SARS-CoV-2 Omicron Variant: Clinical Presentation and Occupational Implications in Young and Healthy IDF Soldiers

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ABSTRACT

Introduction:
To this date, there is little known about the symptoms, their duration, and occupational implications of Coronavirus disease (COVID-19) in the military population. Decisions regarding implementing precaution measures are based on data deriving from the general population. Moreover, the Omicron variant seems to cause a disease with lesser severity than previous variants. We aimed to describe the clinical presentation and estimate the loss of workdays due to mild COVID-19 during an Omicron predominant wave among a young, healthy, and mostly vaccinated military population.

Materials and Methods:
A cross-sectional, survey-based study among IDF soldiers who replied to an online questionnaire following recovery from COVID-19. Data included self-reported vaccination status, symptoms presentation and duration, and service-related sick days. Student's *t*-test and chi-square test of independence were used to compare differences in continuous and categorical variables, respectively. A binary logistic regression analysis was performed to estimate the odds ratio and 95% CIs for prolonged symptom duration (4 days and above) by participants' characteristics. The IDF medical corps institutional review board approved this study.

Results:
A total of 199 soldiers, with a mean age of 21.9 years, were included in the study. Upper respiratory tract symptoms, headache, and constitutional symptoms were found to be the most common among symptomatic soldiers. The median reported time for inability to continue the daily routine, including work, was 5 days [Interquartile range (IQR), 0-10]. Median duration of symptoms was 4 days (IQR, 0-10). In addition, women were found to have longer symptomatic disease (odds ratio = 2.34; 95% CI, 1.20-4.52).

Conclusions:
Our findings demonstrate that even among a young and fully vaccinated population, COVID-19 caused by the Omicron variant may result in substantial medical leave from military service, compared to common cold or influenza virus infection. Our study sample was relatively small; however, the response rate was high and our results shed light on the yet-to-be fully characterized Omicron variant-related COVID-19. Despite the current common perception of COVID-19 as a self-limiting mild disease with low burden of symptoms, our findings show the potential occupational burden of infection with COVID-19 on military units and their readiness and could be considered when discussing public health restrictions and further steps taken to minimize outbreaks ramifications.

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variant B.1.1.529 (Omicron) was classified as a variant of concern by the WHO on November 26, 2021[1]. Since then, the variant has propagated globally in an unprecedented pace, accounting for approximately 4,000,000 cases worldwide.[2] During November 2021, first cases of Omicron were diagnosed in Israel,[3] commencing the fifth wave of COVID-19 morbidity. In the following months, over 40,000 confirmed cases were recorded daily, and according to estimations, many more undiagnosed cases.[4] Initial reports suggest that clinical manifestations of the SARS-CoV-2 Omicron variant are marked by a unique clinical profile as compared with the disease caused by previous SARS-CoV-2 variants. Specifically, the Omicron variant seems to cause a disease with lesser severity than previous variants.[5–7] Another factor distinguishing the Omicron COVID-19 wave is the high rate of breakthrough infection among individuals previously vaccinated against COVID-19, which is approximated to be more than two-thirds of the population in Israel who are fully vaccinated, and more than 50% who received the third booster vaccine. Moreover, the Israel Ministry of Health (MOH) recommended administration of a fourth vaccination to certain populations (medical staff, ≥60 years of age, and patients with chronic conditions) in order to decrease morbidity and mortality due to COVID-19.[8–10] The apparent shifts in morbidity and mortality associated with the Omicron variant[11] have led public health policymakers worldwide to reconsider isolation and quarantine precautions previously imposed during previous COVID-19 waves, which resulted in significant economic[12,13] and social[14] impacts. In the military scope, duration and severity of symptoms among infected soldiers may influence the ability to carry out missions.[15] The military

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population is characterized by increased physical proximity between soldiers and special living conditions (for example, use of shared amenities such as toilets and crowded sleeping halls) posing risk for higher infectious disease transmission.[16]

To this date, there is little known about the symptoms, their duration, and occupational implications of COVID-19 infection in the military population. Decisions regarding implementing precaution measures are based on data referring to the general population.

This study aims to delineate the clinical characteristics, risk factors, and service-related implications (days of absence and refrainment from physical ability) in COVID-19 patients during the Omicron wave, specifically in a young and vaccinated military population.

