Research Article

Preliminary Epidemiological Investigation of SARS-CoV-2 and Risk Factors Associated with Infection in Tarhouna, Libya

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Background: During the last couple of years, the emerging and re-emerging viral diseases have been spilled over and were considered of great international concern, Severe Acute Respiratory Syndrome (SARS), Middle Eastern Respiratory Syndrome Corona virus (MERS-CoV), Ebola virus disease and Severe Acute Respiratory distress Syndrome (SARS-CoV-2). SARS-CoV-2, the virus that causes corona virus disease 2019 (COVID-19), has spread rapidly around the world since emerging in Wuhan, China, in late 2019.

Objectives: The study was conducted to investigate the epidemiological situation of COVID-19 and risk factors associated with SRAS-CoV-2 infection in Tarhouna city.

Materials and Methods: The cross-sectional study was conducted to investigate the epidemiological situation of COVID-19 and study the risk factors (age, gender, history of contact and comorbidity condition) associated with infection in the city of Tarhouna from December 2020 to Jan 2021. All data were entered into the Microsoft Excel spreadsheet and coded for analysis. Influence of variables like age, gender, comorbidity and history of contact on infection was calculated. A descriptive statistical analysis was performed to analyze the epidemiological characteristics of the confirmed cases of COVID-19 using SPSS version 22. For each proportion the percent and 95% confidence interval (CI) were calculated. Chi square test was used to investigate the level of association among variables at the significance level of $p<0.05$.

Results: The present study reported 540 confirmed cases of COVID-19 screened by RT.PCR. The result showed the statistical significant (.001) at $p < 0.05$ among four age categories (≤19 year 5.50%, 20-39 year 42.41%, 40-59 year 48.30% and ≥60 year 4.62%). Significantly (P=.04), the gender influence on infection rate of SARS-CoV-2 amongst target population. The infection rate was estimated to be 70.74% (95% CI: 66.90%-4.58%) and 29.50% (95% CI: 25.42%-33.10%) in male and female respectively. Our results reported no statistical difference (P=.09) among comorbidity and non-comorbidity cases. It well known that the comorbidities patients are considered most risk group. Comparatively, the infection was found to be higher in history contact 92.7% (95% CI: 90.59%-94.96%) than non-contact 7.2% (95% CI: 5.04%-9.41%). unexpectedly, the infection was estimated to be 72.59% (95% CI: 68.83%-76.35%) and 27.27% (95% CI: 23.65%-31.17%) among asymptomatic and symptomatic patients respectively.

Conclusion: This study is the first in the city of Tarhuona to provide information on epidemiological characterization of COVID pandemic in this city. The study emphasizes the significant effects of older age, male gender and underling diseases on the risk of mortality among COVID-19 patients. In spite, we excluded risk factors that constituted laboratory findings, vital signs or symptoms and silent cases of COVID-19, clearly that, asymptomatic cases could be underestimated. Therefore, it is recommended to take preventative measures more seriously in the elderly patients, and asymptomatic cases that play a potential silent role in COVID-19 epidemiology, and larger scale studies are highly recommended to investigate deeply the epidemiology of this virus among Libyan population.

1. Introduction

Corona viruses (CoVs) have been well known since first identified many years ago as primarily zoonotic pathogens and causative of diverse animal illnesses. However, in the 1960s, CoVs were capable of causing human illness usually consistent with self-limiting respiratory infections in humans [1]. In recent years newly identified human pathogen CoVs have caused three significant global outbreaks since 2003. The first of these was Severe Acute Respiratory Syndrome (SARS) which was emerged in 2003 in Hong Kong and Toronto. The second was Middle Eastern Respiratory Syndrome Corona virus (MERS-CoV), and that was mostly localized in the Middle East, although cases well beyond that region were diagnosed. The third is Severe Acute Distress Respiratory Syndrome (SARS-CoV-2) in December 2019 and was named Corona virus Disease-19 (COVID-19), and still of great public

