Awareness of use of artificial colourants in sweets preparation and their harmful effects

Article · September 2017

DOI: 10.18203/2394-6040.ijcmph20174270

3 authors, including:

Ravishankar Suryanarayana
SDUAHER,KOLAR
26 PUBLICATIONS **20** CITATIONS
SEE PROFILE

Chandrappa Muninarayana
Sri Devaraj Urs Medical College
14 PUBLICATIONS **107** CITATIONS
SEE PROFILE

International Journal of Community Medicine and Public Health
Suryanarayana R et al. Int J Community Med Public Health. 2017 Oct;4(10):3893-3898
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20174270

Original Research Article

Awareness of use of artificial colourants in sweets preparation and their harmful effects

Ravishankar Suryanarayana[1]*, Muninarayana Chandrappa[1], Santhosh R.[2]

[1]Department of Community Medicine, Sri Devaraj Urs medical College, Tamaka, Kolar, Karnataka, India
[2]Sri Devaraj Urs medical College, Tamaka, Kolar, Karnataka, India

Received: 16 August 2017
Revised: 08 September 2017
Accepted: 09 September 2017

***Correspondence:**
Mr. Ravishankar Suryanarayana,
E-mail: suryasankya@gmail.com

ABSTRACT

Background: Colour is the first notable feature of a food and often directly influences the choice of food by increasing the taste threshold, appeal and acceptability. There are natural and few traditional colours but many of the shop keepers, restaurant and processed food manufacturers prefer artificial colours. The sweet manufactures do not realize adverse health effects of colourants. The present study was undertaken to assess the awareness of use of colorants in sweets and its harmful effects among consumers and shopkeepers.
Methods: A cross sectional study was conducted. A sample of 96 consumers and 20 shopkeepers across the Kolar town were randomly selected and interviewed to collect information on awareness regarding artificial colourants, permissible limits and their harmful effects by using pre-tested semi structured proforma. Data analyzed by using SPSS statistical software version 22.
Results: 16.8% of the consumers did not have the knowledge regarding the artificial colorants. 42.6% of the consumers were aware of the toxic metals in colourants and 46.5% knew the harmful effects. Among shopkeepers only 15% and 10% of them had the awareness regarding the toxic metal present and their harmful effects respectively. Majority (75%) of the shopkeepers knew the permissible limits for usage of colourants. Consumers and shop keepers knew that artificial colorants can cause damage to bladder, Kidney, thyroid, brain, immune system, nerve cell development, hyper activity and genotoxicity.
Conclusions: The consumers were aware of artificial colorants, various toxic metals present and their harmful effects. There is a need to increase awareness among shopkeepers regarding presence of toxic metals and their harmful effects.

Keywords: Colourants, Awareness, Toxic metals, Harmful effects

INTRODUCTION

Colour is the first notable feature of a food and often predetermines the quality of the food.[1] Food colours found to have a natural effect which directly influences the choice of food by increasing the taste threshold, sweetness perception, increasing the appeal and acceptability.[2] There are natural and few traditional colours like turmeric, beets, saffron and Kashmiri chilli powder. But many of the shop keepers, restaurants and processed food manufacturers prefer artificial colours, because they are cheap, gives the product a deep colour and enhances visual appeal, quality and lost longer.[3,4] The awareness regarding toxic heavy metals present in artificial colours like lead and cadmium is very poor.[5] The sweet manufactures do not realize adverse health effects like brain gliomas, tumours of urinary bladder and

kidneys, thyroid cancer and hypersensitivity.[3,6,7] In India very few studies have been conducted though it is one of the public health problems hence the study undertaken.

METHODS

A cross sectional study was conducted in Kolar town. A sample size of 96 consumers and 20 Shopkeepers were included in the study. 20 sweet shops were identified and shopkeepers were interviewed. Further from each of the surveyed shop five consumers were identified by using Systematic random sampling method and were interviewed to collect information on awareness regarding colouring agents and their harmful effects. The study was carried out during the period from August 2016 to October 2016.

Inclusion criteria

Shop keepers and consumers aged above 18 Years willing to participate were included in the study.

Exclusion criteria

Shop keepers who were not available at the time of visit were excluded.

Statistical analysis

Data compiled in Microsoft excel and SPSS statistical software version 22 and was analyzed. Quantitative measures were presented by mean, SD and categorical data was presented by frequencies, percentages. Chi-square test was used as test of significance for qualitative data. P value of <0.05 was considered as statistically significant

RESULTS

Among the consumers visiting the sweet shops 35.6% of them were in the age 15-30 years. Most of the consumers visiting sweet shops were Males (73.3%) and only 34.7% of them were illiterates. Among the shopkeepers in the study 60% of them were males and 75% of them studied up to PUC and above. Age distribution of the shopkeepers reveals that 35% of them belong to 41-50 years (Table 1).