METHODS

We conducted an anonymous cross-sectional survey among IDF soldiers from four units, who tested positive for SARS-CoV-2 infection by PCR or antigen testing. Both tests were considered diagnostic of COVID-19, in line with the policy of the Israeli MOH. Soldiers included were diagnosed between January 15, 2022 and February 11, 2022. In Israel, during the research period, termination of quarantine following COVID-19 diagnosis required a telemedicine physician appointment for formal discharge. Discharging physicians forwarded the survey to patients within a day following recovery from COVID-19, via WhatsApp, a widely used messaging application in Israel.

We developed a questionnaire assessing recently recovered soldiers' symptoms. Questions were multiple choice, limited to a single answer, except for questions regarding the presence of symptoms, which allowed for multiple selection. The questionnaire was in Hebrew, the formal language in Israel. Participants could reply to the survey only once. Soldiers were surveyed regarding COVID-19 vaccination status and the presence and duration of symptoms. Fully vaccinated soldiers were defined as those who received three COVID-19 vaccine doses (first and second doses of messenger RNA (mRNA) COVID-19 vaccines and a "booster" COVID-19 vaccine), as per the definition of the Israeli MOH. Participants were asked to estimate the number of days they could not carry out their daily routine and tasks due to the infection (range, 0-20 days). Sociodemographic and anthropometric data collected included sex, date of birth, weight, height, smoking status (dichotomous), and past medical history. Submission was accepted if participants replied to all questions. No incentives were offered in return for completion of the survey, and participation was voluntary. Importantly, the results of the survey were used for research purposes only and did not guide quarantine or following medical leave length. The full questionnaire is available in the Supplementary Appendix.

Participants were defined as having unimpaired health if they had no history of major operation or comorbidity (including cancer), and no regular use of prescription, in accordance with eligibility criteria of the IDF for service in combat units.[17]

Symptom duration and prevalence among participants were compared to data previously reported in the literature focusing on a similar population (IDF soldiers), during the first SARS-CoV-2 outbreak (predominated by the Alpha variant) in Israel during March-May 2021[5].

The IDF medical corps institutional review board approved the use of questionnaire data with a waiver of informed consent. The questionnaire was anonymous, and soldiers agreed to participate after reading the study description outlined at the top of the questionnaire.

STATISTICAL ANALYSIS

The demographic characteristics of the study population are presented as means or medians and standard deviations for continuous variables and frequencies and proportions for categorical variables. Student's *t*-test and chi-square test of independence were used to compare differences in continuous and categorical variables, respectively. The median reported symptoms duration in this study (4 days) was set as a cutoff for prolonged symptoms duration definition. A binary logistic regression analysis was performed to estimate the odds ratio (ORs) and 95% CIs for prolonged symptoms duration by participants' characteristics. Logistic regression prerequisites were all met. Kaplan–Meier survival analysis was used to calculate symptoms duration in days, stratified by sex. Differences between the Kaplan–Meier curves were tested for significance by the Breslow (generalized Wilcoxon) test. $P < .05$ and CI exclusive of the null were considered statistically significant. Data analysis was performed using SPSS 25.0 software (Chicago, IL).

RESULTS

Participant Demographics

Study population baseline characteristics are shown in Table I. A total of 199 soldiers with a mean age of 21.9 years ($\pm$5.11) were included in the study, and 55.3% ($n = 110$) were men. The majority of them (62.3%, $n = 124$) served in noncombat units, while the rest (37.5 %, $n = 75$) served in combat platoons. Over 80% of participants (82.9%, $n = 165$) were fully vaccinated against COVID-19, while the rest (7.3%, $n = 43$) were considered not fully vaccinated (received between 0 and 2 vaccine doses). 72.9% ($n = 145$) of participants had unimpaired health.

Clinical Course of the Disease

The majority (165, 82.9%) of respondents reported having symptoms, while only 17.1% ($n = 34$) were asymptomatic. Most cases were diagnosed by a rapid-antigen test (63.3%), and the rest 36.7% were diagnosed using an RT-PCR test.

41.2% ($n = 82$) of the respondents had a fever above 37.5 °C. Of all respondents with fever, the median fever duration was 2 days (SD = 1.5).

