Impact of COVID-19 Pandemic on Hand Washing Process and Water Consumption

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Abstract: World Health Organization suggested many ways to protect from coronavirus disease 2019 (COVID-19), such as maintaining a safe distance from others, wearing a mask, avoiding touching eyes, nose, or mouth, staying at home, cleaning/washing hands often, and using soap and water or an alcohol-based hand rub. Thus, water and alcohol-based handwashing were frequently used since the pandemic. Therefore, this research aimed to compare the amount of water used before and during COVID-19. Similarly, using the alcohol-based cleaning will be evaluated during the COVID-19 and before that. Several questions were prepared and sent to the participants using technology. This study found that the number of handwashing and the duration of the washing hand increased by 85.34% and 101.92% respectively, which means water used for handwashing was doubled after the spread of the coronavirus. Correspondingly, clean and sanitizers like gel and alcohol were used more as well.

Keywords: COVID-19, Detergents, Disinfectants, Handwashing, Sanitizers, Water Consumption

1. Introduction

Coronaviruses were first discovered in domesticated chickens in the 1930s. It was only in the 1960s that it was discovered in humans. This virus can cause serious respiratory illnesses (Khoshnaw et al., 2020). The coronavirus illness (COVID-19) is a pandemic caused by the Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) and caused by an outbreak at the end of 2019 (COVID-19) (Ibarra-Vega, 2020). Coronavirus disease is a contagious infection caused by a newly identified coronavirus (Ahmad & Murad, 2020; Ahmed et al., 2020). On December 30, 2019, in Hubei province, Wuhan City, China, the first case of this new coronavirus infection was detected and subsequently spread globally (Aziz, 2020; Wadood et al., 2020). On January 20, 2020, Chinese health officials stated that coronavirus had been transmitted to humans. COVID-19 cases outside of China began to rise fast on February 20, with new infections reported in South Korea, Iraq, Iran, and Italy, followed by a rapid spread in European countries in March. On February 24, 2020, COVID-19 was first detected in Iraq (Hashim et al., 2021).

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The general public is finding knowledge on ways of defending themselves as COVID-19 spreads across the world. Because of the COVID-19's powerful human-to-human transmitting capacity, the world has now undergone a pandemic. Both pharmaceutical and non-pharmaceutical strategies are available to treat COVID-19. Whereas the most highly successful approach is pharmaceutical interventions, the production of vaccines and antiviral drugs takes much time, so they can not contain an outbreak triggered by a new pathogen at an early stage. Non-pharmaceutical treatments, such as washing hands and wearing masks, are required in this scenario to reduce the risk by creating a barrier that will prevent the aerosol from spreading and protecting vulnerable groups (Aiello et al., 2012; Aledort et al., 2007). Daily hand washing is at the top of the World Health Organization's (WHO) and US Centers for Disease Control and Prevention's (CDC) public health advice on COVID-19 prevention (WHO, 2020a). In March 2020, The Guardian released a piece on COVID-19 and hand hygiene, in which a distinguished biologist argues, "one thing you can do is minimize your risk" (Fleming, 2020). "Your hands convey practically all your pathogens to your respiratory tract," said an emergency medicine professor, according to the New York Times (Parker-Pope et al., 2020). On March 20, 2020, Google Doodle recognized Dr. Semmelweis, the "father" of handwashing, as a technique to reduce disease transmission, depicting in real-time the various independent procedures of effective handwashing (Lin et al., 2020). Currently, the most important actions taken overseas are maintaining hand hygiene and maintaining an acceptable social distance, but China also encourages masks. For all individuals, hand washing is necessary. Washing hands with soap and wearing a mask as a way of preventing and managing infectious diseases has the advantages of ease of use, high health benefits, good economic benefits and long-term sustainability; however, even wearing gloves does not provide adequate protection against hand contamination (Curtis & Cairncross, 2003; Grayson et al., 2009). Doebbeling et al. (1988) put various microorganisms on gloved hands; after removing the gloves put on the glove's hands, they could isolate the same microorganisms on the skin. As a consequence, hand hygiene is still required after using gloves. Hand hygiene is a significant and essential factor in preventing the hands from transmitting diseases (Nazliansyah et al., 2016). Since the number of infections that a caretaker's hand can transmit is immense, washing hands is one of the successful steps to break the infection transmission chain (Soesanto, 2018). Research from the literature suggests that regular handwashing decreases the risk of virtual transmission by 55% (Jefferson et al., 2009). Through filtration, masks will filter the air that enters the lungs and significantly impact respiratory infectious diseases (Chen et al., 2020). Lin et al. (2020) evaluated Google searches for "face mask" and "wash hands" to supplement national population health literacy in 21 nations from January 19 to February 18, 2020. The big rise in "face mask" searched showed the general public's anxieties against the COVID-19 pandemic. Increased Google searches for "wash hands" between January 19 and February 18, 2020, were shown to be linked to a slower COVID-19 spread speed between 21 countries between February 19 and March 10, 2020. These findings backed up previous research that found wearing a face mask to be less effective than hand hygiene. Before putting on the face mask, Hands must still be washed with soap and water for at least 20 seconds (Desai & Mehrotra, 2020), and hand hygiene must be repeated after touching the masks' exterior surface (Bae et al., 2020).

