

# Oral health habits during COVID-19 pandemic in university medical students

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## Abstract

**Abstract Background:** The recent coronavirus disease 2019 (COVID-19) pandemic has strongly affected the young population, with a significant impact on their mental health, lifestyle, and sleep. The aim of the present study was to explore the effects of COVID-19 on oral health and general hygiene habits in an undergraduate medical school population. **Methods:** A total of 500 participants, including pre-graduate students from the School of Medicine with a mean age of  $22.84 \pm 2.68$  years completed an anonymous web survey. Of these, 200 belonged to the schools of dental hygiene and dentistry and 300 belonged to the medical school. **Results:** Students suffered from increased stress and emotional distress, which led to an increase in weight in 48.6% of the subjects. A reduction in personal and dental hygiene (8% and 4%, respectively) was observed. Students in dentistry and dental hygiene courses were more careful about their dental hygiene. Students from the dentistry and dental hygiene courses reported an increase in the use of chlorhexidine mouthwash during quarantine (+ 15%). **Conclusion:** Pandemic-related stress has affected the youth, with an increase in unhealthy lifestyle and changes in dental hygiene habits. Strong action must be taken to promote good oral hygiene habits and a healthy lifestyle among the general population during the COVID-19 pandemic.

## Oral health habits during COVID-19 pandemic in university medical students

### Knowledge transfer statement

The results of this study help us understand the impact that COVID-19-induced quarantine has had on students' oral health. From a clinical point of view it is the prerequisite for taking preventive actions on the young population.

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**Methods:** A total of 500 participants, including pre-graduate students from the School of Medicine with a mean age of  $22.84 \pm 2.68$  years completed an anonymous web survey. Of these, 200 belonged to the schools of dental hygiene and dentistry and 300 belonged to the medical school.

**Results:** Students suffered from increased stress and emotional distress, which led to an increase in weight in 48.6% of the subjects. A reduction in personal and dental hygiene (8% and 4%, respectively) was observed. Students in dentistry and dental hygiene courses were more careful about their dental hygiene. Students from the dentistry and dental hygiene courses reported an increase in the use of chlorhexidine mouthwash during quarantine (+ 15%).

Conclusion: Pandemic-related stress has affected the youth, with an increase in unhealthy lifestyle and changes in dental hygiene habits. Strong action must be taken to promote good oral hygiene habits and a healthy lifestyle among the general population during the COVID-19 pandemic.

Key words: oral hygiene; COVID-19; pre-graduate students; anxiety; quarantine

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originated in December 2019 and has rapidly spread worldwide since then. Italy was severely affected by the pandemic, reporting a high number of deaths in early March, leading the government to enforce a nationwide lockdown. The lockdown was implemented on February 23, 2020, and ended on May 3. [1] The pandemic and the associated lockdown have strongly affected the student community. The ongoing restrictions have limited the access to university facilities for students, while the schools have switched to distance learning.

Several studies have explored the psychological effects of the pandemic on students. [2,3,4,5] One of the main consequences of lockdown has been a change in lifestyle. During the lockdown, individuals switched to an unhealthy lifestyle, including poor diet and hygiene behaviors. [6,7,8,9]

In addition, several oral treatments were delayed during the pandemic. Some hospitals have promoted scientific articles on mass media to educate the public regarding oral health and strengthening the prevention and treatment of oral diseases. [9]

The aim of the present study was to explore the effects of COVID-19 on oral health and general hygiene habits in an undergraduate medical school population. The second goal was to assess whether students with higher knowledge of the benefits of good oral hygiene maintained oral hygiene habits. This endpoint was explored by comparing students from the schools of dentistry and dental hygiene with those from other medical school courses.

## Material and methods

### Participants

Participants completed an anonymous web-based survey from March 24 to May 3, 2020, after agreeing to an electronic informed consent request. The survey took 20 min to complete. A total of 500 participants recruited from the university of . . . . . (Italy) (pre-graduate students from School of Medicine), with a mean age of  $22.84 \pm 2.68$  years (range 19–24 years), completed the survey. Two hundred students belonged to the schools of dental hygiene and dentistry, and the remaining 300 belonged to the school of medicine. None of the participants reported any symptoms of COVID-19.

