

The impact of the SARS-CoV-2 virus pandemic on the hygiene habits of the Poles

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Abstract

Background

The objective of the study was to learn about and evaluate the hygienic habits of the Poles. There were also specific objectives defined, related to the change of the habits during the pandemic:

1. perform basic hygiene activities and those aimed at reducing the risk of contracting COVID-19,
2. use of hygiene utensils.

Material and methods

The study was conducted in two editions. The first edition took place at the beginning of the pandemic in Poland (April 2020) and the second one after another 8 months (November 2020). A total of 549 people took part in the study, including 412 women and 137 men. In the study (survey) a specifically designed questionnaire consisting of 14 closed questions was used. The questions concerned three subject areas:

1. Possession and use of hygienic utensils,
2. Habits and activities related to COVID-19 pandemic,
3. Basic activities of personal hygiene.

Within each part, the existence of a correlation between the first edition and the second round of the study was examined.

Results

Most of the respondents had personal hygiene equipment, in the second edition they also had a toothbrush ($p=0.0367$). The habits of the respondents regarding the additional activities related to oral hygiene changed sig-

nificantly ($p=0.0315$), the percentage of people using only dental floss increased along with decreasing percentage of people using mouthwash solely. There was also a significant decrease in the percentage of respondents using chewing gum ($p=0.0044$). In addition, it was found that the frequency of hand washing during the pandemic increased and the time of using antibacterial fluids lengthened significantly ($p=0.000$). Along with the course of the pandemic, the subjects stopped adhering to the recommendations related to the manner of sneezing and coughing. The number of people sneezing in their elbow decreased significantly ($p=0.0016$), while the number of people sneezing in their hands increased simultaneously ($p=0.000$). Along with the course of the pandemic, the number of people who do not take their bath every day has also decreased ($p=0.0023$), which may be related to the prolonged period of social isolation.

Conclusions

In the light of the obtained results, it can be noticed that the respondents do not fully comply with the requirements of the sanitary regime and they apply the guidelines selectively and for a short time. The behavioural patterns that may be identified by the subjects as related to their personal epidemic safety seem to be more persistent. These behavioural patterns indicate the need for more frequent and systematic educational campaigns on epidemiological safety and hygiene.

Introduction

Maintaining personal hygiene is one of the most important human habits that affect the health and mental comfort of a person. Moreover, this habit is of great importance for human acceptance in the social environment,^[1] which is one of the basic values in Maslow's pyramid of needs.

The principles of personal hygiene include such activities as taking care of oral hygiene, washing the body (including hands and hair) and taking care of regular changes of bed linen, underwear and clothes. The activities listed above are designed to remove the remnants of contaminants from the environment from the surface of the body and the surface surrounding the body. Sweat, exfoliated epidermis and pathogenic microorganisms make it difficult for the skin to function properly and become a place for the development of infections.^[2] Furthermore, hand hygiene is the basic and simplest method of breaking the chain of infectious disease spread. Failure to be systematic in this regard may result in serious health problems - both individual and in relation to the public health - also in the context of the prevailing SARS-CoV-2 pandemic and attempts to contain it.

In every health care system, the organizations dealing with public health operate in a systematic manner, also in the field of preventing infectious diseases. Undoubtedly, however, the SARS-CoV-2 virus pandemic resulted in the intensification of activities promoting personal hygiene carried out by public, scientific and social institutions.

The World Health Organization (WHO) and the Chief Sanitary Inspectorate (Pol.GIS) recommend, among other things, washing hands for more than 30 seconds with soap and disinfecting them with disinfectant liquid, which contains at least 60% alcohol - so often as you need it. To enable this, it is recommended that antibacterial agents be made available in every public place, e.g. in a shop, at a school or at an office.^[3]

An important element of the information campaign conducted during the pandemic by the Ministry of Health is educating the public on the correct way of sneezing and coughing in order to minimize the risk of spreading microorganisms. The Ministry of Health recommends that you cover your mouth and nose with a bent elbow or a disposable handkerchief during these activities, claiming that covering your face with your hand may result in the transmission of germs to the public surfaces.^[4]

Personal hygiene is an integral part of a healthy lifestyle. There is a persistent and measurable link between the lack of personal hygiene and the increased prevalence of infection. Good hygiene practices can significantly reduce the risk of human disease,^[5, 6] which is why it is so important to constantly educate people in this field and conduct research aimed at familiarizing them with social attitudes and habits of society.^[7] Identification of irregularities in this regard may constitute the foundation for further recommendations and proposed educational activities.

