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Preliminary Epidemiological Investigation of COVID-19 Pandemic in Alassabiea City, Libya

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A B S T R A C T

Background: The Coronavirus Severe Acute Respiratory Syndrome-2 (SARS CoV-2) was reported as sporadic outbreaks for the first time last December 2019 in Wuhan, Hubei Province, China. Later, spillover across China with transboundary spread worldwide, and due to quickly raising the epidemic curve with a high case fatality rate (CFR), on 11 March 2020, WHO announced the coronavirus outbreak as a pandemic. **Material and Methods:** The cross-sectional study was conducted to investigate the epidemiological situation of COVID-19 and study the risk factors associated with infection in the city of Alassabiea from July 2020 to March 2021, a total of 1542 respiratory samples specimens (nasopharyngeal swabs) were screened by real-time RT-PCR test for detection of SARS-CoV-2. **Results:** The overall infection rate of COVID-19 was estimated to be (15.63%; 241/1542) with a 95% confidence interval (CI) (13.94-17.58%). The results showed a significant difference (P=.005) in COVID.19 infection rates among age groups. **Conclusion:** The epidemiological situation of the SARS-CoV-2 was underestimated during the first wave of the COVID-19 pandemic; however, our results reported a high infection rate of COVID-19 in Alassabiea city due to cultural and social lifestyles in this city. Potentially, the weakness of quarantine measures and shortage of healthy capacity have made it difficult to communicate between the health sectors. Therefore, the Libyan National Centre for Disease Control (NCDC) under the supervision of Libyan healthy authorities should enforce the public health capacity and the surveillance system including training surveillance officers and Laboratory technicians.

التقصي الوبائي الأولي لجائحة COVID-19 في مدينة الأصابعة ، ليبيا

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الكلمات المفتاحية:

فيروس كورونا -19
ليبيا
جائحة

الملخص

معلومات اساسية: تم الإبلاغ عن فيروس كورونا المتلازمة التنفسية الحادة الوخيمة 2 (SARS CoV-2) على أنها تفشي متقطع لأول مرة في ديسمبر الماضي 2019 في ووهان ، مقاطعة هوبي ، الصين. في وقت لاحق ، امتد انتشار الفيروس عبر الحدود في جميع أنحاء العالم ، وبسبب الارتفاع السريع للمنحنى الوبائي مع إرتفاع في معدل الوفيات الحالات (CFR) ، في 11 مارس 2020 ، أعلنت منظمة الصحة العالمية أن تفشي فيروس كورونا جائحة. **المواد والطرق:** أجريت الدراسة المقطعية لاستقصاء الوضع الوبائي لفيروس كوفيد -19 ودراسة عوامل الخطر المرتبطة بالعدوى في مدينة الأصابعة من يوليو 2020 إلى مارس 2021 ، بإجمالي 1542 عينة تنفسية

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(مسحات أنفية بلعومية) بواسطة اختبار RT-PCR للكشف عن SARS-CoV-2.. **النتائج:** قُدِّر المعدل الإجمالي للإصابة بـ COVID-19 (15.63% ؛ 1542/241) بفاصل ثقة 95%. (CI) (13.94-17.58%) أظهرت النتائج وجود فرق معنوي (P= .005) في معدلات الإصابة بـ COVID.19 بين الفئات العمرية. **الخلاصة:** تم التقليل من شأن الوضع الوبائي لـ SARS-CoV-2 خلال الموجة الأولى من جائحة COVID-19 ؛ ومع ذلك ، فقد أبلغت نتائجنا عن ارتفاع معدل الإصابة بـ COVID-19 في مدينة الأصابعة بسبب أنماط الحياة الثقافية والاجتماعية في هذه المدينة. من المحتمل أن ضعف تدابير الحجر الصحي ونقص القدرات الصحية جعل من الصعب التواصل بين القطاعات الصحية. لذلك ، يجب على المركز الوطني الليبي لمكافحة الأمراض، تحت إشراف السلطات الصحية الليبية تقوية قدرات الصحة العامة ونظام المراقبة بما في ذلك تدريب فرق الرصد و التقصي وفنيي المختبرات.

