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ANALYSIS OF A COVID-19 OUTBREAK IN A LONG-TERM CARE FACILITY IN ÇANAKKALE PROVINCE

ÇANAKKALE ILINDEKI BIR UZUN SÜRELI BAKIMEVI TESISINDEKI COVİD-19 SALGININ ANALIZI

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ABSTRACT

Objective: Long-term care facilities (LTCF) caring for chronically ill residents and older adults are high-risk centers for acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) outbreaks. The aim of this study was to report an outbreak of coronavirus disease 2019 (COVID-19) in a single LTCF located in Canakkale, Turkey, and describe symptoms and chronological aspects of the disease among both LTCF residents and staff.

Materials-methods: This retrospective study analysis the demographic and clinical characteristics of SARS-CoV-2 infected LTCF residents and staff in a middle-sized LTCF located in Canakkale.

Results: A total of 69/102 residents and 21/50 staff members of a single LTCF were infected with SARS-CoV-2. Residents exhibited both general and respiratory signs (37.7% fever, 31.9 % dyspnea, 29% weakness and fatigue, and 60.9% cough). ICU admission was significantly elevated in patients over >65 years old (p=0.005). All deaths (n=5) was observed in patients over 65 years (0.003).

Conclusion: The increased rates of mortality among older LTCF residents justify mass screening in LTCF, and obliges responsible authorities to identify and exclude potentially infected staff and visitors and carry out proper infection prevention and control measures.

Keywords: COVID-19, Long-term Care Facilities, Outbreak, Prognosis, SARS-CoV-2.

ÖZET

Amaç: Yaşlı ve kronik hastalara bakım hizmeti veren engelli ve yaşlı bakım merkezleri (EYBM) akut solunum sendromu koronavirüs tip 2 (SARS-CoV-2) salgınları için yüksek riskli merkezlerdir. Bu çalışmanın amacı Çanakkale ilindeki bir EYBM'de gerçekleşen koronavirüs hastalığı 2019 (COVID-19) salgınını bildirmek, hem EYBM çalışanlarının hem de sakinlerinin semptomlarını ve kronolojik gidişatlarını tanımlamaktır.

Gereç-Yöntem: Bu retrospektif çalışma Çanakkale ilinde bulunan orta ölçekli bir EYBM'de SARS-CoV-2 ile enfekte olmuş EYBM sakinlerinin ve personelininin demografik ve klinik özelliklerini analiz etmektedir.

Bulgular: Bu çalışmanın yapıldığı EYBM'deki 102 sakinin 69'u ve 50 personelin 21'i SARS-CoV-2 ile enfekte olmuştu. Hastaların hem sistemik hem de solunum sistemi yakınmaları (%37,7 ateş, %31,9 dispne, %29 halsizlik ve yorgunluk ve %60,9 öksürük) mevcuttu. 65 yaş üstü hastalarda yoğun bakıma yatış oranı anlamlı olarak yüksekti (p=0,005). Tüm ölümler (n=5) 65 yaş üstü hastalarda (0,003) gözlendi

Sonuç: Yaşlı EYBM sakinleri arasındaki artmış ölüm oranları, EYBM'de COVID-19 açısından toplu taramayı haklı çıkarmakta ve sorumlu makamları potansiyel olarak enfekte olmuş personel ve ziyaretçileri belirleyip izole etmek ve uygun enfeksiyon önleme ve kontrol önlemleri almakla yükümlü kılmaktadır.

Anahtar kelimeler: COVID-19, Prognoz, Salgın, SARS-CoV-2, Uzun Süreli Bakımevi Tesisleri.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) disease caused by the novel Severe Acute Respiratory Syndrome 2 (SARS-CoV-2) has had a devastating influence on a worldwide scale with more than 200 million cases identified and 4.5 million deaths in the space of nearly 1.5 years. Although the first report from China on clusters of unexplained pneumonia was on December 31, 2019, which was later be identified SARS-CoV-2, the first patient diagnosed with COVID-19 were detected on March 11, 2020 in Turkey. Furthermore, the first death related to COVID-19 in Turkey was reported on March 15, 2021. Due to increased trends in the diagnosis of new COVID-19 cases, the first national complete lockdown was ordered between March and May 2020 for people over 65 years as well as those under 20 years over almost throughout the whole country (1).

