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Günlük Hayatta Kullanılan Hijyen Malzemelerinin Kimyasal İçeriklerinin Covid ve İş Sağlığı ve Güvenliği Açısından Değerlendirilmesi

Yunus ÖNAL[1*], Azmi Kaan ŞEN[2], Tuğba UTKU[3]

Öne Çıkanlar:
- İnsan sağlığında hijyen,
- Hijyen amaçlı kullanılan ürünler,
- Hijyen ürünlerinin bileşimi ve kimyasal içerikleri.

Anahtar Kelimeler:
- Hijyen,
- Hijyen kimyasalları,
- Sabun,
- Dezenfektan,
- İş Sağlığı ve Güvenliği,
- Kimyasal içerik

ÖZET:

Pandemi süreci, hijyenin bireysel ve toplumsal düzeydeki önemini bir kez daha ortaya koymuş, özellikle toplu kullanım alanlarında hijyen uygulamalarına yönelik farkındalığın artmasına sebep olmuştur. Bu dönemde hijyenin sağlanması amacıyla kullanılan kimyasal içerikli ürünlerin tüketiminde önemli bir artış gözlenmiştir. Ancak bu ürünlerin bilinçsiz ve aşırı kullanımı, yalnızca kullanıcı sağlığı üzerinde değil, aynı zamanda çevre üzerinde de çeşitli riskler barındırmaktadır. Bu nedenle hijyen kimyasallarının bileşimlerinin incelenmesi, sağlık ve çevre güvenliği açısından bilimsel bir gereklilik olarak karşımıza çıkmaktadır. Bu çalışmada, pandemi döneminde yaygın olarak kullanılan sıvı kimyasal sabun, arap sabunu, kolonya, el dezenfektanı ve ıslak mendil gibi beş farklı ürün grubu incelenmiştir. Piyasada yaygın olarak bulunan her bir ürün grubundan 10 farklı marka seçilerek toplamda 50 numune analiz edilmiştir. Yapılan incelemelerde, numunelerin içerik ve bileşim açısından birbirinden farklı özellikler taşıdığı belirlenmiştir. Ayrıca, ürünlerde yer alan kimyasal maddelerin letal doz (LD) değerlerinin ambalaj üzerinde belirtilmediği saptanmıştır. Elde edilen bulgular, hijyen ürünlerinin doğru kullanımının hem çalışanların hem de toplum sağlığının korunmasında kritik rol oynadığını göstermektedir. Bununla birlikte, çevreye olası olumsuz etkilerin en aza indirilebilmesi için üretici firmaların içerik şeffaflığını sağlamaları ve kullanıcıların bilinçlendirilmesi gerekmektedir. Çalışma, bu yönüyle hijyen ürünlerinin sağlık ve çevre odaklı değerlendirilmesine bilimsel bir katkı sunmayı amaçlamaktadır.

Evaluation of Chemical Contents of Hygiene Materials Used in Daily Life in Terms of Covid and Occupational Health and Safety

Highlights:
- Hygiene in human health,
- Products used for hygiene purposes,
- Composition and chemical contents of hygiene products.

Keywords:
- Hygiene,
- Hygiene chemicals,
- Soap,
- Disinfection,
- Occupational Health and Safety,
- Chemical content

ABSTRACT:

The pandemic period has once again highlighted the importance of hygiene at both individual and societal levels, particularly increasing awareness of hygiene practices in public spaces. During this period, a significant rise was observed in the consumption of chemical hygiene products used to maintain cleanliness. However, the careless and excessive use of these products poses various risks not only to users' health but also to the environment. Therefore, analyzing the composition of hygiene chemicals emerges as a scientific necessity for both health and environmental safety. In this study, five product groups commonly used during the pandemic liquid chemical soap, olive oil soap, cologne, hand sanitizer, and wet wipes were examined. Ten different brands from each product group were selected, totaling 50 samples. The analyses revealed that the samples differ in terms of content and composition. Moreover, it was observed that the lethal dose (LD) values of the chemical substances in the products were not indicated on the packaging. The findings demonstrate that the correct use of hygiene products plays a critical role in protecting both employee and public health. Additionally, to minimize potential negative impacts on the environment, it is essential for manufacturers to ensure transparency in product composition and for users to be adequately informed. This study, therefore, aims to make a scientific contribution to the evaluation of hygiene products from health and environmental perspectives.