Questionnaire . A 34-question, multiple-choice questionnaire was prepared. After providing informed consent, the participants completed the questionnaire. The questionnaire consisted of four sections concerning demographic information, changes in diet, physical activity and sleep during quarantine, ways of coping with the lockdown, and changes in personal and dental hygiene behaviors during quarantine. This analysis focused on dental hygiene habits. The questions explored the frequency of tooth brushing, frequency of use of oral mouthwash, type of mouthwash, toothpaste, and toothbrush used before and during quarantine (that is, “how many times a day did you brush your teeth before quarantine?” and “how many times a day did you brush your teeth during quarantine?”).

We also asked about self-perception of stress, fear, stigma, and anxiety. Eating for coping and drinking for coping were also investigated.

### Statistical analysis

Descriptive analyses were performed for all variables. The Shapiro–Wilk test was used to test the normal distribution of continuous variables. We revised the analytical plan after the registration because of differences in age and sex between the cohorts (see Table 1). A stepwise regression controlling for these differences and involving a dummy code to compare the behavior before and during quarantine (0 =before quarantine, 1

= after quarantine) was conducted. To determine the differences between the two groups (before and after quarantine) and cohorts (data obtained from the first and second questionnaires), we used the t-test, chi-square test, and Fisher’s exact test when appropriate. Univariate and multivariate correlations were also determined. We followed up with multiple regressions predicting variables of interest and potential moderators (main effect and interaction with COVID-19 stress) associated with COVID-19 stress. Categorical moderators were dummy-coded (i.e., sex: 0 = men, 1 = women).

Statistical Package for the Social Sciences (SPSS v25) was used for statistical analysis, and a two-tailed p-value < 0.05 was considered significant. Missing values were excluded from the analysis.

#### Ethical consideration

No personal or private data were collected. The data collection procedure followed the provisions of the Declaration of Helsinki on human subjects [10].

#### Results.

A total of 500 students completed the questionnaire, including 297 (59.4%) women and 203 men (40.6%). The characteristics of the participants are shown in Table 1. As expected, the students self-reported that they suffered from increased stress and emotional distress. An increase in weight was observed in 48.6% of the subjects. Female students reported more “eating for coping” than male students did (68% vs. 43.8%;  $p < 0.001$ ).

General hygiene habits were maintained by students, with only a small group that reported a reduction in personal and dental hygiene (8% and 4% of the total population, respectively). (table 2).

We then compared students from the dentistry and dental hygiene courses to those from other medical courses (control group). A reduction in the frequency of use of floss or interdental brush during quarantine was reported in the control group (7.5% versus 21% of the total students in each group;  $p < 0.01$ )

To the question “Which component is included in your toothpaste?”, there was a difference between study population and control students; a significant greater number of students from the control groups answered “don’t know” or “don’t care” (respectively: 7.5% versus 75.6%;  $p < 0.001$  and 1% versus 14.3%;  $p < 0.001$ ).

To the question “what type of mouthwash do you usually use?”, a great number of students from the control group answered “none” (36.6% compared to the dentistry and dental hygiene students, where only 0.5% reported not using a mouthwash;  $p < 0.01$ ).

Interestingly, a large number of students from the dentistry and dental hygiene courses reported a change in the quality of mouthwash with an increase in the use of chlorhexidine mouthwash during quarantine (+ 15%).

We then correlated self-perception of increase in stress among students because of COVID-19 with all variables related to general and dental hygiene, and found a small correlation between COVID-19 stress perception and reduced hygiene.

#### Discussion

Our study shows that the lockdown in Italy because of the COVID-19 pandemic had a significant impact on both general and dental hygiene of medical students. We selected this population because we assumed that knowledge of the disease and good hygiene practices (i.e., washing hands frequently or wearing a surgical mask) should have mitigated the negative psychological effects of the Covid-19 pandemic. However, it appears that this was not the case. Despite having a good knowledge of general infectious diseases, stress related to COVID-19 strongly affected the examined population. Self-assessment of stress and anxiety showed that almost all students perceived increased fear, anxiety, and stigma.