Types of sweets commonly purchased by the consumers were mysore pak, badushah, gulab jamun, halwa, jalebi, milk peda (83-94.7%). The types of sweets prepared and sold in the sweet shops revealed that 95% of the sweet shops prepare and sell sweets like boondi, ladoo, burfi, jalebi, jahangir and mango shake.

Knowledge regarding the artificial colorants used in sweets preparations was poor among consumers visiting sweet shops (16.8%). Only 42.6% had the awareness of toxic metals present in the artificial colorants used in the preparation of sweets (Table 2).

The consumers had little knowledge (15-54%) about the various toxic metals present in colorants. Very few consumers were aware of metals like copper, arsenic (3-5%) present in colourants, the silver foil used in the sweet preparation, presence of lead, aluminium and Cadmium. Among the consumers only 46.5% of them were aware of the harmful effects of toxic metals present in the colorants (Table 2).

Knowledge of the harmful effects of colorants among consumers indicates that colourants used in preparation of sweets can cause bladder tumors (62.4%), kidney tumors (59.4%), thyroid cancer (13.9%), Brain cancer (10%), tumors of immune system (5.9%), and effects on nerve cell development (1%). Hyper activity (2%) and can also cause genotoxicity (4%). Most of the consumers got information regarding various harmful effects through newspapers and magazines (65.5%), television (54.5%). Consumers also mentioned that health professionals like doctors, health workers, nurses and others as source of information (Table 2).

Table 1: Demographic characteristic of consumers and shopkeepers.

	Consumers		Shopkeepers	
Age	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
15-30 Years	36	35.6	7	35.0
31-40 Years	33	32.7	5	25.0
41-50 Years	24	23.8	7	35.0
> 51 Years	8	7.9	1	5.0
Gender				
Female	27	26.7	8	40.0
Male	74	73.3	12	60.0
Educational Status				
Illiterates	35	34.7	00	00
Primary	1	1.0	02	10
Higher Secondary	6	5.9	01	05
SSLC/PUC/Diploma	37	36.6	15	75
Graduates	22	21.8	2	10

Table 2: Awareness among consumers.

	Frequency	Percentage (%)
Awareness about colorants used in sweets		
Yes	84	83.2
Awareness about harmful toxic metals present in colorants		
Yes	43	42.6
Awareness of types of toxic metals present in colorants		
Silver (foil)	54	53.5
Lead	36	35.6
Cadmium, aluminum, arsenic, copper	41	40.6
Awareness regarding harmful effects of toxic metals		
Yes	47	46.5
Source of information regarding harmful effects		
Television	55	54.5
Newspaper/Magazines	46	45.5
Health professional	76	75.5
Don't Know	01	01.0
Awarenessregarding harmful effects		
Bladder tumours	63	62.4
Brain cancer, tumors of immune system	17	16.8
Kidney Tumours, Genotoxicity	64	63.4
affects nerve cell development, , Hyperactivity, Thyroid cancer	17	16.9
Others	25	24.8
Source of information regarding harmful effects		
Television	55	54.5
Newspaper/Magazines	66	65.5
Health professional	41	40.6

Table 3: Awareness among shopkeepers.

Awareness among shopkeepers	Frequency (n-20)	Percentage (%)
Awareness about colours and their forms		
Yes	15	75
Types of colours preferred		
Natural	09	45
Synthetic	07	35
Both	04	20
Reason for preference of using natural colour		
Colour quality	12	60
Ill effects of synthetic colour	05	25
Medicinal value and cost factor	05	25
Knowledge of usage of permissible limits of colours		
Yes	15	75
Awareness of harmful toxic metals present in artificial colorants		
Yes	03	15
Awareness of toxic metals present in colorants		
Silver (foil), aluminium, lead	09	45
Cadmium, arsenic, copper	00	00
Awareness of toxic metals causing harmful effects		
Yes	02	10
Awareness regarding harmful effects these colorants can cause		
Bladder tumours, brain cancers	04	20
Tumours of immune system, kidney tumor	04	20
Genotoxicity, affects nerve cell development	03	15

Table 4: Association between demographic characteristics and awareness.

