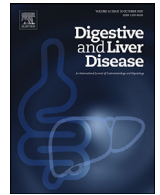




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Alimentary Tract

COVID-19 pandemic perception in adults with celiac disease: an impulse to implement the use of telemedicine[☆]



Monica Siniscalchi^a, Fabiana Zingone^b, Edoardo Vincenzo Savarino^b, Anna D'Odorico^b, Carolina Ciacci^{a,*}

^a Celiac Center at Department of Medicine, Surgery, Dentistry, Scuola Medica Salernitana, University of Salerno, Italy

^b Gastroenterology Unit, Department of Surgery, Oncology and Gastroenterology, University of Padua, Padua, Italy

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ABSTRACT

Background: Coronavirus Disease 2019 (COVID-19) causes severe complications and deaths all over the world. COVID-19 also has indirect effects from the lockdown and the possible lack of food. We aimed to evaluate the perception of this in Celiac Disease (CeD) patients who require a lifelong gluten-free diet as a therapy.

Methods: We invited by e-mail CeD adult patients from the University of Salerno (Campania, South Italy) and the University of Padua (Veneto, North Italy) to answer an *ad hoc* COVID-19 survey.

Results: We sent the web survey to 651 email addresses and we received 276 answers (42.4%). CeD patients did not feel more vulnerable because they had CeD (*not at all* 56.6%) and they did not worry much about the possible shortness of gluten-free food during the epidemic (*not at all* 48.5%). The most worried were the elderly patients, patients with other comorbidities and females. Finally, CeD patients were happy with remote consultations and explicitly asked to have them.

Discussion: The COVID-19 pandemic has impacted a proportion of patients with CeD; in particular, women, elderly patients, patients with other comorbidities. COVID-19, although a challenging experience from the medical and the psychological point of view, has offered an opportunity to practice, on a large-scale, a remote consultation approach for CeD healthcare.

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What You Need to Know:

BACKGROUND: COVID-19 also has indirect effects mediated by the fear and anxiety from the lockdown and the possible lack of food.

FINDINGS: The COVID-19 epidemic has had a moderate impact on patients with CeD. Most CeD patients were happy with remote consultations and explicitly asked to have them.

IMPLICATIONS FOR PATIENT CARE: Remote medical visits may be well received by young CeD patients and all centres should implement that healthcare approach.

Introduction

Coronavirus Disease 2019 (COVID-19) is an emerging disease that has caused a rapid increase in severe complications and deaths since its first identification in Wuhan, China, in December 2019. COVID-19 is due to a virus phylogenetically in the SARS-CoV clade [1]. The outbreak has spread rapidly, affecting several continents. Italy was the first European country to experience the outbreak, with a rapid spread of infection. The first fatality was on February 22, 2020 and a high mortality rate (>10%) followed.

A few weeks after the outbreak, the high rate of deaths of the COVID-19 infection generated worry and uncertainty in the Italian population. On February 23, 2020, the Italian Government placed almost 50,000 people residing in Lombardy and Veneto (Northern Italy) in strict lockdown. As a result, several Italian citizens headed into supermarkets and pharmacies to stock up on large quantities of supplies. Pasta, cookies, rice and other long shelf-life supplies disappeared in a few hours, as reported by several newspapers [2]. After a few weeks, the Italian government took other extraordinary measures to combat the diffusion of the disease, such as imposing a lockdown on the whole country. Beyond the immediate tragedies

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* Corresponding author: Carolina Ciacci, University of Salerno, University Hospital San Giovanni di Dio e Ruggi d'Aragona - Via San Leonardo, 84125 Salerno (SA)
E-mail address: cciacci@unisa.it (C. Ciacci).

of death and disease, indirect effects mediated by fear and anxiety have taken hold of not only the general population, but also the stock markets and goods production and shipment, including importation of grains and food.

