of lysozyme and lactoferrins are accounted for to be two and multiple times higher than those of bovine's milk, individually [8]. Camel milk contains peptides and proteins that show its organic exercises that have valuable impact on numerous bioprocesses as assimilation, ingestion, development and invulnerability [9]. Besides, camel's milk can be put away at room temperature longer period than milk from different creatures [10]. Camel's whey proteins incorporate a heterogeneous gathering of proteins, including serum egg whites, α -lactalbumin, immunoglobulin, lactophorin and peptidoglycan acknowledgment protein [11]. Dietary whey supplementations may improve twisted mending by expanding GSH amalgamation and cell cancer prevention agent resistance [12].

Camel's urine contains a lot of potassium, just as egg whites and magnesium, in light of the fact that the camel just beverages multiple times throughout the mid year and once throughout the winter, which causes it to hold water in its body in order to safeguard the sodium, and the sodium causes it not to pee a lot, since it keeps the water in its body [13]. Camel's urine has various utilizations which are gainful for man. This is shown by the Prophetic messages and affirmed by present day science. Camel urine utilizes for treatment of different ailments, for example, parasitic disease (fasciolosis) [14] albeit some investigation had demonstrated that camel's pee lethally affects bacterial, there is next to no data about the physical and biochemical properties and antimicrobial impacts of camel pee on different microbial contaminating to individuals. Information of the trait of camel urine and its advantages is restricted. Information accessible show, be that as it may, critical antimicrobial enacts against some pathogenic microorganisms tainted human, for example, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and other pathogenic microbes [15]. Camel urine can use to treatment of contagious contamination, for example, ringworm, tinea. Middle Easterners used to drink bubbled urine to fix some inner issues, especially hepatitis Liver expanding and abscesses. Then again, they let out their camels on specific grasses and utilize their dried pee topically to treat consumes and delicate draining injuries [16]. It was utilized for treatment of women head hairs, stomach torment (blended in with milk), gum and teeth torment, eyes expressions of love, skin wounds and contaminations, snake chomp, pregnant lady, liver tumors, anticipation of parched and hungry and to wake up alcoholic man [17]. Camel urine can utilize additionally hostile to cancer-causing specialist, which portrayed tentatively that treatment by colchicines repressed arrangement of c-tumor in *Allium cepa* root tips [18]. From the above expressed realities about the significance of camel milk, urine and seriousness of *S. aureus* and *E. coli* comes the significance of this examination. Along these lines, current examination expected to research relative antimicrobial adequacy of camel milk and urine against some animal pathogenic organisms.

Materials and Methods

The study was carried out in the following phases:

- **Phase I:** The camel urine and milk samples were gotten from neighborhood farm in Al Quwai'yah, Saudi Arabia shipped to lab quickly under complete sterile condition kept in fridge till inspected.
- **Phase II:** A loop full from each urine and milk of camel samples streaked on nutrient agar and MacConkey agar plates incubated at 37°C for 48 - 72hr for assessment of its microbial growth.
- **Phase III:** Microbial culture the pathogenic strains beings utilized for antibacterial effect were *E. coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus spp* and *Candida albicans* strain for antifungal action.

- Phase IV:** The antibacterial test was performed utilizing the agar-well diffusion method [16]. The Muller Hinton agar was arranged and left to cool at 45°C. Agar plates were readied utilizing clean nutrient agar. The bacterial inoculum was equitably spread onto the outside of the agar plates utilizing a sterile cotton swab. Wells were punched in the plates utilizing a clean hardened steel borer. Camel milk and urine examined samples were added to each well. Dispersion of the test was permitted at room temperature for 30 minutes. The agar plates were then incubated at 37°C for 24 hr for bacterial examples and 25°C for 24 hr *Candida albicans*.

Results

Table 1 revealed that the camel milk without boiling have a heavy microbial growth on nutrient agar media however it was free after boiling, since camel urine possesses no microbial growth on nutrient agar media or MacConkey agar without any treatment even after kept for one week in refrigerator which clarified also in figure 1.

Type of specimens	Unboiled camel milk	Boiled camel milk	Camel urine
Microbial growth on nutrient agar	+++	-	-

Table 1: The microbial growth of camel milk and urine on nutrient agar.
 (+++): Heavy Growth; (-): Free Microbial Growth.

