Review Article

Update on Middle East respiratory syndrome corona virus epidemiology, diagnosis and management

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Abstract

In the mid of 2012, Middle East respiratory syndrome otherwise termed as, corona virus (MERS-CoV) emerged among the leading serious infection within the peninsula region with chances of transmission to the most parts of the world. The greatest infection was first confirmed in the Northern part of Saudi Arabia where 50 deaths were experienced and 80 ceases of illness were reported. Apart from the reported cases, possible laboratory reports confirmed that such a compulsory sequence of infection is mainly transmitted through Carmel and bats. While there is no specific cure for corona virus (MERS-CoV), International health governing authorities such as world health organization and the Pan American Health organization (PAHO) have placed recommendations to healthcare institutions of different countries to provide relevant information with regard to preventive measures of the disease. Such has been brought amid skepticism that the disease has no cure. Therefore, regulating prevalence rate of MERS-CoV through means such; as environmental engineering controls, administrative measures and immediate isolation of the infected patients, plays best to curb the rate of infection.

Key words: Middle East Respiratory Syndrome, Corona virus, MERS-CoV, Epidemiology.

Introduction

CDC world health organizations WHO together with other healthcare bodies falling under the European Union and united Arabs emirates believe that countries who are partisans to the treaty should be furnished with adequate information about Middle East respiratory syndrome (MERS) [1]. In light with the presence of such a disease in the peninsular region, all governments of the member countries have been asked to ensure that they avail to healthcare practitioners with relevant information about the infection such as the procedure for handling an infected patient, travel history or any other previous treatment information [2]. Despite the fact that epidemiology of (MERS) seems disastrous to these countries, the CDC and world health organization's do not advise on screening of passengers along the border points or to impose a travel ban among some of the countries deemed to be associated with the infection [3]. Therefore, this paper looks into the relevant information about the Middle East Respiratory Syndrome Corona virus Epidemiology, Diagnosis and Management.

The paper studies about the need for testing and what is being done to furnish the concerned parties with enough information about the latest trend of MERS [4].

While other scholars have made a publication of similar kind in the past, it is still found necessary to continually do the same because the level of infection caused by the virus has always been in the rise due to human-animal interaction in the region [5]. Therefore, possible recommendation with regard to consistent update is quite necessary since it gives a leeway to diagnostic and preventive measures [6,7]. First, the latest information about the MERS was brought into public by the WHO in late December 2013 as a confirmation of the infection as a pandemic in the Middle East [8]. In addition, the laboratory report published by the Pan American Health Organizations also pointed out that the escalation of infection is enhanced by movement

Manuscript received: 12th Dec 2015
Reviewed: 23rd Dec 2015
Author Corrected: 06th Jan 2016
Accepted for Publication: 17th Jan 2016

among countries within the United Arabs Emirates (UAE).

Some of such countries include Dubai, Oman, Qatar, Kuwait and lately Lebanon and Iran [10]. However, there is no specific country that has been identified in the report to have topped highest with the level of infection since the residences of such countries often interact to each other on different platforms [11]. To a smaller level, the presence of the diseases was felt in the United States in early 2014 when two of the US journalists from Saudi Arabia showed the symptom of the MERS virus [12]. On the contrary, no further cases of the same have been reported yet in the United States thereafter [13, 14]. Secondly, despite the level of surveillance that has been implemented in some of such countries, majority as many as 500 people have still reported positive of the virus in over 40 countries [15, 16]. From a report by the WHO, it has been observed that the level of infection was much higher between mid-2013 and late 2014 [17]. Moreover, much more information about the disease was received up early 2015 within Saudi Arabia [18]. With reference to cases confirmed in 2015 alone, [19] it can be pointed out that the presence of the infection is still very imminent in the Middle Eastern region and a lot of measures are still needed to curb its escalation [20].