health emergency of international concern (PHEIC) [2, 3]. COVID-19, emerged in China when several cases of acute respiratory distress syndrome (ARDS) were reported in Wuhan City, China with unknown etiology [4]. Early epidemiological investigation revealed that these cases were linked to a local wet market (seafood markets, live animal markets) a common commercial source of food in China [5, 4], and therefore, the results suggested that an unknown zoonotic transmission, and ultimately human to human propagation of infection with SARS have long been confirmed [6]. Further research identified the virus as a newly discovered human corona virus, SARS 2 known as COVID-19. Soon after, it became clear COVID-19 is transmitted person to person [6]. With a population of eleven million people, Wuhan City became the epicentre for the resulting COVID-19 outbreak and finally starting point for the global pandemic [7]. Subsequently, led to a substantial increase in cases since December 2019, and until, writing this paper, according to World Health Organization (WHO) data, there have been approximately of 169,597,415, 3,530,582 and 143,208,832 confirmed cases and death of COVID-19 respectively reported worldwide [8]. In Africa, the incidence of COVID-19 varies considerably amongst countries, likely reflecting variations in volumes of air travel and differences in coverage of SARS-CoV-2 testing [9]. Tackling of COVID-19 is becoming increasingly difficult in Northern and sub-Saharan countries because of unstable situations and weak health system [10, 11]. Only few African states have been successful in establishing detection, prevention, and control measures. Yet the COVID-19 pandemic still a challenge for most African countries. Currently, there is scanty data regarding the epidemiological and spatial spread of the COVID-19 pandemic in Africa [12, 13].

In Libya, the first case of COVID-19 entered Libya, was a man with history of travelling in Saudi Arabia during March 2020 [14]. Since then many COVID-19 confirmed cases have been reported and spread all over the country, and clearly, due to instability of the country and weakness in the public health capacities as well as surveillance system not in place therefore, that was made difficult to estimate the proper data that reflect the epidemiological situation of COVID-19 in the country. Therefore, it is likely that COVID-19 will spread unnoticed in the Libyan community, if no preventive measures are taken seriously. So that, understanding the epidemiological situation and local variations of the pandemic patterns is an important step in implementing effective strategies to mitigate the COVID-19 in vulnerable communities. Unfortunately, currently, there is no a global standard response to the pandemic, and each country is dealing with the crisis based on their own facilities and expertise [15]. Regarding the epidemiological situation of pandemic in Tarhouna city, the case zero were confirmed in June 2020 and lockdown protocol was taken place in October 2020. Obviously, there was no clear data could be pointed out or figure out the exact time and source of the zero case in the city.

This study aimed to examine the status and patterns of COVID-19 pandemic in the city of Tarhouna in Libya, the risk factors associated with this pandemic were in scope of the study. The study also highlights the potential strategies to minimize the impact of this pandemic on the Libyan community.

2. Material and Methods

The cross-sectional study was conducted to investigate the epidemiological situation of COVID-19 and study the risk factors (Age, gender, History of contact and comorbidity condition) associated with infection in the city of

Tarhouna from December 2020 to Jan 2021. All data were entered into the Microsoft Excel spreadsheet and coded for analysis. Influence of variables like age, gender, comorbidity and history of contact on infection was calculated. A descriptive analyses frequency and percent were measured for numerical data and number and percent for qualitative data by using SPSS version 22. Chi square test was used to investigate the level of association among variables at the significance level of $p<0.05$.

3. Results

The present study reported 540 confirmed cases of COVID-19 screened by RT.PCR. The result showed that there was a statistical significant difference (.001) at $p < 0.05$ amongst four age categories (≤19 year 5.50%, 20-39 year 42.41%, 40-59 year 48.30% and ≥60 year 4.62%) (Table 1 and Fig. 1). Significantly, (P=.04), the gender influence on SARS-CoV-2 in infection rate among target population. The infection rate was estimated to be 70.74% (95% CI: 66.90%-4.58%) and 29.50% (95% CI: 25.42%, 33.10%) in male and female respectively (Fig. 2). Our results reported no statistical difference (P=.09) among comorbidity and non-comorbidity cases (Table 1). Comparatively, the infection was found to be higher in history contact 92.7% (95% CI: 90.59%-94.96%) than non-contact 7.2% (95% CI: 5.04%-9.41%) (Fig. 4). Unexpectedly, the infection rate was estimated to be 72.59% (95% CI: 68.83%-76.35%) and 27.27% (95% CI: 23.65%-31.17%) among asymptomatic and symptomatic patients respectively (Fig. 5).

The results revealed that 90.18% (95% CI: 87.68%-92.69%) and 9.81% (95% CI: 7.31%-12.32%) infection rate of SARS-CoV-2 among non-comorbidities and comorbidities population respectively (Fig.3). Additionally, we found that the health status of the confirmed cases, (P=.09) not significantly influence on infection rate.