Education of consumers	Preference for bright aspects colours		Total	χ^2	df	P value
	Yes	No				
Illiterates	13 (37.1)	22 (62.9)	35			
Primary/higher secondary	03 (42.8)	04 (57.2)	07			
SSLC/PUC	18 (48.6)	19 (51.4)	37	1.879	3	0.598
Graduates and above	10 (45.4)	12 (54.6)	22			
Education of consumers	**Awareness of artificial colorants**					
Illiterates	24 (68.6)	11 (31.4)	35			
Primary/higher secondary	07 (100)	00	07			
SSLC/PUC	35 ((94.6)	02 (5.4)	37	10.22	3	0.017*
Graduates and above	18 (81.8)	04 (8.2)	22			
Education of consumers	**Awareness of toxic metals in artificial colorants**					
Illiterates	05 (14.3)	30 (85.7)	35			
Primary/higher secondary	01 ((14.3)	06 (85.7)	07			
SSLC/PUC	24 (64.9)	13 (35.1)	37	23.72	3	0.001**
Graduates and above	13 (59.1)	09 (40.9)	22			
Gender of consumers	Preference of coloured sweets					
Male	28 (38.3)	45 (61.7)	73			
Female	16 (57.1)	12 (42.9)	28	2.905	1	0.088
Education of consumers	**Awareness of artificial colours**					
Male	57 (78.0)	16 (22)	73	4.866	1	0.027*
Female	27 (96.4)	01 (3.6)	28			
Age of shopkeepers	**Awareness about permissible limits of colorants among shopkeepers**					
20-40 Years	7 (35)	5 (25)	12	-	1	0.187**
> 40 Years	7 (35)	1 (5)	08			

** Fisher's exact probability.

Most of the shopkeepers used yellow, green and orange colour in the preparation of sweets. 75% of the shopkeepers had awareness regarding the food colours and the forms in which they were available in the market. Only 45% of the shopkeepers preferred natural colours 35% used synthetic and 20% of them used both forms of colour in the preparation of sweets. Shopkeepers said that they used natural colours because of quality (60%), and safety. 75% of the shopkeepers knew the permissible limits of usage of colours in the preparation of sweets.[4] Among the shopkeepers only 15% of them had the awareness regarding the toxic metal present in the artificial colorants. The shopkeepers aware that toxic metals like silver (15%), aluminium (10%) present in colourants, but none of them knew about the presence arsenic and copper. Awareness of various harmful effects of artificial colorants was only 15%, they knew that colorants can cause cancer of bladder, Kidney, brain, immune system, and also can affect nerve cell development (Table 3).

DISCUSSION

Most of the Consumers and children are fascinated by bright coloured sweets. Joshi et al and Roy et al observed that colour is one of the important constituent of food which determines the quality and acceptability of food products and also to enhance the visual appeal. [4, 8, 10] Study conducted at Karachi by Nidasaleem et al observed that younger generations are inclined to food and drinks having pleasant and bright colours. Bright colours increases the appetite, palatability of food and drink for the consumers.[9] In the present study 43.6% of the consumers preferred bright coloured sweets. Lakshmi et al observed that bright colours indicate good quality and dull colour indicate lesser quality, not appealing.[11] In the present study the education status of consumers does not influence the preference for bright coloured sweets. (p=0.598) (Table 4).

In present study 82% of the consumers had the knowledge of use of artificial colorants in the preparation of various types of sweets and most of them (57.4%) are not aware of toxic metals in artificial colorants. Khanna et al, Sharma D et al observed that most of the artificial colorants used in sweet and other food items contain toxic metals like lead, cadmium, arsenic, cobalt, nickel chromium, copper, and manganese.[5,12]

Present study revealed that 47% of the consumers were aware of the harmful effects of various toxic metals present in colorants and they knew that the colourants in sweets can affect the bladder, kidney, thyroid, brain, immune system, nerve cell development and can also

cause hyper activity. Chauhan et al reported that synthetic colorants used in sweets preparation are coal or petroleum based and are not purified chemicals. These have harmful effect on health of the consumers and some of them are also carcinogenic in nature.[13] Similarly Siva observed that the artificial colorants in food, can induce attention deficit disorder (ADD), inhibition of the immune system, hyperactivity and allergic reactions.[14] In a study by Kapoor et al observed that prolonged use of artificial colourants causes hyper acidity, thyroid tumors, urticaria, dermatitis, asthma, nasal congestion, allergies, abdominal pain, nausea, eczema, liver and kidney damage and cancer.[6]