TABLE I. Participants Baseline Characteristics

Participant characteristics	Men (n = 110)	Women (n = 89)	Overall (n = 199)
Age—median (SD), years	20.9 (5.9)	20.5 (3.0)	20.6 (5.0)
Designation—n (%)			
Noncombat	55 (50%)	69 (77.5%)	124 (62.3%)
Combat	55 (50%)	20 (22.5%)	75 (37.7%)
Significant medical history[a]—n (%)			
Yes	33 (30%)	21 (23.6%)	54 (27.1%)
No	77 (70%)	68 (76.4%)	145 (72.9%)
Doses of COVID-19 vaccine—n (%)			
0	5 (4.5%)	1 (1.1%)	6 (3.0%)
1	4 (3.6%)	3 (3.4%)	7 (3.5%)
2	9 (8.2%)	8 (9.0%)	17 (8.5%)
3	92 (83.6%)	77 (86.5%)	169 (84.9%)
Smoking			
Yes	28 (25.5%)	15 (16.9%)	43 (21.6%)
No	82 (74.5%)	74 (83.1%)	156 (78.4%)
BMI category—n (%)			
Underweight	2 (1.8%)	13 (14.6%)	15 (7.5%)
Normal weight	74 (67.3%)	64 (71.9%)	138 (69.3%)
Overweight	28 (25.5%)	10 (11.2%)	38 (19.1%)
Obese	6 (5.5%)	2 (2.2%)	8 (4.0%)

[a]Presence of significant medical history is determined as detailed in the "Methods" section.

Among symptomatic cases, symptoms lasted for a median of 4 days (SD = 2.8). The median number of symptoms reported in each symptomatic case was 6 (SD = 3.1). Respondents reported an inability to continue with daily routine for a median of 5 days (SD = 3.9).

The prevalence of the reported symptoms is described in Table II, as compared with reported frequencies from the beginning of the pandemic among a similar population (reported from March to May 2019[18]). The most common symptom was headache reported in 78.2% (n = 129) of cases, followed by sore throat (73.3%, n = 121), cough (64.3%, n = 128), fatigue (61.8%, n = 102), and myalgia (61.2%, n = 101).

In a multivariable logistic regression model (Table III), women were found to be significantly associated with a longer duration (4 days and above) of symptomatic disease (OR = 2.34; 95% CI, 1.20-4.52). Type of military unit (combat vs. noncombat), basic health status (unimpaired health), vaccine status, body mass index (BMI), and smoking status were not found to be associated with longer symptomatic disease. In a Kaplan–Meir survival curve (Fig. 1), women were found to have a longer duration of symptoms as compared to men (P < .05).

DISCUSSION

In this cross-sectional study of young and healthy military servants, who recovered from COVID-19 during the Omicron surge, we found upper respiratory tract symptoms, headache, and constitutional symptoms to be the most common among symptomatic soldiers. In addition, women were found to

TABLE II. Comparison of Self-reported COVID-19 Symptoms Between Two Different Time Periods (2019 vs. 2022) Among Young and Healthy IDF Soldiers

Symptoms	January 2022 (n = 199)	March 2019 (n = 119)	P value
Loss of taste	16 (9.7%)	47 (39.5%)	<.001
Loss of smell	15 (9.1%)	61 (51.3%)	<.001
Nausea	35 (21.2%)	11 (9.2%)	<.05
Rhinorrhea	114 (57.2%)	30 (25.2%)	<.001
Sore throat	121 (73.3%)	32 (26.9%)	<.001
Vomiting	12 (7.3%)		
Myalgia	101 (61.2%)	28 (23.5%)	<.001
Headache	129 (78.2%)	48 (40.3%)	<.001
Cough Productive	128 (64.3%)	75 (63%)	NS
	74 (44.8%)		
Fatigue	102 (61.8%)	41 (34.5%)	<.005
Chills	56 (33.9%)	8 (6.7%)	<.001
Chest pain	30 (18.2%)	7 (5.9%)	<.05
Abdominal pain	26 (15.8%)	7 (5.9%)	<.05
Dyspnea	31 (18.8%)	23 (19.3%)	NS
Hoarseness	41 (24.8%)		
Diarrhea	20 (12.1%)	22 (18.5%)	<.05

NS, nonsignificant.

TABLE III. Adjusted Odds Ratios (ORs) for Longer Symptomatic Disease[a]

Participant characteristics	OR (95% CI)	P value
Sex		
Men	1.00 (reference)	
Women	2.34 (1.21-4.50)	.01
Medical designation		
Noncombat	1.00 (reference)	
Combat	1.19 (0.59-2.39)	.61
Significant previous medical history		
No	1.00 (reference)	
Yes	0.99 (0.48-2.05)	.99
Smoking		
Yes	1.14 (0.53-2.44)	.72
No	1.00 (reference)	
Obesity		
Normal weight	1.00 (reference)	
Overweight	0.77 (0.34-1.74)	.53
Obesity	3.07 (0.51-18.29)	.21

[a]Binary logistic regression model was used to calculate adjusted ORs for longer symptomatic disease (4 days and above).

be associated with longer symptomatic disease (>4 days), while the median reported time for inability to continue daily routine, including work, was 5 days.