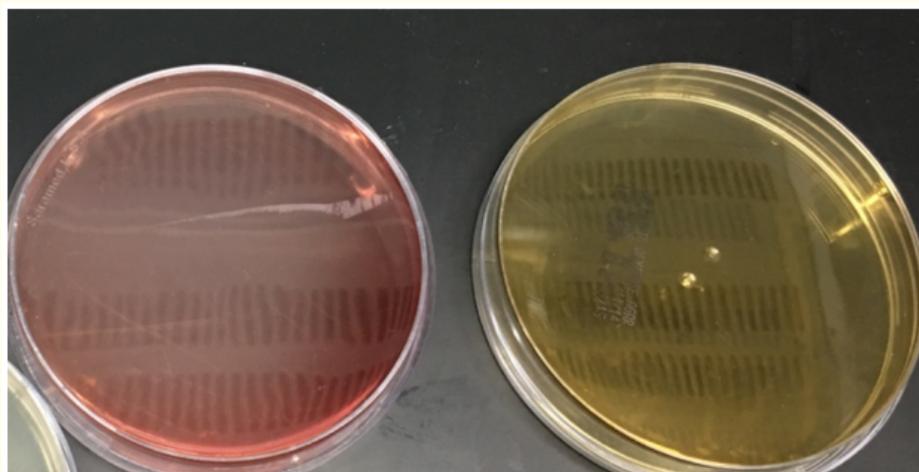


Figure 1: Microbial growth of camel urine on nutrient agar and MacConkey agar.

Table 2 revealed that the highest antimicrobial significance possessed from mixed camel milk and urine against all examined pathogens followed by urine alone followed by boiled milk however unboiled milk possessed antimicrobial significant against only *S. aureus* and *C. albicans*. It has no effect against the examined gram negative bacteria.

Type of samples type of microorganisms	Unboiled milk	Boiled milk	Urine	Mixed milk and Urine	Penicillin	Ciprofloxacin	Nystatin	Distilled water
<i>S. aureus</i>	10	20	23	24	11	28	0	0
<i>E. coli</i>	0	20	21	22	0	20	0	0
<i>C. albicans</i>	11	13	15	17	0	0	16	0
<i>Bacillus</i>	0	10	11	12	12	11	0	0
<i>Pseudomonas</i>	0	15	16	18	0	15	0	0

Table 2: Antimicrobial activity of camel milk and urine against some pathogens in (mm).

Discussion

The boundless use of antibiotics agents has prompted the expanded ecological nearness of microbes; these microorganisms are less powerless to the antibacterial impact. Such obstruction brought about diseases that are increasingly hard to fix. The viability of regular antibiotics medicines against microorganisms, for example, *S. aureus* is low [19]. Penicillin and firmly related antibiotics agents of the β -lactam family are the best weapons against *Staphylococci*. In any case, the monstrous use of these anti-toxins has prompted a sensational increment in microorganisms that can create a protein called β -lactamase that inactivates β -lactam anti-microbials, in this way bringing about microbial opposition [20]. In this way, there is an earnest need to discover new antimicrobials to treat bacterial microorganisms. It is commonly settled that the food constituents can be utilized to decrease the danger of creating or exasperating human ailment conditions. In such manner, utilitarian nourishments and nutraceuticals have risen as adjuvant or option in contrast to chemotherapy particularly in the anticipation and the board of human ailments and for keeping up ideal wellbeing state [21]. Enthusiasm for camel milk utilization for human sustenance is expanding because of its particular creation and remarkable biofunctional properties [22].

Natural substances assume a significant job in our medicinal services framework; treatment with camel pee has no symptoms. Camel urine focused more than ocean water this may allude to pungent plant found in desert that Camels were benefited from in this examination camel pee brings about positive antimicrobial impact on Pathogenic microscopic organisms: *S. aureus*, *Salmonella sp*, *Ps. aeruginosa*, *E. coli* and *E. cloacae*, this is like Ohaj who notice that camel urine had against bacterial, antifungal antiviral, antineoplastic and restorative applications on austere [23].

Also, it could be reasoned that camel urine demonstrated to has an enemy of microbial movement as characteristic and agreeable for utilizing as clinical treatment [24-26]. So, the current examination expected to research relative antimicrobial adequacy of camel milk and urine against some animal pathogenic organisms.

The results in table 1 revealed that the camel milk without boiling have a heavy microbial growth on nutrient agar media however it was free after boiling, since camel urine possesses no microbial growth on nutrient agar media or MacConkey agar without any treatment which clarified also in figure 1.

