

Awareness of Sodium Lauryl Sulfate & Sodium Laureth Sulfate Health Hazards among Users

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Abstract: Some ingredients of personal care products have health hazards and population awareness of these health hazards helps to reduce their occurrence, late reporting & misdiagnosis. So, this study was done to assess the awareness of a sample of Egyptian users with health hazards of foam producing agents; Sodium Lauryl Sulfate and Sodium Laureth Sulfate and to test the influence of socio-demographic characters on awareness. A self-administered questionnaire was used for participants to collect data of some socio-demographic characteristics, knowledge about these substances, reading ingredients practice and attitude towards change. The results showed that the awareness of Sodium Lauryl Sulfate and Sodium Laureth Sulfate health hazards was minimal. More than 81% of the interviewed persons never heard about them or know that a harmful ingredient may be present in personal care products. The significant factors associated with hearing about this were female gender, practice reading compositions, living in a villa and having a car. The basic practice of reading the composition of what one use was deficient among 38% of participants but the attitude towards stop or change harmful products was present among the majority (94%). In conclusion, the level of awareness of Sodium Lauryl Sulfate and Sodium Laureth Sulfate health hazards was low among Egyptian users as many difficulties face the practice of reading products' ingredients but the attitude towards change is very much encouraging. Therefore, agreeing on an international code for labeling of publicly used products, increasing the public's awareness and further researches are very much needed.

[Ghada F. El-Sharkawy. **Awareness of Sodium Lauryl Sulfate & Sodium Laureth Sulfate Health Hazards among Users.** Journal of American Science 2011;7(4):535-541]. (ISSN: 1545-1003).
<http://www.americanscience.org>.

Keywords: Sodium Lauryl Sulfate; Sodium Laureth Sulfate Health Hazards; User

1. Introduction:

Although multiple research results about health hazards of Sodium Lauryl Sulfate (SLS) and *Sodium Laureth Sulfate* (SLES) are added every year, the awareness of these hazards among users are not focused on (Törmä et al., 2008 & Cebotari et al., 2010)

Sodium Lauryl Sulfate (SLS) is an anionic surfactant naturally derived from coconut and/or palm kernel oil. It usually consists of a mixture of sodium alkyl sulfates, mainly the lauryl. SLS lowers surface tension of aqueous solutions and is used as fat emulsifier, wetting agent, and detergent (Löffler and Happel, 2003). *Sodium Laureth Sulfate* (SLES) is a newer detergent that has nearly the same properties as SLS. It was developed to be less irritant, however, its effects were found to be more long-lasting in the body tissues (Drug bank, 2005).

Sodium lauryl sulfate was used as a flea and tick repellent in one registered pesticide product, a flea and tick shampoo for cats and dogs. Then Sodium lauryl sulfate becomes a widely used component of many nonpesticidal consumer products (Environmental Protection Agency, 2000). SLS & SLES are commonly used in soaps, shampoos, children shampoos, body wash, mouthwash and washing-up liquid, lotions and creams as shaving

cream, tooth paste and sun cream. Manufacture companies prefer them as they are cheap and very effective foaming agents (Marrakchi and Maibach, 2006). The same chemicals are used in dish soap, laundry detergent, stain remover, carpet cleaner, car wash, car engines degreaser and garage floor cleaner. (National Institute of Health, 2009).

SLS is a known standard skin irritant. It is used throughout the world as a research tool to irritate skin of test animals and human volunteers for testing the effectiveness of healing agents on the irritated skin (De Jongh et al., 2006). SLES dissolves the oils on skin causing a drying effect, trans-epidermal water loss and denaturation of the skin proteins leading to irritation, infection and may even skin cancers (Tanneberger et al., 2010).