Objective

The objective of the study was to learn about and evaluate the hygienic habits of the Poles. There were also specific objectives defined, related to the change of the habits during the pandemic:

1. perform basic hygiene activities and those aimed at reducing the risk of contracting COVID-19,
2. use of hygiene utensils.

Material and methods

The surveyed group

The study (survey) was conducted in two editions. The first edition took place at the beginning of the pandemic in Poland (April 2020) and the second one after another 8 months (November 2020). In each edition, the methods of recruiting the studied group were the same, i.e. mailing, social media (using people with many contacts, i.e. hubs). A total of 549 people took part in the study, including 412 women and 137 men. It was shown that in both editions there were significant differences in the age distribution - especially in the youngest age group (15-18 years), which in April constituted 25.4% and in November 6% ($p = 0.0000$). Moreover, the percentage of respondents living in cities increased significantly ($p = 0.0000$). The detailed data is presented in [Table 1](#).

Analyzed variables	1st Edition Group (N = 173; 100%)	2nd Edition Group (N = 376; 100%)	P
Age			$p = 0.00000$
15-18	44 (25%)	22 (6%)	
19-25	75 (6%)	92 (24%)	
26-35	11 (6%)	89 (24%)	
36-45	20 (12%)	90 (24%)	
46-55	16 (9%)	50 (13%)	
56-65	6 (3%)	20 (5%)	
65+	1 (1%)	13 (3%)	
Sex (N;%)			$p = 0.8036$
Women	131 (76%)	281 (75%)	
Men	42 (24%)	95 (25%)	
Place of residence (N;%)			$p = 0.0000$
City	87 (50%)	327 (87%)	
Village	73 (42%)	44 (12%)	
No data	13 (8%)	5 (1%)	

Method

In the study (survey) a specifically designed questionnaire consisting of 14 closed questions was used. It was sent to the groups of respondents using a Google form, via social media and e-mail messages. The questions concerned three subject areas:

1. Possession and use of hygienic utensils,
2. Habits and activities related to COVID-19 pandemic,
3. Basic activities of personal hygiene.

Within each part, the existence of a correlation between the first edition and the second round of the study (survey) was examined.

Statistical analysis

The chi-square test and the Pearson's correlation coefficient were used to evaluate the differences and calculate the relationship between the variables, assuming $\alpha \leq 0.05$ as the level of significance. All calculations were made using the Microsoft Excel version 2016 spreadsheet and Statistica version 13.3.

Results

Possession and use of hygiene utensils (equipment)

The first question the respondents were asked was whether each person in the apartment has their own toothbrush. Both in the first and second edition, most of the respondents answered yes (98.8% vs. 100%). Additionally, the percentage of persons who did not have their own toothbrush decreased significantly. In the second round of the study, no-one provided such an answer ($p = 0.0367$). Thus, it seems that access to personal hygiene equipment has not deteriorated despite the ongoing pandemic - [Table 2](#).

Edition	Does each person in the apartment have their own toothbrush?		Line Total	P
	Yes	No		
April % of the line	171 98.8%	2 1.2%	173	0.0367
November % of the line	376 100.0%	0 0.0%	376	
Total	547	2	549	

Another question was about having your own hairbrush or comb. There were no significant differences between the editions. Both in the first and the second edition,

most of the respondents answered the question in the affirmative way (92.5% and 92.6%, respectively) ($p = 0.9777$). Only 7.5% of the respondents of the first edition and 7.4% of the respondents of the second edition do not have such a tool.

Analyzing the answers to the next question about the use of a mouthwash and/or floss, it was noticed that the habits of the respondents regarding additional activities related to oral hygiene had changed significantly ($p=0.0315$). The percentage of people using only dental floss has increased and the percentage of respondents using only mouthwash has decreased. In addition, the percentage of people not using any of these tools has also decreased. The detailed data - [Table 3](#).

