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Analyzing consumer awareness, knowledge and behavior among the population in Putrajaya

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Abstract--Mercury, hydroquinone and tretinoin are the most common adulterant chemicals used in cosmetic products nowadays. This paper focuses on the consumers' awareness and knowledge regarding current cosmetic issues. Parameters to determine their level of awareness and knowledge are knowledge on these three chemicals. This study also examines the relationship between consumers' awareness and knowledge to their safety behavior when selecting cosmetic product in the market. A cross-sectional study was conducted in Putrajaya and 313 responded to the questionnaires. Reliability test, descriptive statistic, Pearson's correlation and independent t-test were used to analyse the collected data with $p < 0.05$. The results indicated that respondents were highly aware about cosmetic safety issue (90.1% of respondents) but have insufficient knowledge regarding the adulterant chemicals in cosmetics where only 17.6% of respondents were in the high knowledge level range. Despite this, consumers' behavior was positive towards safe cosmetic selection. The findings also illustrated that there was a significant relationship between consumers' awareness and knowledge, with gender ($p = 0.004$) and level of education ($p = 0.004$). This study will provide a strong indicator not only to cosmetics users but also authorities that are governing cosmetic industry.

Keywords---cosmetic, adulterants, mercury, hydroquinone, tretinoin, consumer, knowledge, awareness.

Introduction

Cosmetics are one of the elements that can bring attention to an individual, especially females. However, people are getting obsessed with looking beautiful and perfect without being concerned with the implications that cosmetic products might have on their body. A cosmetic product put on the market must not cause any damage to the human health when applied under normal or reasonably foreseeable conditions of use¹.

NPCB have conducted surveillance activities under the Post Market Surveillance Programme. The main objectives are to monitor the quality of registered products or notified cosmetics placed on the market and also to ensure their compliance with the specifications and standards set by the Ministry of Health Malaysia. A report by NPCB states that 40 out of 698 cosmetics samples failed to comply with requirement, thus need to be withdrawn from market².

Nowadays, the demand for whitening products in Malaysia is increasing rapidly. Some skin lightening ingredients can give significant effects in the short term but are highly toxic to our well being and health of our skin. Based on observations of newspapers, articles and websites, the most common adulterants in whitening products are mercury, hydroquinone and tretinoin. These three ingredients are banned by NPCB and products containing these ingredients will be withdrawn from market^{2,3}.

This study was carried out to study the level of knowledge and awareness on cosmetic safety among Malaysians and its relationship with cosmetic selection. To achieve this, first the percentage of consumers who are aware of common chemical used in adulterated cosmetics was measured followed by the measurement of level of consumers' knowledge regarding cosmetic common chemical used in adulterated cosmetics and the behavior of consumers in selecting cosmetic products. These values were then correlated with each other to tabulate how consumers' awareness and consumers' knowledge on ingredients affect their behavior when selecting cosmetic products.

Thus, this study will provide insight on the consumers' level of awareness and knowledge and how this affects their cosmetic selection. In addition, the result can indirectly provide some indications of the effectiveness of the safe cosmetics campaign.

Method

Study design

The cross sectional data for the study were collected from the respondent randomly through interview based on structured questionnaire. The data collection activities were limited to local area and with those who were willing and able to respond to the questionnaires in a public area.

Study population

The selected area of study was in Wilayah Persekutuan Putrajaya, Malaysia. Putrajaya is one of the Federal Territories in Malaysia and it is divided into 20 regions, Presint 1 to Presint 20. The total population in Wilayah Persekutuan Putrajaya is about 68,321. The majority ethnic group is Malays with 64,644; followed by Indians, 820, other bumiputera 787, Chinese 452 and other ethnics 82⁴. This study site has been selected as the target population because Putrajaya is one of the urban cities in Malaysia. Most of the residents are working in government sector and considered to be consistent users of cosmetic products.

