Survey of Jordanian Awareness about Hazardous Symbols of Chemicals

NAWAL BAHTITI*[A], AHMAD ABU RAYYAN[B], TALA SASA[A], WAED ALAHMAD[A]
[a]Basic Science Department, Faculty of Science, Applied Science Private University, P.O. Box 166 Amman 11931, JORDAN
[b]Chemistry Department, Faculty of Science, Applied Science Private University, P.O. Box 166 Amman 11931, JORDAN

Abstract: - The use of chemical substances has commonly increased, there are such a number of chemical dangers all spherical us that it is probably almost now no longer feasible to feature if we centered constantly on the dangers. This is precisely why we need to don't forget the dangers. Everyone need to apprehend exactly what do in case of unstable contact with risky material. Previously we tested consciousness of Jordanian peoples and measured the employees' interest of risky chemical compounds1. So this new seek aimed to research chemical symbols attentions, a questionnaire survey come to be executed among a whole of 245 peoples. The questionnaire come to be acquainted with flammable risky symbols as 90.6%, however handiest 7% for fitness chance symbol. Statistical assessment of the statistics come to be finished with the Statistical Package for Social Sciences (SPSS) version 25. The effects show that the descriptive information confirmed that scholars proven truthful to excellent familiarity and expertise of chemical chance caution symbols. Most college students had bad to truthful attitudes closer to chemical laboratory protection; however, the evaluation of college students' chemical laboratory protection practices found out truthful to suitable practices. While college students' protection focus and practices, however now no longer attitude, at this college have been acceptable, protection tactics want to be applied inside an extra expert protection training and coherent threat and protection weather management.

Key-Words: - Chemical hazard; Awareness; Jordanian, Employees, Risk, Dangerous symbols.

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1 Introduction

Many chemical compounds which are being produced and utilized in merchandise, substances and homes are dangerous for human fitness and the surroundings (1). There are legal guidelines to make chemical utilization more secure and to defend human fitness and the surroundings. Despite efforts on a structural degree human beings are nonetheless being uncovered via touch with merchandise that include dangerous chemical compounds or via dust, indoor-air, water and meals in addition to pores and skin absorption Modern society is experiencing a length of exceptional intake with an amazing multitude of chemical materials being utilized in patron articles and industrial mixtures. Many materials labeled as dangerous in keeping with the EU law on type and labeling (CLP Regulation) 1 are found in regular merchandise as everyday ingredients, like, for example, preservatives in washing and cleansing agents, fragrances in non-public care merchandise, per- and polyfluorinated chemical compounds utilized in fabric finishing, plasticizers in plastic substances, or heavy metals in digital appliances. Many of those materials stay left out via way of means of the common end-consumer who takes the blessings of the chemical ingredients as a right and trusts that undesirable residences for guy and the surroundings are negligible. Risk communication provisions, such as hazard pictograms on the product containers, are established to aid consumers and workers to be aware of hazards and to implement a suitable risk management behavior so as to minimize exposure and hence risk. The understanding of the risk communication message by the recipients is one of the basic pillars of chemical legislation2. Risk communication is an important first step, but there are various indications that risk communication measures are not always as effective as intended, because they are not always understood in the way expected by the decision makers and are thus not sufficiently protective under the consumer and the environmental perspectives. Previous studies that evaluated the efficiency and effectiveness of risk

communication yielded remarkable results: A large number of users in European and non-European countries struggled to understand ingredient lists and labels 3,4. Other studies analyzed the understanding of hazard pictograms and showed that end-users did not understand the signs correctly 5,6. Even correctly understood risk information did not necessarily lead to the intended risk reduction behaviors 5. It was also described that illiterate persons had great difficulty to understand pictorial label information and safety instructions 6. A European survey 7 where citizens should indicate whether they thought that certain products contained 'chemical substances' in general showed that it is also worthwhile to ask very simple and basic questions which do not require any previous knowledge. Participants of this survey were not asked about harmful substances but only about chemical ingredients 8,9. For a chemist the results of this survey were shocking because large numbers of participants in Jordan did not know chemical hazards symbols.10.11 Such results suggest that these citizens might have problems understanding risk communication tools. However, it is not certain that experts judge risks correctly.

2 Methods

2.1 Study Design

The survey was conducted between September and December 2020 among Bachelors chemistry graduated in Jordan in several working sectors (teaching, Laboratory work and in manufactures, and others).

2.2 Survey Instruments

The questionnaire was developed based on the literature review of comparable studies. The questionnaire consisted of 36 items revealed: Assessment of Familiarity and Understanding of Chemical Hazard Warning Signs, Most abundant chemical in our life their presence and health effect.

