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## **Serologic Study of Middle East Respiratory Syndrome (MERS) Corona Virus in Human and camels**

A Thesis

Submitted to the College of Veterinary Medicine-University of  
Diyala in as Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Veterinary Microbiology

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# **Chapter One**

## **Introduction**

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### Introduction

#### 1.1. Introduction:

It is well known that one of the zoonotic transmission coronaviruses was causing a disease known as Middle East Respiratory Syndrome and this disease was reported for the first time in Saudi Arabia 2012 (Chen *et al.*, 2017). This virus can be transmitted from dromedary camels to the human (Adney *et al.*, 2014; Muhairi *et al.*, 2016).

The available data mentioned that the occurrence of the disease was in 27 countries and the largest outbreak was occur out side KSA to the South Korean peninsula in 2015 (Chen *et al.*, 2017; Al Hammadi *et al.*, 2015; Muhairi *et al.*, 2016; Mohd *et al.*, 2016).

Many studies suggested that MERS-COV was originated from bats infection (Mohd *et al.*, 2016). Furthermore the data strongly confirmed that this type of corona viruses which came from the lines of the bats then undergone to a recombination incident in the spike protein possibly in camels of Africa prior to its export to the Arabian Peninsula along the camel trade routes (Younan *et al.*, 2016). Additionally, the bats can act as an effective reservoir for this virus in addition to camels that seemed to be the special animal host responsible for transmission the infection to human (Mohd *et al.*, 2016; Muhairi *et al.*, 2016).

It should be noted that the serological evidence of antibody documentation for this type of corona virus was very elevated up to 100% in camels in the Arabian Peninsula as well as in many other African and Asian countries (Meyer *et al.*, 2014; Omrani *et al.*, 2015; Ali *et al.*, 2017; Miguel *et al.*, 2017; Saqib *et al.*, 2017).

This virus invades the juvenile camels below one year of age and the positivity rate of serological antibodies becomes higher with advancing age with possibility of reaching to 100% in adult camels (Van Doremalen *et al.*, 2017; Wernery *et al.*, 2017). In Pakistan and UAE neutralizing Abs against this virus was noticed in dromedaries (39 %, 97 %) respectively and documenting significant expansion of the enzootic range to Asia (Saqib *et al.*, 2017). Also higher RNA level was identified in camels from Ethiopia (16%), Burkina Faso (12 %), and Morocco (8%) (Miguel *et al.*, 2017; Meyer *et al.*, 2014).

In human, this virus affected the lower tract of respiratory system that lead to many problems such as inhalation complications, respiratory inflammations, respiratory failure, multiple organic failure and finally death in 20 - 40 % that are increased by age; also this virus was identified in persons with slight illness, flu like disturbances and in persons without any symptoms (Mackay and Arden, 2015; Al Hammadi *et al.*, 2015; Alsaifi *et al.*, 2016).

The median incubation period of the virus was 5.2 days (Alraddadi *et al.*, 2016). Among other reported risk factors is the workers in healthcare centers who were highly exposed to this virus when compared to infection of individuals whom were in contact with camels (Muller *et al.*, 2015; Mackay and Arden, 2015).

**1.2. Aims of study:**

1. Detecting the MERS-CoV infection rate among Iraqi dromedary camels and to figuring out its risk factors.
2. Detecting the MERS-CoV sero-positivity rate among human population and exploring its relevant factors.

## Summary

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### Summary:

The study was conducted through the period from October first 2016 to February 28<sup>th</sup>, 2017. The human subjects were included 90 serum samples and they were subdivided into 3 groups; 40 persons who had close contact with camels, 20 persons were normal healthy individuals and 30 persons who had visited Kingdom of Saudia Arabia for Hajj or Umrah, 34 (37.8%) were female and 56 (62.2%) were male and the age range was 22-59 years. Similarly, 90 serum samples from dromedary camels were also included, 50 (55.6%) males and 40 (44.4%) were females and the age range of camels was 3 months to 15 years. Serum samples from subjects were collected and tested for the presence of anti-MERS-CoV, IgG using the recombivirus human and camels anti-MERS-CoV spike protein S1 domain IgG indirect ELISA kits.

The anti Middle East Respiratory Syndrome Coronavirus IgG titer (U/ml) among human 46 (51.1%) were positive with 95% confidence interval for prevalence rate (40.9 - 61.3), but the different was statistically insignificant (**P= 0.88**), also the IgG titer among human contacts (including owners and slaughter house workers) was 27.5%, so the different was statistically insignificant (**P= 0.88**).

In addition, human IgG titer for MERS-COV was high among females compared to males, therefore the sex difference was statistically significant (**P < 0.004**), and human IgG titer for MERS-COV was very high (70%) among pilgrims from Alkhalis city in diayla province, while the least IgG titer for MERS-COV titer (27.5%) was among workers of slaughter house in Al-Najaf province, therefore the difference was statistically significant too (**P<0.001**).

## Summary

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In human IgG titer for MERS-COV was high among samples collected during January (75%), while the least IgG titer for MERS-COV was found among samples collected during October (40%), so the difference was statistically significant (**P =0.013**).

In regards symptoms of human, persons without symptoms had higher serum IgG titer for MERS-COV, while those showing one or more symptoms had lower IgG titer for MERS-COV, so the absence of clinical symptoms was significantly associated with high serum IgG titer (**P =0.003**). Also the flu-like symptoms were found to be highly associated with an increased serum IgG titer, so that the flu-like symptoms in comparison with negative flu-like symptoms was statistically significant (**P =0.001**).

Of note that the IgG titer for MERS-COV among dromedaries camels 81 (90.0%) were positive with 95% confidence interval for prevalence rate was (82.5 - 94.9), so the difference was high statistically significant (**P < 0.001**). In addition the highest IgG titer for MERS-COV among dromedary camels were in the age group 10-15 years (91.9%), followed by the age group less than 5 years and 5-9 years (88.9 % and 88.6%) respectively, but the difference was statistically insignificant (**P= 0.88**).

### **Conclusions:**

The high IgG titer against MERS-CoV were in persons whom visited Kingdom of Saudi Arabia for Hajj or Umrah and in dromedaries camels, this indicate the presence of MERS-COV in Iraq.