Table 1: Result of univariate analysis for variables associated with SARS-CoV-2 infection

Variables	Tested	% positive	DF	X^2	P value
Age Categories/Year			3	15.62	**.001**
0-19	25	5.50			
20-39	229	42.41			
40-59	261	48.30			
60-100	25	4.62			
Gender			1	4.2	**.040**
Female	158	29.50			
Male	382	70.74			
History of contact				1.24	.26
Contact	501	92.7			
Non-Contact	39	7.2			
Healthy status			1	2.76	.09
Comorbidity	53	9.81			
Non- Comorbidity	487	90.18			
Clinical aspect			1		
Symptomatic	148	27.27		.912	.012
Asymptomatic	392	72.59			
Total	540				

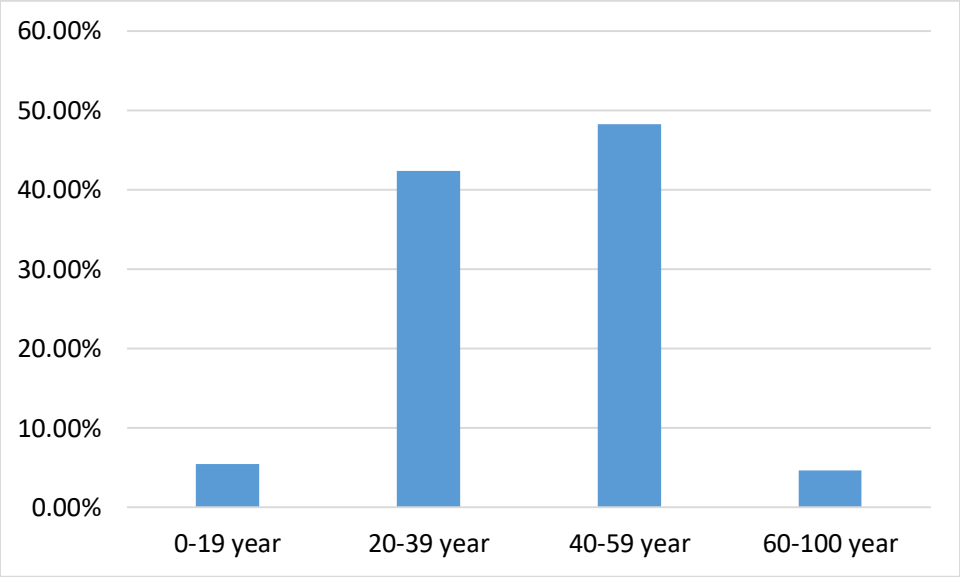

Figure 1: The infection rate of SARS-CoV-2 among of confirmed cases belong to different age group