Celiac disease (CeD) is an immune-mediated gastrointestinal disease, the only treatment being the exclusion of gluten from the diet [3]. CeD has been associated with certain infections in several papers [4–6]. A population-based cohort study in 2010 described an increased risk of hospital admission for influenza in patients with CeD [7]. A 2015 study found a 28% increased risk of community-acquired pneumonia in CeD unvaccinated subjects compared to controls (HR 1.28, 95% CI 1.02–1.60), with a higher risk of bacterial pneumonia also found in children. Hyposplenism associated with CeD might be related to this higher risk [8,9]. Vaccination against *Pneumococcus* is therefore recommended. However, it is unclear whether additional vaccination against *Haemophilus*, *Meningococcus* and *Influenza* should be considered if not previously given [3,10]. Moreover, beyond the risk of infection, it is known that CeD patients may suffer from anxiety and depression [11–14], and the pandemic with the restrictions in place due to the risk of infection during this period might increase these conditions. Moreover, looking at the empty shelves in the supermarket, CeD patients might also fear the lack of gluten-free food.

The aim of the present survey was to investigate the COVID-19-related perception during the lockdown in adults with CeD from Veneto and Campania, for whom food supplies represent a daily concern.

Methods

We used a web-survey that included 10 multiple-choice questions aiming to evaluate the perception of the COVID-19 pandemic during the period of the quarantine (see supplementary file). We invited by email all celiac patients followed at the Celiac Disease Centers Units of the University of Salerno (Campania, South Italy) and the University of Padua (Veneto, North Italy), between the 14th and the 24th March 2020. Padua, at the time of the questionnaire, was considered a ‘red zone’ for the spread of infection with a high mortality from COVID-19. Salerno, although in preventive lockdown, was considered a zone with a low prevalence of infection and low mortality.

All patients had previously provided their consent and email address during outpatient visits, and both lists included only adult patients (≥ 18 years) with confirmed CeD diagnosis (positive CeD serology and duodenum histological damage at the time of diagnosis) who had been on a gluten free diet for at least six months. We also collected data on gender, date of birth, time of CeD diagnosis, the Italian region of origin (Veneto or Campania), compliance with the GFD using a four point Likert scale ranging from 1= bad, 2= good enough, 3= well, 4= perfect and if they had undergone the influenza vaccination. We investigated the presence of other comorbidities, in particular the presence of diabetes type 2, high blood pressure and dyslipidaemia, since it is known that the presence of comorbidities can lead to a worse outcome in regard to the COVID-19 infection [15]. The survey also included the questions of the CD-QoL [16] in the validated Italian version [17]. The CD-QoL is composed of 20 questions and its scores range from 20 to 100: the higher the score; the better the QoL. The patients also could write a short text entry. We calculated an average time of 10 minutes to complete the survey. The number of items of the questionnaire and the answering time were both devised to provide the best adherence and results.

Categorical variables were expressed as frequency and continuous variables as mean \pm Standard deviations. Comparisons among categorical and continuous variables were performed using the chi-

square test and t-test, respectively. All tests were two-tailed with a significance level set at $p < 0.05$. We analyzed the data using STATA 11 software (Stata Corp., College Station, TX, USA).

Results

We sent the web survey to 651 email addresses (530 from the Salerno centre and 121 from the Padua one) and overall we received 276 answers (42.4%). Table 1 shows a selection of the characteristics of participants. Sixty-seven CeD patients were resident in Veneto and 209 in Campania. The rate of response was 39.4% in Campania and 55.5% in Veneto. The majority were women (75.7%), mean age at the time of the survey was $39. \pm 12.5$ years with most subjects aged between 35 and 50 years. We found no differences in sex and age between Veneto and Campania participants. Most of the patients reported good compliance with the GFD. Twenty-one percent of participants had at least one other chronic disease among diabetes type 2, high blood pressure and dyslipidaemia. Less than 13% of the participants had undergone flu vaccination in the previous months (Table 1). CD-QoL scores were high in the overall population (CD-QoL: 80.9 ± 10.2). We found that CD-QoL scores were statistically significantly lower in the CeD population from Veneto than in those from Campania (77.4 ± 10.03 vs 82.04 ± 9.97 , respectively $p = 0.001$). No other differences in CD-QoL were found based on gender, age, compliance and presence of other chronic diseases.

