Awareness and Attitude of Applied Science Private University-Students Toward Detergents

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Abstract: - Detergents are commonly used in workplaces and homes. Users are at increased risk of exposure to significantly higher concentrations. Many detergents are toxic when we are not careful about them. Chemical detergents have harmful effects on the environment. They can cause climate change, kill fish and wildlife, and make aquatic environments uninhabitable The main objective of this study was to assess the awareness and attitude of Applied Science Private University (ASU) students toward detergents. A cross-sectional study was conducted at ASU. A questionnaire containing 40 questions was given to the study category of students (129 students, 38 males, and 91 females), tabulated, and analyzed using SPSS 17 to measure the awareness and attitude of students toward detergents. 70.5% of the total sample were females, 86% from scientific colleges, and 42.6% from the first-year level of study. There were no significant differences between awareness and attitude attributed to gender, college, or study year level. Workplaces and homes that ensure good ventilation to reduce occupational diseases, injuries, and accidents have the highest mean of 2.3721 (SD = 0.62587) with high attitude. Read indicative, alert, and warning signs of detergents and hazardous materials with a mean of 2.3333 (SD = 0.67700) with a high attitude. Knowledge of the import and shipping laws for hazardous detergents with a mean of 1.7674 (SD = 0.61887) with a medium attitude. Students' knowledge of the side effects of detergents on health and their general knowledge of cleaning materials and the side effects of mixing detergents is high. Students do not use detergents frequently. Female students' knowledge rates of detergents are higher than those of male students. The knowledge rates of students of science college about detergents are higher than those of students of humanities college. The knowledge rates of students in the first and second years about detergents are higher than the percentage of students in the third and fourth years. This study provides a pathway for health education to broaden a change of attitude toward detergents and household poisons.

Key-Words: Detergents, Awareness, Attitude, ASU students, Environmental-risks.

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1 Introduction

Potentially dangerous chemicals are found in every home. These products can cause minor to serious life-threatening health problems if not stored or used appropriately, [1]. Many products used in our daily lives, such as detergent, cleaning materials, cosmetics, cooking fuels, and paints, may have side effects on our lives, and users must be careful about them, [2]. Repeated exposure to household poisons is related to every disease that we know of, most notably cancer, [3]. Many household poisons have also been linked to mental and physical developmental problems, [4]. Moreover, they cause damage to the cardiovascular system, nervous system,

endocrine system, respiratory system, reproductive system, immune system, etc., [5]. Fruits and vegetables are covered in pesticides and cause many health problems, [6]. India is a developing country that uses asbestos in construction, which is considered one of the most important causes of mesothelioma and respiratory diseases, [7]. Most households use solid fuels such as wood, coal, and biogas, which emit health-damaging polluting products due to incomplete combustion. These products cause serious health problems, and environmental pollution, which lead to additional health risks, [8]. Cleaning and personal care products are a major source of xenobiotic organic compounds in wastewater, [9]. The most common way to dispose of leftover medicines is through the garbage. Finally, waste lands in landfills with the potential to discharge into the environment and then percolate into the groundwater and thus cause water pollution, [10]. Poisons such as medicines, cleaning products, and cooking fuels such as kerosene must be kept out of reach of children, which may cause unintentional household poisoning in children, [11]. Cosmetics and personal care are essential to our daily care routine, such as sunscreen, lip balm, hand cream, hair cream, shampoo, sanitizer, baby oil, baby powder, bar soap, hair dye, makeup, deodorant, hair serum, shaving gel, and toothpaste. Ensuring the safety of cosmetics is paramount. Cosmetics are the main sources of heavy metal release, harmful chemicals, and pathogenic microorganisms, [12]. To assess their actual impact on the environment, a full analysis of their life cycle would have to be carried out: production, packaging, transportation, use, disposal, and recycling. Hundreds of diverse detergents are available in homes, posing potential dangers to humans. These products are complex mixtures of chemicals that vary widely in toxicity.