Introduction

The Coronavirus Severe Acute Respiratory Syndrome-2 (SARS CoVs-2) was reported in China in late December 2019 [1]. SARS CoVs-2 sporadic outbreaks reported for the first time last December 2019 in Wuhan, Hubei Province, China, quickly expanded to neighboring provinces resulting in an epidemic all over china [2] [3]. Later, spillover across china to reach other countries throughout the world [4]. On 9 January 2020, Chinese healthy authorities have isolated and sequenced the viral genome, which led to the preliminary identification of this novel virus [5]. Later, due to the quick raising of the epidemic curve with a high case fatality rate (CFR), on 30 January 2020, the World Health Organization (WHO) declared the outbreak a public health emergency of international concern [6]. On 11 March 2020, WHO announced the coronavirus outbreak as a pandemic [6]. The SARS CoVs-2 is a member of family coronaviruses, subdivided into four genera: Alpha-, Beta-, Gamma-, and Delta-coronavirus [7]. SARS-CoV2 is a β coronavirus of group 2B with at least 70% similarity in its genetic sequence to SARS-CoV. [8]. Probably, the first confirmed case of COVID-19 in Libya was reported on 24 March 2020, however, due to the instability of the country led to impacts on the public health capacity including the disease surveillance system, which might be underestimated active cases or asymptomatic cases [9]. Consequently, the epidemiological patterns of COVID-19 in the country at beginning of the pandemic were constant and there were sporadic outbreaks reported in some cities, there was a scarcity of information regarding the epidemic picture in the city. Therefore, in this study, we exploit epidemiological data to understand the epidemiological situation of COVID-19 pandemic in Alassabiea city, in Libya.

Material and Methods

The cross-sectional study was conducted to investigate the epidemiological situation of COVID-19 and study the risk factors (age, gender, nationality) associated with infection in the city of Alassabiea from July 2020 to March 2021, a total of 1542 respiratory samples specimens (nasopharyngeal swabs) were screened by real-time RT-PCR test for detection of SARS-CoV-2. All relevant data were entered into the Microsoft Excel spreadsheet and coded for analysis. Descriptive analyses frequency and percent were measured for numerical data and number and percent for qualitative data using SPSS version 22. The Chi-square test was used to investigate the level of association among variables at the significance level of $p<0.05$.

Results

The overall infection rate of COVID-19 was estimated to be (15.63%; 241/1542) with a 95% confidence interval (CI) (13.94-17.58%). Results revealed that (7.39%, 95% CI: 6.15%-8.77%) and (8.24%, 95% CI: 6.92%-9.68%) of males and females were COVID-19 positive respectively (Table 1 and Fig. 1).

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

Variables Tested		Percent of Positive	DF	X^2	P value
Gender			1	51.96	.00001
Male	1040	7.39%			
Female	501	8.24%			
Age Groups/year			4	14.67	.0054
0-20 Y	220	2.66%			
21-40 Y	756	6.68%			
41-60 Y	416	4.02%			
61-8o Y	107	1.88%			
81-100 Y	41	0.38%			
Nationality			1	1.719	.189
Libyan	1481	14.79%			
Non- Libyan	60	0.84%			
Total	1541	15.63%			

Gender significantly (p=.00001) influences on COVID-19 infection rates at $p < .05$. (The chi-square statistic with Yates correction is 51.9668. The p-value is < .00001. Significant at $p< .05$). The infection rate among Libyan nationality was estimated to be (14.79%; 228) and only (0.84%; 13) were from foreign nationalities (Fig. 2), our results showed no statistical difference (P=.258) at $p<.05$ among Libyan and non-Libyan citizens' target population.

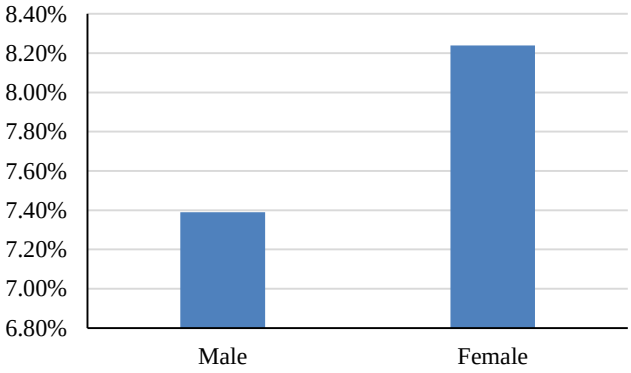

Fig. 1: Infection rate of COVID-19 among Males and Female

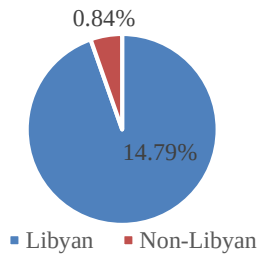

Fig. 2: Infection rate of COVID-19 according to nationality

Regarding the month-wise COVID-19 positive cases, in 2020, during the first wave of the COVID-19 pandemic, the average positivity rate was estimated to be (13.75%), and the highest positivity rate was reported in September (35.10%), August (29.35%), and October (25.67%). And lowest positivity rates were estimated to be (3.57%) and (2.70%) in November and December 2020 respectively (Fig. 3). In 2021, the highest positivity rate (15.52%) of COVID-19 was reported in March, while the lowest positivity rates (4.78%) and (7.18%) were reported in January and February 2021 respectively.