Observation Objective of MERS-CoV infection: With the availability of an opportunity to achieve a mitigating effort of MERS-CoV infection [21], all health representatives in different countries should develop commitment to control the prevalence rate [22, 23]. The following are some of the mitigating effort that has been employed to control the prevalence of the disease:

1. Employment of early detection mechanism of the virus within the region within peninsular countries [24].
2. Closer monitoring of the infected persons and the geographical region to deter increases of prevalence [25].
3. Determine and implement new preventive measures to prevent the epidemiology, the development cycle and the morbidity of an affected region [26].
4. The relevant healthcare authorities should be furnished with relevant and timely information so that they can similarly do the same to the society [27, 28].

Suspension/ shadowing of the MERS virus: As part of a future mitigation effort against the disease, the WHO organization launched a forum in January 2015 in Riyadh to discuss possible measures that can be incorporated to prevent continued prevalence of MERS infection in the Middle East [29]. Part of the information that was discussed during the forum and the report compiled was to be used as part of the recommendation to review c the extent of prevalence [30,31]. Moreover, laboratory reports from different countries were presented during the discussion and recommendations concerning the results were given [32]. As a matter of concerns, reports that had been discussed in a previous meeting held in France were revised to ascertain possible relationship between the MERS and human relationship [33, 34].

It was discovered that MERS is closely related to a Carmel diseases and there is more likeliness that it is promoted the trade in camel products that is mostly common in the region [35-39]. Therefore, there is a need to establish a temporary institution to gather more information concerning the prevalence of MERS [40].

The CDC together with the world health organization recommends that laboratory centers to engage in tests be put in place. Such centers will be empowered to investigate about camels products and recommend on the relevance between the products and the MERS infection [41]. Moreover, the WHO organizations advised that partisan countries to improve their surveillance and institute a preventive measure to dealing with the chances of emergency occurrence [42]. As a consequent, health practitioners should be exposed on symptoms of the diseases as this would give them easy time to investigate about the patients travel history and the suspected infection as pointed out in Bioinformatics and Functional Genomics (p56-74) [43].

The Criteria for Investigation: Pointing from the previous results and what has been discussed by other scholars about the disease, epidemiological investigation and laboratory testing are recommended. However, the following are some of the possible criteria of what should be incorporated through the process of investigation [44].

If a person shows signs of severity for respiratory syndrome lasting more than 2 weeks or if the patient may have had a previous contact with a patient of MERS victim then he requires tests. While developing such symptoms is not an automatic indication of an infection; it would help in reducing the sample size of those whom should be tested [45]. A patient with clinical syndrome associated with MERS, for which he may be suspected of MERS respiratory disease [46].

However, such must also be supported with a duration lasting for more than 2 weeks from which the suspicion was e first noted [36, 37].

The Virus Associated With MERS Infection: Middle East respiratory syndrome corona virus otherwise termed as the (MERS- CoV) falls under the class of infection termed as beta corona virus. Such is a very unique virus since it does fall among human causing virus yet it causes infection to human beings. Another possible confusing fact is that Middle East respiratory syndrome virus has much more relationship to corona viruses causing organism in bats. Never the less, it is characterized by a Dipeptidyl peptidase (DPP4) that is transmitted through human cells into the receptor. The potentiality of the virus to transmit itself through the conciliated bronchial epithelial cells makes it more adaptable for infection in human [69]. As a result, the virus is able to harbor itself within the protein consequent and obtain a cyst making it very difficult to die.The susceptibility of MERS infection is found in a number of human cells located various body organs such as the colon, kidney and liver among others [67]. The rate at which the virus multiplies in such organs is promoted by the conducive-environment exhibited by cells in those organs. Results have also confirmed that the tropic cycle of the virus is much broader than any other human corona virus that increases its level of growth [61]. Possible enough; the virus is adaptable to human bronchial cells that also promote the rate of infection. Ultimately, it has also been confirmed that the virus also attacks other animals such as monkey, rabbit and donkey among others apart from human [64]. Worst of all, corona virus can transforms into greater species at the vivo infection stage [62].