Questionnaires

The research instrument used in this study was a structured questionnaire. The content validity of the questionnaire was ascertained through expert group discussion and a pilot study on 15 respondents to build a valid research instrument. Reliability test on the instrument revealed that it was reliable with Cronbachs' alfa value of ≥ 0.70 for all three constructs as presented in Table 1.

Table 1: Internal consistency reliability, Cronbachs' alpha values for the constructs

Construct	Internal consistency reliability (Cronbachs' alpha)
Consumers' behavior	0.70
Consumers' awareness	0.79
Consumers' knowledge	0.72

The questionnaire comprises of Section A, B and C. Section A asks about the demographic data. Section B were measured using a 5-point Likert scale of frequency (always-5 – never-1) and agreement (strongly agree-5 – strongly disagree-1). Section C tested the knowledge and awareness of the consumer on cosmetic safety issues. The items in this section were measured by yes or no answers. A correct answer yields one mark. The score on these 6 items (total score = 6 points) is used to determine knowledge level. Scores of 2 and below signify low knowledge level, scores of 3 and 4 show moderate knowledge level and scores of 5 and above indicate high knowledge level.

Statistical analysis

The collected data were analysed in detail by using Statistical Package for the Social Sciences (SPSS) software for Windows version 20.0. Descriptive statistics was used to make a general observation on the demographic characteristics of the respondents and to measure the level of awareness, and in Section B and Section C. Pearson's correlation analysis was performed to test the relationship between awareness and knowledge with purchasing behavior in cosmetic products selection. Independent sample t-test was used to determine the relationship of education level with the consumers' awareness and knowledge on cosmetic safety. Samples were categorised into two groups which consist of higher educational level and lower educational level respondents. Higher education level referred to those who have pursued their studies in tertiary education, for instance diploma,

bachelor's degree and any other higher certification; whereas lower education level were those with only primary and secondary education. Pearson's correlation analysis was also used to determine the relationship between the awareness and knowledge of males and females.

Results

Demographic Data of Respondents

The demographic data of the 313 that accepted the set of questionnaires are as presented in Table 2.

Table 2: Demographic data of respondent

Variables	Number of respondents (%)	
	Frequency (N)	%
Gender		
Male	82	26.2
Female	227	72.5
Do not respond	4	1.3
Age		
18-30 years old	190	60.7
31-40 years old	75	24
41-50 years old	18	5.7
51-60 years old	11	3.5
Do not respond	19	6.0
Marital status		
Single	154	49.2
Married	144	46.0
Do not respond	15	4.8
Level of education		
SPM	109	34.8
Diploma, STPM	52	16.6
Degree	120	38.3
Master, PhD	20	6.4
Do not respond	12	3.8
Occupation		
Administration unit	135	43.1
Private sector	26	10.7
Professional field	24	9.8
Education field	20	8.2
Student	31	12.7
Others	8	3.3

Consumers' awareness and knowledge for mercury, hydroquinone and tretinoin.

It was established that 90% of respondents were aware of the cosmetic safety issue (Table 3). However, only almost 67% were conscious of cosmetic toxicity. Even though consumers know that not all cosmetics are safe to be used, their awareness toward these chemicals is moderate with mean value 52.96% (SD= 30.54). 53.7% (168) of the respondents are aware of mercury toxicity meanwhile 46% (145) do not know about it.

More respondents [n=185 (59.1%)] do not know that skin whitening products may contain mercury even though 164 (52.4%) of them are aware that mercury is a toxic chemical (Table 4).

38.3% of the respondents have heard of hydroquinone toxicity (Table 3). Compared to respondents' answer for knowledge in table 3.3, 215 (68.7%) did not know that hydroquinone can cause hyperpigmentation (Table 4).

Majority of respondents 79.2% were not aware about tretinoin toxicity (Table 3). Corresponding to respondents' knowledge in Table 4, 254 (81.2%) do not know that tretinoin should be used under supervision of healthcare. Only 59 (18.8%) know that tretinoin must be prescribed by doctor. Some ingredients in cosmetics can be absorbed into blood stream through hair follicles and/or through skin. 166 (53.0%) of the respondents know this fact.