Many social, cultural, and religious views are influenced by the practice of hand rubbing with alcohol-based hand rubbing or handwashing with soap and water (Al-Tawfiq & Memish, 2017). Regular handwashing with water and soap was one of the most effective ways to prevent infection spread during the global COVID-19 outbreak (CDC, 2020b; UNICEF, 2020; WHO, 2020b). Both, United Nations Children's Fund (UNICEF) and WHO also suggested switching whilst lathering hands with soap and scrubbing to prevent water loss for at least 20 seconds. During the pandemic, the frequency of hand hygiene increased (Park et al., 2010).

As a result, handwashing has been observed to become more common during the concurrent COVID-19 pandemic. During the COVID-19 pandemic in India, 20 to 25% of water demand increased due to taps opening during hand washing (Rohilla, 2020). Furthermore, Jordan's social water sector reported that after the government forced individuals to stay at home as part of a national curfew, water consumption increased by 40% (Al-Masri, 2020). As a result of the increased water demand, water loss during hand washing could become a problem. According to Sackey (2019), the total amount of water used in scrubbing was 20.2 L, with just 5.9 L utilized for hand washing. However, Rose-Innes (2017) reported 2.1 L of water for handwashing. Also, Marvin (2019) showed that each person used about 17.5 L of water for handwashing in regular taps; this number dropped to around 4.2 liter in sensor taps; the author stated that on average, 55% of used water was waste due to being left on without water being used. Moreover, Sayeed et al. (2020) state that massive amounts of water loss daily in handwashing practice. The average number of handwashing practices per day among the participants was 8.93 (Sayeed et al., 2020). However, this number reduced to 4.5 times a day (Marvin, 2019). Beale et al. (2020) found that Moderate-frequency hand washing (6-10) times a day was associated with a reduced overall risk of coronavirus infection. Regarding the time of hand washing, WHO (2020b) recommends using an alcohol-based hand rub for 20-30 seconds and water with soap for 40-60 seconds.

COVID-19 impacted several sectors such as politics, tourism, economics, sports, human activities, education, transportation, the environment, etc. (Aziz, 2020). It affected the lifestyle as well, particularly during lockdowns. According to the WHO guidelines, people are encouraged to clean and wash their hands periodically and at essential times. Accordingly, this research aimed to study the public awareness and anxieties of handwashing before and during COVID-19 disease spreading. This research investigated water consumption by a person for hand washing before and during COVID-19. Because a questionnaire is a simple instrument and an efficient way of collecting information from many people in a short period, it was used to collect data (Jenn, 2006; Patel & Joseph, 2016). This type of research has not yet to be published in the literature.