Due to the rapid spreading of SARS-CoV-2 throughout the country starting from March 11, 2020, it was reasonable to suggest that residents and staff of long-term care facilities (LTCF) and nursing homes will be particularly vulnerable to severe COVID-19 infections and will encounter increased morbidity and mortality rates (1-3). Accordingly, the COVID-19 pandemic has caused various overwhelming outbreaks in LTCF, with the intricacy accumulating nationwide. Unfortunately, it is still uncertain, how diverse senior living arrangements effects the spread of the virus in these LTCFs.

On April 14, 2020 resident of a LTCF in the Çanakkale Region complained of general malaise, cough, dyspnea and displayed increased body temperature. Çanakkale Health Administration was notified and after a positive test result, the patient was referred to Çanakkale Onsekiz Mart University (ÇOMU) Medical center, which was at that time dedicated solely to COVID-19 patients. Through May 13, 2021 69 residents and 21 staff of this particular LTCF located in Canakkale were positively tested for COVID-19 and all of them were hospitalized.

In this study, we aimed to explore the clinical and demographic characteristics of an outbreak of COVID-19 in a particular LTCF which is administratively attached to the Canakkale Governorship. Our objective was to investigate the signs and symptoms of COVID-19 in this particular LTCF and to ascertain risk factors for adverse outcomes in order to prevent similar situations in the future.

MATERIALS AND METHODS

Design and settings

This study consists a four-week retrospective observational cohort in a middle-sized LTCF in Canakkale, Turkey. At the time of the first confirmed case (April 14, 2020) the facility had 102 residents and 50 staff members. Staff members included persons working as health aides, and in social services, food service, and administration. After the first cases on April 14, a total of 20 residents and 10 staff were admitted to hospital on April 17. Because of increased number of COVID-19 cases, comprehensive RT-PCR swabbing of residents and staff was started on April 17, 2020 using the increased testing capacity that was put in place with strict social distancing and other preventive measures. Residents were isolated in their private rooms with no communal meals or group activities. Apart from special circumstances, no external visitors including the families of residents were allowed in the LTCF since May 13, 2020. During and after the outbreak, enhanced hygiene measures were put in place that includes cleaning and disinfection of commonly touched surfaces, use of face masks, and additional hand hygiene stations for LTCF personnel.

Clinical, laboratory and demographic data were collected alongside with comprehensive Real-time reverse transcription polymerase chain reaction (RT-PCR) swabbing of residents and staff. A prompt result of RT-PCR tests were notified back to residents and staff for cohorting and implementing additional infection prevention measures where needed. The following datas for all study participants were collected; age, sex, vital and laboratory parameters, medications used, accompanying diseases, discharge status, symptoms during 1 week before and after COVID-19 test, treatment requirement at the hospital.

The study was approved by the institutional review committee of Çanakkale Onsekiz Mart University medical center (Approval No: 2011-KAEK-27/2020-E.2000070220). The necessity for informed consent was given up because of the retrospective study design and rapid outbreak of this infectious disease.

Real-time reverse transcription polymerase chain reaction

SARS-CoV-2 RT-PCR tests were done by using kits supplied by the Turkish Ministry of Health. Two different kits were used during the 4 weeks period in accordance with the manufacturers instructions for SARS-CoV-2 RNA detection. PCR tests were performed using Biospeedy SARS-CoV-2 Double Gene RT-qPCR (Bioeksen, Istanbul, Turkey) or Diagnovital HS SARS-CoV-2 Real-Time PCR (RTA Labs, Kocaeli, Turkey). All RT-PCR analysis was done using Biorad CFX-96 Touch Real-Time PCR detection system (California, USA).

Statistical analysis

Categorical variables were expressed as frequencies and percentages (%). Continuous variables were expressed median and interquartile range (IQR). The Shapiro–Wilk test was used to assess the normality assumption for the continuous variables. Differences between two groups for non-normally distributed continuous variables were evaluated by the Mann–Whitney U test. Categorical variables were evaluated using Pearson's chi-square test or Fisher's exact test. All statistical analyses were conducted using SPSS19.0 for Windows (IBM Corp., Armonk, NY, USA). All p-values of less than 0.05 were considered to indicate statistical significance.