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This study is derived from Azmi Kaan Şen's Master's thesis.

INTRODUCTION

The origin of the word hygiene dates back to Hygieia, the goddess who protects health in Greek mythology. The name of this goddess is given to a multidisciplinary branch of science that works to maintain health. The scientific foundations of hygiene date back to Hippocrates, and his work "Air, Water and Earth" is considered one of the first written sources on the importance of hygiene in medicine. This work had a great impact on scientific medicine in the Middle Ages (Yumuturuğ & Sungur, 1980).

Traces of hygiene in the early periods can also be seen in archaeological finds. For example, the Sumerians of 4000 BC believed in the importance of personal hygiene and incorporated washing and cleaning practices into their lives. Additionally, Babylonian correspondence from the 17th century BC contains warnings that personal belongings should not be shared. During the Roman period, various infrastructures were created for hygiene; water purification systems, sewers and baths were built (Curtis, 2007; Burkert, 1985; Biggs, 1969).

After the adoption of Islam, hygiene became closely intertwined with religious principles, particularly those emphasizing cleanliness. Practices such as ablution, personal hygiene, and maintaining purity during worship contributed to the wider spread of hygienic habits within society (Haddad, 2025). During the Ottoman Empire, this culture of cleanliness was further reinforced, and the first official regulations concerning soap production and cleaning practices were introduced (Kurt, 2021; Sakkaravarthi, 2022). The use of soap for cleaning represented one of the early steps toward industrialization in the Ottoman Empire (Adak, 2022). Moreover, public hygiene policies not only reflected cultural and religious values but were also instrumental in shaping social control and urban management in late Ottoman cities (Kalkan, 2021).

Developments in hygiene have gained great momentum from the Ottoman Empire to the present day, and a significant transformation has occurred in terms of technology since the 1950s (Yumuturuğ & Sungur, 1980). During this period, many regulations were made regarding the production, quality and trade of hygiene materials.

Throughout history, the development of hygiene is an important indicator reflecting the understanding of health, cultural norms and scientific advances of societies.

After the pandemic, the necessity of hygiene has become more prominent all over the world and has caused businesses to take more precautions in this area. The examination of hygiene chemicals is of great importance in terms of both health and the environment. The examination of hygiene chemicals and their compositions, which the study focuses on, plays a critical role especially in terms of ensuring personal hygiene in work areas. Investigating the toxic effects of chemicals in the compositions of products such as liquid soap, soft soap, cologne, hand sanitizer and wet wipes is especially important in terms of protecting the health of employees. The correct use of such products can have positive results in terms of both health and productivity. Focusing on legal regulations and national legislation, ensuring the necessary inspections and standards regarding the use of hygiene chemicals will enable businesses to choose the right products and create a safe environment. The use of products approved by the Ministry both enables businesses to fulfill their legal obligations and ensures the health and safety of employees. As a result, the correct selection and use of hygiene chemicals is of critical importance in terms of occupational health and safety. Our findings that the toxic effects of chemicals used in ensuring hygiene should be minimized will be beneficial in terms of both occupational health and the environment.

The lower chemical content of the hygiene chemicals that businesses will use contributes to both the environment and the health of their employees. Considering that the chemicals used will be in constant contact, especially in industrial areas, we can say that such an approach is critical in terms of

safety and health. In addition, choosing products with ministry approval will be an important step for businesses to fulfill their legal obligations and for inspections. This suggestion that we reached as a result of the study also creates awareness that a more conscious approach should be adopted in ensuring hygiene. Not only ensuring hygiene, but also adopting a safe and ethical approach in the use of chemicals can also affect the long-term success of businesses. At this point, it may be useful to conduct a study on the guidance or training that can be provided to businesses regarding the selection of hygiene chemicals. In this way, businesses not only comply with legal regulations, but also create an environment that is sensitive to the environment and safe in terms of health (Dewey et al., 2022).

In our research, we note that most of the published regulations on hygiene focus on the food and livestock sector, especially on sterilization regulations. At this point, it has been stated that the general regulations regarding food and hygiene are not sufficient and that there is a lack of legislation on the hygiene conditions of businesses.