Hundreds of diverse detergents are available in homes, posing potential dangers to humans. These products are complex mixtures of chemicals that vary widely in toxicity. Avoidance of these toxins is done by following these guidelines; keep cleaning products out of reach of children, never leave open containers or cleaning product solutions unattended, ensure cleaning product containers are sealed and properly labeled, and dispose of any cleaning solutions immediately after use. Many products also have warnings regarding the potential for product corrosion or irritation and instructions on the label for initial action in the event of accidental exposure to the human mouth, skin, or eyes.

To avoid the damage caused by detergents, it is necessary to know the correct way to use, store, and transport detergents. You must have sufficient protective equipment to handle detergents, recognize ways to dispose of expired materials, and read the labels on detergents. In addition, you must know the side effects of detergents on the environment and health as well as the side effects of mixing detergents. Because many household chemicals cannot be felt, smelled, or tasted on first contact, it is important to be aware of the most common household toxins and take proactive measures to prevent or reduce exposure to them, [13]. This study was conducted among students of both scientific and humanities colleges to assess their knowledge, awareness, and attitude toward detergents.

2 Method

2.1 Study Design and Participants

This cross-sectional research was conducted online between 1 November 2022 and 1 December 2022. The population of the study consisted of scientific and humanities college students from all study years levels. The questionnaire study was completed by 129 participants, 70.5% of the total sample are females. Informed consent was obtained from the students participating in the survey. All the study participants were subjected to a self-administered questionnaire. Information obtained through the questionnaires was analyzed and tabulated using the statistical software SPSS, version 22 for Windows.

The results were compared according to demographic characteristics using an independent sample t-test, and a one-way analysis of variance (ANOVA) was calculated. In addition, the reliability coefficient (Cronbach's Alpha) for construct A of the study is 0.89. Data analysis was performed using SPSS, version 22. The level of statistical significance was set at $p < 0.05$ (two-sided).

2.2 Sample Description

A total of 129 were recruited to the study. 70.5% of the total sample are females, 86% are from scientific colleges, 55.8% of age less than twenty, and 42.6% are from the first level of study as shown in Table 1.

3 Results

3.1 A Knowledge and Attitude of Students Toward Detergents

The results are shown in the below Table 2. The percentage of students' knowledge of the side effects of detergents on health and their general knowledge about detergents are the highest values (89.8 % and 85.8%), respectively. The percentage of student's knowledge of the side effects of mixing detergents is equal to 70.1 %. When comparing the side effects of detergents on the environment and health, students' knowledge of the side effects of detergents on health was higher. The percentages of students who use detergents, and know about the laws and regulations related to detergents and their side effects on the environment are average (66.9 %, 60.6 %, and 69.3 %), respectively. The percentage of student's knowledge about how to dispose of expired materials is the lowest value (51.2 %).

Female students' knowledge about detergents is much higher than those of male students (76.1 %, 23.9 %), respectively. The knowledge about detergents is also much higher for students of science college than those of students of humanities college (85.3 %, 14.7 %), respectively. The students' knowledge about detergents for first-, and second-years students are also much higher than the students of the third and fourth years (39.4 %, 36.7 and 13.8 %, 10.1 %), respectively.

Table 1. Demographic characteristics of the study sample

Variable	Category	No.	%
Gender	Male	38	29.5
	Female	91	70.5
College	Humanities	18	14.0
	Scientific	111	86.0
Year level of study	First	55	42.6
	Second	43	33.3
	Third	16	12.4
	Fourth	15	11.6