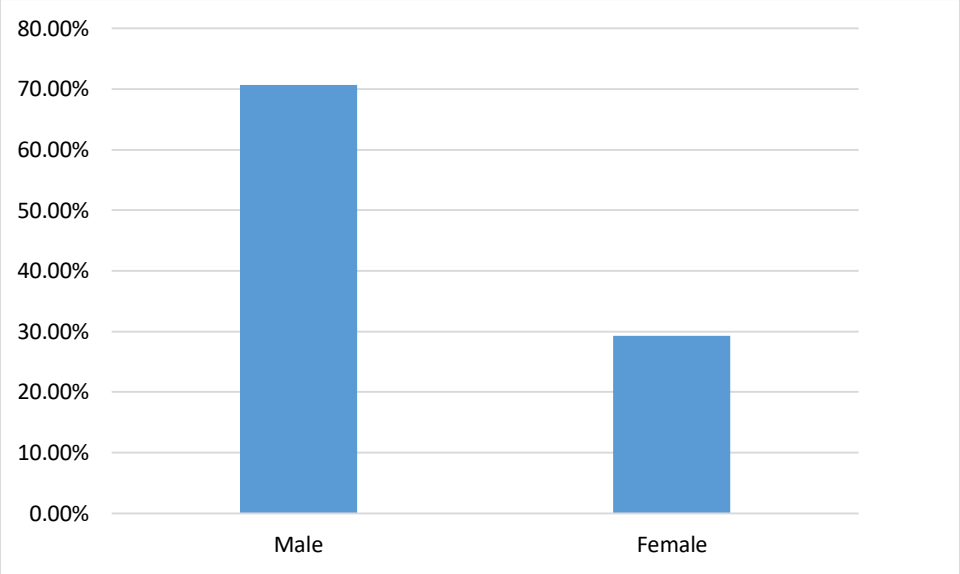

Figure 2: the infection rate of SARS-CoV-2 according to the gender

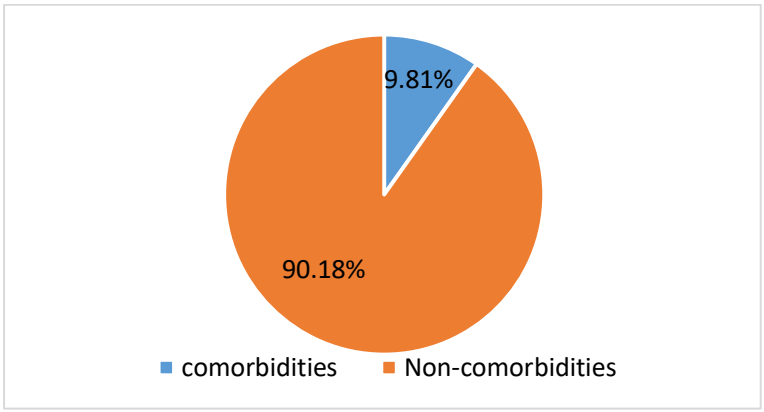

Figure 3: The infection rate of SARS-CoV-2 according to the healthy status

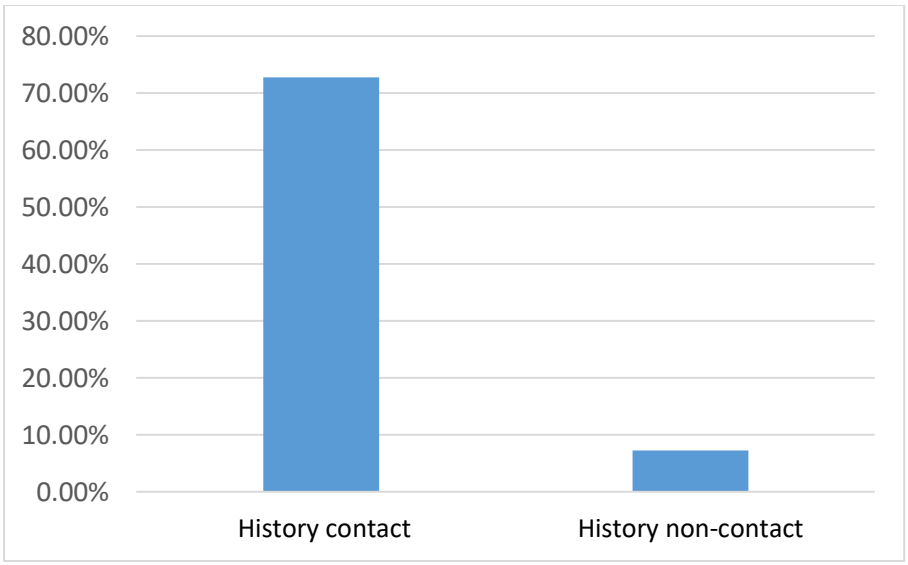

Figure 4: The infection rate of SARS-CoV-2 among population with history and without history of close contact of confirmed cases

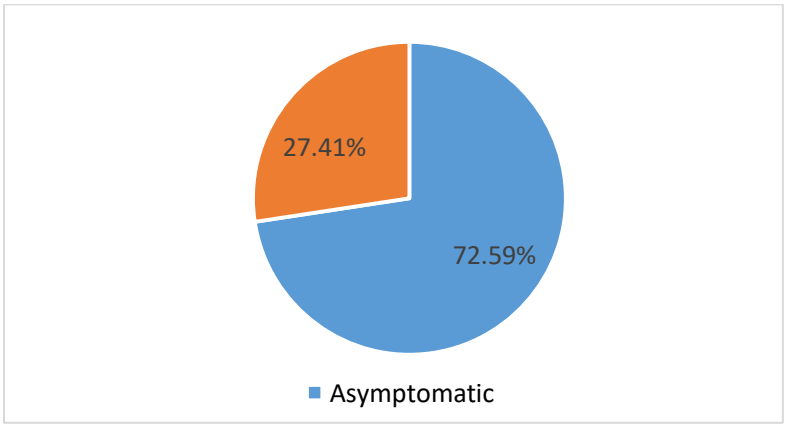

Figure 5: The infection rate of SARS-CoV-2 among the symptomatic and asymptomatic confirmed cases

