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University of Diyala
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Isolation and Identification of Bacterial Causes of Urinary Tract Infections and their Relation to Physical and Chemical Characters of Urine in Human and Sheep in Diyala Province

A Thesis

Submitted to the Council of the College of Veterinary Medicine, University of Diyala, in Partial Fulfillment of the Requirements for the Degree of Master of Science in Internal and Preventive Veterinary Medicine - Zoonosis

By

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وَإِنَّ لَكُمْ فِي الْأَنْعَامِ لَعِبْرَةً نُسْقِيكُمْ مِمَّا فِي بُطُونِهَا وَلَكُمْ فِيهَا مَنَافِعُ كَثِيرَةٌ وَمِنْهَا تَأْكُلُونَ

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Dedication

To the owner of the first and last credit, the guide to the right path... ***Allah*** **Almighty**

*To whom my eyes rejoice with his visions, and my heart rejoices with his secrets (**Sheikh Dr. Mahmoud Sheikh Younis Al-Tai**)*

To those who raised me on the love of science when I was young, and God fulfilled their dream when I was old...
*(**My dear parents**)*

*To those who calm me down by meeting them, and the gaps smile at their faces... (**My wife and children**)*

*To those who are for my heart my joy and for my life the best of people (**brothers and sisters**)*

To the sincere hands that helped me... ***My dear professors***

To everyone who spared effort to help me

Dedicate this message

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Summary

The current study was conducted to evaluate the specific value of physical and chemical characteristics in addition to the microscopical examination of urine sediment and study the common bacteria in urine of human and sheep. Therefore 300 urine samples were collected (150 for each human and sheep) (75 male and 75 female) from the urinary bladder of sheep and from midstream of human urine, from June, 2019 – May, 2020. The result of physical and chemical examination of urine samples in both human and sheep (Bacterial non infected), reported no change in the physical and chemical value . While in urine samples (human and sheep) from which the bacteria were infected showed changes in all physical parameters value (colour, transparency, foam, specific gravity) of urine, So the chemical examination of the samples (human and sheep both male and female) appear an increase in PH of urine while the examination of protein showed positive results. Also, revealed positive result for blood examination. On the other hand, all the samples showed positive result for ketone bodies examination. The results of examination of urine sediment revealed high number of the epithelial cells, pus cell, red blood cells (RBCs) and Cast in addition to Bacteria. The result of urine sample culture, in human the total isolated bacteria were 80 (53.3%) in which (35) isolates from males (45) isolates from females with different species of bacteria which included (12) *Escherichia coli*, (3)*Staphylococcus Haemolyticus*, (4) for each of these bacteria: *Klebsiella pneumoniae*, *Psudomonas aeroginosa*, *Proteus mirabilis* and *Staphylococcus aureus*, one isolated for each of the next bacteria: *Pantonae spp , Sphingomonas paucimobilis , Gamella bergeri , Staphylococcus Kloosii* .

In female there were (19) *E. coli*, (3) for *Psudomonas aeroginosa* and *Proteus mirabilis* , (5) *Staphylococcus Haemolyticus*, and (6) *Klebsiella*

pneumoniae, (2) *Staphylococcus aureus*,(1) for each of the these bacteria: *Streptococcus agalactiae , Acinatobacter Baumannii complex , Kocuria Kiristinae , Staphylococcus sciuri , Vibiro Fluvialis , Enterococcus faecalis , Serratia marcescens* .

Generally, the bacterial isolation in human were at the following percentage for each bacteria, *Escherichia coli* (38.7%) , (12.5 %) *Klebsiella pneumoniae*, (8%) *Staphylococcus Haemolyticus* and for each of *Psudomonas aeroginosa, Proteus mirabilis* were (8.7%).