The current legislation on food hygiene is determined as the "Food Hygiene Regulation" dated 17 December 2011 and the "Turkish Food Codex Microbiological Criteria Regulation" dated 29 December 2011. However, in the content of this brochure, specifications regarding microbiological limits in food production environments and contact surfaces, lack of digitalization, missing components regarding hygiene chemicals and business hygiene standards are marked.

These deficiencies reveal that additional regulations are needed to ensure that hygiene practices in businesses are more effective and certified. It seems to be an area that needs to be supervised, especially with regard to the use of hygiene chemicals and maintaining a certain level of business hygiene (Sipahi, 2021).

MATERIALS AND METHODS

Materıals

In this study, ten different brands from each of five different hygiene products were sampled, resulting in a total of 50 samples being analyzed. Five different substances were selected from the hygiene chemicals that are important in terms of occupational health and safety and were determined as the material of our research. If we need to list these materials that we obtain from the market; liquid soap, soft soap, hand sanitizer, cologne and wet wipes. While the material known as soft soap is used to provide environmental hygiene, our other materials, liquid soap, hand sanitizer, cologne and wet wipes, are the materials we use to provide personal hygiene.

Table 1. Dish Soap Samples

Dish Soap Samples	Ingredients
Sample 1	<%5 Soap, Parfume, Limonene
Sample 2	Sunflwer fatty acid(Cas No: 84625-38-7)-%15-30 Potassium Hydroxide (Cas No: 1310-58-3)-%5 EDTA (Cas No: 60-00-4)<1 D-Limonen, Metilizotiazolinon, dye and aqua
Sample 3	%15-30 Soap Choloro-2-methyl-2,3 dihidroisothiazol-3-one and –Methyl-2,3 dihidroisohiazol-3-one(3:1), dye and parfume

Data showing the contents of dish soap samples offered for sale in the market are given in Table 1. The above samples are the contents given in dish soap packaging, one of the five basic hygiene chemicals used in businesses.

Table 2. Liquid Soap Samples

Liquid Soap Samples	Ingredients
Sample 1	Aqua, Sodium Laureth Sulfate, Cocamidopropyl betaine, Sodium Chloride(sea salt), Acrylates Copolymercocamid dea, Clay, Parfume, Peg-7 Glyceryl Cocoate Polyquaternium-7, Glycerin, Methylisothiazolinone, Methylchloroisothiazolinone, Benzyl Alcohol, Styrene/Acrylates Copolymer, Tertasodium edta, Benzophenone-4, Citric Acid, Sodium Hydroxide, CI:28440, CI:16255
Sample 2	Sunflwer fatty acid(Cas No: 84625-38-7)-%15-30 Potassium Hydroxide (Cas No: 1310-58-3)-%5 EDTA (Cas No: 60-00-4)<1 D-Limonen, Metilizotiazolinon, dye and water
Sample 3	%15-30 Soap Choloro-2-methyl-2,3 dihidroisothiazol-3-one and –Methyl-2,3 dihidroisohiazol-3-one(3:1), dye and parfume

The contents of liquid soap samples available for sale are shown in Table 2 above. The above examples are the contents of liquid soap packaging, one of the five basic hygiene chemicals used in businesses.

Table 3. Cologne Samples

Cologne Samples	Ingredients
Sample 1	Ethyl Alcohol, Demineralized Water, Perfume, Citral, Hydroxycitronellal, Limonene, Linalool, Geraniol, Citronellol
Sample 2	Alcohol Denat., Aqua, Parfum, D-Limonene, Linalool, Benzyl Salicylate, Butylphenyl Methylpropional, Citral, Citronellol, Alpha-Isomethyl Ionone, Coumarin
Sample 3	Alcohol, Aqua, Parfum, Citral, Geraniol, Hydroxycitronellal, Limonene, Butylphenyl Methylpropional, Linalool

The contents of cologne samples sold on the market are given in Table 3 above. The above examples are the contents of cologne packaging, one of the five basic hygiene chemicals used in businesses.