Table 2 reported the findings of the web survey in the overall population. Most of the CeD patients were worried about COVID-19 (item 1: enough, 26.4%, much/very much, 60.1%). They did not feel more vulnerable because they had CeD (item 2: not at all 56.6%, a little 20.3%), and about half of them did not worry much about the possible shortness of gluten-free food during the epidemic (item 6: not at all 48.5%, a little 21.4%). Overall, we found a high score for CD-QoL, meaning a reported good QoL; in fact most of them did not feel, during the lockdown time, depressed or frightened

Table 1
Study population.

Number of questionnaires received /sent	276/651 (42.4%)
Region origin, N (%)	
- Veneto	67 (24.3)
- Campania	209 (75.7)
% females, N (%)	209 (75.7)
Age groups, mean (SD)	39. \pm 12.5
- <35 years	103 (37.2)
- 35 – 49 years	114 (41.3)
- ≥ 50 years	59 (21.4)
Time from diagnosis, mean (SD)	8.7 (8.9)
- <5 years	115 (41.7)
- 5-9 years	60 (21.7)
- ≥ 10 years	101 (36.6)
Compliance	
- Bad	2 (0.72)
- Good enough	36 (13.04)
- Well	148 (53.6)
- Perfect	90 (32.6)
With at least one other chronic disease*	
- No	218 (79)
- Yes	58 (21)
Flu vaccination	
- No	241 (87.3)
- Yes	35 (12.7)
CeD-QoL score	80.9 \pm 10.2

* at least one among diabetes, high blood pressure, dyslipidemia

Table 2

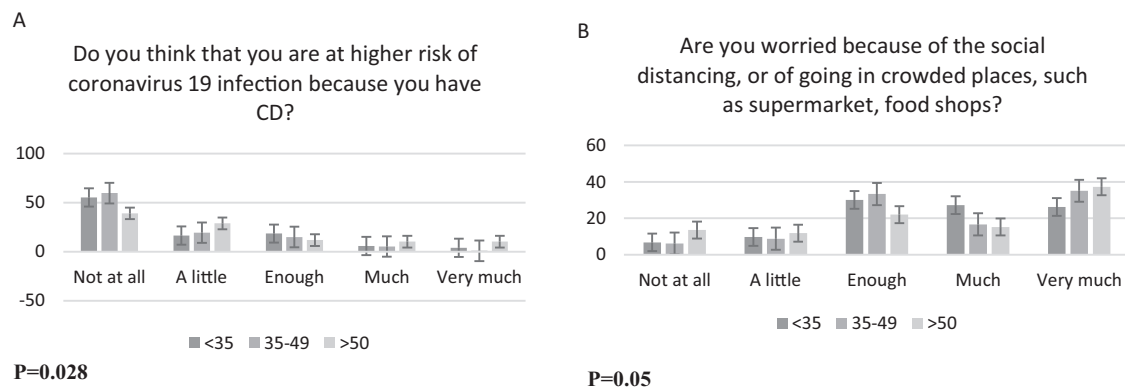
Results of the COVID-19 survey (questions 1-6) and two questions (Q10 and Q11) of the CD-QoL questionnaire.

	Not at all ★ % of patients	A little ★ ★	Neutral ★ ★ ★	Much ★ ★ ★ ★	Very much ★ ★ ★ ★ ★
1. How much are you worried because of the coronavirus 19 pandemic?	3.62	9.8	26.4	38	22.1
2. Do you think that you are at higher risk of coronavirus 19 infection because you have CeD?	56.6	20.3	15.6	6.5	4
3. Are you worried because of the social distancing, or of going into crowded places, such as supermarket, food shops?	8	9.8	29.7	20.3	32.2
4. Do you think that the coronavirus 19 information is excessive?	38.8	18.8	26.4	7.8	7.8
5. Do you feel disturbed or tense thinking about coronavirus infection?	7.6	16.3	36.6	20.6	18.8
6. Are you worried about the possible shortness of gluten-free food during the epidemic?	48.5	21.4	17	5.8	7.2
Q10. I feel depressed because of my disease	78.6	17.03	2.9	1.1	0.36
Q11. I feel frightened by having this disease	72.1	23.5	4	0.36	-

Table 3

Results of the COVID-19 survey (questions 7-9).