Table 2. percentage of agreement of knowledge and attitudes toward detergents

Questions	**Total Percentage (%)**	**Gender**		**Faculty**		**Level of study**			
		Male (%)	Female (%)	Humanities College	Scientific College	First (%)	Second (%)	Third (%)	Fourth (%)
				(%)	(%)				
Do you have Knowledge of detergents?	85.8	23.9	76.1	14.7	85.3	39.4	36.7	13.8	10.1
Do you use detergents a lot?	66.9	22.4	77.6	14.1	85.9	37.6	40.0	11.8	10.6
Do you know the laws and regulations regarding detergents?	60.6	26.0	74.0	10.4	89.6	41.6	37.7	10.4	810.4
Do you know ways to dispose of expired materials?	51.2	26.2	73.8	9.2%	90.8	44.6	33.8	12.3	9.2
Do you know the side effects of detergents on the environment?	69.3	23.9%	76.1	14.8%	85.2	44.3	33.0	11.4	11.4
Do you know of the side effects of detergents on health?	89.8	23.7	76.3	14.0	86.0	42.1	33.3	13.2	11.4
Do You know the side effects of mixing detergents?	70.1	23.6%	76.4	13.5	86.5	40.4	33.7	14.6	11.2

The below Table 3, shows responses to the levels of the variables. Mean and standard deviation are calculated for each item and ranked in descending order according to mean. A higher mean value indicates more agreement on that item.

From Table 3, it is noticed that (workplaces and homes ensure good ventilation to deal with detergents and reduce occupational diseases, injuries, and accidents) have the highest mean value which is equal to 2.3721 (SD = 0.62587) with a high attitude. The second rank is (read indicative, alert, and warning signs of detergents and hazardous materials) with a mean value of 2.3333 (SD = 0.67700) with high attitude. The minimum rank is for (knowledge of the import and shipping laws for hazardous detergents) with a mean of 1.7674 (SD = 0.61887) with a medium attitude. Overall, knowledge is with medium attitude and a mean of 2.0846 (SD = 0.45762).

Table 3. Mean, standard deviation, and attitude for items of knowledge

Item	Mean	SD	Attitude
Do workplaces and homes ensure good ventilation to deal with detergents and reduce occupational diseases, injuries, and accidents?	2.3721	0.62587	high
Do you read indicative, alert, and warning signs of detergents and hazardous materials?	2.3333	0.67700	high
Do you know and read the labels for detergents?	2.2248	0.68739	medium
Do you know safe ways to store detergents?	2.2016	0.64202	medium
Do you have sufficient protective equipment to handle detergents?	2.0930	0.70091	medium
Do you know how to deal with accidents resulting from hazardous detergents?	2.0620	0.69318	medium
Do you know how to deal with all types of hazardous detergents?	2.0620	0.68182	medium
Do you check the validity of the detergents before using them at home?	2.0233	0.70117	medium
Do you know of safe ways to transport detergents?	1.9845	0.72870	medium
Do you store the detergent in areas well-ventilated?	1.9690	0.69527	medium
Do you apply standards for storing hazardous detergents?	1.9225	0.64484	medium
Do you know the import and shipping laws for hazardous detergents?	1.7674	0.61887	medium
knowledge (Cronbach's Alpha) = 0.89	2.0846	0.45762	medium

3.2 Reliability Coefficient

The reliability coefficient (Cronbach's Alpha) of "knowledge" is 0.89.

3.2.1 T-tests and Analysis of Variance

Are there significant differences in the levels of the study construct A "knowledge" that can be attributed to gender, age, and college? Independent samples t-test will be used to test for the previous construct while, analysis of variance (ANOVA) will be used to test for the year level of study variable.

3.2.2 Gender

The mean and standard deviation for males and females are shown in Table 4. An independent samples t-test was conducted to test that there are no differences in the levels of knowledge that can be attributed to gender. Table 5 shows no significant differences between knowledge that can be attributed to gender.

Table 4. The mean and standard deviation for males and females

	Gender	No.	Mean	Std. Deviation	Std. Error Mean
Knowledge	male	38	1.9693	0.42906	0.06960
	female	91	2.1328	0.46281	0.04852

Table 5. Independent Samples T-tests

Variable	t	df	Sig. (2tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Knowledge	- 1.868	127	0.064	-0.16349	0.08754	-0.33671	0.00974

3.2.3 College

The mean and standard deviation for scientific college and humanities college are shown in Table 6. An independent samples t-test was conducted to test that there are no differences in the levels of knowledge that can be attributed to college. Table 7 shows no significant differences between knowledge that can be attributed to college.