3 Statistical Analysis

Statistical analysis was developed using STATA software program, version 16 (Stata Corporation. College Station, Tx). Data were summarized using frequencies and percentages for categorical data and mean and standard deviations for continuous data. Univariate and stepwise multivariate logistic regression analyses were performed to determine the independent association of explanatory variables with the following outcomes of interest:

and research fellows, and 25.5% had been working in the current lab for less than 1 year; overall, more than half reported at least one working experience in other labs. About half of the workers reported to have a chronic illness and 67.9% had attended a GP in the previous year (Table 1).

3 Conclusion

According to table 3. There is significant difference between the answers of male and female about (Corrosion)q5 $p= 0.005<0.05$. The percentage of correct answers with respect to female is more than the percentage of correct answer with respect to male.

According to table 4. There is significant difference between the answers with respect to age about (flammable) q2 $p=0.006<0.05$, The highest percentage of correct answers of age 23-30, the lowest of age greater than 40.

According of table 5. There is significant difference between the answers with respect to education qualification.

q2(flammable) $p= 0.001< 0.05$. The highest percentage of correct answers is in favour of current undergraduate students and laboratory technicians, the lowest of lab managers.

There is significant difference between the answers with respect to education qualification q3(oxidizing) $p= 0.038<0.05$. The highest percentage of correct answers is in favour of current undergraduate students, the lowest of post graduate students.

There is significant difference between the answers with respect to education qualification q4 (gas cylinder $p=0.022<0.05$. The highest percentage of correct answers is in favour of lab manager, the lowest of master or doctors or others.

4 Conclusions

Misconceptions approximately dangerous materials in merchandise may be risky for the non-public fitness and the environment. The survey shows that motivation, instructional level, and chemical understanding do now no longer robotically offer the suitable expertise of dangerous materials in merchandise. If well-knowledgeable customers aren't sufficiently successful to apply chance statistics factors as found out on this study, then this can be even greater the case for the overall public.

Consumer recognition ought to be stipulated via way of means of a stepped forward statistics approach approximately chemical dangers in patron merchandise with an in depth participation of the goal companies and via way of means of greater efforts via way of means of government and manufactures to construct consider and to offer effortlessly comprehensible statistics.

We recommended to enhance the lifestyle of protection ethics and threat control a few of the college body of workers and college students who've more than one chemistry laboratories of their examine plan; specifically, the pharmaceutical and chemical engineering and biomedical engineering college students. This may be carried out with the aid of using organizing an Environmental Health and Safety Office on the college this is answerable for making use of and following up on compliance with protection regulations and procedures, and growing a direction on dangerous waste and threat control, to be made obligatory for all college students who're assignment an application of examine that entails chemical laboratory exercises.

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Appendix:

Table1. A hazard Warning Symbol

Table 2. Demographic, professional and knowledge of chemical hazards characteristics of the responders

Characteristic		Frequency	Percent
Gender	Male	71	29.0
	Female	174	71.0
Age	18-22	154	62.9
	23-30	44	18.0
	31-39	15	6.1
	ABOVE 40	32	13.1
educational qualification	Currently student	160	65.3
	Post graduate students	19	7.8
	Teachers	14	5.7
	Lab technicians	12	4.9
	Lab managers	6	2.4
	Instructors (master or doctor)	15	6.1
	Others	19	7.8
Q1 Explosive symbol(1) 	Correct	126	51.4
	Incorrect	70	28.6
	Do not know	49	20
Q2 Flammable symbol(2) 	Correct	222	90.6
	Incorrect	18	7.3
	Do not know	5	2
Q3 Oxidizer symbol (3) 	Correct	96	39.2
	Incorrect	118	48.2
	Do not know	31	12.7
Q4 Gas cylinder symbol (4) 	Correct	117	47.8%
	Incorrect	79	32.2%
	Do not know	49	20%
Q5 Corrosive symbol (5) 	Correct	103	42%
	Incorrect	74	30.2%
	Do not know	68	27.8
Q6 Harmful symbol (6) 	Correct	127	51.8%
	Incorrect	107	43.7%
	Do not know	11	4.5%
Q7 Exclamation mark symbol (7) 	Correct	60	24.5%
	Incorrect	116	47.3%
	Do not know	69	28.2%
Q8 Health hazard symbol (8)	Correct	20	8.2%
	Incorrect	194	79.2%
	Do not know	31	12.7%

			
Q9 Environment hazard symbol (9) 	Correct	181	73.9%
	Incorrect	23	9.4%
	Do not know	41	16.7%

Table 3. Percentage of correct answers, incorrect answer and not knowing the answer for respondents with respect to gender

