Original Research Article

Use of health belief model to explain the behaviour of following safety measures during the use of household chemical products among adult females in Riyadh

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ABSTRACT

Background: The hazards and life-threatening conditions resulting from using household chemical products can be avoided or minimized by following certain safety measures. To investigate following safety measures during use of household chemical products (HHCP) among women and to explain that behaviour using the Health belief model (HBM).

Methods: This was a cross sectional study. The study was conducted among adult females in Riyadh. The total sample size was 449 by convenience Sampling. this study started in September 2019 till April 2020. the questionnaire included 3 sections which were sociodemographic characteristics, safety measures followed during use of HHCP and the last section assessed the six components of health belief model.

Results: Data analysis was done using JMP version 14.2 and the cutoff point of significance was 0.05. 30.3% of the studied sample demonstrated good level of following safety measures. There was no association between the level of following safety measures during the use of HHCP and level of education among studied sample (p value>0.05). The mean of each component of HBM was higher among women with good level of following safety measures than those who follow safety measures poorly. This was significant for perceived susceptibility (1.397 vs 1.269, p=0.03), perceived barriers (8.080 vs 7.038, p=0.0001), self-efficacy (2.889 vs 2.750, p=0.0240) and motivation factors (cues to action) (14.75 vs 13.69, p=0.0001).

Conclusions: Health belief model can successfully explain following safety measures behaviour during use of HHCP. Motivation factors has the greatest impact on this behaviour.

Keywords: Health belief model, Safety measures, Household cleaning

INTRODUCTION

The hazards and life-threatening conditions result from using household chemical products (HHCP) can be avoided or minimized by following the instructions.[1] The amount of product consumption, frequency cleaning, the amount of time that spent on cleaning and the way of storing products are considered factors of exposure to detergents.[2]

The appropriate storing of household cleaning products and parents' education are important factors to decrease the poisoning rate at home.[3] Consumers mostly get their information about the cleaning products and its possible health impact from the label of the products. The label should contain the product's name, the proper using method and its constitutional substances. According to Globally harmonized system (GHS), the information in products label should be written in black with white background to take the purchaser attention about the

possible hazards. Personal protection against cleaning hazards includes wearing gloves and masks during cleaning.[1]

One of the important safety procedures is to make sure that the house is ventilated during and after cleaning by opening windows or doors and to avoid staying in a place that has been cleaned by strong chemical products.[4] The health belief model (HBM) was used to find out the reasons behind why people are failing to follow preventive health measures. It is commonly used to figure out the behaviours that have an impact on health by understanding its six important elements.[5]

Perceived susceptibility; refers to individual awareness of the possible risk of illness or disease.[6] When people are aware enough about their susceptibility toward the consequences of diseases or bad behaviours they will be motivated to change.[5] Perceived severity; refers to individuals' awareness of the seriousness of health outcomes related to disease.[7] Perceived benefit; refers to the subjective view of the individual toward the benefits of acquiring a healthy behaviour. The individual should believe that changing the target behaviour will lead to positive results.[5] Perceived barriers: refers to obstacles that prevent the individual to obtain a healthy behaviour. The individual might believe the target behaviour can be inconvenient, expensive or time-consuming.[7] In changing any behaviour perceived benefits be required to outbalance the perceived barriers.[8] Cues to action; refers to factors that encourage an individual to take any action that can be beneficial for human health and these factors can be internal or external.[9,10]

The internal factor can be a psychological or emotional factor such as pain and external factors such as getting family support.[9,10] Self-efficacy; refers to the individual's beliefs of his or her capability to do something.[6] An individual's self-efficacy to change a behaviour is an essential step and has an effective outcome, but might not be required in behaviours that is easy to be achieved.[9] The advantages of using health belief model are that it is easy to utilize, test and implement in the intervention.