	No % of patients	Yes	MAY BE
7. Do you think that you are at higher risk of COVID-19 complications compared with the general population because you suffer from CeD?	59.4	8.7	31.9
8. Are you worried that because of COVID-19 you are not receiving care as normal?	75.5	10.1	16.3
9. Are you afraid because of COVID-19 of going to the hospital for a visit?	30.4	59.1	10.5

**Fig. 1.** COVID-19 survey: Data analyzed according to age-groups.

because of having CeD (CD-QoL Question 10 and 11). As reported in Table 3, most of our population did not feel at higher risk of COVID-19 complications compared with the general population because of CeD (item 7: answer was No in 59.4%); however, in about 30% the answer was “maybe” and this could be related to a source of anxiety. They were not worried because of the COVID-19 that they were not having care as normal (item 8: answer was No in 75.5%) and fifty-nine percent of our population were afraid because of COVID-19 to go to the hospital for a visit and 10% had doubts about it. Finally, we found that about 86% of our patients were happy with remote telemedicine visits (item 10: Are you happy with telemedicine remote visits?), even if about 14% were unhappy and felt not looked after, or felt unable to answer the medical interview because of the distance.

When we analyzed the data by age-groups, we found that people >50 years were significantly more worried about getting the infection because they had CeD ($p = 0.028$ Fig. 1 A). Likewise, the reported worry about being in crowded places was higher for the older age groups ($p = 0.05$, Fig. 1 B). Moreover, older patients felt at higher risk of COVID-19 complications (compared with the general population) because of CeD than younger people (item 7: answer yes: 6.8% in <35 years, 5.26% in 35-49 years and 18.6% in >50 years, $p = 0.012$), and were more worried, because of COVID-19, that they were not having care as normal (item 8: answer Yes: 10.7% in <35 years, 5.2% in 35-49 years and 18.6% in >50 years, $p = 0.04$).

We also found that patients with at least one other chronic condition, compared to patients with only CeD, felt more at risk of COVID-19 (item 2: answer much/very much 22.4% vs 7.3%, $p = 0.013$).

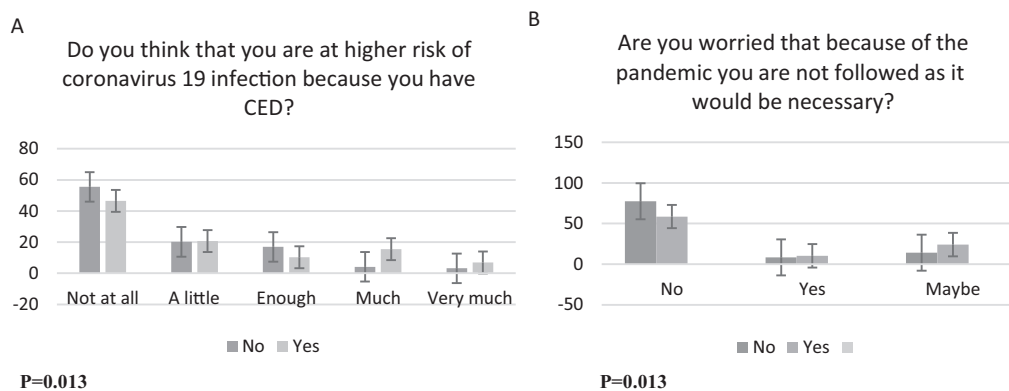


Fig. 2. COVID-19 survey: Data analyzed according to the presence of other chronic diseases besides celiac disease.

and were more worried about not being taken into care as necessary during an emergency (item 8: answer No 58.6% vs 77.5%, $p = 0.013$) (Fig. 2 A and B).

The comparison between the patients according to the region of residence showed that a more significant percentage of patients from Campania were happy with a remote visit compared with the patients from Veneto (item 10: $p = 0.023$) and more patients from Veneto were afraid that because of the pandemic they were not being followed as normal (item 8: answer was “yes” in 17.9% vs 7.6%, respectively $p = 0.05$).