Concentrations of SLS as low as 0.5% could cause irritation and concentrations of 10-30% caused skin corrosion and severe irritation. Some soaps have concentrations of up to 30%. The cutaneous reaction to SLS and SLES is influenced by the duration of application and the irritant concentration. Subclinical surfactant-induced skin surface alterations and irritation by SLS and SLES can be detected after as few as three washes (Charbonnier et al, 2001). SLES can lead to direct damage of hair follicles and skin and can cause eye irritation, scalp irritation, tangled

hair and swelling of the hands, face and arms (Takahashi et al., 2009).

Carcinogenic nitrates can form during manufacturing SLS or by its inter-reaction with other nitrogen bearing ingredients within the compound. Some products containing SLES have been found to contain very low levels of the probable human carcinogen 1,4-Dioxane which is generated during ethoxylation process. (Environmental Protection Agency, 2000).

SLS & SLES are thought to permanently keep eyes of the children from developing properly as tests showed that in young animals with skin contact even in non eye areas. This possibly occurred by proteins denaturation and structure formation prevention. Other studies have indicated that SLS& SLES enter and maintain residual levels in the heart, liver, lungs and brain from skin contact. Another worrying effect of SLES is estrogen-like action (Riviere et al., 2010).

Many of products of famous brands labeled as "natural" or "Herbal" still use these chemicals as their main active ingredient. So, population should be directed to check the ingredients of personal care products they buy themselves (Bergfeld et al., 2005).

No previous research studied the awareness of users of health hazards of these agents. So, it was important to assess the awareness of health hazards of SLS and SLES among users to reduce the occurrence of these hazards and avoid late reporting & misdiagnosis. Users included in this study were of very high educational and occupational level; mainly university teaching staff, doctors, pharmacists and engineers as those are the suitable Egyptian sample for such study.

2. Subjects and Methods:

Study design and population:

The study was carried as a cross-sectional survey during the second half of 2010. As products containing sodium lauryl sulfate and sodium laureth sulfate are mainly used by the high social class groups in Egypt, so, this study included 970 high social class Egyptians aged 20 years and more. Inclusion criteria were being Egyptian with high professional occupation, higher than university education and sufficient income as indicated by residing a separate flat or higher residence with or without having a car or more. Scoring educational level, indwelling level and having a car was done and according to the median of the score, the studied high class group was classified into two grades ; grade₁(less than the median) and grade₂ (more than the median).

The sample was from 9 different Egyptian governorates. Participants were interviewed in areas where subjects with required criteria are usually

present as high professions' syndicates, scientific conferences, private profession practices and competency development programs for university teaching staff. The sample size was calculated to be 970 subjects (based on a pilot study) using EPI-INFO statistical program version 6. Non response rate was less than 1%.

Ethical issues:

Free informed consent was got from each participants and the questionnaire was anonymous. Data confidentiality was kept.

Data collection and scoring:

A self- administered semi-structured specifically- designed questionnaire was used after its pilot testing& validation. It was distributed during a short standardized interview. The questionnaire included questions to collect data about some socio-demographic characteristics, knowledge about sodium lauryl sulfate and sodium laureth sulfate including if ever hear their names or know that hazardous chemicals may be present in personal care products, if know the properties for which they are used, categories of products containing them and their health hazards . For participants who chose "Yes", they were asked to write down the answers. Attitude was asked about by the readiness to change or stop using harmful products while practice was asked about by practicing reading ingredients of personal care products they use. For participants who chose "No", they were asked to choose or write down the reasons. The questionnaire was ended with a request for any comment or note.

The score of different aspects of knowledge such as the advantageous properties of SLS& SLES, categories of products containing them and their health hazards...etc, was formed by the sum of answers of related questions. A total score for awareness was formed by the sum of the different aspects of knowledge and was classified into three levels: less than 50% was considered "Low", from 50 to less than 75% was considered "Medium" while from 75 % and more was considered "Good."