2. Handwashing

2.1 Barriers

When faced with a disease for which no proven pharmaceutical intervention or vaccination exists, we have prevention. The importance of handwashing has been known for over a century in preventing infectious diseases, but It's been referred to as one of health policy's "lost foundations" (Bartram & Cairncross, 2010). Regular and thorough hand washing is essential when individuals live close together, amid rubbish heaps and open drains. However, if you don't have access to soap and water at home, how do you wash your hands regularly? This is true for more than a quarter of the world's population, as well as more than half of the population in Sub-Saharan Africa and Oceania (Brauer et al., 2020). The importance of handwashing in the prevention of infectious diseases has been known for over a century. Over 26% of the world's population lacks access to a handwashing station at home; this population rises to more than 50% in many low-income countries (Ray, 2020). Despite the apparent benefits of handwashing, the number of people who do it is low. 81% of the global population does not wash their hands with soap after defecating (Freeman et al., 2014). Hand hygiene barriers are incredibly complex and multifactorial, influenced by components at the organizational and individual levels (Jeffcott et al., 2009). Measures as affordable and straightforward as handwashing with soap and water should be used to reduce and save millions of lives, and hand hygiene compliance is still

inadequate in developing countries (Asare et al., 2009; Karabey et al., 2002). Despite contradicting data on the impact of accessibility and the accessibility of handwashing facilities in boosting handwashing compliance (Preston et al., 1981; Ward, 2000); one obstacle to adequate handwashing frequently identify by Health Care Workers (HCWs) is an insufficient number or inconvenient location of sinks (Larson & Killien, 1982; Zimakoff et al., 1992). Hand hygiene during the delivery of health care in developing countries is hampered by a lack of soap and water, as well as inadequate sink facilities (Pittet et al., 2008). In humanitarian crises, the shortage of hand wash is particularly problematic as sanitation services, unclean water, inadequate health care, overcrowding, and environmental pollution leave people who are at a greater risk of contracting a disease (Connolly et al., 2004; Kouadio et al., 2012). In some other cases, the water is unaffordable because of unpaid bills, or the supply has been cut off. When there is no water in the house or yard, or the supply has been cut off. When there is no water in the house or yard or no water distribution system, handwashing is particularly tough. Long before COVID-19, worldwide cost-benefit analyses of investments in water and sanitation, with benefits estimated in both time and health savings, revealed significant net benefits in all developing world sub-regions (Ray, 2020). Studies have shown the population's attention to explain the link between handwashing and disease avoidance (Biran et al., 2012; Curtis et al., 2009). Because of these reasons, maybe the people in Kurdistan Region (KR) cannot adequately apply the procedure of hand washing.