Table 4. Hand Disinfectant Samples

Hand Disinfectant Samples	Ingredients
Sample 1	Ethanol (Cas: 64-17-5, EC No: 200-578-6) (Amount(v/v) 70), 2-Propanol (Cas: 67-63-0, EC No: 200-661-7) (Amount(v/v) 0,5), Deionized Water, Glycerin %1,3, Citric Acid %0,05
Sample 2	Ethyl alcohol (CAS: 64-17-5) → %67,2 (%70–%96) Didecyldimethylammonium chloride (CAS: 7173-51-5) → %0.08 Alkyldimethylbenzylammonium chloride (CAS: 68424-85-1) → %0.05 Excipients: Deionized water, Non-ionic active substance → %32.67
Sample 3	Ethyl alcohol (CAS: 64-17-5) → %67,2 (%70–%96 Raw Materials) Didecyldimethylammonium chloride (CAS: 7173-51-5) → %0.08 Alkyldimethylbenzylammonium chloride (CAS: 68424-85-1) → %0.05 Excipients: Deionized water, Non-ionic active substance → %32.67

The contents of hand disinfectant samples available for sale are listed in Table 4 above. The above examples are the contents of hand disinfectant packaging, one of the five basic hygiene chemicals used in businesses.

Table 5. Wet Wipe Samples

Wet Wipe Samples	Ingredients
Sample 1	Aqua, Citric Acid, PEG-40 Hydrogenated Castor Oil, Sodium Citrate, Sorbitan Caprylate, Sodium Benzoate, Disodium EDTA, Bis-PEG/PPG-16/16 PEG/PPG-16/16 Dimethicone, Parfum, Xanthan Gum, Caprylic/Capric Triglyceride
Sample 2	Aqua, Phenoxyethanol, Sodium Citrate, Tetrasodium Glutamate Diacetate, Polysorbate 20, Parfum, Benzoic Acid, Dehydroacetic Acid, Citric Acid, Disodium Cocoamphodiacetate, Caprylic/Capric Triglyceride
Sample 3	Aqua, Glycerin, Dicaprylyl Carbonate, Polysorbate-20, Disodium EDTA, Parfum, Cetrimonium Chloride, Isopropyl Myristate, Lauryl Glucoside, Phenoxyethanol, Benzoic Acid, Dehydroacetic Acid, Ethylhexylglycerin, Linalool, Eugenol, Coumarin, Citronellol, Citral, Cinnamyl Alcohol, Butylphenyl Methylpropional

The contents of wet wipe samples available for sale are listed in Table 5 above. The above examples are the contents of wet wipe packaging, one of the five basic hygiene chemicals used in businesses.

Methods

In our research, samples were taken from different brands for each material offered for sale in the market from the materials we determined as 5 different types. The brand names of these products obtained from the market were included in our research by giving the sample number without sharing them. A detailed table was prepared by determining which substances were included in the contents of these samples.

In the light of this table prepared afterwards, a detailed research was conducted on the chemicals in the content by examining both open sources and MSDS information forms. The toxicological effects of the chemicals in the content were investigated in detail. The effects of the usage rates of the chemicals written in the content on occupational health and safety were investigated. An attempt was made to shed light on the selection of the right products in terms of ensuring hygiene in occupational health and safety.

RESULTS AND DISCUSSION

1-Liquid Soap Composition Findings

Liquid soaps are one of the substances frequently used for hygiene purposes in businesses. There are many different brands of liquid soaps on the market. It was concluded that the liquid soaps selected as samples in the study had many common substances in their contents, and some substances were not common.

It has been determined that most of the substances in liquid soaps are Aqua, Sodium Laureth Sulfate, Sodium Chloride, Cocamidopropyl Betaine, Glycerin, Sodium Salicylate, Sodium Benzoate, parfum, Citric Acid, Tetrasodium EDTA, Cocamide MEA. In addition, it has been determined that some of the substances include Polyquaternium-7, Coumarin, Benzophenone-4, Phalaenopsis Amabilis Extract, Hexyl Cinnamal, Linalool, Methylisothiazolinone, Clay.

The toxic values of most of the above substances found in liquid soaps are known (Table 6), and it has been determined that some of them can cause diseases in the body cumulatively.