The surveyed participants were asked about using deodorant. There were no significant changes between the first and the second edition ($p=0.2041$). The respondents most often declared the daily use of deodorant. However, the percentage of people using it only before leaving home increased (11.6% and 15.2%). It may be suspected that the reason for this is the shift from stationary to remote work mode, and therefore the society may be paying less attention to basic personal hygiene.

The next question in the questionnaire concerned the use of chewing gums, where it was noticed that the percentage of the respondents using chewing gum decreased significantly ($p=0.0044$) - [Table 4](#). It can be concluded that this is a result of the reduced frequency of social contacts due to COVID-19 pandemic, wearing a face mask and taking less care of fresh breath.

Edition	Do you use chewing gums?		Line Total	P
	Yes	No		
April % of the line	127 73.4%	46 26.6%	173	0.0044
November % of the line	229 60.9%	147 39.1%	376	
Total	356	193	549	

Edition	Do you use mouthwash/ dental floss?				Line Total	P
	I don't use any of the listed items	I use a mouthwash	I use dental floss	I use both		
April % of the line	56 32.4%	57 32.9%	25 14.5%	35 20.2%	173	0.0315
November % of the line	112 29.8%	90 23.9%	88 23.4%	86 22.9%	376	
Total	168	147	113	121	549	

Habits and activities related to COVID-19 pandemic

The next part of the questionnaire concerned the performance of activities relevant to the pandemic situation.

The surveyed participants were asked, among other things, about the frequency of washing their hands during the day. The responses among the respondents in both editions of the study (survey) changed significantly but not statistically significant ($p=0.07$). The respondents invariably gave answers of 3 times or less. It is worth noting that the percentage of respondents washing their hands more than 6 times a day increased by over 10%. It may be suspected that this is due to the ongoing SARS-COV-2 pandemic and the strengthening of hand washing habits, e.g. washing hands after returning home. It was the most frequently chosen answer in both editions (68.2% vs. 78.7%). The detailed data are presented in [Table 5](#).

The respondents were also asked about the use of anti-

bacterial hand lotions. There was a significant increase in the duration of their use during pandemic, which may suggest that it is a permanent habit ($p=0.000$). The percentage of people using them for 6 months or longer increased by almost 48%. This is probably related, among other things, to the prevalence of information released on this subject as well as the recommendation that liquid dispensers should be located in every public building. It is interesting that almost 17% of the respondents have not changed their habits and still do not use antibacterial lotions. The detailed information is provided in [Table 6](#).

In the survey, the compliance of respondents with the guidelines on how to sneeze was also evaluated. There were significant changes in responses consistent with the recommendations, i.e. elbow sneezing/coughing. The number of people sneezing in this way significantly decreased ($p=0.0016$). At the same time, the number of

Table 5. The frequency of hand washing during the day

Edition	Do you use mouthwash/ dental floss?							Line	P
	1x	2x	3x	4x	5x	6x	More often than 6x	Total	
April % of the line	0 0.0%	1 0.6%	4 2.3%	6 3.5%	29 16.8%	15 8.7%	118 68.2%	173	0.0700
November % of the line	2 0.5%	4 1.1%	4 1.1%	14 3.7%	39 10.4%	17 4.4%	296 78.7%	376	
Total	2	5	8	20	68	32	414	549	

Table 6. The period of use of antibacterial hand lotions (in months)

Edition	How long have you been using antibacterial hand lotions?							Line	P
	I don't use	For 1 month	For 2 months	For 3 months	For 4 months	For 5 months	For 6 months or longer	Total	
April % of the line	29 16.85	48 27.7%	39 22.5%	11 6.4%	1 0.6%	1 0.6%	44 25.4%	173	0.0000
November % of the line	63 16.8%	1 0.3%	4 1.1%	5 1.3%	7 1.9%	20 5.3%	276 73.4%	376	
Total	92	49	43	16	8	21	320	549	

Table 7. The habit of sneezing or coughing

Edition	In the elbow			Line	P
	Yes	No	Total		
April % of the line	135 78.0%	38 22.0%	173	0.0016	
November % of the line	243 64.6%	133 35.4%	376		
Total	378	171	549		
In the hands					
Edition	Yes	No	Line	P	
	Yes	No			
April % of the line	33 19.1%	140 80.9%	173	0.0000	
November % of the line	138 36.7%	238 63.3%	376		
Total	171	378	549		

people who sneeze/cough in their hands increased significantly ($p=0.0000$), which is inconsistent with the recommendations of the State Sanitary Inspection and the Ministry of Health.^[4, 8]

Nearly twice as many people sneezed in their hands in the second edition than in the first edition (19.1% vs. 36.7%). Moreover people stopped following the recommendations in this regard already during the pandemic, this may indicate that the society is getting used to the current situation - [Table 7](#).