2.2 Technique

Every year, we hear about Norovirus, Methicillin-Resistant Staphylococcus Aureus (MRSA), and respiratory viruses that infect a large number of people and necessitate handwashing to prevent infection. In the UK, 5000 deaths are reportedly caused per year by healthcare-related infection (HAI) (WHO, 2020c). However, considering recent findings and proof-based national guidance policy, healthcare professionals find no compelling evidence for hand-cleaning approaches appropriate for primary and community care hands hygiene (Smith, 2009). Hand washes with soap may seem vital, if necessary, whether antimicrobial or straightforward, to manage infections or prevent spread in primary care and community environments (Smith, 2009). In a research, guidance, and textbook publications, a description of this technique has been recorded (Rennie-Meyer, 2007; Timby, 2009; WHO, 2020c). As part of hand-decontamination, this procedure eliminates all the temporary waste and organisms from the hand. Hand washing and washing hands are highly recommended, but there is no knowledge of current handwashing policies. In addition to HAI, the prevalence of respiratory diseases has been shown by hand washing in a community setting (Luby et al., 2005; Ryan et al., 2001). Handwashing technologies were generally poorly established in journal papers, with contradictory information on hand positions and water flow direction for sanitary hand washes, social, and surgical scrub (Hsieh et al., 2006). A limited number of publications defined handwashing in Feldman's standards seem to have reversed the "dirty" and "clean" concepts for social or healthy handwashing and the related hand location and water flow path (Feldman, 1969). Various clinical textbooks indicate that the water stream can run from top hands to fingertips in a social hand wash to justify that the water stream is clean to dirty (Altman, 2004; Wilson et al., 2015). Handwashing has been recommended by the CDC for decades (Garner & Favero, 1986). "Plain soap should be used to wash hands unless otherwise indicated" is mentioned. Whishing by hand with soap, where pollution is high, cannot eliminate all transient microorganisms. The use of soap and water will reduce or even improve the bacterial yield relative to the hand's hands' simple numbers (Meers & Yeo, 1978). Steps that included incorrect handwashing have been recently reviewed (Elizabeth, 1999). If HCWs wish to wash their hands, they must first go to the sink, 2) for a few seconds, run the water, 3) soak their hands and wrists, 4) apply

one teaspoon of soap on the forearm or elbow, 5) rub their hands and wrists for 10–15 seconds before rinsing them, 6) gently wipe their hands with paper towels without rubbing, 7) turn off the faucet with a paper towel, and 8) remove the towel from the wastebasket without touching it (Elizabeth, 1999; Larson, 1995).

As suggested by the WHO, management tips should be washed with clean water and soap, especially when it is in public places, after coughing, after toilet use, after meals, and if hands are dirty, for 20 seconds (Interdigital web gaps, wrists, and fingernails are all included). If soap or water is not available, the CDC suggests using alcohol-based hand sanitizer sanitizers (at least 60% alcohol concentration) to destroy the virus. The qualities and efficiency of this type of sanitizer are unaffected by applying a moisturizing cream afterwards. For people who operate with disposable gloves, it is strongly advised to wash and moisturize after removing them. They can then be changed regularly, only to be used on dry hands to reduce moisture.

3. Methodology

3.1 Study site and Participants

From May 5, 2020, to June 15, 2020, a cross-sectional and quantitative study was conducted in the Kurdistan Region of Iraq (KRI), and all of its residents were chosen as the study's population. There were three specific exclusion criteria for participating: reading and workplace, and residence in the KR. Anyone who had these specifics can be eligible to participate in this survey.

3.2 Questionnaire Design and Data Collection

The current study was designed to obtain information regarding handwashing and demand before and during COVID-19 and anxiety and awareness through their daily practices. This was a cross-sectional study that used a self-administered online questionnaire. Google forms, a free electronic form provided by Google, was used to create the questionnaire, which was used to collect information voluntarily. There were 17 closed-ended questions in this survey with a proposed filling time of about 3-5 minutes. Using snowball sampling, the authors sent the survey link over social media across all KRI Provinces' areas (i.e., Erbil, Sulaimani, Duhok, and Halabja). A total of 1000 people were sent the survey form, and 654 responded aged 18 to above 45 years from practically all of the country's divisions. Experts evaluated the draft questionnaire, and the relation between the items was studied before distributing the questionnaire.

3.3 Sample Size Determination

In 2020, the total population in the KR was expected to be 6,171,083 people (Kurdistan Regions Statistics office, 2020). In this situation, the formula below would be adequate for calculating the sample size required for this investigation (Wadood et al., 2020):

$$\mathbf{n} = \frac{\mathbf{N}}{1 + \mathbf{N}\mathbf{d}^2} \qquad [1]$$

Where n = sample size required, d= margin of error (considered d= 0.05), and N= size of population (Rana et al., 2015). Because of the sample size allotted by considering the population in KRI, a simple random sampling strategy was used because the formula said that 400 samples would be sufficient for this investigation. (Chen et al., 2020).