Using scoring system that mentioned before, most of respondents fall into the poor knowledge level category, at 43.1%. 39.3% of respondents fall into the moderate knowledge level category, and only 17.57% were categorised under high knowledge level.

Table 3: Consumers' awareness on mercury, hydroquinone and tretinoin

Items in the questionnaire	Yes (%)	No (%)
1. Are you aware of Cosmetic safety issue?	282 (90.1)	31(9.9)
2. Have you heard about cosmetic toxicity?	105 (33.5)	208 (66.5)
3. Have you heard about mercury toxicity?	168 (53.7)	145 (46.3)
4. Have you heard about hydroquinone toxicity?	120 (38.3)	193 (61.7)
5. Have you heard about tretinoin toxicity?	65 (20.8)	248(79.2)

Table 4: Consumers' knowledge on mercury, hydroquinone and tretinoin

Items in the questionnaire	Percentage of correct answers (Yes)(%)	Percentage incorrect answers (No) (%)
1. Do you know that the skin whitening product may contain mercury?	128 (40.9)	185 (59.1)
2. Do you know that mercury is toxic?	164 (52.4)	149 (47.6)
3. Do you know some ingredients in personal care products can be absorbed into the blood stream through hair follicles and/or through skin?	166 (53.0)	147 (47)
4. Do you know that cosmetic products that contain mercury can cause damage to the brain, nervous system and kidneys?	166 (53)	147(47)
5. Do you know tretinoin should be used under supervision of health care?	59 (18.8)	254(81.2)
6. Do you know that cosmetic product that has hydroquinone (high concentration) can cause hyperpigmentation?	98 (31.1)	215(68.7)

Consumers' behavior

Consumers' behavior involved in this study includes how they select cosmetic products in the market. The frequency distribution of respondents' behavior regarding safe cosmetic selection is depicted in Table 5. Those respondents with scores ranging from 50% to 100% were assumed to have positive behavior towards safe cosmetic selection. 226 out of 313 respondents scored 50% and above. Out of the maximum possible score (100%), the mean behavior score was 62.95% \pm 12.36 which indicates positive behavior towards safe cosmetic selection.

Table 5: Consumers' behavior

Items in questionnaire	Frequency (%)					Mean (SD)
	Always	Usually	Sometim	Rarely	Never	
1. Do you use cosmetic products prescribed by dermatologists?	42(13.4)	41 (13.1)	95 (30.4)	56(17.9)	78 (24.9)	2.72(1.335)
2. Do you look for natural cosmetics?	100(31.9)	77(24.6)	92(29.4)	23 (7.3)	20 (6.6)	3.68(1.18)
3. Do you read ingredients on your cosmetic products?	74(23.6)	74(23.6)	73(23.3)	33(10.5)	17(5.7)	3.75(1.218)
4. Do you understand what are the ingredients' functions and effect on our health?	58(18.5)	67(21.4)	120(38.3)	41(13.1)	27(8.6)	3.28(1.165)
5. I actively seek out information from outside sources about safety on the products I buy.	49(15.7)	81(25.9)	83(26.5)	71(22.7)	29(9.3)	3.16(1.209)
6. I am concerned about safety in products, but I generally feel confident that the products that I buy are safe.	114(36.5)	113(35.5)	113(36.1)	21(19.5)	4(1.3)	4.00(0.972)

Effect of consumers' awareness and knowledge on consumers' behavior when selecting cosmetic products

There was weak correlation between consumers' awareness and knowledge toward consumers' behavior with r-value 0.175 and 0.164 respectively ($p < 0.001$). Awareness level had imposed a more significant influence on knowledge with r-value of 0.545 ($p < 0.001$).

Discussion

As established in this study, consumers' knowledge on the three adulterants, mercury, hydroquinone and tretinoin, was proven low. People care about safe cosmetic issue but have insufficient knowledge on health hazards associated with common adulterants, thus they do not take action. Similarly, the study in Lahore revealed that most of the users agreed that skin lightening products may produce undesirable side effect, however they still continue to use it because most of them are satisfied with the outcomes⁵.