Basic activities of personal hygiene

The first question in this section was the frequency of brushing the subjects' teeth. There were no significant changes in this hygienic activity ($p=0.1469$). Most respondents declared that they brush their teeth twice a day (59% and 67%, respectively).

On the other hand, the frequency of taking a bath changed significantly ($p=0.0023$). The percentage of people who do not take a bath daily has increased, while the percentage of respondents declaring taking a bath more than twice a day has decreased. The detailed data - [Table 8](#).

The respondents were also asked about the frequency of bed linen changes. Their habits did not change significantly when comparing both editions ($p=0.4810$). Regardless of the edition, the majority of respondents declared that they change their bed linen every 2 weeks, however, the percentage of these people decreased in the second edition of the survey. Moreover, the percentage of respondents performing this activity every week has decreased, while the percentage of people changing bed linen every month has increased. On average, the respondents changed their bed linen every 19 days in the first edition, and every 20 days in the second edition.

When asked about the frequency of changing their underwear, most respondents declared that they changed it every day. In the statistical analysis, no changes were found in both editions ($p=0.4681$).

In both editions, there were also no significant differences between the responses to the question about washing

hands after using the toilet ($p=0.3235$). Regardless of the time of the study, the majority of the respondents declared that they always do this after using the toilet.

We have many sayings in the Polish culture. These include the saying of "frequent washing shortens life". The survey respondents were asked if they agreed with that statement. In both editions, the participants' attitude to this saying did not change ($p=0.3890$). Most of the respondents invariably stated that that was untrue or rather untrue. Only less than 3% of the respondents believed that that statement was true.

Discussion

Hygiene habits are an important topic in the field of population health, which is of particular importance in the time of a pandemic. It is a frequently discussed topic, the most popular aspect being hand hygiene as a factor that may limit the spread of COVID-19.^[9-12]

A thematically coherent and structurally similar (before-after) to the presented study (survey) is the study (survey) by Mościcka et al., published in 2020.^[13] It was carried out in a group of 140 women. It concerned the routine hygiene activities (e.g. washing hands, washing hair, taking a bath, using disinfectants and using certain types of cosmetics). During the pandemic, there was a significant ($p<0.001$) increase in the frequency of hand washing compared to the time before the epidemic in relation to the situation when the public transport was used (from 53.6% to 80.7%) and after returning home (from 80.00% to 100.00%). In foreign studies (surveys), an improvement in hand hygiene is also observed.^[14] The similar results were obtained in the presented study (survey). Invariably, the population of people washing their hands the least frequently was the least numerous and at the same time, along with the pandemic, the percentage of respondents washing their hands more than 6 times a day increased by over 10%.

The pandemic and the need for home isolation have also influenced people's overall body hygiene. Interestingly, the results obtained in this study differ from the results of the survey by Mościcka et al., where an improvement

Table 8. The frequency of taking a bath
How often do you wash yourself/take a bath?

Edition	How often do you wash yourself/take a bath?				Line	P
	Less than 1x a day	1x a day	2x a day	More than 2x a day	Total	
April % of the line	1 0.6%	91 53.5%	65 38.2%	13 7.6%	170	0.0023
November % of the line	24 6.4%	199 52.9%	142 37.8%	11 2.9%	376	
Total	25	290	207	24	546	

in taking a bath habit was demonstrated. In the presented group, the percentage of people who do not wash themselves daily has increased, while the percentage of respondents declaring washing themselves more than twice a day has decreased.