3.4 Instrument

Questionnaires consisted of three main parts. The first part is related to the demography. Demographic variables included gender, age, education, residence address, and workplace. The second part focusing on the impact of COVID-19 to hand washing; it was divided into two main portions: 1) before and 2) during COVID-19. This part was subdivided into other items such as hand washing daily numbers and durations with the other substitute cleanser instead of handwashing.

3.5 Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 26.0 was used for all statistical analyses (IBM Corp., Armonk, NY, USA). Data were presented as frequencies and percentages if a normality test was not statistically significant ($p > 0.05$). The pair sample test was used to analyze the participant's attitude before and during COVID-19, and statistically significant occurred when ($p < 0.05$).

4. Results and Discussions

4.1 Demography

For the study, 17 comprehensive questions were answered by participants. The questionnaire was responded to by 654 from many different places in KRI. Gender, age, qualification, and workplace were the primary questions that the participants were asked to answer (Table 1). The males participated more than females, shown in Table 1 by a difference rate (20.60%). The young people age (18-25 years) had a higher rate of filling in this questionnaire, followed by those aged (26-35 years) at a rate of (22%). In the third rank come those aged (36-45) followed by those aged more than (45 years) in the fourth rank. Variety people filled the form, the majority of them have university degrees, followed by high school graduates, and the lowest percent of the contributor has hold primary school (3%). People from different cities contribute to this questionnaire. Form Sulaimani City height people responded to this questionnaire, and the lowest number from Duhok answered the questions (Table 1).

Table 1: Characteristic of the participants

Variable	Participants (No.)	Percentage
Gender		
Male	394	60.34%
Female	260	39.82%
Age (Year)		
18-25	371	56.73%
26-35	141	21.56%
36-45	95	14.53%
older than 45	47	7.19%

Academic Background		
Primary	18	2.75%
Secondary	69	10.55%
High school	156	23.85%
Institute	119	18.20%
University	222	33.94%
Master	43	6.57%
PhD	27	4.13%
Residence Address		
Sulaimani	433	66.21%
Erbil	176	26.91%
Halabja	17	2.60%
Kirkuk	20	3.06%
Duhok	8	1.22%
Workplace		
School	172	26.30%
University	129	19.72%
Hospital	33	5.05%
Project	50	7.65%
Shopkeeper	70	10.70%
Other Places	200	30.58%

4.2 Hand Hygiene Using Water and Sanitizers

Six paired questions were prepared for evaluating water consumption before and during the spread of the COVID-19, as shown in Tables 2 and 3. The participants answered all the paired questions. The questions were about the frequency of handwashing, duration of handwashing, using the amount of water for handwashing, washed hands needlessly, and the last two questions were about sanitizers like

gel and alcohol and cleaners for hand washing. The extra amount of water used during the spread of the COVID-19 would be evaluated from the above list of questions.

Table 2: Paired samples tests to show water consumption rate before and during COVID-19

No.	Question	Mean	Paired differences		p-value	Result
			Mean	Std. deviation		
Pair 1	How many times did you wash your hands before coronavirus spread?	1.578	-0.119	0.733	0.000	Significant
	How many times do you wash your hands during the coronavirus spread?	1.697				
Pair 2	How long did it take you to wash your hands before coronavirus spread? (The duration you use had to compatible with the cleaners you have used)	1.615	0.087	0.626	0.000	Significant
	How long does it take you to wash your hands during coronavirus spread? (The duration you use had to compatible with the cleaners you have used)	1.528				
Pair 3	Do you think you have used a lot of water for washing your hands before the coronavirus?	1.850	-0.099	0.917	0.006	Significant
	Do you think you use a lot of water for washing your hands during the coronavirus?	1.949				
Pair 4	Have you washed your hands needlessly for any reason before corona virus?	1.468	-0.468	0.979	0.000	Significant
	Have you washed your hands needlessly for any reason during corona virus?	1.936				

