Does COVID-19 pandemic change hand hygiene compliance among the medical students and residents? A comparative study from a university hospital

COVID-19 Pandemisi tıp öğrencilerinin ve uzmanlık öğrencilerinin el hijyenine uyumunu değiştiriyor mu? Bir üniversite hastanesinden karşılaştırmalı çalışma

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ABSTRACT

Aim: We aimed to find out if there is statistically significant difference in self-reported hand hygiene compliance among Year-5 medical students, Year-6 medical students, and residents in Gazi University Faculty of Medicine between right before and after the first confirmed case of COVID-19 in Turkiye.

Materials and Methods: Two cross-sectional surveys were carried out to reveal self-reported hand hygiene compliance among participants right before and after the first confirmed case of COVID-19 in Turkiye. Participants were Year-5 and Year-6 medical students and residents in Gazi University Faculty of Medicine. Convenience sampling was used. There were 833 participants in total. The survey form consists of 10 items that were constituted by examining World Health Organization guidelines on hand hygiene. The compliance scores before and after the first confirmed case were compared by performing T-Test.

Results: Out of 10 items, there was significant difference in Year-5 medical students', Year-6 medical students' and residents' self-reported hand hygiene compliance scores between before and after the first confirmed case of COVID-19 in 6 items, 10 items, and 8 items, respectively (p<0.05).

Conclusion: Significant increase in hand hygiene compliance was found right after the COVID-19 outbreak when it compared to before. The main factor behind the improvement would be extremely high levels of perceived risk created by outbreak.

Keywords: Hand hygiene, COVID-19, SARS-COV-2, medical students, residents COVID-19.

ÖZ

Amaç: *Bu çalışmada, Türkiye'de tespit edilen ilk COVID-19 vakasından hemen önce ve sonra, Gazi Üniversitesi Tıp Fakültesi Dönem 5 tıp öğrencileri, Dönem 6 tıp öğrencileri ve tıpta uzmanlık öğrencilerinin el hijyenine uyumlarına yönelik beyanlarında istatistiksel olarak anlamlı bir değişiklik olup olmadığının belirlenmesi amaçlanmıştır.*

Gereç ve Yöntem: *Kesitsel tipte gerçekleştirilmiş olan bu çalışmada, Türkiye'de resmî olarak saptanan ilk COVID-19 vakasından hemen önce ve sonra, katılımcıların el hijyenine yönelik beyana dayalı uyumlarını ortaya çıkarmak için iki anket uygulanmıştır. Çalışmanın katılımcıları, Gazi Üniversitesi Tıp Fakültesi Dönem 5 ve Dönem 6 öğrencileri ve tıpta uzmanlık öğrencileridir. Uygunluk örnekleme yöntemi kullanılmıştır. Toplam katılımcı sayısı 833'tür. El hijyeni sağlama ile ilgili 10 madde içeren anket formu, Dünya Sağlık Örgütü tarafından geliştirilmiş olan el hijyenine dair rehberi incelenerek oluşturulmuştur. İlk vakadan önceki ve sonraki uyum puanları, T testi kullanılarak karşılaştırılmıştır.*

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Bulgular: 10 maddede Dönem 5 ve Dönem 6 tıp öğrencilerinin ve tıpta uzmanlık öğrencilerinin el hijyenini sağlamaya yönelik beyana dayalı puanlarında, resmî olarak ilk kez tespit edilen COVID-19 vakasından önce ve sonra sırasıyla altı, on ve sekiz maddede anlamlı farklılık vardı (p<0.05).

Sonuç: Öncesiyle karşılaştırıldığında, COVID-19 salgınının hemen sonrasında katılımcıların el hijyenine uyum beyanında anlamlı artış olduğu saptanmıştır. Söz konusu artışın sebebi, COVID-19 salgınının yarattığı çok yüksek düzeydeki risk algısı olabilir.

Anahtar Sözcükler: El hijyeni, COVID-19, SARS-COV-2, tıp öğrencileri, uzmanlık öğrencileri.

INTRODUCTION

Hand hygiene plays an essential role to prevent communicable diseases and hospital-acquired infections. Data demonstrates that hand hygiene enables us to reduce the transmittance of pathogens between patients as well as to lower infection rates and healthcare costs (1, 2). In spite of its importance, observational studies show that hand hygiene compliance among healthcare workers are mostly below 50% (3). The compliance rates are low and it is considered a universal problem (4, 5). Furthermore, medical students have a lack of information problem that may cause non-compliance (6). World Health Organization is aware of the gap and organizes campaigns to support hand hygiene improvement globally (7).