Table 2 revealed that the highest antimicrobial significance possessed from mixed camel milk and urine against all examined pathogens followed by urine alone followed by boiled milk however unboiled milk possessed antimicrobial significant against only *S. aureus* and *C. albicans*. It has no effect against the examined gram negative bacteria. This is in concurrence with Aisha [27]. This antibacterial movement might be credited to antimicrobial segments of wild plants and searches which camels were benefited from, this clarification concur with numerous specialists who concentrated on an assortment of desert plant like wormwood and its solid impact against microorganisms, yeast and parasites [28].

In this investigation high inhibitory zone (18 mm) of *Ps. aeruginosa* was accounted for, this was significant on the grounds that this microscopic organisms progress destructiveness and have constrained helplessness to antimicrobials, additionally can create protection from antibacterial so expanding protection from various anti-toxins has been accounted for overall [29,31].

Dynamic mixes from plants that camel were benefited from discharged into the urine and increment antimicrobial movement, these desert plants incorporate *Haloxylon aphyllum*, *H. persicum*, *Salsola gemmascens*, *S. orientalis*, *Astragalus*, *Aristida*, *A. pennate*, *Citrullus colocynthis* Schrad, *Acacia ehrenbergiana*, *Dipterygium glaucum*, *Convolvulus hystrix* Vahl, *Rhazya stricta*, *Decne* and *Anabasis setifera* Moq [30,32,33]. Camels spend over 80% of their absolute taking care of time on dicotyledons [32,34], which have more extracellular mixes contrasted with plants eaten by Cattle, Goat and Sheep. Camels likewise brush on assortment of plants including prickly bush, halophytes and sweet-smelling species that evaded by cattles, goats and sheep [35], which guarantees that dynamic mixes, for example, flavonoids, alkaloid and phenolic are discharged in the pee [36-38]. The consequences of hindrance of microorganisms utilizing moved camel pee in our examination were in concurrence with other creators [30,37,38].

A few investigations decided the impact of camel urine on the cells and the outcomes demonstrated the proficient as fixed to the harm cells, including the tumor cells and can be utilized as anticancer and antiplatelet action against ADP - incited operator [39-42].

Kidney, liver and stomach tissues contaminated with *Escherichia coli* in mice recoup with no histopathological impacts after treatment with Camel pee [43].

Camel milk has synergistic activity with anti-microbial ciprofloxacin. These discoveries are in concurrence with that of Diarra, *et al.* [44], which may diminish the portion of anti-infection agents and reduction the bacterial opposition and that is useful for human wellbeing and security. Camel milk diminished the complete bacterial check of *S. aureus* and *E. coli* in all tissues of rodents in camel milk along with microorganism infused rodents contrasted with microbes alone infused rodents. The conceivable clarification of such abatement might be credited to high measures of antimicrobial peptides, for example, Lysozyme (LZ), lactoferrin (LF), lactoperoxidase (LP), short peptidoglycan acknowledgment protein (PGRP) present in camel milk [44-46]. Lysozyme is one of the most universal antibacterial particles that apply wide range antimicrobial activity. It has muramidase action against Gram positive microscopic organisms and *Streptococcus* [47,48].

Conclusion

Current investigation explain that bubbled camel milk and camel urine have antimicrobial impact against pathogenicity actuated by *E. coli* and *S. aureus*, *Bacillus*, *Pseudomonas* and *C. albicans* in animals. In addition, camel milk has synergistic activity with camel urine which might be utilized to lessen the utilization of antibiotics and decrease bacterial antibiotic resistance.

Bibliography

1. Parastoo Karimi Alavijeh, *et al.* "A study of antimicrobial activity of few medicinal herbs". *Asian Journal of Plant Science and Research* 2 (2012): 496-502.
2. Piddock KJV and R Wise. "Mechanism of resistance of quinolones and clinical perspective". *Journal of Antimicrobial Chemotherapy* 23 (1989): 475-483.
3. Singh M., *et al.* "The spectrum of antibiotic resistance in human and veterinary isolates of *E. coli* collected from 1984-1986 in northern India". *Journal of Antimicrobial Chemotherapy* 29 (1992): 159-168.
4. El-Agamy SI., *et al.* "Antibacterial and antiviral activity of camel milk protective proteins". *Journal of Dairy Research* 59 (1992): 169-175.