RESULTS

A total of 69 residents [median (IQR), 59.0 (51.0-72.0) years; 66.7% male) out of 102 and 21 staff members [median (IQR), 43.0 (39.0-48.0) years; 33.3% male) out of 50 were included in the present study. Overall, 47 of 69 residents (68.1%) had at least 2 serious chronic medical condition and 26 (37.7%) reported symptoms including fever, cough [42 (60.9%)]), dyspnea [22 (31.9%)]), and sore throat [12 (17.4%)]). Baseline characteristics and medical history of residents and staff are detailed in Table 1.The most encountered comorbid condition in residents were cardiovascular problems [8 (11.6%)]), hypertension [41 (61.2%)]), and neurologic disorders [29 (42.0%)]) (Table 1).

Table 1. Baseline characteristics' of study population

Variable	Residents (n=69)	Staff (n=21)	p value
Age (years)	59.0 (51.0-72.0)	43.0 (39.0-48.0)	< 0.001
Sex (M) (n%)	46 (66.7)	7 (33.3)	0.007
Hematologic parameters			
Leucocyte ($mm^3 \times 10^3$)	6.4 (5.27-65)	6.45 (5.45-7.98)	0.830
Lymphocyte ($mm^3 \times 10^3$)	2.0 (1.4-2.43)	2.1 (1.5-2.58)	0.130
Hemoglobin (g/dL)	14.05 (12.8-15.0)	13.25 (12.48-14.42)	0.181
Hematocrit (%)	42.05 (39.05-44.05)	39.05 (35.98-42.53)	0.046
Biochemical Parameters			
Glucose (mg/dL)	108.2 (94.1-125.98)	96.0 (89.98-105.08)	0.004
Creatinine (mg/dL)	0.9 (0.77-1.07)	0.76 (0.60-0.87)	<0.001
AST (U/L)	21.15 (17.58-30.45)	20.01 (16.43-21.75)	0.110
Serum ferritin level (ng/ml)	177.45 (77.47-304.0)	35.61 (28.62-73.83)	<0.001
Comorbid disease (n%)			
Cardiovascular	8 (11.6)	1 (4.8)	0.361
Hypertension	41 (61.2)	4 (19.0)	0.001
Neurologic	29 (42.0)	0 (0)	<0.001
Pulmonary	11 (15.9)	1 (4.8)	0.187
Endocrine	19 (27.5)	0 (0)	0.007
Psychotic disorder	39 (56.5)	0 (0)	<0.001
Complaints (n%)			
Fever	26 (37.7)	3 (14.3)	0.045
Cough	42 (60.9)	7 (33.3)	0.027
Dyspnoea	22 (31.9)	2 (9.5)	0.042
Sore throat	12 (17.4)	9 (42.9)	0.016
Weakness and fatigue	20 (29.0)	6 (28.57)	0.752
Back pain	22 (31.9)	2 (9.5)	0.042
Diarrhea	1 (1.4)	2 (9.5)	0.071
Nausea and vomiting	4 (5.8)	2 (9.5)	0.549
Drugs (n%)			
Bronchodilator	10 (14.5)	1 (4.8)	0.233

Antihypertensive	37 (53.6)	3 (14.3)	0.001
ACE inhibitor	17 (24.6)	1 (4.8)	0.046
Other drugs	15 (21.7)	2 (9.5)	0.045
Triage Parameters			
Body temperature (°C)	36.5 (36.4-36.8)	36.7 (36.4-36.8)	0.617
Systolic blood pressure (mm/Hg)	135.5 (126.5-146.3)	128.0 (120.3-135.0)	0.018
Diastolic blood pressure (mm/Hg)	79.0 (74.0-85.3)	83.5 (75.3-85.8)	0.667
Heart rate (/min)	88.0 (77.0-96.3)	82.0 (75.3-85.0)	0.027
ICU (n,%)	7 (10.1)	0 (0)	0.427
Regular Ward	66 (97.1)	21(100)	
LOS in Regular Ward (days)	5 (5-7)	6 (5-6)	1.000
LOS in ICU (days)	3 (1-5)	0 (0)	
Mortality (n%)	5 (7.2)	0 (0)	0.204

ICU: Intensive Care Unit; LOS: Length of Stay; AST: Aspartate Transaminase; ACE: Angiotensin conerverting enzyme

As illustrated in Fig. 1, the first confirmed COVID-19 cases among residents and staff were reported on April 14, 2020 and the last COVID 19 case was reported among staff and residents on April 26 and May 13, 2020 respectively.