3.2.4 Level of Study

Table 8 shows the mean and the standard deviation within constructs according to year level of study. An analysis of variance was performed to explore the impact of the year level of study on the knowledge. Table 9 shows no significant effect of the year level of study on knowledge.

Table 6. The mean and standard deviation for scientific college and humanities college

College		No.	Mean	Std. Deviation	Std. Error Mean
Knowledge	Humanities college	18	2.0509	0.44386	0.10462
	Scientific college	111	2.0901	0.46154	0.04381

Table 7. Independent samples T -tests

Variable	t	df	Sig. (2tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
knowledge	-0.336	127	0.738	-0.03916	0.11668	-0.27006	0.19173

Table 8. The mean and standard deviation within constructs according to year level of study

Variable	Category	Mean	SD	No.
Knowledge	First	2.0515	.45545	55
	Second	2.1531	.49097	43
	Third	1.9948	.35154	16
	Fourth	2.1056	.48023	15

Table 9. ANOVA for the level of study

Variable	Sum of Squares	df	Mean Square	F	Sig.
Knowledge	0.398	3	0.133	0.627	0.599

4 Discussion

Daily used cleaning products are chemicals, such as bleach, oven sprays, liquid laundry capsules, and toilet cleaners. Most of them are not dangerous if correctly used. However, some detergents need more careful handling than others. This study measured the awareness and attitude of ASU-Students toward Detergents. The study showed the students had high scores on awareness of knowledge about detergents, which is in agreement with Omari, which showed 82.2% of respondents had good information about the materials used for handwashing, [14]. This study showed that students do not use detergents frequently which may be attributed to their lack of information about detergents. The study also showed that they have little knowledge about the laws and regulations related to detergents. As a sequence of the results of this study, The Department of Basic Science at the UAS held periodic seminars and pro chores for students at the university and many schools in Jordan as a kind of community service that the UAS is keen to achieve.

The results of this study showed that the students attain a high percentage value about awareness of detergent risks on health (89.8 %) as consistent with many previous studies. This may be attributed to the importance of reducing occupational diseases, injuries, and accidents. Lafta revealed that women in Baghdad are poorly educated about protecting against domestic accidents involving children, [15]. Reading the description and instructions on the packaging is helpful and can lead to good recommendations about safety behavior, [16]. Reading alone does not reduce risk, but using sufficient protective equipment and providing well-ventilated areas could be obliging.

Students showed a medium score for knowledge about the environmental risks of detergents and a low score about the disposal of expired materials. Disposing of the products after use according to instructions is a way to reduce environmental exposure, [16]. Choosing cleaning products marketed as ‘green’ may also help reduce exposure to several carcinogens. A previous study characterized Latino women's contact with cleaning chemicals and documented a simple method for reducing several of them; participants were receptive to switching their cleaning products, [17].

Unsafe handling of detergents and improper storage of chemicals are common mistakes among consumers in our society in Jordan. Therefore, it is necessary to launch educational campaigns to improve consumer handling of household products.

5 Limitations

This study is limited to a sample of students of the AUS, and therefore it is not possible to guarantee to obtain the same results if applied to another sample.
The process of generalizing the results is limited to the tools that were used in the study, and therefore it is not possible to guarantee to obtain the same results when applied to another sample. This study is limited to the use of a questionnaire about detergents in general and not certain brands. Concerning the variables: gender, GPA, college, and year level of study, maybe it impossible to guarantee to obtain the same results if other dependent variables are used.

6 Conclusion

The study concluded that ASU students had a positive attitude toward detergents and needed the conscious of the type of hazardous detergents. Students are confused about how to deal with detergents; the university should make more efforts to educate students. The study could serve as an initiative to make the consumer more aware and demand eco-friendlier green detergents with good cleaning action. The government places more stringent regulations, and the manufacturers sell less polluting detergents; that are eco-friendlier, water and energy-efficient, and have good cleaning performance. Informed public opinion would bring about stricter norms and regulations as in the Western countries and bring better products to the market.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

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Conflict of Interest

The authors have no conflict of interest to declare.