A random sampling was done through market surveillance of cosmetic product by NPCB and was revealed that out of 438 samples tested, 59 were found not compliance to the requirement by NPCB of which more than 70% were positive for either hydroquinone or tretinoin or both³. From the findings, we can deduce that consumers have low awareness and knowledge regarding these chemicals and their effects to the users. Studies regarding hydroquinone and tretinoin are still limited and researchers have not study this matter widely, yet the prevalence of adulterant occurrence is high.

The results were supported by some comments made by particular respondents:

Respondent 1:

“ I never knew mercury is very toxic. I thought they are widely used for medicine. I also used mercury as an alternative medicine”

Respondent 2:

“I know many cosmetics nowadays are dangerous. I do not believe it can make your face beautiful within 2 weeks. But I do not know how to obtain information and which products are unsafe to be used.”

Respondent 3:

“I'm aware that cosmetic products especially whitening products nowadays are unsafe, because I experienced adverse effects after using one of whitening products. My skin became irritated and experienced thinning.”

Consumers that look for natural cosmetics were regarded as having positive behavior in selecting safe cosmetics. As shown in table 5, respondents who are always and sometimes looking for natural cosmetics are 31.9% and 29.4% respectively. This explains that consumers were highly concerned of their health.

It was discovered that the mean of consumers that read the ingredients before purchasing is 3.74 (SD=1.218). This shows that respondents are concerned about the ingredients when purchasing any cosmetic products. However, they sometimes understand the ingredient functions and their effects on their health.

Consumers sometimes seek out information prior to purchase. However, consumers were mostly concerned about the safety of the products and generally feel the products they bought are safe with the mean value 4.00 (SD= 0.972). Even though respondents were concerned about the safety, they usually (31.6%)

did not pay much attention to the ingredients and feel very confident that products they bought are safe.

In addition to that, respondents were asked about how much the ingredients have influenced their purchasing behavior. It was found that ingredients moderately (27.2%) influenced their purchasing behavior. They will buy products not because of the content but may probably have been influenced by friends or advertisements⁶.

Consumers usually have the assumption that there is a positive relationship between price and quality. Consumers tend to experiment and try out any products that may be suitable for them. This was assured by Nelson, as in the absence of any other information, the consumer would not know if they were better off experimenting with low- or high- priced brands⁷.

Behavior is a complex aspect of the study because it can be explained through the analysis of how people select goods from the market. From the findings of consumers' behavior, it can be concluded that consumers are moderately concerned about selecting safe cosmetic products. Consumers put safety as their main consideration, but they do not put ingredients as their mandatory option when selecting cosmetic products. Consumers with high safety conscious attitude will actively seek for information before using any cosmetic products but they occasionally search for information. Nelson (1970) opined that consumers should inspect the option, and inspection must occur prior to purchasing the brand. Good consumers of cosmetics will consult with experts or dermatologists if they face any abnormalities or skin problem. Dermatologically tested products are trusted and safe to be used because they undergo various tests to make sure the product is definitely safe to be used⁷.

Weak correlation between consumers' awareness and knowledge toward consumers' behavior indicates that awareness and knowledge are not related to behavior in selecting cosmetic product. Consumers mostly claim to choose safe and high quality products, however they are not aware of recent cosmetic issues.

The public needs more information and knowledge, and to have them delivered in a way that gets their attention. Delivery of information and knowledge to the public can be done in various ways, and it would be best if they could be conducted in a way such that it would be easily accessible for consumers.

This study indicated that consumers' awareness and knowledge (independent variables) regarding cosmetic ingredient toxicity has no relationship with consumers' behavior (dependent variable) in terms of cosmetic product selection.