Questions	gender	Correct answer		Incorrect answer		I don't know	
		number	percent	number	percent	number	percent
This symbol  represents	male female	35 91	52.3% 49.3%	26 44	36.6% 25.3%	10 39	14.1% 22.4%
This symbol  represents	male female	63 159	88.7% 91.4%	5 13	7% 7.5%	3 2	4.2% 1.1%
This symbol  represents	male female	23 73	32.4% 42%	42 76	59.2% 43.7%	6 25	8.5% 14.4%
This symbol  represents	male female	31 86	43.7% 49.4%	27 52	38% 29.9%	13 36	18.3% 20.7%
 This symbol represents	male female	24 79	33.8% 45.4%	32 42	45.1% 24.1%	15 53	21.1% 30.5%
This symbol  represents	male female	37 90	52.1% 51.7%	31 76	43.7% 43.7%	3 8	4.2% 4.6%
 This symbol represents	male female	18 42	25.4% 24.1%	35 81	49.3% 46.6%	18 51	25.4% 29.3%
This symbol  represents	male female	5 15	7% 8.6%	61 133	85.9% 76.4%	5 26	7% 26%
This symbol  represents	male female	54 127	76.1% 73%	9 14	12.7% 8%	8 33	11.3% 19%

Table 4. Percentage of correct answers, incorrect answer and not knowing the answer for respondents with respect to age

Questions	age	Correct answer	Incorrect answer	I don't know

		number	percent	number	percent	number	percent
This symbol  represents	18-22 23-30 31-39 Greater than 40	81 20 9 16	52.6% 45.5% 60% 50%	50 13 2 5	32.5% 29.5% 13.3% 15.6%	23 11 4 11	14.9% 25% 26.7% 34.4%
This symbol  represents	18-22 23-30 31-39 Greater than 40	143 43 13 23	92.9% 97.7% 86.7% 71.9%	8 1 2 7	5.2% 2.3% 13.3% 21.9%	3 0 0 2	1.9% 0% 0% 6.3%
This symbol  represents	18-22 23-30 31-39 Greater than 40	64 16 3 13	41.6% 36.4% 20% 40.6%	71 23 9 15	46.1% 52.3% 60% 46.9%	19 5 3 4	12.3% 11.4% 20% 12.5%
This symbol  represents	18-22 23-30 31-39 Greater than 40	81 14 7 15	52.6% 31.8% 46.7% 46.9%	42 21 6 10	27.3% 47.7% 40% 31.3%	31 9 2 7	20.1% 20.5% 13.3% 21.9%
This symbol  represents	18-22 23-30 31-39 Greater than 40	69 13 6 15	44.8% 29.5% 40% 46.9%	51 12 5 6	33.1% 27.3% 33.3% 18.8%	34 19 4 11	22.1% 43.2% 26.7% 34.4%
This symbol  represents	18-22 23-30 31-39 Greater than 40	83 21 7 16	53.9% 47.7% 46.7% 50%	63 21 8 15	40.9% 47.7% 53.3% 46.9%	8 2 0 1	5.2% 4.5% 0% 3.1%
This symbol  represents	18-22 23-30 31-39 Greater than 40	37 13 2 8	24% 29.5% 13.3% 25%	71 21 9 15	46.1% 47.7% 60% 46.9%	46 10 4 9	29.9% 22.7% 26.7% 28.1%
This symbol  represents	18-22 23-30 31-39 Greater than 40	14 2 0 4	9.1% 4.5% 0% 12. %5	123 35 15 21	79.9% 79.5% 100% 65.6%	17 7 0 7	11% 15.9% 0% 21.9%
This symbol  represents	18-22 23-30 31-39 Greater than 40	109 34 10 28	70.8% 77.3% 66.7% 87.5%	17 2 3 1	11% 4.5% 20% 3.1%	28 8 2 3	18.2% 18.2% 13.3% 9.4%

Table 5. Percentage of correct answers, incorrect answer and not knowing the answer for respondents with respect to education qualification

questions	Education qualification	Correct answer		Incorrect answer		I don't know	
		number	percent	number	percent	number	percent
This symbol	CURRENTLY STUDENT	82	51.2%	51	31.9%	27	16.9%