5. Agrawal RP, *et al.* "Beneficial effect of camel milk in diabetic nephropathy". *Acta Biomedica* 80 (2009): 131-134.
6. EL-Fakharany EM, *et al.* "Anti-infectivity of camel polyclonal antibodies against hepatitis C virus in Huh7.5 hepatoma". *Virology Journal* 201 (2012): 1-9.
7. De Valdez GF, *et al.* "Antimicrobial effect of the lactoperoxydase/thiocyanate/hydrogen peroxide (LP) system on the activity of thermophilic starter culture". *Milchwissenschaft* 43 (1988): 350-352.
8. Kappeler SR, *et al.* "Sequence analysis of camel (*Camelus dromedarius*) lactoferrin". *International Dairy Journal* 82.9 (1999): 481-448.
9. Yagil R. "Camel milk-a review". *International Journal of Animal Science* 2 (1987): 81-99.
10. Korhonen H and Pihlanto A. "Food-derived bioactive peptides opportunities for designing future foods". *Current Pharmaceutical Design* 9 (2001): 1297-1308.
11. Omar RH and Eltinay AH. "Microbial quality of camel's raw milk in central southern region of united Arab Emirates". *Emirates Journal of Food and Agriculture* 20.1 (2008): 76-83.
12. Kappeler SR, *et al.* "Expression of the peptidoglycan recognition protein, PGRP, in the lactating mammary gland". *Journal of Dairy Science* 87 (2004): 2660-2668.
13. Velioglu Oğünç A, *et al.* "Dietary whey supplementation in experimental models of wound healing". *International Journal for Vitamin and Nutrition Research* 78.2 (2008): 70-73.
14. Cimolai N. "MRSA and the environment: implications for comprehensive control measures". *European Journal of Clinical Microbiology and Infectious Diseases* 27.7 (2008): 481-493.
15. Welinder-Olsson C and Kaijser B. "Enterohemorrhagic *Escherichia coli* (EHEC)". *Scandinavian Journal of Infectious Diseases* 37.6-7 (2005): 405-416.
16. Cheesbrough M. "Medical Laboratory Manual for Tropical Countries". Microbiology, Linacre House, Jordan Hill Oxford (2000): 260.
17. Majid A A. "The one-humped Camel (*Camelus dromedaries*). And human health". The 2nd annual conference the faculty of Graduate Studies. University of Khartoum, Friend Ship Hall, Khartoum (2011).
18. Muna E Ahmed, *et al.* "Bacteria Associated with Healthy Sudanese Camels' Urine and Drugs Susceptibility of Some Bacteria of Human Origin to Camel Urine". *The Sudan Journal of Veterinary Research* 23 (2008): 79-82.
19. Wilson P, *et al.* "Linezolid resistance in clinical isolates of *Staphylococcus aureus*". *The Journal of Antimicrobial Chemotherapy* 51 (2003): 186-188.
20. Aarestrup FM and Jensen NE. "Development of penicillin resistance among *Staphylococcus aureus* isolated from bovine mastitis in Denmark and other countries". *Microbial and Drug Resistance* 4 (1998): 247-256.
21. Kris-Etherton PM, *et al.* "Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer". *American Journal of Medicine* 113 (2002): 71-88.
22. Sboui A, *et al.* "Antidiabetic effect of camel milk on alloxan-induced diabetic dogs". *African Journal of Microbiology Research* 6 (2012): 4023-4029.
23. Ohaj HM. "Clinical trial for treatment of ascitis with Camel urine M.Sc. University of the Gezira, Sudan. (1998).
24. AL Awadi A AL Judaib A. "Antimicrobial agents in Camel urine (9B) microbial Viruses 8 (2000): 256-218.