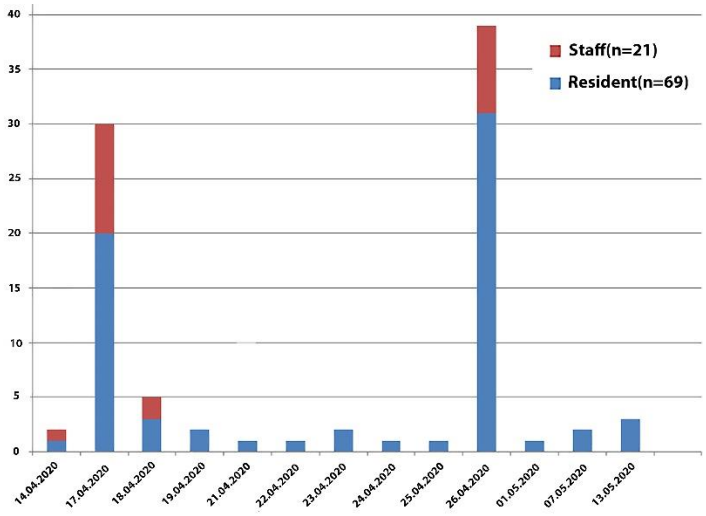

Figure 1. Timeline showing confirmed cases of COVİD-19 linked to long-term care center

Comparison of demographic and laboratory characteristics of the patients are summarized in Table 2. ICU admission was significantly elevated in patients over >65 years old (p=0.005). All deaths (n=5) was observed in patients over 65 years (0.003).

Table2. Comparison of demographic features of residents according to age

Age	<65 years	≥65 years	p value
Male/Female	17 (37.0)/6 (26.1)	29 (63.0)/17 (73.9)	0.367
Hemoglobin (mg/dL)	13.8 (12.8-15.0)	14.0 (11.9-14.8)	0.868
Hematocrit (%)	41.3 (39.3-44.7)	42.6 (35.7-44.6)	0.785
Leucocyte ($mm^3 \times 10^3$)	6.4 (4.8-7.9)	6.9 (5.4-7.8)	0.677
Lymphocyte ($mm^3 \times 10^3$)	1.9 (1.3-2.3)	1.7 (0.9-2.5)	0.257
LOS in Regular ward (days)	5.50 (5.0-7.0)	5.0 (5.0-8.0)	0.683
ICU (n %)	1 (2.2)	6 (26.1)	0.005
LOS in ICU (days)	3.0	4 (0.75-14.0)	0.799
Comorbidity≥2	29 (63.0)	18 (78.3)	0.201

Drugs ≥3	32 (69.6)	15 (65.2)	0.715
Mortality	0 (0)	5 (21.7)	0.003

Results presented as Median (IQR) for continuous variables, n(%) for categroic variables, ICU: Intensive Care Unit, LOS: Length of Stay. IQR: Interquartile Range.

DISCUSSION

In this study, we showed that in the early phases of the pandemic (in which most of the community and LTCF's are not completely ready for a global scale disease progression) the adverse outcomes related to SARS-CoV-2 would be tremendous especially in LTCFs unless the necessary measures are taken on time to stop disease progression.