Statistical analysis:

Collected data were handled using a data base software programs (SPSS version 10 and EPI-INFO 6). Analysis included univariate, bivariate as well as multivariate analytical techniques. Independent variables were analyzed descriptively by frequency distribution and (mean±standard deviation) whenever possible. Chi square test with corresponding *P*-value was used to test the significance for qualitative variables. Binary logistic regression was carried out to identify variables most predictive of hearing about

harmful compounds in personal care products among the surveyed users. $P < 0.05$ was used as the level of significance.

3. Results:

As shown in Table (1) only 1% of participants had a good level of knowledge as revealed by total score.

The age range of participants was 20 to 60 years with 75% of them less than 40 years. Males and females were nearly equally represented in the sample. They were mostly of high level of postgraduate education (more than 92% were having master degree or higher). Half of participants were university teaching staff while physicians and pharmacists represented 27%. Only 5% were residing villas while 73% had a car. The majority (64%) were representing the large sector of users with modest high social class grade (Table 2).

More than 96% of the participants were from urban areas and the same percent were married and had children and all participants were having sufficient income.

The majority of participants (81.4%) have never heard about harmful ingredients in personal care products and they don't know the names of sodium lauryl sulfate (SLS) and sodium laureth sulfate (SLES). Comparing participants who have never heard about harmful ingredients in personal care products (81.4%) with participants who heard about them (18.6%) by their socio-demographic characters revealed that the gender, practice of reading ingredients, having a car, housing level as well as the

grade of the high social class were the significant factors. (Table 2).

In regression analysis of significant factors that influence hearing about SLS & SLES, the grade of high social class became no longer significant while the significance of reading ingredients, having a car, gender and housing level persisted. (Table 3).

The participants' knowledge about the important aspects regarding SLS & SLES as categories of products containing them and their health hazards for adults and children were deficient among (94%) of participants. The awareness in all aspects is significantly higher among who practice reading ingredients compared to who don't read them while the attitude towards change was very high among both group without significant difference (Table 4).

Among the only 18.6% of participants who heard about (SLS) & (SLES) or harmful ingredients in personal care products, two-thirds or more don't know their health hazards for themselves or for children (66.7%) nor the categories of products contain them (72%) (Table 5).

Table (1): Total Score of awareness level of SLS and SLES health hazards among the sample (N=970)

Total score	N	%
1) Low (less than 50%)	940	96.9
2) Medium (50 to less than 75%)	20	2.1
3) Good (75% and more)	10	1.0

Mean \pm SD = 1.04 ± 0.24 Range 1- 14 out of total score = 17

Table (2): Characteristics of the interviewed sample (N=970) in relation to if they ever hear about SLS & SLES (or harmful ingredients in personal care products)

Characteristics	Hear		Never hear		Total		P	
	N	%	N	%	N	%		
Age: 20-39	130	72.2	600	75.9	730	75.3	1.09	0.27
40-60	50	27.8	190	24.1	240	24.7		
Sex: Male	60	33.3	440	55.7	500	51.5	29.35	0.000*
Female	120	66.7	350	44.3	470	48.5		
Edu: Post University Studies	20	11.1	60	7.6	80	8.2	2.42	0.3
Master	80	44.4	370	46.8	450	46.4		
MD & higher	80	44.4	360	45.6	440	45.3		
Occ: University staff	100	55.6	400	50.6	500	51.5	3.3	0.19
Physicians & Pharmacists	50	27.8	210	26.6	260	26.8		
Engineers & Bank managers	30	16.7	180	22.8	210 [#]	21.6		
High social class: Grade 1	90	50.0	530	67.1	620	63.9	18.56	0.000*
Grade 2	90	50.0	260	32.9	350	36.1		
Housing: Flat	160	88.9	760	96.2	920	94.8	16.04	0.000*
Villa	20	11.1	30	3.8	50	5.2		
Car: No	10	5.6	250	31.6	260	26.8	50.86	0.000*
One or more	170	94.4	540	68.4	710	73.2		
Read ingredients: No	30	16.7	340	43.0	370	38.1	43.2	0.000*
Yes	150	83.3	450	57.0	600	61.9		
Total	180	100.0	790	100.0	970	100.0		