Table 6. Table Showing Liquid Soap Compositions

	Liquid soap composition		
	Sample 1	**Sample 2**	**Sample 3**
1	Aqua (Not applicable)	Aqua (Not applicable)	Aqua (Not applicable)
2	Sodium Laureth Sulfate (LD50: > 2,000 mg/kg-Rat-Dermal)	Sodyum Laurth Sulfate(LD50: > 2,000 mg/kg-Rat-Dermal)	C12-13 Pareth Sülfate
3	Sodium Chloride (LD50: > 10,000 mg/kg-Rat-Dermal)	Sodyum Chloride(LD50: > 10,000 mg/kg-Rat-Dermal)	Sodyum Laureth Sulfate (LD50: > 2,000 mg/kg-Rat-Dermal)

Table 6. Table Showing Liquid Soap Compositions (Continue)

4	Cocamidopropyl Betaine(LD50: > 2,000 mg/kg-Rat-Dermal)	Cocamidopropyl Betaine(LD50: > 2,000 mg/kg-Rat-Dermal)	Linalool(LD50: 5610 mg/kg-Rat-Dermal)
5	Glycerin(LD50: > 21,900 mg/kg-Rat-Dermal)	Caprylyl/ Capryl Glucoside(LD50: > 2,000 mg/kg-Rat-Dermal)	Cocamidopropyl Betaine(LD50: > 2,000 mg/kg-Rat-Dermal)
6	Styrene/Acrylates Copolymer(LD50: > 5,000 mg/kg-Rat-Dermal)	Lauryl Glucoside(LD50: > 2,000 mg/kg-Rat-Dermal)	Sodium Chloride(LD50: > 10,000 mg/kg-Rat-Dermal)
7	Cocamide MEA(LD50: > 2,000 mg/kg-Rat-Dermal)	Glycerin(LD50: > 21,900 mg/kg-Rat-Dermal)	Styrene/Acrylates Copolymer(LD50: > 5,000 mg/kg-Rat-Dermal)
8	Sodium Salicylate (LD50: > 2,000 mg/kg-Rat-Dermal)	Parfum(LD50: > 2000-5000 mg/kg-Rat-Dermal)	Cocamide MEA(LD50: > 2,000 mg/kg-Rat-Dermal)
9	Sodium Benzoate (LD50: > 4,070 mg/kg-Rat-Dermal)	C12-15 Alkyl Lactate	Sodium Salicylate(LD50: > 2,000 mg/kg-Rat-Dermal)
10	Parfum (LD50: > 2000-5000 mg/kg-Rat-Dermal)	Cl-17200	Parfum(LD50: > 2000-5000 mg/kg-Rat-Dermal)
11	Glycol Distearate(LD50: > 10,000 mg/kg-Rat-Dermal)	Methylisothiazolinone(LD50: 242 mg/kg-Rat-Dermal)	Sodium Benzoate(LD50: > 4,070 mg/kg-Rat-Dermal)
12	Citric Acid(LD50: > 2,000 mg/kg-Rat-Dermal)	Tetrasodium EDTA(LD50: > 1,780-1,913 mg/kg-Rat-Dermal)	Citric Acid(LD50: > 2,000 mg/kg-Rat-Dermal)
13	Polyquaternium-7(LD50: > 2,000 mg/kg-Rat-Dermal)	Citric Acid (LD50: > 2,000 mg/kg-Rat-Dermal)	Glycol Distearate
14	Tetrasodium EDTA(LD50: > 1,780-1,913 mg/kg-Rat-Dermal)	Benzophenone-4	Polyquaternium-7(LD50: > 2,000 mg/kg-Rat-Dermal)
15	Laureth-4(LD50: > 2,000 mg/kg-Rat-Dermal)	Cl-16255	Tetrasodium EDTA(LD50: > 1,780-1,913 mg/kg-Rat-Dermal)
16	Cocos Nucifera Fruit Extract	Methylchloroiso thiazolinone(LD50: 357 mg/kg-Rat-Dermal)	Laureth-4(LD50: > 2,000 mg/kg-Rat-Dermal)
17	Coumarin(LD50: > 293 mg/kg-Rat-Dermal)		Phalaenopsis Amabilis Extract
			Aloe Barbadensis Leaf extract (LD50: no information available).
			Benzyl Salicylate(LD50: 2227 mg/kg-Rat-Dermal)
			Butylphenyl Methylpropional(LD50: >2000 mg/kg-Rat-Dermal)
			Hexyl Cinnamal(LD50: >3000 mg/kg-Rat-Dermal)
			Cl-17200, Cl-42090

2-Dish Soap Composition Findings

Dish soaps are one of the hygiene chemicals used to ensure environmental hygiene and in our study, they are also seen as hygiene substances that should be taken into consideration for use in workplaces.