In this study, 82.9% of participants were symptomatic. Common symptoms reported by subjects were headache (78.2%), sore throat (73.3%), cough (64.3%), myalgia (61.2%), and fatigue (61.8%). We found loss of taste (ageusia) and loss of smell (anosmia) to be reported less frequently (9.7% and 9.1%, respectively), compared with previous surges of COVID-19 variants. These findings are in line with emerging data from other countries. A study from the
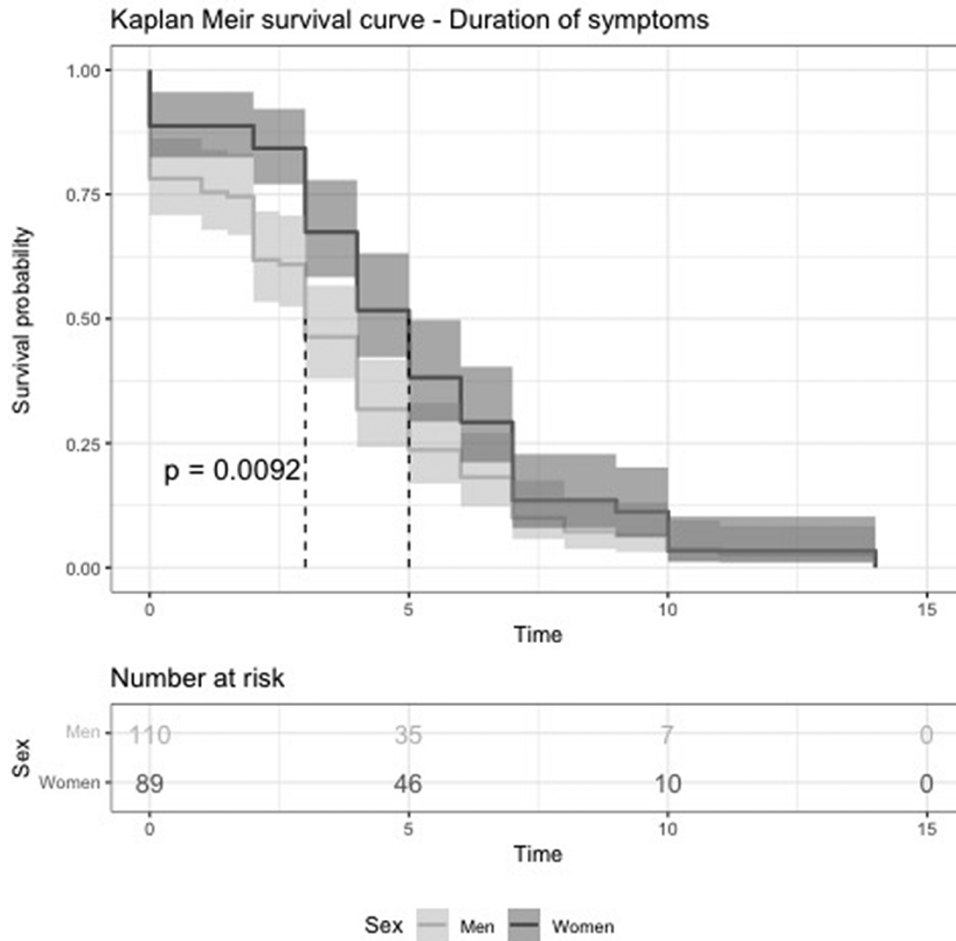
FIGURE 1. Kaplan-Meir survival curve of duration of symptoms and comparison between men and women.
*Dashed line marks the median duration of symptoms in women (5 days) and men (4 days).