4. Discussion

The present study reported high infection rate of SARS-CoV-2 among the target population in Tarhouna city. To best our knowledge, this the first study investigates the epidemiological situation of COVID-19 in Tarhouna city in Libya. This city is located southeast of Tripoli, in the Murqub District with a population density of about 300000, and considered one of the largest cities in Libya with a high population. In Libya, since the first case reported on 24 March 2020, still the epidemiological patterns of COVID-19 among different Libyan cities clearly variables [3], however, three months later, the first officially confirmed cases of COVID-19 were reported in Tarhouna, and it seems to be reported before that time and might be overlapped and the reason being that instability of the city was made it difficult to implement the surveillance and trace back of infected cases in the city. In fact, there is still a scarcity of information regarding the epidemiological situation of COVID-19 in the Tarhouna city, and in the country in general, and the epidemic curve of COVID-19 in Libya has risen sharply since July 2020, and the country entered the cluster pandemic stage [3]. Regardless, the obtained results reflect a high percentage of infection in this city, however, the infection rate might be substantially higher than reported. Comparatively, the present study reported the highest infection rate of COVID-19 in males. This variability among gender might be attributable to many factors that influence infection rate, like physiological or/and biological factors [16, 17]. There are many studies reported that expression of angiotensin converting enzyme 2 (ACE2) receptors which have a potential role for SARS-CoV-2 viral entry and transmission is difference between both genders [18, 19]. However, the gender variance of infection rate could be multifactorial that might be influenced by sex bias reported in the present study. Also the gender-based socio-cultural and behavioural differences are other factors that influence the infection rate among males and females. Due to attitudes, costumes, and behaviour life, men are more likely to get an infection [20]. In agreement with different studies reported that the male's sexes more frequently exposed to be infected with infectious disease [20]. In contrast to other reports, they have found no significant difference between both sexes in the proportion of males and females infected with SARS-CoV-2 [21, 20]. According to the global COVID-19 meta-analysis, the male is considered a risk factor for intensive care unit (ITU) and death [22]. In line with other studies, the infection rate reported significant differences among four age group categories (≤19 years 12%, 20-39 year 6.98%, 40-59 year 11.11%, and ≥60 years 32%), significantly, the age influence on COVID-19 infection rate among the population [23]. The highest infection rate (32%) was reported in ≥60 years while the lowest (6.98%) in 20-39 years. Comparatively, the infection rate difference reported among age groups might be influence by the age-immunity factors [24], however, the high age group more exposed to infection than the lower age group, and consequently clinical features or clinical course of disease more clear and detectable in the elderly cases as contrast young ages, therefore, clinical form of COVID-19 in young age might be silent and undetectable [25]. According to the WHO clinical definition of COVID-19, there are five levels of severity which include mild (silent), severe, acute, sepsis, and septic shock [25]. Significantly, our data showed that, high asymptomatic (silent) cases (72.59%) as compared to symptomatic (27.27%). In agreement with other studies had reported a higher infection rate among silent cases of COVID-19 (26). Clearly, due to low testing capacity, there was infection data missing, and difficult to quantify asymptomatic infection and transmission in the city. Consequently, the infection rate in the city might be higher than that reported and could not be easily detectable. And there are many infected cases that seem to be underestimated, and tracing of index cases to who closely contact it is very hard and difficult to perform for many

reasons, likely, the shortage of public health capacities, political instability, and civilian conflict within and around the city had to make it difficult to implement any strategy to combat COVID-19. The present study reported no statistical difference among patients with comorbidities condition. Importantly, due to a shortage in data of the ethnicity and comorbidities individuals in the city, therefore, the non-significant difference results in the present study might not be valuable and could not reflect real results. It is well known that the comorbidities patients are considered the most risk group [24, 27]. In spite, the weakness in the public health capacities and surveillance system in the country since 2016, therefore, WHO has implemented an Early Warning Response Alertness Network (EWRN) in Libya to combat and mitigate emerging and re-emerging of infectious diseases. Notably, the present study findings regarding epidemiological patterns of COVID-19 are considered warranty and valuable at least among the target population in Tahrhouna city.

5. Conclusion

This study is the first in Tarhouna city to provide information on epidemiological characterization of COVID-19 pandemic in this city. The study emphasizes the significant effects of older age, male gender and underling diseases on the risk of mortality among COVID-19 patients. In spite, we excluded risk factors that constituted laboratory findings, vital signs or symptoms and silent cases of COVID-19, clearly that, asymptomatic cases could be (underestimated) under go without being noticed. Therefore, it is recommended to take preventative measures more seriously in the elderly patients, and asymptomatic cases that play a potential silent role in COVID-19 epidemiology, and larger scale studies are highly recommended to investigate deeply the epidemiology of this virus among Libyan population.

6. Acknowledgement

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7. Conflict of interest

There is no conflict of interest

8. References

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