25. Al-Talhi AD and Albashan MM. "Microbiologia and Chemical studies on Camel's urine at Taif City". In the Proceedings of the International Scientific Conference on Camels, Under the Patronage of His royal Highness Prince Sultan Bin Abdulaziz Al-Saud, Part 2, 10-12 May 2006, Ministry of Saudi Arabia, Qassim University, Collage of Agriculture and Veterinary Medicine, Kingdome of Saudi Arabia (2006): 533-522.
26. Munir Mustafa Al-Bashan. "In vitro Assessment of the Antimicrobial Activity and Biochemical Properties of Camel's Urine Against Some Human Pathogenic Microbes (2011): 947-958.
27. Aishea M Ba Hatheg. "Antibacterial Effect of Camel urine on some pathogenic bacteria". *Department of Botany and Microbiology, King Saud University* (2006).
28. Zaki D., et al. "Antimicrobial potentiation of some Egyptian desert plant". *HerbaHungarica* 23 (1984): 73-84.
29. Loureiro MM de Moraes AB. "Mendoca VLF (*Pseudomonas aeruginosa*. study of Anti-biotic resistance and Molecular typing in hospital cases in alveonatal intensive care unit from Rio Janiero Cityll". *Brazil Memories Do Institute O Cruz* 3 (2002): 387-394.
30. Muna EA. "Studies on Sudanese Camel Urine". M.Sc. Thesis Department of Microbiology and Parasitology .Unviresity .of Khartoum (2003).
31. Rutagwenda T., et al. "Dietary preference degradability of forage on a semiarid thornbush savannah by indigenous ruminants Camels and donkeys". *Animal Feed Science and Technology* 31 (1990): 179-192.
32. Al-yahya MA., et al. "Aromatic plants of Saudi Arabia. Part 7: Essential oil of *Plectranthustenuiflorus*". Proceedings sumb. Saudi Arabia. Saudi BiolSoc (Al-Hassa). (1985): 147-153.
33. Mukasa-M E. "The Camel (*Camelus dromedairus*), a bibioraphical review". The International Live Stock for Africa. ILCA Monograph. No 5 Addis Ababa (1981).
34. Iqbal A and Khan BB. "Feeding Behavior of Camel, Review". *Pakistan Journal of Agricultural Sciences* 38 (2001): 58-63.
35. Murthy GS and Bagyaraj DJ. "Falvonol and alkaloid content of pigeon pea cultivars resistance and susceptible to fusariumadum". *Indian Phytopathology* 33 (1981): 633-634.
36. Tsankova ET., et al. "Xanthanolides of *Xanthium italicum* Moretti and their biological activity". *Z Naturforsch C* 49 (1994): 154-155.
37. Ahlam Al-Awadi and Awatif Al-Judaibi. "Effect of Heating and Storage on Antifungal Activity of Camel urine Department Biological Science, Microbiology Section, King Abdalaziz Univercity, Jeddah, KSA, Saudi Arabia (2014).
38. Abed-rahman A Humaid. "Antagonistic effect of camel urine on some pathogenic bacteria species". Department of Biology, Faculty of science, Sanaa, University. Sanaa, Yemen (2016).
39. Muhammad AM. "A study of the chemical composition and some medical uses of the urine of Arabian camels, Al-Jazeera university thesis (1998).
40. Al-Yousef N., et al. "Camel Urine components Display anticancer properties In Vitro". *Journal of Ethnopharmacology* 143 (2012): 819-825.
41. EL-ELYaniRAA and Kalifa SAM. "Histological Studies on the effect of Camels Urine-and Milk on stomach of Albino Mice". *Saudi Journal of Biological Sciences* 13 (2006): 2.
42. Alhaindar A., et al. *The Journal of Alternative and Complementary Medicine* 17 (2011): 803-808.

43. Khalifa S., *et al.* "Histological, Cyto logical and Histochemical Studies on effect of Camel urine on liver of Rabbits infected By Escherichia coli". *Saudi Journal of Biological Sciences* 12 (2005): 66-80.
44. El-Agamy EI., *et al.* "Purification and characterization of lactoferrin, lactoperoxidase, lysozyme and immunoglobulins from camel's milk". *International Dairy Journal* 6 (1996): 129-145.
45. Benkerroum N., *et al.* "Antimicrobial activity of camel's milk against pathogenic strains of Escherichia coli and Listeria monocytogenes". *International Journal Dairy Technology* 57 (2008): 39-43.
46. Abbas S., *et al.* "Physico-chemical analysis and composition of camel milk". *International Research* 2.2 (2013): 85-98.
47. Mwambete KD. "The *In vitro* antimicrobial activity of fruit and leaf crude extracts of Momordica charantia: a Tanzania medicinal plant". *African Health Science* 9.1 (2009): 34-39.
48. Narmadha G., *et al.* "Characterization of a novel lysozyme-like 4 gene in the rat". *PLoS ONE* 6.11 (2011): E27659-E27659.

Volume 5 Issue 9 September 2020

©All rights reserved by Rehab Mohamed Atta El-Desoukey, *et al.*