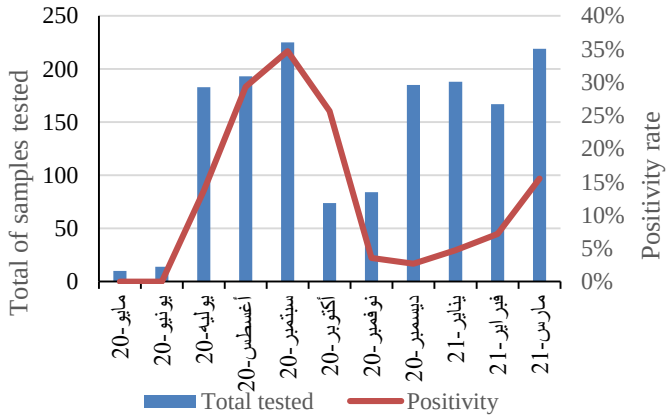

Fig. 3: Month-wise positivity rate in correlation to samples tested

Regarding age groups, the highest infection rate (6.8%) was reported in the age group 21-41 years followed by (41-60 years: 4.02%), (0-20 years: 2.66%), and the lowest infection rate was reported amongst age groups (61-80 years: 1.88%) and (81-100 years: 0.38%) (Fig. 4). The results showed a significant difference (P=.005) in COVID-19 infection rates among age groups (Table 1). Concerning the CFR in the city, in 2020 the average CFR was estimated to be 0.79%, while during the early months of 2021, the CFR was estimated to be 0.45% (Fig. 5).