represents 	POST GRADUATE STUDENTS	8	42.1%	7	36.8%	4	21.1%
	TEACHERS						
	LAB	8	57.1%	1	7.1%	5	35.7%
	TECHNICIANS	9	75%	1	8.3%	2	16.7%
	LAB MANEGER						
	INSTRUCTER	4	66.7%	0	0%	2	33.3%
	Master OR doctor	9	60%	2	13.3%	4	26.7%
	OTHERS	6	31.6%	8	42.1%	5	26.3%
This symbol represents 	CURRENTLY STUDENT	150	93.8%	7	4.4%	3	1.9%
	POST GRADUATE STUDENTS	16	84.2%	3	15.8%	0	0%
	TEACHERS						
	LAB	13	92.9%	1	7.1%	0	0%
	TECHNICIANS	12	100%	0	0%	0	0%
	LAB MANEGER						
	INSTRUCTER	3	50%	3	50%	0	0%
	Master OR doctor	12	80%	1	6.7%	2	13.3%
	OTHERS	16	84.2%	3	15.8%	0	0%
This symbol represents 	CURRENTLY STUDENT	70	43.8%	69	43.1%	21	13.1%
	POST GRADUATE STUDENTS	4	21.1%	13	68.4%	2	10.5%
	TEACHERS						
	LAB	6	42.9%	8	57.1%	0	0%
	TECHNICIANS	5	41.7%	7	58.3%	0	0%
	LAB MANEGER						
	INSTRUCTER	2	33.3%	4	66.7%	0	0%
	Master OR doctor	4	26.7%	5	33.3%	6	40%
	OTHERS	5	26.3%	12	63.2%	2	10.5%
This symbol represents 	CURRENTLY STUDENT	83	51.9%	40	25%	37	23.1%
	POST GRADUATE STUDENTS	7	36.8%	10	52.6%	2	10.5%
	TEACHERS						
	LAB	6	42.9%	7	50%	1	7.1%
	TECHNICIANS	5	41.7%	6	50%	1	8.3%
	LAB MANEGER						
	INSTRUCTER	4	66.7%	2	33.3%	0	0%
	Master OR doctor	6	40%	3	20%	6	40%
	OTHERS	6	31.6%	11	57.9%	2	10.5%
This symbol represents 	CURRENTLY STUDENT	70	43.8%	51	31.9%	39	24.4%
	POST GRADUATE STUDENTS	7	36.8%	6	31.6%	6	31.6%
	TEACHERS						
	LAB	6	42.9%	4	28.6%	4	28.6%
	TECHNICIANS						
	LAB MANEGER	7	58.3%	0	0%	5	41.7%
	INSTRUCTER						

	Master OR doctor	3	50%	2	33.3%	1	16.7%
	OTHERS	6	40%	2	13.3%	7	46.7%
		4	21.1	9	47.4	6	31.6%
This symbol  represents	CURRENTLY STUDENT	93	58.1%	58	36.3%	9	5.6%
	POST GRADUATE STUDENTS	7	36.8%	12	63.2%	0	0%
	TEACHERS						
	LAB	8	57.1%	6	42.9%	0	0%
	TECHNICIANS	5	41.7%	7	58.3%	0	0%
	LAB MANEGER						
	INSTRUCTER	3	50%	3	50%	0	0%
	Master OR doctor	4	26.7%	9	60%	2	13.3%
	OTHERS	7	36.8%	12	63.2%	0	0%
This symbol  represents	CURRENTLY STUDENT	35	21.9%	74	46.3%	51	31.9%
	POST GRADUATE STUDENTS	6	31.6%	10	52.6%	3	15.8%
	TEACHERS						
	LAB	5	35.7%	7	50%	2	14.3%
	TECHNICIANS	7	58.3%	4	33.3%	1	8.3%
	LAB MANEGER						
	INSTRUCTER	1	16.7%	2	33.3%	3	50%
	Master OR doctor	3	20%	7	46.7%	5	33.3%
	OTHERS	3	15.8%	12	63.2%	4	21.1%
This symbol  represents	CURRENTLY STUDENT	13	8.1%	128	80%	19	11.9%
	POST GRADUATE STUDENTS	2	10.5%	14	73.7%	3	15.8%
	TEACHERS						
	LAB	1	7.1%	13	92.9%	0	0%
	TECHNICIANS	2	16.7%	10	83.3%	0	0%
	LAB MANEGER						
	INSTRUCTER	1	16.7%	2	33.3%	3	50%
	Master OR doctor	0	0%	11	73.3%	4	26.7%
	OTHERS	1	5.3%	16	84.2%	2	10.5%
This symbol  represents	CURRENTLY STUDENT	110	68.8%	17	10.6%	33	20.6%
	POST GRADUATE STUDENTS	17	89.5%	1	5.3%	1	5.3%
	TEACHERS						
	LAB	12	85.7%	2	14.3%	0	0%
	TECHNICIANS	12	100%	0	0%	0	0%
	LAB MANEGER						
	INSTRUCTER	6	100%	0	0%	0	0%
	Master OR doctor	10	66.7%	1	6.7%	4	26.%7
	OTHERS	14	73.7%	2	10.5%	3	15.8%

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