When the contents of the dish soaps (Table 7) obtained from the market in our study were examined, it was determined that they generally consisted of common substances. In the selected samples, it was determined that all of them contained vegetable fatty acids, potassium hydroxide and perfume. In addition, it was determined that some of them contained Limonene, EDTA, Citral, Methylisothiazolinone, Paint, Essence etc.

Table 7. Table Showing Dish Soap Compositions

	Yellow soap		
	Sample 1	**Sample 2**	**Sample 3**
1	>%30 Aqua	%15-30 Sunflower Oil Soap	Sunflower Fatty Acid %15-30
2	%5-15 Soap	Perfume	Potasyum Hidroksit %5
3	<%5 Ethylenedia minetetra acetic asid tetrasodyum salt (Cas no: 64-02-8)	Limonene	<%1 EDTA

Table 7. Table Showing Dish Soap Compositions (Continue)

4	<%5 Kloro 2 methil 2H isotiazol 3 one and 2 methyl 2H İsotiazol 3 one (Cas No:55965-84- 9)	D-Limonene
5	<%5 D-Limonene	Metilizotiazolinon
6	Perfume	Dye
7		Aqua

3-Cologne Composition Findings

Another hygiene chemical used to provide personal hygiene is cologne. Although it is not used frequently in the production phase, it is important because it is a hygiene substance frequently used in the marketing and sales offices of businesses or in offices where services are provided.

Especially with the pandemic period, many varieties and brands of cologne have been produced. It was observed that common and non-common substances were used in the samples of these colognes obtained from the market.

It was determined that the colognes taken as samples from the market contained alcohol, aqua, perfume, linalool, limonene, geraniol and citral substances in common, while it was concluded that hydroxycitronellal Benzyl Alcohol Benzyl Benzoate Buthylphenyl Methylpropional substances were also included in some of them (Table 8).

Table 8. Table Showing Cologne Compositions

	Cologne		
	Sample 1	**Sample 2**	**Sample 3**
1	Alcohol Denat	Denatured Ethyl Alcohol	Alcohol
2	Aqua	Aqua	Aqua
3	Perfume	Perfume	Perfume
4	BHT	Limonene	Limonene
5	Citral	Citral	Citral
6	Hydroxycitronellal	Citronellol	Linalool
7	Limonene	Geraniol	Geraniol
8	Linalool	Linalool	Hydroxycitronellal
9			Buthylphenyl Methylpropional

4-Hand Disinfectant Composition Findings

Hand sanitizers were hygiene products used only in certain places such as hospitals before the pandemic, but with the pandemic period, they have become hygiene products frequently used in both homes and workplaces.

Hand sanitizer varieties have also reached a wide range of numbers with the pandemic period. Some of the many hand sanitizers that have entered the market were selected and used in our study. When the contents of the hand sanitizers selected as samples were examined, it was determined that ethanol, propanol and solvent were used in common, and Dimethylbenzyllammonium chloride, fragrance, softener, vitamin, moisturizer, perfume, glycerin and dye substances were found to be included in some of their contents (Table 9).

Table 9. Table Showing Hand Disinfectant Compositions

	Alcohol based hand and skin antiseptic		
	Sample 1	**Sample 2**	**Sample 3**
1	%15 Propan-2ol	%67.2 Ethyl alcohol	Ethanol-%70
2	%55 Ethanol	%0.08- DDAC- Didecyldimethylammonium chloride	2-Propanol
3	Fragrant - %0.25	%0.05 Alkyl (C12-16) Dimethylbenzyllammonium chloride	Fabric softener - %1.3,
4	Fabric softener - %2		Essence %0.2
5	Solvent-complementary %27.75		Ph balancer - %0.05
6			Deionized water

5- Wet Wipe Composition Findings

Wet wipes have emerged as substances used to provide personal hygiene in recent years. The use of wet wipes has also increased in workplaces. It is a fact that wet wipes are used in situations where direct access to hand washing is difficult or time-consuming.