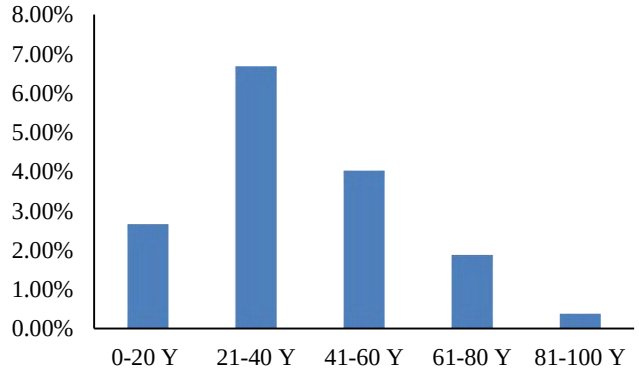

Fig. 4: The infection rate of COVID-19 among age groups

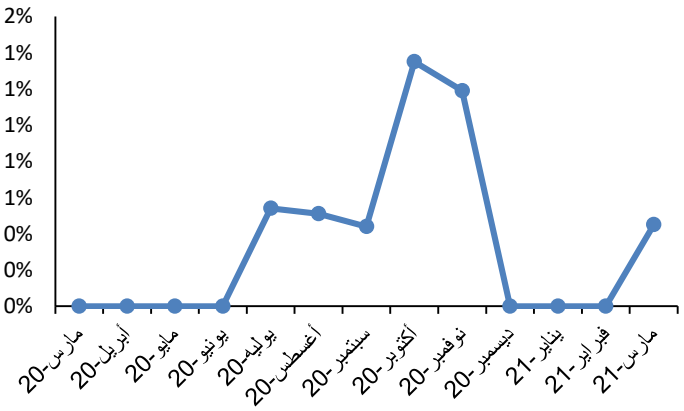

Fig. 5: Case Fatality Rate of COVID-19

Discussion

The present study represents the epidemiological situation of COVID-19 during the first wave of the pandemic in Alassabiea city. To the best of our knowledge, this first study investigates the epidemiological situation of COVID-19 in Alassabiea city in Libya. This city is located in Nafusa Mountains within Jabal al Gharbi district about 120 km west of Tripoli with a population density of about 60 thousand. The epidemiological situation of COVID-19 in this city was underestimated during the first COVID-19 wave, however, the present study reported a high infection rate of COVID-19 in the city, due to unrestricted transitional movement, human contact patterns, and social lifestyle of the people that lead to a high transmission rate of SARS-CoV-2 infection in the city. Regarding the infection rate among age groups, the present study reported a difference in the infection rates of SRAS. CoV.2 among different age groups. Reasonably, the variance of the infection rates reported among age groups might be attributable to the age immunity factors [10] [11]. However, older age groups are more susceptible to COVID-19 than younger individuals, and consequently, clinical features or clinical course of the disease is more clear and detectable in elderly cases as contrast to young ages, therefore, the clinical form of COVID-19 in young age might be silent and undetectable [11]. In agreement with other studies, the infection rate reported significant differences among five age groups (0-20 years 2.66%, 21-40 years 6.88%, 41-60 years 4.02%, 61-80 years 1.88%, and 81-100 years 0.38%), The highest infection rate (6.88%) was reported in 21-40 years followed by 41-60 years, while the lowest (0.38%) in 61-80 years [12]. Significantly, age influence on COVID-19 infection rate among the population [13]. Comparatively, the high infection rates among young adults aged 21-40 influenced COVID-19 age-specific transmission pattern. Consequently, the risk of coronavirus infection among young adults could be influenced and increase the risk of infection rates among elderly people. However, the youthful age structure of the Libyan population may be another factor that influenced the epidemiological pattern of COVID-19. Considering the gender, the infection rate was reported a significant difference between males and females. This variability among gender might be attributable to many factors that influence infection rate, like physiological or/and biological factors [14] [15]. In concordance, different studies reported that the male sexes are more frequently exposed to being infected with infectious diseases [15]. In distinction to other studies, they have reported no significant difference between both sexes in the proportion of males and females infected with SARS-CoV-2 [15]. Comparatively, the Libyan nationality reported a substantially high infection rate in the city as compared to other nationalities. In spite, of the Libyan nationality represented the most samples tested and most screened samples were from the Libyan nationality, however, the results reported no significant difference between Libyan and non-Libyan citizens. The first COVID-19 case in Libya was reported on 24th March 2020. Since then SARS CoVs.2 spillover has stroke many cities in the country with sporadic cases in some cities compared to epidemic and epidemic cluster patterns in other cities [9]. In Alassabies city, the COVID-19 have not reported until mid-July 2020. Later, the infection rate started to rise up in subsequent months, therefore, the month-wise positivity rate in correlation to the samples tested was reported a significant difference in the city (Fig. 4). The high positivity rates were reported in August, September, and October 2020 and that was coincident with epidemiological patterns of COVID-19 in Libya where the epidemic curve of COVID-19 has risen sharply since July 2020, and the country entered the cluster pandemic stage [9] [16]. However, the high positivity rate reported in Alassabies city from July 2020 onwards indicates the overlapping of COVID-19 cases, and it seems to be reported before that time. During 2021, from January to March the epidemic curve raised where the high positivity rate of COVID-19 reported in the city coincident with COVID-19-second wave in the country, and that reflects the high transmission rate of the virus in Alassabiea city. The limitations in the public health and social measures were considered the potential factors influencing the combat of COVID-19 in the city. Moreover, cultural and social lifestyles in the city were considered another factor that influenced SARS. CoVs.2 transmission, therefore, it was very difficult to block all the administrative borders of Alassabiea city and impose a

lockdown and curfew within the city. In fact, weaknesses in the public health capacities and healthy service system of the country have made it difficult to communicate between the regional subdivisions of health service units (The health sector, including health care workers (HCWs), laboratory technicians, and groups of high-risk professionals) across the country, and that led to a shortage of data about the epidemiological situation in the cities. Also, the shortage of medical supplement materials and well-trained medical staff are considered very important factors to mitigate and effectively combat of COVID-19 and minimize the CFR. The CFR reported in this study is relatively lower than expected compared with other regional and international cities [16] [17] [18] [19]. In this city, in October and November 2020 highest CFR was estimated to be 1.35% and 1.19% respectively. In Libya, the average CFR during first and second COVID.19 waves were estimated to be 1.4% and 1.3% respectively; and as of 19 November 2020, Libya has a COVID-19 mortality rate of 15.90 deaths/100000 people [9] [20]. However, the estimation of the CFR is very crucial during the COVID-19 pandemic because extremely difficult for tracing the asymptomatic and mild cases, therefore, most of these cases were not included in the CFR estimation and could lead to an overestimation of CFR.

Conclusion

The epidemiological situation of the SARS-CoV-2 was underestimated during the first wave of the COVID-19 pandemic, however, our results reported a high infection rate of COVID-19 in the city due to cultural and social lifestyles in the city. Potentially, the weakness of quarantine measures and shortage of healthy capacity have made it difficult to communicate between the health sectors, therefore influencing on implementation of the prevention and control strategy for COVID-19 in Alassabiea city. Urgently, The NCDC under the supervision of Libyan healthy authorities should enforce the public health capacity and the surveillance system including training surveillance officers and Laboratory technicians.

Authors Contributions: All authors contributed to the study design and writing the review article; all authors read and approved the final manuscript.

Conflict of Interest: The authors declare that there is no conflict of interest.

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