A study conducted by Habib revealed that women do not give attention to the importance of storing detergents properly and reading label warning in the products.[2] Habib's study found that there was higher utilization of HHCP more than what it recommended. For instance; instead of using 2 drops of dishwashing which is considered the average use of the product, women used 5 drops.[2] About 22% of the household chemical products users stored them in lower counters, which is accessible for the children. So, most of the poisoning accident at houses happen among children.[1]

Thus, this study was conducted to investigate following safety measures during use of HHCP among women and to explain that behaviour using the HBM.

METHODS

Study type

A cross-sectional study.

Study population

Adult females aged between 18-64 years and living in Riyadh.

Inclusion criteria

Adult Females aged between 18-64 years and living in Riyadh.

Exclusion criteria

Males, elderly aged more than 64 years.

Sample size

The number of Adult females in Riyadh region is 1975928, the sample size calculated to be 385 but the total female that undergo to this study were 449. It was calculated by the epi calculator; the confidence level of the sample size is 95% according to the following formula:[11]

$$n = [DEFF*Np(1-p)]/ [(d2/Z21-\alpha/2*(N-1) +p*(1-p)].$$

Sampling technique

Convenience Sampling technique. The questionnaire was distributed online through social media applications such as WhatsApp, twitter etc.

Study duration

This study started in September 2019 till April 2020

Tools of the study

The questionnaire was composed of 3 domains which are sociodemographic characteristics, following safety measures, and health belief model components.

In sociodemographic characteristics, 7 questions were asked such as age, nationality, and place of residence.

Following safety measures included 10 questions such as reading the instruction of cleaning products and wearing masks or gloves during the use of HHCP. Each question had 3 responses: always, sometimes, and never. These questions were scored by giving 3 points for always, 2 points for sometimes and 1 point for never.

The health belief model section included 14 questions to assess its 6 components. perceived susceptibility (1

question), perceived severity (1 multiple response question), perceived benefits (2 questions), perceived barriers (3 question), self-efficacy (1 question) and motivation factors as cues to action (5 questions).

Pilot study

Pilot study was conducted among 16 females from the target population of the study to identify common issues in the questions and to ensure its validity. According to their responses, some modifications were done.

The reliability test was done by using JMP 14.2. Cronbach Alpha was 0.7 for each of the following sets of questions: following safety measures, perceived barriers, perceive benefit and motivation factors.

Statistical analysis

Collected data were coded, tabulated, and analyzed by using the statistical software JMP version 14.2. The applied tests were Chi-square test to investigate the possible association between categorical variables and t-test or ANOVA to compare means between different groups. Multiple linear regression was performed to predict the behaviour of following safety measures. 0.05 level was used as a cutoff point of significance.

Ethical consideration

Before filling the questionnaire, all participants were asked to sign an informed consent. The consent contains the research title, the target group, study setting and the assurance of the confidentiality of participant information's. IRP approval from princess Nourah bint Abdulrahman university was obtained before starting to collect data and IRP log number was 20-0006.

RESULTS

Table 1 shows the demographics characteristics of studied population .67% of the participants aged between 18-33 years and only 6% of the participants were older than 50 years. 94% of participants were Saudi meanwhile only 5% were non-Saudi. 74.6% of the participants had bachelor's degree or diploma and 18% had an educational level of high school or less. 64.7% of the participants were working or students. One third of the participants had family income from 5,000 to10,000 SR per month. Only 10% of them had family income 4,000 SR or less. (Table 1).

Regarding the overall level of restriction to the safety measures during use of HHCP among the studied sample, only 30.3% demonstrated good level and 58.1% fair and 11.6% poor. Table 2 shows the most common safety measures followed by the studied population were storage the cleaning products away from children (84%) then keeping cleaning product away from flammable and heat source (79%). Only 20% of them used to read the product's instructions before use. The least common procedures were Post warning images for children on cleaning products (7%) and wearing mask during cleaning (4%) (Table 2).

Table 1: Demographic characteristics of the studied sample.