However, there was weak correlation between consumers' awareness and knowledge toward consumers' behavior with r-value 0.175 and 0.164 respectively ($p < 0.001$). Awareness level had imposed a more significant influence on knowledge with r-value of 0.545 ($p < 0.001$). This indicated that awareness and knowledge are not related to behavior in selecting cosmetic product. Consumers mostly claimed to choose safe and high quality products, however they were not aware of recent cosmetic issues.

Generally, consumers were concerned about the safety of cosmetics, despite the fact that their awareness and knowledge regarding the three harmful active compounds which are mercury, hydroquinone and tretinoin, were still limited. In view of this, it can be suggested that consumers' awareness and knowledge can be increased by having more programs in order to inculcate resilience in consumers of this developing country.

The public needs more information and knowledge, and to have them delivered in a way that gets their attention. Delivery of information and knowledge to the public can be done in various ways, and it would be best if they could be conducted in a way such that it would be easily accessible for consumers. Awareness campaigns are those like *Tak Nak Merokok* (Say NO to Smoking Campaign) by Ministry of Health Malaysia which was done to present facts regarding consequences of smoking cigarettes which was done mostly via magazine and television. These campaigns reach a wide variety of age groups as well as provide visual images that link toxic substances and human health.

According to the report Country Health 2011-2015, there was still wide gap between community knowledge and their behavior. Ultimately it was communities and individuals who must change their behavior in order to be healthier. It was suggested that campaign messages need to be integrated into activities within the community settings in order to establish healthy social norms⁶. For improvement on consumer awareness, NPCB has a plan to initiate a consumer awareness programme as a part of the effort to promote the safe use of cosmetic product to consumers by publishing issue related articles to the public on a regular basis².

This situation is rather similar in other countries as well. The Campaign for Safe Cosmetic and Environmental Working Group (EWG), which is a non-government organisation, that focuses on exposing products they deem hazardous to health. The groups are actively doing research regarding safe cosmetics and successfully pressing FDA's Office of Cosmetics to withdraw various products from the market. They are effectively updating news and information concerning dangerous chemicals from cosmetics and personal care products to the public. This shows that authorities should consider providing education and knowledge to the public on cosmetic safety⁸.

Limitation

There were several limitations in this study. The first limitation was the anecdotal evidence. Even though this research was done in Putrajaya, there were possibilities that people working here were not residents of Putrajaya. Since Putrajaya is a Federal Administrative Centre, thus many of the people here are not permanent residents and only come to Putrajaya for business purpose. Secondly, misunderstanding of the term 'cosmetics'. Many of the target population rejected the questionnaire form because they thought cosmetic refers to anything related to "make up" and beauty products. Therefore, the factors above may have affected the accuracy in responding to the questionnaires. Despite the sampling population limitations, this study will hopefully become a preliminary move to trigger future studies on the issue. Thus, future studies

could replicate this study with clearer definition and a definite sample for greater validity.

Conclusion

This study was focused on the awareness and knowledge of consumers on current cosmetic issues. To determine the level of awareness and knowledge of consumers, three parameters; mercury, hydroquinone and tretinoin were used. These three chemicals are the most common adulterants in cosmetic products especially in whitening products. Study showed that percentage of respondents who are aware of mercury, hydroquinone and tretinoin in cosmetic products are 53.7%, 38.3% and 20.8% respectively. The analysis indicated that consumers are lacking knowledge regarding current cosmetic issues with knowledge score 43.13%. Consumer behavior was observed to determine consumers' priorities when shopping for cosmetic products, especially the safety aspect. This study shows that the behavior of consumers is positive towards searching for safe and high quality cosmetic products.

Even though the sample population taken was in Putrajaya, which is one of the most urban places in Malaysia, the knowledge regarding cosmetic issues is still insufficient. The result demonstrates that unawareness and insufficient knowledge leads to ignorance, and this can lead to the increase in illegal products in the cosmetic industry. Authorities such as Ministry of Health and NPCB should widen consumers' awareness campaigns to encourage Malaysians consumers to choose safe cosmetics and notified cosmetics. Notified cosmetics must free from any banned ingredient and must be within allowable limit.

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