* = significant difference

Bank managers were 10

Table (3): Binary Logistic regression of factors affecting ever hearing about SLS& SLES (or harmful ingredients in personal care products) among participants (N=970)

Independent variables	B± S.E	Wald	P
Read ingredients	1.49 ± 0.23	41.45	0.000*
Having car	2.14 ± 0.35	36.86	0.000*
Sex	0.97 ± 0.2	23.32	0.000*
Housing level	1.38 ± 0.37	14.0	0.000*
High Social class grade	0.35 ± 0.2	2.9	0.089
Constant	7.81 ± 0.7	123.8	0.000

Table (4): Knowledge and attitude towards SLS and SLES among participants who read ingredients versus who don't read them (N=970)

Reading ingredients	Read		Don't read		Total		χ ²	P
	N	%	N	%	N	%		
Know adventitious characters: Yes	100	16.7	0	0.0	100	10.3	68.8	0.000*
No	500	83.3	370	100.	870	89.7		
Know categories of products in which they are included: Yes	50	8.3	0	0.0	50	5.2	32.5	0.000*
No	550	91.7	370	100.	920	94.8		
Know their health hazards : Yes	60	10.0	0	0.0	60	6.2	39.4	0.000*
No	540	90.0	370	100.	910	93.8		
Know their hazard to children: Yes	50	8.3	10	2.7	60	6.2	12.5	0.000*
No	550	91.7	360	97.3	910	93.8		
Ready to change harmful products: Yes	560	93.3	350	94.6	910	93.8	0.63	0.43
No	40	6.7	20	5.4	60	6.2		
Total	600	100.	370	100.	970	100.		
		61.9		38.1		100.		

* = significant difference

Table (5): Lack of Awareness of SLS and SLES knowledge among participants who heard their name (or heard about harmful ingredients in personal care products) (N=180)

Lake of Awareness aspect	N	%
Don't Know why they are used in products	80	44.4
Don't Know any of categories of products in which they are included	130	72.2
Don't Know any of their health hazards in general	120	66.7
Don't Know their special hazards to children	120	66.7

4. Discussion:

Up to my knowledge, this is the first scientific research that considers the awareness of the public with health hazards of Sodium Lauryl Sulfate (SLS) & Sodium laureth sulfate (SLES) or hazardous ingredients of personal care products. Even the previous study which considered the population tested the variation in sensitivity but didn't consider the awareness (Lera et al, 2008).

Informing the public about hazards they are exposed to, as found by clinical researches is their right. When people know these hazards, they can avoid unnecessary exposure, perceive the occurrence of a problem and link it to the exposure and protect their children from such hazards. However, lack of complementation between public health and clinical research disciplines, together with pressure of

industrial and trade world hinder the needed efforts for wide dissemination of information. These are known to occur in both developed and developing world as well (Blouin, 2007).

The problem is more in developing world because of many factors. First, clinical researches are usually published in English which isn't the mother tongue for many developing countries, second, people of different social classes are busily working most hours of the day to earn enough money to live, third, excessive wasting of time occurs during getting the daily requirements. As a result, people usually don't have the "luxury" of searching what are the newly discovered health hazards.

Although health hazards of SLS& SLES are not a major concern for the "Poor" in Egypt, public health discipline can't ignore prevention of health

problems that may involve the “Rich” as discrimination is not accepted against either of them. As children are exposed to these hazards, this put high responsibility on public health specialists to protect them from additional devastating problem to what they suffers (El-Sharkawy, 2001).