Pair 5	Cleaners you have used for washing your hands before coronavirus spread?	2.525	-0.142	0.850	0.000	Significant
	Cleaners you use for washing your hands during the coronavirus spread?	2.667				
Pair 6	Have you used sanitizers like gel and alcohol before coronavirus so that it will lead to less using water??	2.009	0.164	0.911	0.000	Significant
	Do you use sanitizers like gel and alcohol due to coronavirus so that it will lead to less using water?	1.845				

Table 3: Paired question for assessment the water consumption

	Before Coronavirus spread			During the Coronavirus spread		
	Class interval	No. of people	Percentage	Class interval	No. of people	Percentage
Pair 1: How many times do you wash your hands?	3-5 Times	368	56.27%	5-8 Times	290	44.34%
	6-8 Times	194	29.66%	9-15 Times	272	41.59%
	9-12 Times	92	14.07%	16-25 Times	92	14.07%
Pair 2: How long did it take you to wash your hands?	3-5 Seconds	326	49.85%	5-15 Seconds	358	54.74%
	5-15 Seconds	254	38.84%	16-30 Seconds	247	37.77%
	16-30 Seconds	74	11.31%	31-45 Seconds	49	7.49%
	Yes, I have	248	37.92%	Yes, I do.	300	45.87%

Pair 3: Do you think you have used a lot of water for washing your hands?	I have used little water.	256	39.14%	No, I don't. I use water as much as needed	87	13.30%
	No.	150	22.94%	I have used a little more than needed.	267	40.83%
Pair 4: Have you washed your hands needlessly for any reason?	Yes	446	68.20%	Yes	166	25.38%
	No	110	16.82%	No	364	55.66%
	Sometimes	98	14.98%	Sometimes	124	18.96%
Pair 5: Cleaners you have used for washing your hands?	Only Water	71	10.86%	Only Water	41	6.27%
	Shampoo	215	32.87%	Shampoo	236	36.09%
	Soap	322	49.24%	Soap	277	42.35%
	Others	46	7.03%	Other	100	15.29%
Pair 6: Have you used sanitizers like (gel and alcohol)? so that it will lead to less use of water?	Yes, I have.	112	17.13%	Yes. I am sure it lessens hand washing frequency.	259	39.60%
	No, I haven't.	424	64.83%	No. It does not lessen hand washing frequency.	237	36.24%
	Sometimes	118	18.04%	It slightly lessens hand washing frequency.	158	24.16%

4.3 Water Consumption Before and During COVID-19

The first paired question was about how many times you washed your hands before and during coronavirus spread? The ranges of 3-5, 6-8, and 9-12 times were asked before the pandemic, and range 5-8, 9-15, and 16-25 times were given as a precipitant question during the COVID-19 pandemic. The ranges were labelled from 1 to 3 for both durations for analysis in SPSS. From the SPSS analysis, it appeared that the mean difference for both durations was - 0.119, and the p-value was less than 0.05. Therefore, it can be concluded that the pandemic of COVID-19 had a significant impact on the number of times of washing hands in a day. The mean for both cases were 1.578 and 1.697. This meaning that participants washed hands on average of 5.804 and 10.757 times before and during the spread of COVID19, respectively (Table 4). According to Rohilla (2020), people washing their hands ten times a day, instead of a usual average of five times a day after the COVID-19 outbreak. This will be equivalent to results in which the rate of handwashing doubled after spread COVID-19. Beale et al. (2020) categorized the hands washing by the participant as low (≤5 times daily), moderate (6–10 times daily), and high (>10 times daily). Compared to the present work, the responders washed their hands in a low to moderate range before the pandemic, which increased the frequency of handwashing in a day to a high rate. This showed that people cleaned their hands sufficient times a day and used more water after spread COVID-19.