MERS Topological Distribution: As from early 2012, the infection of East respiratory syndrome virus had been confirmed in the Middle Eastern region of the world by the world health organization [63]. Moreover, other possible reports also confirmed a similar infection most especially among the countries falling within the Arabian Peninsula. While MERS infection has been felt in different countries within the same region, high rate of prevalence has been felt within Saudi Arabia-(figure 1). However, similar cases, but to a lower capacity have been felt in other countries such as Africa Europe or Asia [60]. However, cases report outside the prevalent regions are said to be from patients who may have had a previous contact with an infected person or maybe after having traveled from such infected regions [70]. Due to consistent reports of the same infection within Saudi Arabia till late 2014, MERS was classified as one of the most dangerous diseases in peninsular region [59]. However, the non-explicative nature of the virus has made it more neutral affecting other countries outside the region. The teropoligical nature of this disease has made it to be classified as not only infectious, but also simultaneous in regions that are perceived predominant [71].

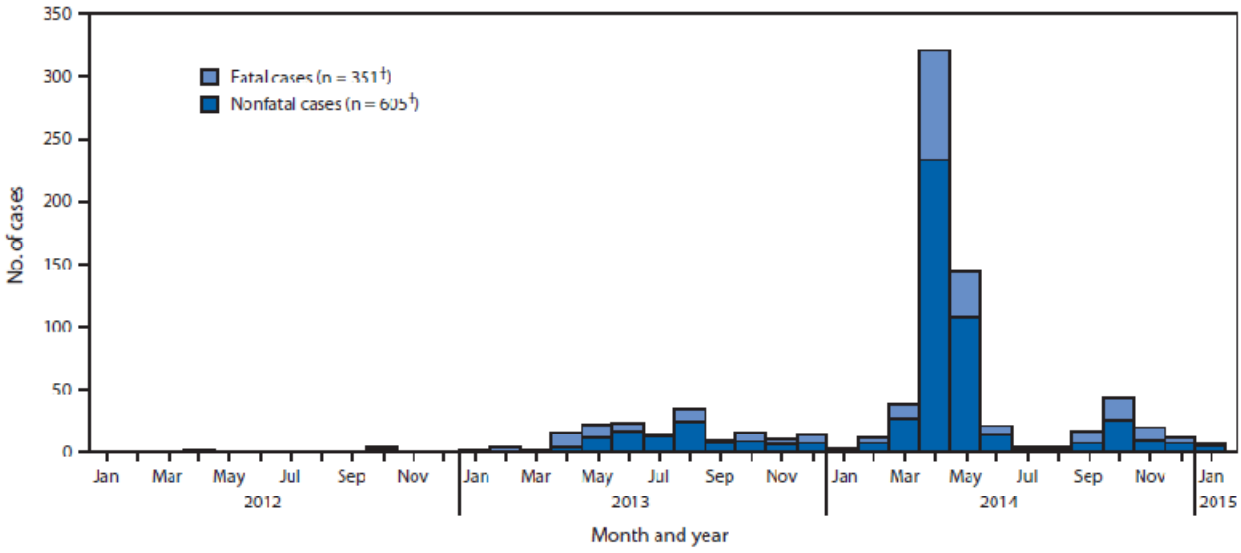

Figure 1: Cases of Middle East respiratory syndrome within Saudi Arabia between 2012-2015

Epidemiological Transmission Mode: A good number of MRS cases that have since been experienced in both eastern and southern part of Saudi Arabia and its environment have been acquired from unknown source [73]. However, the WHO confirmed that the suspicion from a zoonotic transmission in the peninsular region and Yemen. Bats and viruses:

From pathogen discovery to host genomics (P-42) reports that a possible transmission mode of the virus is unclear, but 80% of infections confirmed are through Carmel. For instance, in a laboratory test of 12 infected patients, it found that the victims may have had a previous contact with the Carmel [74]. Therefore; Carmel is a fumitory evidence or asymptomatic mode for MERS transmission. Moreover, 54% of patients who had such relationships remained positive for the viral infection especially their upper respiratory track [44]. Additionally, a case of infection that was found to have been reported in Jeddah in June 2013 showed that the asymptomatic patient was a Carmel farmer in Riyadh [45]. However, the transmission level was low since the person in question experienced a lower level of infection since he had very minimal interaction to the public.