This study revealed very low awareness level as those with 50% and more of the score only presented 3.1%. So, I couldn't compare who had good knowledge score with those who can't got a good score to found what influence awareness. Instead, I compared who ever heard about these substances or harmful ingredients in personal care products (18.6%) with who never heard about this issue. The low awareness level ensures the deficiency of informing the public with research results (Kartono and Maibach, 2006)

Sex, housing, having a car, grade of high social class and reading ingredients practice were the significant factors associated with hearing about these substances. In logistic regression analysis, all factors remained significant except the grade of high social class which became no longer influencing.

The significantly more females heard about SLS& SLES found in my study is logic as they use many of products containing them as shampoos and sun cream for themselves and their children more than males and mothers routinely screen what they use for kids (Bergfeld et al. , 2005). Another factor is the more involvement of females in the kitchen which develops the habit of reading food ingredients, then, this habit grow up to involve reading ingredients of other products . However, males are not excluded from using shampoos, toothpaste, shaving cream that may cause skin irritation but they are usually more busy and have no time to read ingredients (De Jongh et al., 2007).

The Significantly more percentage of who heard about these substances among who have cars and who live in villas may be explained by presence of these ingredients in products used for cleaning car, car engine & garage floor (Wikipedia, 2010).

Participants who practice reading ingredients were found to have significantly better knowledge of all aspect regarding SLS& SLES. The positive attitude of readiness for changing products containing harmful components is high among all participants whether they practice reading or not without significant difference. This reflects how much the participants are keen to avoid hazards and this agrees with researches about behavioral aspects behind persons' health related behavior (Gillibrand and Stevenson, 2006).

Although reading ingredients practice is good in more than 60% of included sample, the knowledge is good in only 1%. The solution of this quiz could be

got from comments of participants who denoted very important aspects regarding the low benefit they got from reading ingredients. First, they may fail in reading ingredients as they are usually written in very small font size and on most products in English only. Also, multiple names of many chemicals are written without any notice or knowledge of why each substance is used in the product or its possible hazards. This is strongly criticized with products containing dangerous chemicals that have cell-toxicity (Tanneberger et al., 2010).

Regarding participants who don't read ingredients, some of them said that they believe in the safety of publicly available products as the government surely grantees them. On the contrary, others don't trust what is written on the products and think that harmful ingredients may be included without been mentioned. This lack of trust needs real governmental effort to prove interest in the population health. Trust in the government is influenced by satisfaction with different governmental services and political democracy (Christensen and Læg Reid, 2002).

Among those who have ever heard about SLS& SLES (or harmful ingredients in personal care products) the majority only know that they are foam producing agents but the important items of health hazards or category of products containing them other than shampoos are not known for their majority denoting the obvious deficiency of awareness in this health related area. We don't blame participants but blame ourselves- as public health specialists-, the government, the mass media and the scientific community to ignore increasing the public awareness of these health hazards and many other health hazards.

5. Conclusion

The level of awareness of Sodium Lauryl Sulfate and Sodium Laureth Sulfate health hazards was low among the included Egyptian sample. What is more worrying is the fact that the important aspects as hazards for children, health effects on adults and categories of products containing the harmful substances, were very little perceived. Also, the basic practice of reading ingredients was unsatisfactory, however positive attitude towards adoption of healthy behavior was very much encouraging. Therefore, there is a need for raising awareness and agreeing on an international code for labeling in order to improve practice of reading products' components. Also, more researches are very much needed.

Recommendation

1- International codes for labeling and illustration of ingredients of personal care products & their

possible hazards in users' language(s), with suitable font size are very much required. Insertion of an accompanied pamphlet may be also considered.

- 2- Mass media health education to increase awareness of these health hazards among users and their children is needed with motivating people to regain trust and interest.
- 3-Scientific community must agree on a way to disseminate research results considering publicly used products to users.
- 4- Conducting researches on presence of such health hazards among workers with industrial exposure to SLS& SLES and among users of general population after rising their awareness and also, studying awareness with other harmful exposures are strongly required.

Competing interest: None at all.

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3/3/2011