To our knowledge, this is the only study that specifically explores the effects of stress induced by the COVID-19 pandemic on dental hygiene. Several studies have evaluated the impact of COVID-19 and quarantine-

related restrictions on student populations. [2,3,4,7]

A recent survey of medical students during the Covid-19 pandemic, reported an increase in anxiety (61%) and depression (70%). [2] Fear, anxiety, and depression are strongly associated with the development of unhealthy habits, characterized by unhealthy diet, reduced physical activity, and increased sitting time. [11]

A study by Esteves et al. supported these observations, reporting that many students changed their lifestyle habits to maintain social distancing, that is, not practicing physical activities and maintaining contact with friends only via telephone. [3] Distance learning may have contributed to an increase in lifestyle changes. [12,13]

Wilson et al. reported a significant decline in the mental health of college students during the COVID 19 outbreak. In addition, physical activity did not appear to protect against deterioration in mental health. [14]

A previous study showed that the lockdown and restrictions imposed by the Italian government produced psychological distress and anxiety symptoms among students, which negatively impacted their sleep quality and sleep hygiene. [5]

These results are in agreement with ours; we observed increased anxiety among students leading to unhealthy eating and weight gain, reduced physical activity, and increased sitting time.

Personal hygiene and dental hygiene were maintained during quarantine, with only a small group of students reporting a reduction in personal and dental hygiene. However, when we compared the students from dentistry and dental hygiene courses against those from other courses, we observed that the former had better dental hygiene practices. Likewise, they showed better knowledge of the tools used in maintaining oral hygiene.

The lack of knowledge of the tools for oral care by students of other medical courses is surprising. All students belonged to the medical field and were expected to have good knowledge about tools for oral care and hygiene. This is an important issue that needs to be addressed by delving into the aspects of oral disease prevention among medical students. It has been shown previously that oral hygiene plays an important role in the prevention of chronic diseases, such as diabetes and cardiovascular diseases. [15]

The persistence of the pandemic appears to have exacerbated the stress-and stress-related lifestyles of students. [16,17,18,19] Despite efforts to share reliable information on healthy lifestyles, the psychological orientation of young people, particularly their health and food consumption, appears to have not changed during the second wave period. [19]

Interestingly, a large number of students from dentistry and dental hygiene courses reported a change in the quality of mouthwash with an increase in the use of chlorhexidine mouthwash during quarantine. This was because of the effect of some studies that supported the efficacy of mouthwash in fighting the COVID-19 infection. In the study by Cavalcante-Leao et al., in which the asymptomatic patient has been mentioned multiple times, special attention has been given to dental risk since the epithelial cells of the salivary glands have high expression of the angiotensin converting enzyme 2 (ACE2) receptor, which is a functional receptor for COVID-19. They systematically reviewed evidence in the literature regarding the effectiveness of three types of mouthwashes in decreasing the viral load of the oral cavity; the three types of commonly used mouthwashes in dentistry are chlorhexidine, hydrogen peroxide, and povidone-iodine (PVP-I). They concluded that PVP-I, at concentrations of 1% and 7%, appeared to be the most effective mouthwash for reducing COVID-19 viral load in human saliva. However, the level of scientific evidence related to the use of PVP-I mouthwash in reducing SARS-CoV-2 viral load is very low because it was demonstrated only in two *in vitro* studies. The guidelines for dental care refer to the use of hydrogen peroxide; however, there is insufficient scientific evidence to support this recommendation. [20,21,22]

Our study had some limitations. First, the questionnaires were self-administered, and subjective evaluations were described. No validated tools were used to assess stress and depression among students. Second, we used a web-based survey, which may have resulted in possible selection bias. We selected a restricted cohort of medical students; therefore, it is not possible to extend our findings to the general population. However,

this very select population of medical students provides important information on how young individuals perceived the lockdown and the effects it has had on their hygiene habits.

## Conclusions

The long-lasting pandemic has led to stress and anxiety among medical pre-graduate students. The restrictions adopted by various governments to reduce the outbreak of infection has strongly affected the youth. School closures, distance learning, and reduced social life have induced a change in hygiene habits, leading to an unhealthy lifestyle among the young individuals. The major unknown is what damage is induced by stress in younger populations. We know that an unhealthy lifestyle will have long-term effects on non-communicable diseases, but we have few tools to manage the generalized stress that has affected the younger generations during this pandemic.

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## Compliance with Ethical Standards

Conflict of Interest: All authors declare no conflicts of interest.

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Table legends

### Table 1

Baseline characteristics of student populations

### Table 2

Comparison between dentistry and dental hygiene students and the control group.

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