The shopkeepers in the present study mostly used yellow (90%), green (95%) and orange (70%) colours in the preparation of sweets. Other commonly used colours are red, saffron which is similar to the observations made by Joshi et al.[8] Most of the shopkeepers in the present study had awareness regarding the food colours and the forms in which they were available in the market. Joshi et al made similar observations.[8] Very few of them prefer natural food colour because it is not economical compared to synthetic colorants.[8,11]

Most of the shopkeepers (75%) knew about the permissible limits of colorants used in sweets preparation, In a study conducted by Kapoor et al observed that in under developed areas many shop keepers were not aware of the permissible limits of colorants.[6] Majority 85% shopkeepers were not aware of the toxic metals present in artificial colorants. In a study conducted at Bangalore by Singh et al found that food manufacturing industry were highly aware of food additive rules and whereas the consumer's level of awareness was medium regarding the knowledge on food additive rules.[15]

Awareness among shopkeepers regarding various harmful effects of artificial colours was very low. Joshi et al in their study also observed that shopkeepers 47% of them were aware of harmful effects of synthetic colorants.[8] Goswami et al observed in a study conducted at Kolkata that food items containing artificial food colorant contain high level of lead. The study found that there was lack of awareness among the consumers regarding the health hazards of the colourrants.[16]

CONCLUSION

The consumers prefer bright coloured sweets, majority of them had the knowledge of use of artificial colorants in the preparation of various types of sweets and they did not aware of the toxic metals in artificial colorants.

The consumers were aware of the harmful effects of various toxic metals present in colorants they were also aware that the colourants in sweets can affect the bladder, kidney, thyroid, brain, immune system, nerve cell development and can also cause hyper activity, genotoxicity.

Most of the shopkeepers had awareness regarding the food colours and the forms in which they were available in the market. Very few of them prefer natural food colour because it is not economical compared to synthetic colorants. Awareness among shopkeepers regarding various harmful effects of artificial colours was very low. Most of the shopkeepers knew about the permissible limits of colorants used in sweets preparation. But majority shopkeepers were not aware of the toxic metals present in artificial colorants.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Joshi P, Jain S, Sharma V. Acceptability assessment of yellow colour obtained from turmeric in food products and at consumer level. Asian J Food Agro Industry. 2011;4:1-15.
2. Nayak H, Nath KG. Dietary Intake of Synthetic Colours by School Children. Karnataka J Agric Sci. 2007;20:819-22.
3. Artificial Food Colours and Dyes May Have Adverse Health Effects: 2013.
4. Sahar SA, Soltan, Manal ME, Shehata M. The Effects of Using Colour Foods of Children on Immunity Properties and Liver, Kidney on Rats. Food Nutrition Sci. 2012;3:897-904.
5. Sharma DC. Sweet poison? Survey of nation's favourite treats shows many could contain toxic dyes. 2013.
6. Kapoor VP. Food Colours: Concern Regarding Their Safety and Toxicity. National Botanical Research Institute (NBRI), Lucknow. 2006;12.
7. Wilson L. Toxic metals and detoxification. The centre for development 2015.
8. Joshi P, Jain S, Sharma. Acceptability assessment of yellow colour obtained from turmeric in food products and at consumer level. As J Food Ag-Ind. 2011;4:1-15.
9. Nidasaleem, Umar ZN, Khan SI. Survey on the use of synthetic food colours in food samples procured from different educational institutes of Karachi city. J Tropical Life Sci. 2013;3:1-7.
10. Roy K, Gullapalli S, Chaudhary UR, Chakraborty R. The use of a natural colorant based on betalain in the manufacture of sweet products in India. Int J Food Sci Tech. 2004;39:1087–91.
11. Lakshmi CG. Food colouring: The natural way. Research J Chem Sci. 2014;4:87-96.
12. Subhash K, Khanna, Singh GB, Hasan MZ. Metal contaminants in various food colours. Journal of the science of food and agriculture. 1976;27:170-74.
13. Chavan P. Why artificial food colours are bad for you're: health, Health site, 2015.
14. Siva R. Food colorants and health issues: are we aware? Current Sci. 2014;106:2-25.

15. Singh V, Nagaraja GN, Kavya C. Consumer awareness towards food colour, flavour and their safety regulations. Int J Commerce Business Mgmt. 2014;7:289-94.
16. Goswami KJ, Mazumdar I. Lead: the silent killer in our favourite street food. Evid Based Med. 2016;3:2349-570.

Cite this article as: Suryanarayana R, Chandrappa M, Santhosh R. Awareness of use of artificial colourants in sweets preparation and their harmful effects. Int J Community Med Public Health 2017;4:3893-8.