Variables		No.	%
Age (in years)	18-33	305	67
	34-49	111	24
	50 or more	29	6
Nationality	Saudi	426	94
	Non-Saudi	23	5
Educational level	Post Graduate	29	6
	Bachelor's degree/diploma	335	74.6
	High school or less	85	18
Working status	Working\student	293	64.7
	Housewife.	156	34
Family income	4,000 or less	48	10
	5,000-10,000	147	33
	11,000-16,000	106	23
	17,000-21,000	67	15
	22,000 or more	74	16.7

Table 2: Following safety measures during use of household chemical products among the studied sample.

Safety measures	No.	%
Wearing mask	22	4.9
wearing gloves	61	24.5
Reading the product's instructions	97	21.8
Ventilate the house during cleaning.	231	51.6
Following the instructions	184	41.8
Look at the expiry date of the product before use	134	30
Store cleaning products away from children	377	84
Post warning images for children on cleaning products	32	7.3
Store cleaning products away from heat/ ignition sources?	355	79

Table 3: Association between following safety measures during use of household chemical products and level of education among studied sample.

Count col%				
Level of education	Fair	Good	Poor	Chi square test
Bachelor's degree or diploma	198 (75.86)	97 (71.32)	40 (76.92)	
High school or less	46 (17.62)	27 (19.85)	12 (23.08)	X= 8.807,
Post graduated	17 (6.51)	12 (8.82)	0 (0.00)	P=0.0661
Total	261 (58.13)	136 (30.29)	52 (11.58)	

Table 4: Comparison of the mean value of each component in health belief model between different levels of restriction to the safety measure during the use of HHCP.

Factor	Poor		Fair		Good		
	Mean	Std	Mean	Std	Mean	Std	ANOVA
Perceived susceptibility	1.2692308	0.4478876	1.2720307	0.4458605	1.3970588	0.4910972	F=3.5250 P=0.0303*
Perceived severity	3.42308	0.12608	3.58621	0.05627	3.69853	0.07796	F= 1.8129 P=0.1644
Perceived barriers	7.0384615	1.8782714	7.2528736	1.8577388	8.0808824	1.4860096	F= 11.7885 P=0.0001**
Perceived benefits	5.76923	0.703364	5.84674	0.5109182	5.83088	0.6272237	F= 0.3986 P= 0.6715
Self- efficacy	2.75000	0.5192378	2.75862	0.5030411	2.88971	0.3785507	F= 3.7617 P=0.0240*
Motivation	13.6923	1.7324862	14.1686	1.622655	14.7574	0.802739	F= 12.5717 P=0.0001**

**=highly significant as P<0.001

Table 5: Multiple linear regression to predict following safety measures during use of HHCP.

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	7.6568197	1.736659	4.41	<.0001*
perceived susceptibility	0.4956262	0.280952	1.76	0.0784
total barrier score	0.165656	0.077219	2.15	0.0325*
total motivation score	0.3938668	0.095478	4.13	<.0001*
self-efficacy	0.1388535	0.284761	0.49	0.6261
perceived severity	0.17306	0.144977	1.19	0.2332
total benefits	-0.226917	0.237307	-0.96	0.3395

*=significant as P<0.001

Table 3 shows the relationship between following safety measures and level of education among studied sample: It was found that there was no association between the level of following safety measures during the use of HHCP and level of education among studied sample (P value>0.05).

Regarding the use of HBM to explain this preventive behaviour, the mean of each component of HBM was higher among women with good level of following safety measures than those who follow safety measures poorly. This was significant for perceived susceptibility (1.397 vs 1.269, P=0.03), perceived barriers (8.080 VS 7.038, P=0.0001), self-efficacy (2.889 vs 2.750, p=0.0240) and motivation factors (cues to action) (14.75 vs 13.69, p=0.0001). Motivational factors included protection of health of oneself and children against possible hazards from use of HHCP, being aware of these safety measures

and the presence of clear instructions on the product label (Table 4). The six components of health belief model can successfully predict following safety measures as shown in Table 5. The score of following safety measures entered the regression model as the dependent variable. The scores of the six components of the HBM entered the model as independent variables. The regression model was statistically highly significant (F=6.8, p=0.0001). Motivation factor had the greatest impact on following safety measures (estimate=0.39, p=0.00004) (Table 4).