The hygiene habits are often evaluated by gender. The study by Skolomowska et al., which was conducted among adolescents, but similarly to the present study in the context of COVID pandemic, showed that young women wash their hands significantly more often than men ($p < 0.0001$). Both women and men most often declared that they do it 6-10 times a day.^[15] The similar results were obtained in the presented study, despite the fact that the majority of respondents here were adults. Also in this study, the most frequently indicated answer was 6x or more, and it was also found that women washed their hands noticeably more often than men ($p = 0.0601$). The recorded differences were not statistically significant, which may indicate that the hygiene habits become similar with age - regardless of gender. It is also worth noting that in edition 1 no significant differences were found in the discussed range ($p = 0.16194$).

Another frequently discussed topic is the use of disinfectants. Here, the study results seem consistent. The pandemic caused an increase in the use of antibacterial lotions not only in Poland. In the Spanish study,^[16] more than half of the respondents used hand washing liquids with ethanol, not only outside but also at home, and nearly 80% used bleach to disinfect surfaces at home. Similarly, in the USA it is a frequently used method of protection against the virus.^[17]

The pandemic appears to have improved hygiene habits in relation to those activities that the respondents directly relate to reducing their own exposure to the disease, such as washing hands, using disinfectants or washing the whole body. This is indicated by the results of study conducted both in Poland and abroad.^[18] However, the habits of a cosmetic nature or habits of an indoor nature only (e.g., changing bed linen) have not changed significantly with the development of the pandemic. It can also be seen that the hygiene habits often undertaken in connection with the close contact with other people have become less widespread, such as chewing gums or using mouthwash. This may be due to the need to maintain a greater social distance and wear masks. In the presented study, the percentage of respondents who used deodorant only before leaving home also increased, which may be related to the prolonged lock-down and the transfer of a significant part of their activity, including professional life, to their home. Zakout et al. from Saudi Arabia drew similar conclusions.^[19] There, too, it was noted that the pandemic has a particularly strong impact on those behaviours,

which may lead to a reduction in the risk of infection with the virus. However, it is less important for activities that are not perceived by society as important in the context of epidemic safety. In the study by Moore et al.^[20] it was shown that even those hygienic habits that can protect against infection are not permanent habits and after few weeks they are abandoned and people returned to their original habits. In this study, the habit instability was also captured in relation to the manner of sneezing and coughing. As the pandemic progressed, the percentage of people who did not follow the official recommendations, even though they initially did so, has increased. An interesting aspect worth further study seems to be the analysis whether the durability of habits depends on their type, i.e. whether their role is to protect our health or the safety of others. In this study, the respondents were consistent in following the rules and, moreover, over time they improved those habits that were intended to protect them personally. At the same time, they seemed to pay less attention to activities affecting the safety of others. However, it is difficult to draw conclusions on the basis of one study since this topic has not been discussed in other studies so far. The available results of the national studies seem to confirm the thesis that the habits developed during pandemic are not permanent.^[13]

Limitations of the study

The study has several limitations that should be kept in mind. The biggest limitation is the fact that the study group consisted only of people using the computer and the Internet. It should be noted, however, that during the pandemic, the percentage of people from older age groups increased significantly, which may be an interesting additional conclusion from the study. The pandemic appears to have increased the use of computers by the elderly.

Conclusions

1. Both in the first and second rounds of the survey, the majority of respondents declared having tools for personal hygiene, access to them does not seem to be difficult despite the prolonged pandemic.
2. During the pandemic, the way the Poles care for oral hygiene and fresh breath has changed. The percentage of people using only dental floss has increased significantly, and the percentage of respondents using only mouthwash and chewing gum has decreased.
3. It is noticeable that the frequency of hand washing during the pandemic has increased and the time of using antibacterial lotions has lengthened significantly among the respondents. Women wash their

hands noticeably more than men, especially later in the pandemic time.

4. The habits acquired during the pandemic are not permanent, which is evident in the manner of sneezing and coughing, where the respondents stopped following the official recommendations over time.
5. Particularly those habits related to prolonged home isolation were neglected. As the pandemic continues, more and more people do not wash themselves daily, change bed linen less often and use deodorants only before leaving home.
6. Summing up, in the light of the obtained results, it can be noticed that the respondents do not fully comply with the requirements of the sanitary regime and they apply the guidelines selectively and for a short time. These behaviours indicate the need for more frequent and systematic educational campaigns on epidemiological safety and hygiene.

Authors disclose no conflict of interests.

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