Table 1: Confirmed MERS cases in Oman by age and sex, March 2012–25 September 2012

	Male		Female		
Age (years)	**Dead**	**Total**	**dead**	**Total**	**Total number of cases**
10 to 19	0	3	1	5	8
20 to 29	0	4	0	8	12
30 to 39	0	2	4	2	4
40 to 49	0	7	5	6	13
50 to 59	2	9	3	2	11
60to 69	2	11	7	0	11
70 to 79	5	8	14	4	12
80 to 89	0	5	12	3	8
90 to 99	12	2	5	1	3
Case fatality	24%		54%		

Bats: Another possible mode MERS virus transmission is through bats. Most laboratory researches have confirmed bat as a possible mode of transmission continents such as Africa, Europe and the Middle East. In early October 2012, samples collected by the ministry of health within Saudi Arabia confirmed possible infection of MERS virus [46]. Besides, the CDC working in conjunction with the University of Colombia also confirmed the same out of an investigation where patients from a case family were interviewed in Bishah [47, 48]. Moreover, another research sample conducted in Lebanon tested positive results of corona virus RNA virus with others not showing exact, but possible traits of virus.

In Oman, fecal and rectal swab samples gathered from the government healthcare training center for infectious diseases tested positive of corona virus infection [49]. Nevertheless, the level of fecal pellets though not much, but has since gained gradual development in areas where bats commonly share dwelling units with human being [50]. Critical information towards accurate evaluation of the disease transmission through bats has confirmed a direct and sequential epidemic potentiality amongst bats. In essence, a man-aged 46 years who was admitted at a hospital in Jeddah showed that the man had a habitual relationship with bats that were associated with nasal discharge right ahead before the patient's admission [51].

Camels: From most of the statistics collected, it is noted with deep concerns that that camels acts as horde for MERS-CoV infection. Some of the strongest evidence has been found within Saudi Arabia. For instance, a man who had been previously admitted under intensive care unit was found to have had a previous physical contact with a Carmel. Therefore, it can be confirmed that there is a genome sequence demonstrated by the virus both in men and animals**.**

Infection Prevention and Control in Health Care: As per the recommendations of the world health organizations, there is need for countries that are prone to infection to apply preventive measures to tame the prevalence of infection [58]. As part of a major concern, guidelines for possible prevention have been acknowledge through screening of the infected patients and probable measure be taken [52]. Up to date, medical researchers have not developed any specific clinical preventive method for MERS infection. None

the less, possible control mechanism such as travel advisory has been created to curb a continued escalation of the virus menace [59]. Besides, the world health organization recommended that patients with acute respiratory syndrome be placed on convalescent plasma or be given antibody additives to protect people from further respiratory infection. In early 2014, a forum was convened by the international network of clinical experts who recommended that more vaccines be developed e to mitigate a continued menace [53]. As a result international standard principles were developed with objectives much similar to the ones that were used to curb the menace of avian flu [54].

Screening is recommended as the first method targeting to eliminate infected patients from the rest [55]. Therefore, amplification should be provided supported with a deep nucleic extraction to confirm a real case of infection [56]. Such a procedure have since been used in Dubai and Saudi Arabia where over 50% of the nucleic generated components of the suspected victims have turned positive of infection [57]. From a nucleic acid generated from over 200 samples mixed with aspirate will definitely give a confirmation of a disease infection [7].

Conclusion

Middle East respiratory syndrome corona virus (MERS-CoV) causing severe respiratory distress emerged in 2012 in Saudi Arabia**.** There is currently no treatment recommended for corona virus infections except for supportive care as needed. There is no licensed vaccine for MERS-CoV.

Funding: Nil, **Conflict of interest:** None.
Permission of IRB: Yes

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How to cite this article?

Al-Ghamdi S. Update on Middle East respiratory syndrome corona virus epidemiology, diagnosis and management. *Int J Med Res Rev* 2016;4(1): 104-112. doi: 10.17511/ijmrr.2016.i01.016.

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