Although there are many different types of wet wipes on the market, samples from ten different brands were taken for use in our study and their contents were examined. When the contents of wet wipes were examined; It was observed that substances such as Aqua, Glycerin, Perfume, Dehydroacetic Acid, Benzoic Acid, Citric Acid, Phenoxyethanol, Propylene Glycol, Sodium Benzoate were common. Some of them were found to contain substances such as Dicaprylyl Carbonate Citral, Limonene, Linalool, Coumarin, Isopropyl Myristate, Tetrasodium EDTA, Glyceryl Polyacrylate, Cetrimonium Chloride, PEG-7 Glyceryl Cocoate (Table 10).

Table 10. Table Showing Wet Wipe Compositions

	Baby wipes		
	Sample 1	**Sample 2**	**Sample 3**
1	% 0.2 Alkyl(C12-C14) dimetilbenzilamonyumklorid	Aqua	Aqua
2	Aqua	Phenoxyethanol	Glycerin
3	Glycerin	Propylene Glicol	Prunus Amygdalus Dulcis Seed Extract
4	Phenoxyethanol	C12-15 Pareth 12	Sodium Citrat
5	C12-15 Pareth 12	Caprylic Trigliserit	Citric Acid
6	Perfume	Benzoic Acid	Cocamidopropyl Betaine
7	Benzoic Acid	Perfume	Ethylhexylglicerine
8	Dehidroasetik Acid	Dehidroasetik Asit	Sodium Benzoate
9	Citric acid	Citric acid	Perfume

Evaluation of Hygiene Chemicals in Terms of Occupational Health and Safety

Daffodil soaps should be preferred because they contain much less chemicals than products such as surface cleaners on the market. The use of Daffodil soaps in businesses is important in terms of the organic nature of these substances. It should be taken into account that much more chemicals are used in other surface cleaners. When choosing Daffodil soaps, those with the least amount of components should be preferred.

In this study, when the contents of different soft soap products on the market were examined, it was seen that although potassium hydroxide was generally used as the main ingredient, sodium hydroxide-based soaps were also used in some of them, rarely.

It is seen that a wide variety of chemicals are used in liquid soaps. When we look at the contents of liquid soaps, we can conclude that some chemicals are more dangerous. Two basic substances are more important than other chemicals in making liquid soap harmful to health. These are Sodium Lauryl Sulfate, which is used for foaming purposes and Tetrasodium EDTA, which is used for lightening, which is found in almost all liquid soaps. These substances can cause irritation on the skin. Although the reaction time and shape of each skin may be different, they can cause allergic reactions. Although we say that liquid soap should not be used, this is not always possible. Therefore, in cases where the use of liquid soap is mandatory, it would be better to wash our hands once correctly rather than washing our hands repeatedly. However, these chemicals can be transferred from our sinks after use and returned to our living spaces by being purified for reuse in the biological purification systems of municipalities or they can mix with other water sources and threaten fish and other living things.

Although it is seen that liquid soaps are used a lot in businesses, the products to be selected should be those with the fewest ingredients. In fact, contrary to popular belief, the use of solid soaps should be

increased. Since the pH value of solid soaps is higher than liquid soaps and is around 13-14, there are no viruses and bacteria that can survive at this pH level.

The use of cologne was at a standard level until the last few years. Following the increasing interest in disinfectant and hygiene products due to the increasing infectious disease caused by the virus all over the world, the use of cologne has also increased. As a result of the increasing use of cologne, many new brands have entered the market in this field and have not undergone a full inspection. Since the proportions of the substances used in it are important, the inspections of these materials should also be increased. For this reason, businesses need to make more careful choices when purchasing cologne. Especially during the pandemic period, the importance of hygiene has increased among people, and the production of hand sanitizers has also increased significantly in providing hand hygiene. With the sudden increase in hand sanitizers, a wide variety of disinfectant brands have emerged in the market. With the increasing need in a short time, many disinfectant brands that have not undergone sufficient inspections by both the Ministry of Health and the Ministry of Commerce have also emerged.