Finally, we found that more women than men were worried about COVID-19 (item 1: much/very much, 44% women and 25.4% men, $p = 0.005$). We found no other differences in the survey's answers according to region of origin, age, sex, dietary compliance and the presence of at least one other chronic disease besides CeD.

In the section of the questionnaire in which patients could freely write, 46 (about 17%) asked for a remote consultation, specifying their names. When contacted, the reasons for asking for a remote consultation were: checking the laboratory tests (20), reassurance (8), sleeping problems (6), dietetic problems (8), prescription for headache (4). No patients reported in this section that they had contracted the virus.

Discussion

The major finding of our study is that CeD patients did not think they were at excessive risk of being infected with the Sars-COV-2 virus. The majority of CeD patients were not worried about the shortage of gluten-free food in shops or pharmacies, and few of them reported being much concerned. The vast majority of CeD patients of both regions reported good QoL, as assessed by a standardized questionnaire. QoL is a health status instrument that focuses on both physical and psychological symptoms, as well as impairments in daily function. We found that patients from Veneto had a lower CD-QoL score, probably because at the time of the questionnaire that region was considered a ‘red zone’ for the spread of infection with high mortality from COVID-19. Moreover, the most worried were the elderly patients, and patients with other comorbidities probably because they knew they were at greater risk of mortality [18]. The greater worry in females than males is in line with a Chinese study which described female gender associating with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression [19], despite males having a worse prognosis if infected [20].

The other relevant finding is that most of the CeD patients were happy with remote consultations. The finding suggests that remote consultation may become a standard in CeD healthcare. COVID-19, although a challenging experience from the medical and the psy-

chological point of view, has offered an opportunity to practice on a large-scale a new healthcare approach. It would be a waste if doctors and patients do not take advantage of the experience of the lockdown. Clinical researchers will eventually plan further studies to validate and regulate remote consultation in CeD and in other diseases.

At the moment, there is no regulation of any kind of telemedicine in Italy. The patients do not have access to it under the National Health System, nor is there any rule or condition regarding remote consultation. However, in the peculiar moment of the crisis the Ministry of Health encouraged the e-health initiative, free of charge. As per CeD follow-up, to our knowledge, the Sars-COV-2 epidemic has been the first occasion in which Italian doctors and patients have carried out remote consultations.

Only a few patients had undergone flu vaccination in the previous months. The datum should be taken into account in our clinical practice, as the CeD guidelines report that additional vaccination against influenza should be considered [3,10]. In Italy, doctors offer flu shots to eligible patients at any time during the flu season. According to the Italian Ministry of Health, subjects older than 65 years, children over 6 months and all subjects with a chronic disease, including CeD patients, have a free flu shot. Overall, less than 20% of the general population undergo flu vaccination in Italy [21].

Our study has several strengths. First, the present survey is the first to report on the perception of COVID-19 in CeD. Second, responders are from a large Italian cohort of CeD patients living in a similar condition of restraint. We consider that the responders represented a quite high percentage compared with the figures reported by a recent controlled study [22]. Most importantly, the survey reached the CeD patients as soon as the lockdown occurred and when there was no certainty of an end in sight. Our study also has some limitations. We did not have a control group from the general population to evaluate the weight of the chronic condition of COVID-19 in the same areas. However, an Italian study of 500 subjects from the general population described that 62% of the individuals reported no likelihood of psychological distress, whereas 19.4% and 18.6% displayed mild and moderate-to-severe likelihood [23].

We cannot exclude, although it is unlikely, that those who did respond were those most worried about the current situation. Last, we combined a standardized QoL questionnaire adding other questions ad hoc formulated for the COVID-19 circumstance. However, we tried to formulate open questions and multiple-choice answers in order not to influence the answers of our patients.

In conclusion, the results of our survey demonstrate that the lockdown has had a limited impact on the psychological balance of our patients. The results also indicate that remote medical visits

may be well received by young CeD patients and all centres should implement that healthcare approach. Finally, the survey results underlined the need to encourage flu vaccinations and, hopefully in the future, any other vaccination needed including one against Sars-COV-2.

Declaration of Competing Interest

None

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Supplementary materials

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