Another pair question was, how long did it take you to wash your hands before coronavirus spread? The total participants answered this question. The three range of duration time of handwashing was given to participants as a choice option for before COVID-19 and during COVID-19, (3-5) seconds, (5-15) seconds, and (15-30) seconds were an option for before the pandemic. During the spread, COVID-19 (5-15) seconds, (16-30) seconds, and (31-45) seconds were given to whom answers. After labelled, SPSS found the range, mean, and p-value. The means for both conditions were 1.615 and 1.528, Table 2. The mean difference is equal to 0.087, and the p-value was less than 0.05. From these two parameters, it appeared that the time of hand washing was declined during COVID-19. This happened due to the different range in options for these two durations. In the questionnaire range, 3-5 seconds were given as the lowest option. However, virus 5-15 seconds was the second option in the first part of the pair and was the first option for the second part. This range of handwashing time was raised from 38.84% to 57.74% among the responders. However, the mean difference decreased, but the more interested people in washing their hands ranged from 5 to 15 seconds. Comparing this to the highest range of time for handwashing was 3 to 5 seconds before appearing COVID-19, which was 49.85% from raising the percentage of participants who washed their hands in a time range of 5 to 15 seconds after the spreading virus. From table 4, the meantime of handwashing was increased from 8.424 seconds to 17.01 seconds. It can be concluded that responders washed their hands more after spread the COVID-19. CDC (2020b) stated that scrub hands for at least 20 seconds are needed for the most effective ways to prevent the spread of germs. Moreover, WHO (2009) declared that washing hands with plain soap for 20 seconds would be beneficial in reducing counts of viable bacteria on hands. Correspondingly, UNICEF (2020) stated at least 20 seconds for scrub hands. Compared to the result from the work of CDC (2020b); UNICEF (2020); WHO (2009), the time for handwashing was way lower below standards before spreading the COVID-19 with 8.424 seconds as average. However, this figure increased to 17.01 seconds after the epidemic. However, people did not hand wash their hands with sufficient time compared to WHO and CDC recommendations; the hand washing time was doubled aby impact the Pandemic.

Table 4: Water demand change during pandemic of COVID-19

No.	Question	Class intervals	Class marks	Mean	Paired differences		Percentage of changes
					Mean	Std. deviation	
Pair 1	How many times did you wash your hands before coronavirus spread?	3-5	4	5.804	-4.953	4.169	-85.34%
		6-8	7				
		9-12	10.5				
	How many times do you wash your hands during the coronavirus spread?	5-8	7	10.757			
		9-15	12				
		16-25	20.5				
Pair 2	How long (in seconds) did it take you to wash your hands before coronavirus spread? (The duration you use had to compatible with the cleaners you have used)	3-5	4	8.424	-8.586	7.218	-101.92%
		5-15	10				
		15-30	22.5				
	How long (in seconds) does it take you to wash your hands during coronavirus spread? (The duration you use had to compatible with the cleaners you have used)	5-15	10	17.01			
		16-30	23				
		31-45	38				

People seem to be used water more for hand washing after spread COVID-19 in an effective way. From the questions, do you think you have used much water for washing your hands before the coronavirus? Moreover, have you washed your hands needlessly for any reason? The participants' responses to these questions. For their answers, it appears that water was used more before spread COVID-19. For the amount of water, the mean was 1.850 and 1.949 before and during the COVID-19 spread. This means that people used only a sufficient amount of water after it resembles the new virus by a difference mean of -0.099, Table 2.

The increase was significant because the p-value was less than 0.05. Table 3 showed that the respondents' percentage with yes to the above question increased from 37.92% to 45.78%. In the

following question about washing hands needlessly, 68.2% of participants responded to this question with a yes before the pandemic. This figure was dropped to 25.38% after the pandemic (Table 3). This indicated that people were trying to protect themselves with hand washing, with only an adequate amount of water without more demand; the mean was 1.468 and 1.936 for before and during the spread from the answer to the above question.