As a result of excessive use of hand sanitizer, dryness, redness and cracking may occur on the skin. Because excessive use thins the oil layer on the skin and causes dryness on the skin. For this reason, hands should only be disinfected after possible contact with the virus. To prevent this problem, a moisturizer should be used after cleaning hands with disinfectant. When looking at disinfectants supplied on the market, it is seen that there are changes in the amount of ethyl alcohol they contain. It has been observed that these amounts of ethyl alcohol are in different ratios such as 65%-80%. Studies have revealed that in order for hand sanitizers to be effective, the ethyl alcohol ratio should not be less than 70%. For this reason, disinfectants above this limit should be preferred, especially by businesses where hygiene is even more important. In order to provide effective hygiene, brands above this limit should be preferred and choosing brands that meet national and international standards will contribute to business efficiency.

Various studies have revealed that substances such as Potassium Sorbate, Sodium Benzoate, Parfum, Phenoxyethanol, Buthylphenyl Methylpropional etc. are harmful to human health in wet wipes that are obtained from the market and whose contents are examined. Although the usage rates of chemicals in wet wipes on the market are not known, the fact that various diseases occur as a result of continuous exposure to these chemicals has been revealed in studies. In terms of our subject, it is concluded that wet wipes used in businesses should be selected more carefully. For wet wipes used for hygiene purposes in workplaces, wipes with the least amount of chemicals should be selected and workers should be protected from various skin diseases. Otherwise, it is inevitable that situations that reduce efficiency in businesses will occur.

CONCLUSION

It cannot be said that there was sufficient awareness in businesses regarding occupational hygiene before the pandemic. It can be determined that even in food businesses where hygiene rules should be at the highest level, the necessary precautions were not fully taken. However, after the infectious disease that became a global epidemic, compliance with hygiene rules has become even more important and various legislations have been published by the relevant institutions and organizations on this issue. The fact that not paying attention to hygiene has a serious place in the spread of the epidemic has also led to certain regulations on this issue. The lack of awareness of employees has been effective in the spread of the epidemic and it has become clear that it is necessary to increase the awareness and consciousness levels of the personnel working in the businesses in order to prevent the spread of the epidemic.

Especially in sectors such as food and service, compliance with hygiene rules will also reduce the speed of the spread of the epidemic.

Some regulations have been made to ensure and increase hygiene in the workplaces of businesses. The necessity of complying with the distance rules in the workplace, the use of disinfectants for hand hygiene and the increase in the number of hand washing stations are examples of post-pandemic regulations. The importance of hygiene chemicals has become more evident both for the personal hygiene of the personnel and for increasing the hygiene of the environment. In addition, the use of masks, which was applied only in workplaces with certain activities such as food, production and manufacturing in the pre-pandemic period, has become a rule applied in all workplaces after the pandemic. Hygiene rules have been established not only in the workplace, but also in other annexes and social areas. Various regulations have been made to comply with hygiene, especially in areas of collective use such as cafeterias, compared to before the pandemic. Protecting the health of the worker is one of the most important responsibilities of the employer. In this responsibility, it is necessary not to think in a one-sided way, focusing only on protecting the worker. Because the worker must be healthy in terms of the continuity of production and services in the workplace. The hygiene products used in the workplace are important for the protection of the worker's health. For this reason, among the hygiene chemicals to be selected for the workplace, products that will not negatively affect the health of the worker should be selected.

As a result, while there were no detailed and specific regulations regarding occupational hygiene in workplaces before the global pandemic, the number of measures and regulations taken increased after the global pandemic as the seriousness of the situation became apparent. Personnel is one of the most important factors in terms of continuity of production in workplaces. Workplaces are careful to work at full capacity, and personnel shortage is an undesirable situation. Personnel shortage disrupts both efficiency and goods and services that need to be produced on time. In the post-pandemic period, personnel affected by the pandemic and infected with infectious diseases cannot come to the workplace for a certain period (10-14 days). Although businesses that can continue their activities online during these times are less affected, serious disruptions have occurred in the activities of businesses where working in person is important. For this reason, businesses are trying to comply with hygiene rules more in the post-pandemic period. As a result of examining the components of the hygiene products we examined in our study; It is possible to say that the amount contained in the product does not reach a toxic value. However, like many chemicals, these components can increase cumulatively and cause various health problems. Therefore, when using hygiene products, it is necessary to prefer those that contain the least amount and type of chemicals. It would be beneficial to choose hygiene chemicals that have undergone the necessary inspections and have been approved by the relevant ministries.

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Conflict of Interest

The article authors declare that there is no conflict of interest between them.

Author’s Contributions

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