United Kingdom[11] showed that among symptomatic COVID-19 patients, loss of smell/taste dropped from above 50% in the Delta variant-dominated period to below 20% in the Omicron-dominated period, in addition to an increase in reported rates of sore throat and rhinorrhea. A similar study done in France[6] during the Omicron-dominated period showed similar results—only 8.3% and 9% of cases reported loss of smell or taste. Several mechanisms have been suggested to explain smell dysfunction seen in COVID-19 patients, including nasal obstruction, loss of olfactory receptor neurons, brain infiltration affecting olfactory centers, and damage of support cells in the olfactory epithelium.[19] The reported decrease in anosmia during the Omicron period in recent studies could suggest less involvement of olfactory nerve and centers in Omicron patients compared to previous variants; however, further in vivo studies are needed. Description of changes in the reported symptomatic presentation of COVID-19 cases is of importance, especially with testing criteria relying on these self-reported symptoms to detect and isolate positive cases. Assessing and sharing these data can potentially aid to update and validate current and future testing criteria worldwide.

Emerging reports regarding the Omicron variant suggest a less severe clinical course than previous variants (Alpha and Delta variants).[11,20,21] During the recent Omicron wave, and in accordance with the CDC's recommendation from December 27, 2021, many countries around the globe have reduced the length of mandatory isolation period for COVID-19 from 10-14 days to only 5 days.[22] Furthermore, England had canceled the mandatory isolation for confirmed cases, and citizens were instructed to self-quarantine while being symptomatic, a policy that was later withdrawn and replaced by what is now accepted in most countries, 5-7 days of isolation.[23] Our data show that even in a young, healthy, and mostly vaccinated population, the median time of symptom resolution was 4 days. Furthermore, participants in this study reported they failed to engage in their daily routine (regardless of the isolation period needed) for a median length of 5 days. In contrast, work absenteeism due to the common cold in adults is estimated as an average of 9 work hours (slightly >1 workday) per cold episode[24] and 20-24 hours during an influenza infection (median).[25] These estimations were made in the general population, which is older and has more

comorbidities than our cohort. Regardless of the isolation period, which is subjected to the infectious period,[26] individuals with symptomatic Omicron COVID-19 infection will lose 4 work days on average, which is estimated almost four times longer than previously seen in other common upper respiratory infections. This is also supported by a study[27] that showed an increase in workdays lost due to flu-like symptoms during the COVID-19 pandemic. This finding has important implications when discussing the economical and occupational implications of mild COVID-19 in a young and generally healthy population.

Women were 2-fold more likely to experience a longer symptomatic disease (4 days or longer; OR = 2.34; 95% CI, 1.2-4.5; $P = .01$). This finding remained significant, even after accounting for basic health status, BMI, and smoking status. Predictors of delayed return to usual health in an outpatient population with COVID-19 during March-June 2020 were older age and chronic medical conditions.[28] However, the latter study focused on a wider age group with different basic health characteristics. In the same study, women were not associated with delayed return to usual health, although in other studies, women had an increased risk of long COVID-19[29] (defined as persistence of symptoms for more than 4 weeks). Our finding that women experience longer disease duration, which is not shared with previous reports, has several plausible explanations. First, is the unique population included, consisting of young and healthy individuals. Second, previous reports focused largely on COVID-19 caused by the Alpha variant; while in this study, data were collected during a national surge of the Omicron variant. Lastly, the high prevalence of vaccinations in our cohort might have contributed; as of 2020, no COVID-19 vaccines were available. Nonetheless, this novel finding should be considered in a population similar to ours, of healthy vaccinated youth such as college campuses and universities, and in a military setting where military preparedness and productivity is a vital aim. To this date, no studies were performed in a young adult population, exploring symptoms duration and occupational implications during the Omicron surge.

Our study has several limitations. First, as participation was voluntary, we cannot rule out the possibility of self-selection bias. However, the response rate was above 50%, minimizing this possibility. Second, our study population mainly consisted of young adults; therefore, generalizability of the results is limited to this age group. Lastly, the discussion regarding isolation policies takes into consideration the period of infectivity, whereas absence from work as discussed in our study is predicated on self-reported inability to work. While the latter is an important consideration for employers and military forces, it does not constitute a tool for assessing mandated isolation periods.

CONCLUSIONS

This research provides novel information regarding the clinical course and occupational-related implications of COVID-19 Omicron variant among young and vaccinated soldiers population. The median self-reported inability to work was 5 days, and women were more than two times more likely to have a longer duration of symptomatic disease (>4 days). From the military perspective, these findings could be considered when discussing restrictions and steps to minimize outbreaks scale and maintain army readiness.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Military Medicine* online.

CONFLICT OF INTEREST STATEMENT

The authors declare the following financial interests/personal relationships, which may be considered as potential competing interests: T.T. is a former employee of Emedgene Technologies, entirely unrelated to the work reported in this paper.

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