DISCUSSION

In spite of the benefits and importance of household chemical products, it also can cause deleterious effects on health if used without following safety measures.

In the present study, only 30% of the studied sample followed these safety measures appropriately. Storing cleaning products away from heat sources and away from children is the most safety measures were followed among women. Meanwhile, wearing face mask during house cleaning was not a common practice. According to health believe model, most of women believed that not following safety measures well lead to a negative impact on family health so, women are keeping chemical products away from children and heat sources. However, not wearing face mask during cleaning process can be explained by lack of information about the health impact of cleaning product. In contrast to these findings, a study was carried on Northern Palestine by Sawalha, A presented that women were storing their cleaning products unsafely and inappropriately that children can accesses them easily.[3]

In the present study, the educational level has no impact on following safety measures during use of HHCP. On the contrary, there was a study showed that the education was significantly highly associated with following safety measures at work. The highly educated subjects evaluated work safety more than the lower-educated counterparts.[12] This contradiction can be attributed to the difference in the study population in both researches. The present study investigated the impact of education among females while doing tasks at home, while the other study investigated the association of education with following safety measures among industrial workers.

The health belief model has been successfully used in the present study for the explanation of individual behaviour of following safety measures during use of HHCP. The results demonstrated that the mean scores of all component of health belief model were higher among those with good level practicing safety measure than those with low level. However, a significant relationship was detected only in perceived susceptibility, perceived barriers, self-efficacy, and motivation. In agreement with these findings, Tarkang conducted a study showed that individuals were more likely to take preventive action if they belief that they have a chance of getting a health condition.[13] There's no significant relationship between following safety measures and perceived severity, this could be due to the fact that with frequent use of cleaning products, women feel that the effect is not serious and underestimate it.

Self-efficacy is a term used to describe an individual's belief about his ability to attempt and perform a certain behaviour.[5] This study revealed that there was a significant association between self-efficacy and following safety measure and this explains their ability to follow the instructions for each product and use protective measures for safer cleaning. In the present study, there was a significant relationship between following safety measure and perceived barriers. However, it was found that the mean score of perceived barriers was significantly higher among those who

followed safety measures appropriately than others. This could be explained by the self-efficacy component. This research found that women with high self-efficacy had a significant higher barrier score than the lower self-efficacy individuals. This indicates that the presence of high barriers will not prevent the person with high self-efficacy from following healthy behaviour. Thus, self-efficacy can be considered more important than perceived barriers component.

Perceived benefits are the person's belief that by taking a particular action, it will help to avoid and also prevent a problem from happening. This study showed that there was no significant association between perceived benefits and following safety measures and this indicates that this component had little impact on following the healthy behaviour. In contrast to this finding, Elvis E. Tarkang study reported that the person would take preventative action if it has a positive expectation of following the recommended action.[13]

This study also reported a significant association between cues to action and following safety measures. Motivational factors included the concern in protecting one's health and the health of the children, the awareness of these measures and the presence of clear instructions on the product label. In this study motivational factors played a major role in following safety measures during using HHCP. Among the six components of HBM, motivational factors had the highest impact on that behaviour. This can be due to women are more willing to protect their family from HHCP harm regardless of the barrier they face.

CONCLUSION

Following safety measures during the use of HHCP is not a common practice among women in Riyadh and only 30.3% demonstrated appropriate restriction to these measures. The most common safety measure followed by the studied population was storage the cleaning products away from children and the least was wearing mask during cleaning.

There was no association between the level of following safety measures during the use of HHCP and level of education.

Recommendations

Health belief model can successfully explain following safety measures behaviour during use of HHCP. The greatest impact on following safety measures was achieved by motivational factors especially the desire to protect health, the awareness of these measures and the presence of clear instructions on the product label.

Health educational campaigns for adult females are needed to demonstrate how to follow safety measures appropriately during the use of HHCP with special

emphasis on the motivational factors encountered in this study.

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