Hand hygiene compliance would be considered more vital during COVID-19 (SARS-COV-2) outbreak since the virus transmitted person-to-person and spread rapidly with severe effects (8, 9). As of 24/11/2020, global results of COVID-19 are more than 57 million confirmed cases and 1.5 million deaths (10). A United Nations chief expressed that "COVID-19 is the worst crisis since World War II as deaths surge" (11). It brings to mind that this huge crisis may coerce ordinary people into changing the way they live and increase their hand washing compliance same as happened during SARS outbreak in 2003 (12), influenza pandemic in 2009 (13), and MERS outbreak in 2014 (14). Likewise, the routines of healthcare workers would be affected. It may be possible to recognize the increase of hand hygiene compliance among medical students as during SARS outbreak in 2003 (15).

The aim of this study is to find out if there is a statistically significant difference in self-reported hand hygiene compliance among Year-5 medical students, Year-6 medical students, and residents in Gazi University Faculty of Medicine between right before and after the first confirmed case of COVID-19 in Turkiye.

The hypotheses of the study are as follows:

H01: There is no statistically significant difference in Year-5 medical students' self-reported hand hygiene compliance scores between before and after the first confirmed case of COVID-19.

H02: There is no significant difference in Year-6 medical students' self-reported hand hygiene compliance scores between before and after the first confirmed case of COVID-19.

H03: There is no significant difference in residents' self-reported hand hygiene compliance scores between before and after the first confirmed case of COVID-19.

MATERIAL AND METHODS

Study Setting

The study was carried out at Gazi University Faculty of Medicine, Ankara, Turkiye. The faculty offers a 6-year educational program for undergraduate medical education. A 1000-bed tertiary teaching hospital is used in clinical years as well as in residency. After the first confirmed case of COVID-19, medical students were at their home due to the fact that undergraduate medical education was turned completely into distance education. At the same time, residents were actively working in clinics.

Study Design

The study consists of a comparison of two cross-sectional surveys that were carried out right before and after the first confirmed case of COVID-19 in Turkiye with 833 participants in total.

Before the First Confirmed Case: We had started to collect data to evaluate hand hygiene compliance of Year-5 and Year-6 medical students and residents in our medical faculty on December 10, 2019 without awareness of COVID-19 outbreak. By using an anonymous online survey form, we asked 10 questions to the participants to reveal their self-reported hand hygiene compliance and discuss the results to evaluate it under the context of role-modelling. These 10 questions were constituted by examining WHO guidelines on hand hygiene in healthcare (16). They answered the questions by using 5-point Likert type items (1: Never 5: Always). The survey form does not include any question that might indicate the participants'

identity (such as age and gender) so that they express their compliance without any concern. When we were collecting data, COVID-19 outbreak has started at the end of 2019 in China but there was no confirmed case of COVID-19 in Turkiye for a while (17). Officials announced the first case of COVID-19 on 10/03/2020 (18). We ceased the data collection process immediately due to the unusual circumstance that is created by the atmosphere of the first confirmed case and related high level precautions in the country. 122 Year-5 medical students, 116 Year-6 medical students, and 125 residents had filled the survey until that day. Cronbach's Alpha levels were 0.89, 0.88, 0.82 for Year 5, Year 6, and residents, respectively. We used the data collected before the first confirmed case to only evaluate role-modelling effect by not depending on COVID-19 outbreak. It is a separate research independent of this study because of its original aim and different context (19).

After the First Confirmed Case: Right after the first confirmed case of COVID-19 that were announced in Turkiye, on 10/03/2020, we removed the survey. We added only a question to the residents' form that asks whether they participated in any hand hygiene education in 2020. We did not change the other parts as well as Year-5 and Year-6 medical students' survey forms. The survey forms have been sent to the Year-5 and Year-6 medical students and residents in our faculty by using online environment in the same way that we had sent before the first confirmed case. The data were collected between 31/03/2020 and 24/04/2020. 211 Year-5 medical students, 135 Year-6 medical students, and 124 residents have filled the form. Cronbach's Alpha levels were 0.85, 0.79, 0.78 for Year-5, Year-6, and residents, respectively.

Eligibility

Convenience sampling method was used. There were around 340 students in Year-5 and Year-6 both, and 590 medical residents. We calculated that the sample size should be more than 105 for both of the Year-5 and Year-6 students, and 120 for residents (confidence level: 95%, margin of error: 8%, Raosoft Sample Size Calculator). We reached medical students and residents by posting the link of the forms to their communication groups on the internet. There were no eligibility criteria to participate in the study other than being Year-5 or Year-6 medical student or resident in our faculty. Although the first and the second population was the same, the participants likely not to be exactly the same

in both surveys. We did not match the participants.