From April 14, 2020 to May 13, 2020 69/102 residents and 21/50 staff of LTCF was infected with SARS-CoV-2. All of the SARS-CoV-2 positive cases (90) were transferred to COMU Medical center and from the residents that were hospitalized 5/69 (7.5%) died from the complications related to COVID-19. But considering that all the deceased patients was >65 years old, we can conclude that case fatality rate in our study was 21.7% (5 out of 23 LTCF residents over 65 years). No mortality among LTCF staff was observed in our study group. The mortality rate revealed among residents in our study was comparable to the studies published from other western countries. For instance, in a similar paper by Zollner-Schwetz et al. (4) analysis of COVID-19 outbreaks in 3 LTCFs in Graz, Austria was successfully demonstrated and it was reported that the mortality rate among 36 of /277 residents of 3 LTCFs was 33% (12 out of 36 infected residents). Similar to our study, no mortality among LTCF staff was reported. In another study by McMichael et al. (5) the case fatality rate for LTCF residents was found to be 33.7% (34 out of 101 residents). Sacco et al. (6) investigated the results of an outbreak from a middle-sized nursing home in Maine-et-Loire, west of France. The authors demonstrated that the attack rate of COVID-19 was 47% in LTCF residents (case fatality rate, 27 %), and the attack rate 24 % in LTCF staff. These increased rates of mortality rates among LTCF residents suggests the importance of precautions during COVID-19 pandemic. Therefore, all LCTF staff should be precautious so that the spread of SARS-CoV-2 can be diminished.

Although responsible authorities and medical staff were well informed of the high vulnerability of LTCFs to respiratory disease outbreaks, delayed identification of COVID-19 patients in this elderly group due to the definition of cases suggestive of COVID-19 at that time and inadequate testing capabilities might be a factor for the spreading of the COVID19 in LTCFs (4). As very well known, one of the most important symptoms and prognostic determinant of COVID-19 is body temperature over 38 °C (7,8). In our case series, only 26 (37.7%) of COVID-19 cases among residents had fever over 38 °C during the course of their disease which is similar to findings recently published by Zollner-Schwetz et al. (4) and Graham et al. (9). In the study by Zollner-Schwetz et al. (4) only a quarter of COVID-19 patients among LTCF residents had fever over 38.1°C and only one fifth suffered from cough. Graham et al. (9) reported a similar data among 4 nursing homes affected by COVID-19 outbreaks in central London comprising 394 LTCF residents and 70 staff. In the Graham et al. (9) study only 23.8% of SARS-CoV-2 positive residents developed fever, and 32.5% developed cough and/or breathlessness. In similar, 60.9% and 31.9% of SARS-COV-2 infected LTCF residents had cough and dyspnea respectively in our study.

In a depth investigation, we also identified distinct parameters that played a significant role in the SARS-CoV-2 spread among LTCF residents. Asymptomatic nursing home staff (either medical, social or cleaning staff) or visitors are the potential resource of viral transmission to the residents. Some other factors that are probably had a significant role to the outbreak development in the LTCF can be the limited availability of RT-PCR testing and disobedience to protective measures include self-isolation, social distancing and compliance with personal hygiene rules. Testing of all LTCF residents and staff regardless of symptom existence on May 12 and 13 had an important effect on discontinuation of the outbreaks, as the final LTCF resident became symptomatic on May 13, 2020 and hospitalized with a final full recovery after 5 days. Similar studies investigating LTCF outbreaks also highlight the importance of RT-PCR testing for discontinuation of COVID-19 outbreaks in LTCFs (4,10-12).

The findings of the present study emphasize the challenges of controlling COVID-19 outbreaks in LTCFs. The finding of increased mortality rates among the residents in LTCF is therefore, a serious issue. During the course and after this outbreak investigation, ministry of health

policy among LTCFs of evolved and became apparent. At the time of the writing of this manuscript, it is mandatory for all staff, residents and visitors of the LTCFs to have been vaccinated or regularly tested. We also strongly suggest the importance of vaccination among LTCF residents in order to reduce morbidity and mortality rates related to COVID-19. But in case of a contraindication to vaccination or who otherwise do not complete a vaccination series a regime that involves repeated RT-PCR testing is strongly required.

CONCLUSION

In conclusion, increased morbidity and mortality rates among LTCF residents affected by SARS-CoV-2 requires strict approaches to infection control. Delayed recognition of possible COVID-19 patients in LTCFs due to absence or mild presence of symptoms should contribute to disease transmission within these facilities.

Conflict of Interest

Authors declare no conflict of interest regarding to this article.

Author Contributions

Plan, design: OB, FB, CA; **Material, methods and data collection:** GA, AÖ, MR, ME; Data **analysis and comments:** MD, EUÇ, OA, DS; **Writing and corrections:** YB, MD, OA.

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