Moreover, the p-value was less than 0.05 (Table 2); therefore, it can be said that random handwashing was reduced during the disease spread. However, participants spent more time and increased handwashing in a day; they thought this water was not wasted and used for self-protection. Rohilla (2020), reported a 20 to 25 percent increase in demand for water and this rise in water consumption results from double hand washing time in a day. Besides that, stay home as part of a nationwide restriction had an impact on water demand. In Jorden, a water sector official declared that water demand had surged by 40% since the government directed people to stay home as part of a public curfew. (Al-Masri, 2020). Therefore, more water was used in handwashing from the increasing number and time of hand washing, and people did not want wastewater.

4.4 Soap and Sanitizers for Hand Hygiene

Responders replayed the last two questions, which were related to using cleaner and sanitizers in hand hygiene. Four alternatives were given to participants regarding cleaners, such as only water, shampoo, soap, and others. Using shampoo (liquid soap) and other options were increased during the epidemic of COVID-19. This illustrated that people followed the guidance and awareness of health officials by handwashing with soap. However, hand washing bar soap was used less during spread COVID-19 (Table 2). This could happen because people believed that liquid soap was better than bar soap. However, this is not true; bar and liquid soap work well and have the same effect (CDC, 2020a). Washing hands with only water have marked the lowest rate for both durations compare to other clearers. In the SPSS analysis, significant changes were noted in using these cleaners ($P<0.05$). It seemed that people use more soaps and give up and wash with only water (Table 2), for about using gel and alcohol as a sanitizer, 17.13% of responders used before COVID-19, which raised to 39.60%. Also, the number of people who did not use the sanitizer flowing down from 65% to 24.4% (Table 3). From the SPPS, the participants' mean reduces from 2.009 to 1.845, with a mean difference of 0.164. Also, significant variation for using sanitizers with a p-value <0.05. Using soap with water for handwashing helps clean the hands by friction, microbes, grease, and lift dirt, including disease-causing germs (CDC, 2020a). This indicates that soap is an essential component for handwashing-clean water for rinsing and soaps to loosen microbes from the skin (Todd et al., 2010). From the results, participants washed their hands more with soap and water during spread Coronavirus disease. There has been a significant surge in hand sanitization requests during crises amid the COVID-19 pandemic (Berardi et al., 2020). This verifies the above result regarding using cleaners.

4.5 Quantity of Water Consumption before and During COVID-19

The first two pair questions will be appropriated to quantify the excessive amount of water consumed during COVID-19. Unlike the above parts of analyses by SPSS, the means and class marks for each option in the equations used, Table 4. From the class marks, the mean was calculated. The first pair is about the frequency of handwashing before and during the spread of COVID-19. The mean and mean differences were calculated in the same procedure for the second pair question, which was about the length of time for washing hands. The mean difference has a negative sign (Table 4). This means handwashing frequency and length of time for washing hands are increased during the epidemic of

COVID-19. The -85.34% and -101.92% were found as the percentage of change for both the number of hands washing and duration of the washing hand. This means that handwashing was almost doubled after spread COVID-19 base on the above pair of questions. As a result, water used for washing hands was increased around 100% during the coronavirus pandemic. Compared to India, as total water demand increased by 20-25 % due to the COVID-19 pandemic in India (Rohilla, 2020), handwashing water was high in the KR.

5. Conclusion

COVID-19 is a threat to enter humans due to the spread and infection rate. Many approaches and methods were evaluated to break the chain of the spread and reduce the infection rate. Hand hygiene is the most effective way to reduce the morbidity of the virus. By questioning the survey and asking people about changing their behavior after spreading the COVID-19 disease, a significant change was recorded during appearing COVID-19. After spreading this virus, people used more cleaners and sanitizers. Also, it was found that participants were more careful in using water. This was less water lost due to needlessly hand washing. Nevertheless, almost twice, water is used for handwashing compared to before appearing COVID-19. This means water consumption in handwashing was raised.

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