Data Analysis

The statistical analysis was carried out by using SPSS v.22.0 for Windows (Chicago, IL, USA). We considered data as interval data, coherent with expert recommendations. Sullivan and Artino suggest that "Parametric tests tend to give "the right answer" even when statistical assumptions—such as a normal distribution of data—are violated, even to an extreme degree. Thus, parametric tests are sufficiently robust to yield largely unbiased answers that are acceptably close to "the truth" when analyzing Likert scale responses." (20). In the guidance of this, Independent-Samples T-Test has been performed since the participants in two groups (before-after) highly likely are not exactly the same. The 2-tailed 0.05 alpha level was used as a cut-off value of statistical significance.

Ethical Considerations

Participation was voluntary. Ethics Committee of Gazi University had approved the study (code: 2019-394).

RESULTS

The mean scores of self-reported hand hygiene compliance of Year-5 medical students, Year-6 medical students, and residents before and after the first confirmed case of COVID-19 as well as the significance of the differences are reported in (Table-1).

Results revealed that;

- There was statistically significant difference in 6 items out of 10 between scores of Year-5 medical students before and after the first confirmed case. Therefore, hypothesis H01 is rejected in 6 items.
- There was statistically significant difference in 10 items out of 10 between scores of Year-6 medical students before and after the first confirmed case. Therefore, hypothesis H02 is rejected in 10 items.
- There was statistically significant difference in 8 items out of 10 between scores of residents before and after the first confirmed case. Therefore, hypothesis H03 is rejected in 8 items.

Out of 124 residents who filled the survey form after the first confirmed case, 56 (45.2%) of them stated that they participated in a hand hygiene education while 68 (54.8%) of them did not. There was no statistically significant difference between them (p>0.05).

Table-1. Mean scores and significance of differences between before and after the first confirmed case of COVID-19 in the country.

I perform hand hygiene procedures;	Year-5 Medical Students			Year-6 Medical Students			Residents			Significant Differences Before and After Between Year-5, Year-6, and Residents (p<0.05)
	Before (N=122)	After (N=211)	p	Before (N=116)	After (N=135)	p	Before (N=125)	After (N=124)	p	
1. Before touching a patient.	4.30 ± 0.68	4.50 ± 0.69	0.011*	4.05 ± 0.65	4.38 ± 0.58	<0.001*	4.06 ± 0.76	4.53 ± 0.60	<0.001*	**Before: Y5-Y6, Y6-R, Y5-R After: Y6-R**
2. After touching a patient.	4.47 ± 0.74	4.77 ± 0.51	<0.001*	4.46 ± 0.59	4.70 ± 0.50	0.001*	4.35 ± 0.75	4.82 ± 0.38	<0.001*	**After: Y6-R**
3. Before touching a patient, even before wearing the gloves.	3.89 ± 0.87	4.10 ± 1.03	0.065	3.38 ± 0.94	3.66 ± 0.96	0.022*	3.40 ± 1.10	4.01 ± 1.03	<0.001*	**Before: Y5-Y6, Y6-R, Y5-R After: Y5-Y6, Y6**
4. When put off the gloves after touching a patient.	4.14 ± 0.85	4.40 ± 0.86	0.009*	4.06 ± 0.91	4.59 ± 0.60	<0.001*	4.31 ± 0.82	4.67 ± 0.62	<0.001*	**After: Y5-Y6, Y5-R**
5. After touching patient surroundings.	3.95 ± 0.93	4.12 ± 0.94	0.117	3.47 ± 0.96	4.14 ± 0.82	<0.001*	3.86 ± 0.92	4.27 ± 0.86	<0.001*	**Before: Y5-Y6**
6. When there are observable excretions or secretions on my hands.	4.69 ± 0.63	4.87 ± 0.42	0.002*	4.60 ± 0.69	4.93 ± 0.27	<0.001*	4.68 ± 0.65	4.88 ± 0.41	0.004*	None
7. Before clean/aseptic procedure. (surgical interventions, peripheral or central intravenous catheterization, urethral catheterization, endotracheal intubation etc.)	4.75 ± 0.50	4.86 ± 0.49	0.068	4.55 ± 0.67	4.75 ± 0.55	0.012*	4.69 ± 0.60	4.82 ± 0.54	0.077	**Before: Y5-Y6**
8. After invasive intervention.	4.66 ± 0.65	4.82 ± 0.49	0.011*	4.54 ± 0.71	4.88 ± 0.32	<0.001*	4.76 ± 0.44	4.93 ± 0.26	<0.001*	**After: Y5-R**
9. Before touching invasive device.	4.61 ± 0.62	4.69 ± 0.62	0.279	4.34 ± 0.73	4.65 ± 0.60	<0.001*	4.57 ± 0.60	4.62 ± 0.71	0.565	**Before: Y5-Y6**
10. After touching invasive device.	4.57 ± 0.64	4.75 ± 0.57	0.009*	4.42 ± 0.67	4.81 ± 0.42	<0.001*	4.64 ± 0.56	4.81 ± 0.50	0.009*	None