While from sheep samples 90 (60%), isolated positive (42 for male and 48 for female) for bacterial isolation, in male were(29) *E. coli*, (6) *Staphylococcus aureus*, (3) for *Proteus mirabilis* , (2) for each of *Klebisella pneumoniae* and *Psudomonas aeroginosa*, and,while in female, (34) *Escherichia coli*, (4) for each of *Klebsela pneumoniae* and *Staphylococcus aureus*, (3) for each of *Psudomonas aeroginosa* and *Proteus mirabilis*. Generally, the bacterial isolation in sheep were at the following percentage for each bacteria, (70%) for *Escherichia coli* , (11.1 %) *Staphylococcus aureus* , (6.6 %) for each of *Klebsiella pneumoniae* and *Proteus mirabilis* and (5.5%) for *Pseudomonas aeruginosa*. It is clear that *E. coli* bacteria were the most common zoonotic bacteria in both human and sheep urine samples. The sensitivity test results showed that all isolates were resistant to Clindamycin, Cloxacillin and Piperacillin. While to Cefixime, all isolates were resisted, except *Klebsiella pneumoniae*. But to Amoxicillin and Metropene, all were resistant, except *Pseudomonas aeroginosa*, while Vancomycin only Staphylococcus was sensitive, Metronidazole all isolated resistant except *Pseudomonas aeroginosa* were sensitive. In the end, this study is the first study in Diyala province that investigated important bacteria in both human and sheep urine.

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List of abbreviations

Aberrations	Key or full name
ANOVA	Analysis of Variance
B cells	B lymphocyte
CFU	Colony Forming Unit
EMB	Eosin Methylene Blue Agar
EFSA	European Food Safety Authority
GIT	Gastrointestinal Tract
Gm	Gram
H2S	Hydrogen Sulphate
IND	Indol Test
ID	Infective Dose
Mac	MacConkey Agar
MSA	Mannitol Salt Agar
MLNS	Mesenteric Lymph Node
μm	Micromole
Mg	Milligram
Ml	Mole
(SPC)	Standard Plate Count
T cells	T lymphocyte
CDC	Centers for Disease Control
SSA	Sulfo salicyclic acid
MA	Microalbuminuria
RPM	Revolutions per minute
HIV	Human Immunodeficiency Virus
UPEC	Uropathogenic E. coli

Chapter one
Introduction

1.1. Introduction

Urinary Tract Infection (UTI) is one of the most common bacterial infections encountered by clinicians in developing countries .there is a compromise of host defense mechanisms and a virulent microbe adheres, multiplies, and persists in a portion of the urinary tract. Host defenses include normal micturition, anatomic structures, the mucosal barrier, properties of urine, and systemic immunocompetence (Chew *et al* ,. 2020)

Most commonly UTIs are caused by bacteria, but fungi and viruses also may infect the urinary tract.. Most bacterial UTI occur as a consequence of ascending migration of pathogens through the genital tract and urethra to the bladder, ureters, and one or both kidneys. Rectal, perineal, and genital bacteria serve as the principal reservoirs for infection(Olin and Bartges , 2015) .

Urinary tract infections (UTIs) are among the most common infectious diseases worldwide but are significantly understudied. Uropathogenic *Escherichia coli* (*E-coli*) (UPEC) accounts for a significant proportion of UTI, but a large number of other species can infect the urinary tract, each of which will have unique host-pathogen interactions with the bladder environment. Given the substantial economic burden of UTI and its increasing antibiotic resistance (Murray *et al*.,2021).

Although UTI may leads to complications, it can cause significant morbidity and mortality particularly when recurrent (Abou Heidar *et al*.,

2019). It is estimated that 150 million cases of UTI occur on a global basis per year resulting in more than 6 billion dollars in direct health care expenditure (Guy's and Thomas, 2004). Infections of the urinary tract are the second most common type of infection in humans. The variation of illnesses are quite wide ranging from asymptomatic bacteriuria to symptomatic urinary tract infections that spread to the blood causing complications such as shock and even death (Kline and Lewis, 2016).

Urinalysis is a remarkable tool that can reveal many of diseases that could go unnoticed and undiagnosed because they generally do not produce striking signs or symptoms. For examples include diabetes mellitus, various forms of glomerulonephritis, and chronic urinary tract infections. Observing the colour, transparency, microscopic , and chemical characteristics of urine and urinary sediments coupled with microbial culture and sensitivity test is likely to identify majority of the lower urinary tract disorders in domestic animals (Parrah *et al*.,2013).

Urinalysis though being a readily available and an inexpensive tool for the diagnosis and management of numerous urinary tract abnormalities, it is still a much neglected facet in veterinary medicine (Feather et.al. 2020).

1.2. Aims of the Study

1- Study the physical and chemical parameters of urine from human and sheep.

2- Isolation and identification of most important zoonotic bacteria in urine of human and sheep.

3- Study the correlation between physical and chemical parameters with bacterial isolation .

4- Study of sensitivity tests of antibiotic to isolated bacteria.