DISCUSSION

We have carried out two surveys on hand hygiene compliance. The first one was before the first confirmed case of COVID-19 in Turkiye. Before that day, strict precautions across the country were not taken yet (such as closed schools and lockdown) (18). The second survey was the same as the first one and conducted after the announcement of the first confirmed case. We compared the data and found that self-reported hand hygiene compliance of Year-5 medical students, Year-6 medical students, and residents after the first confirmed case of COVID-19 is higher than their compliance before. In Year-5 medical students, the number of items that have significant difference was less than Year-6 students and residents. It may be due to the fact that Year-5 students have limited clinical experience than Year-6 students and residents therefore they could not have developed their professional identity as much as other participant groups as well as they have not realized the importance of hand hygiene in the clinical environment.

In our study, there generally was a significant increase in self-reported hand hygiene compliance. The finding is in line with the findings of the study that found a significant improvement in hand washing practice of medical students after the SARS epidemic in Hong Kong (15). Several other studies have shown similar results. A study found that there is "higher awareness of hand hygiene during influenza seasons" and "influenza season is an independent predictor of increased hand hygiene adherence" among healthcare workers (21). Another study shown that hand hygiene compliance among healthcare workers significantly higher during the H1N1 pandemic influenza in 2009 but a year later compliance levels were lower than previous years (22). A study conducted in Brazil during influenza pandemic in 2009 has slightly different results that hand hygiene compliance was not higher than before the pandemic but the use of alcohol based hand rub was increased (23).

In the light of all these studies, it can be concluded that hand hygiene and hand washing compliance have become stronger during outbreak periods. Several factors could have influenced hand hygiene compliance. First, it could be an effect of educational activities on infection control during outbreak times. In our study, however, there was no significant difference regards to participation to hand hygiene education. Nevertheless, we cannot underestimate the role of hidden curriculum that occurs in the clinical environment ceaselessly. Second, medical students and residents might heighten their awareness of hand hygiene due to the perceived threat that is caused by COVID-19 outbreak. It is known that the Turkish students were aware of the threat of the pandemic (24). According to a study that analyzed the data of self-reported hand hygiene compliance among final year medical students in the Netherlands, however, hand hygiene compliance is not associated with risk perception (25) while another study conducted in community in Saudi Arabia during MERS outbreak found that "mean anxiety level was significantly associated with hand washing practice after coughing" (14). We can infer that extremely high levels of perceived risk during outbreaks would be seen as exceptional for hand hygiene compliance since outbreaks are extraordinary time periods. While the hand hygiene compliance among healthcare workers was high in early times of the pandemics, the observed decrease as time progressed (26) is another sign of that. Hand hygiene cannot be maintained by force of threats since the sustainability of hand hygiene compliance "require role models and culture change around infection control" (27).

There are several limitations of this study. First and foremost, our study is based on self-reported compliance, which is susceptible to social desirability bias (28), not on observational data. We aimed to reduce the risk of social desirability bias by excluding any kind of identity information, other than being Year-5 or Year-6 medical student or resident, from the survey form. However, we realize that there is still a potential bias that could limit the validity of study. Moreover, the data without demographic characteristics, such as age and gender, is a limitation to interpret the results. A second limitation of this study is that it included only Year-5 and Year-6 medical students and residents. Reactions of other medical students (Year-1 to Year-4) might be different. As another limitation we must mention that the conclusions arose from this study reflects only scope of our faculty and culture. It should be studied with other medical faculties and cultures to generalize. The long term impact of the COVID-19 pandemic to hand hygiene compliance among medical students and residents may also be studied.

CONCLUSIONS

We surveyed our Year-5 and Year-6 medical students and residents on their hand hygiene compliance before and after the first confirmed case of COVID-19 in Turkiye. Significant increase in hand hygiene compliance was found right after the COVID-19 outbreak when it compared to before. The main factor behind the improvement would be extremely high levels of perceived risk created by the outbreak. Even though, to improve hand hygiene compliance, we cannot maintain a risk-centered approach since this method is not sustainable due to its unhealthiness. We may need more to focus on role-models and building a culture that promotes infection control.

Conflict of interest: None.

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