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Surveillance on Artificial Colours in Different Ready to Eat Foods

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Abstract: Different types of ready to eat foods were analyzed for the detection and estimation of the added synthetic food colours. A total of 72 different samples of sweet meats and confectioneries were randomly collected from large and small shops of Rawalpindi Cantt. Quantities of the permitted colouring matter among the tested samples were found within the range of 18-220 ppm. 47.56% of the samples contained non-permitted food colours. Incidences of the use of non-permitted food colours and colours above permissible limits were higher in case of the unorganized food makers.

Key words: Sweet meats, natural food colours, synthetic food colours

Introduction

From the surveillance data published in different countries it is evident that food intoxication rather than abating are on the increase. It is observed that coloured products are the major source of food intoxication and surveys conducted to determine the presence of non-permitted food colours in different food products. It is instinct phenomenon that human are always attracted to foods and drinks bearing pleasant colours. Adding attractive colours can definitely enhance the appetizing value of food and drink and in order to make the food attractive for customers, most manufacturers use different colours in their bakery products such as cakes biscuits and pastries. Similarly colours are often used in the manufacture of soft drinks various kinds of toffees, ice-creams, jams and jellies etc, by both street vendors and large manufacturers. Even house wives use dyes to colour rice and other dishes, mainly to give them a more appetizing look.

Many of these dyes were originally derived from coal tar and were commonly called coal-tar dyes, they contain the azo group. Colour chemicals are by definition active chemicals hence require greater care than bland additive such as emulsifiers.

Natural food colours are extracted and isolated from different Plants and animals as they have no harmful effect so they can be used in any food in any amount. These colour are less stable, less bright and not uniform but they are very expensive moreover it is also difficult to find the exact shade required for different food products.

According to the Pure Food rules of 1965 eighteen synthetic food colours and five natural food colours are permitted food colours in Pakistan. The synthetic food colours are Food Blue, Food Violet, Food Green Red and Food Black. The use of Black and Brown dyes is completely banned in the developed countries as they contain harmful ingredients. The maximum limit of permissible colour to be added in any food shall be 0.1 gram per Kg of food as consumed.

Even permitted artificial colours, if consumed indiscriminately are not safe. Citizens are still forced to consume adulterer edibles. The greedy elements mix lead chromate in turmeric (causing anemia, blindness and other disabilities), inedible colours in beverage (cause liver disorders and cancer). Higher incidence of gastrointestinal diseases cholera, enteric fever, tuberculosis etc. can also be traced to food infected with the causative organisms of these diseases. (Davis *et al.*,1964; Maurer *et al.*, 1980). Medicines, however, costly and effective can never replace good food. In actual practice, other non-permitted synthetic dyes like auramine, methanol yellow, lead chromate, rohdamine sudan-3 and 4, orange-1 and malachite green, which pose serious health hazards, as they are mutagenic and potential carcinogens, are being used as food colours in the market.

Different studies elsewhere revealed that analysis of various food products with respect to the added colours showed the concentrations of food colours in different food products ranges from 15-20 mg/kg, which was within the minimum permissible limit. It was found that a few foods manufactured by unorganized private sector and small vendors did contain colours in higher concentration than permitted range (Biswas *et al.*, 1994). Most of the food colours tested in conventional toxicity experiment showed toxic effect at a very high level of in take that were not normally encountered. Human studies indicated that food colours could induce a wide range of allergic reactions only in sensitive individuals (Babu and Shenolikar, 1995).

Keeping in view the importance of the subject present research is carried out to find out the percentage of sweet samples which contain non-permitted colours and to identify the source of colouring matter present in various sweets whether they are from the permitted list or not.

Materials and Methods

Sampling protocol: Seventy three samples of different

sweets containing colours and confectionaries were collected at random from different shops of Rawalpindi Cantt, from July to September 2001. They were analyzed to check the colours used in them whether they were permitted or not and to check the intensity of these colours. First of all the colours were extracted from the samples and then paper chromatographic technique was used for analysis.

Method for Colour Extraction: Synthetic dyes were isolated according to method described by Woodman (1941) For liquid foods they were used directly, while solid and semi foods were dissolved in water before isolation of colours.

About 25-50 mg of sample or its solution was added in the beaker, few drops of glacial acetic acid and white animal wool was added in the beaker then the contents of the beaker were boiled for a few minutes. The wool took any synthetic dye if present. The wool was removed from the beaker, washed under running tap water and finally with distilled water. The colour from the dyed wool was recovered by boiling it in a dilute ammonium hydroxide solution. The wool was discarded and the colour solution was evaporated on water bath after the removal of ammonia solution the colour was dissolved in a 2-3 ml of distilled water and evaporated again on the water bath. The dry colour then obtained was dissolved in few drops of water and stored in a stoppered glass bottle for further analysis.

Identification of Extracted Dyes : The extracted colours were identified by using Paper Chromatography according to the procedure prescribed by Biswas *et al.,* 1994.

Results and Discussion

There is a great need to create awareness at different levels about the toxic effects of non-permitted colours. Different studies elsewhere reported that these food colours might cause health hazards affecting kidneys and causing allergies, gastrointestinal and cancer problems. This study has been carried out for the products manufactured by organized and unorganized sectors and the samples were collected randomly from the different shops of Rawalpindi Cantt over a period of two months. The samples included food items i.e. sweet meats and confectioneries. The standard method was followed for the detection and estimation of colours in samples.

Table 1 Shows that 73 samples were examined, results of these samples revealed that 58.5% of the samples contained permitted food colours within the prescribed limit of prevention of Food Adulteration where as 41.1% samples contain permitted food colours above prescribed limits (PFA, 1992), while 46.57% of the samples contain non-permitted colours. This variation among different samples may be due to their different chemical compositions of food and at the same times their manufacturing processes. Organized companies contain the samples with the food colour with in PFA limit while the samples from the small shops contain colour above the permissible level. In the case of confectioneries, from small shops and sweets they were found to contain undesirable quantities of food colours. Amaranth, Ponceaw 4R, Sunset yellow, Tartrazine, Blue F.C.F, carmosine. Rohdamine B are identified permitted colours while orange 11, Metanil yellow, Congo Red, Blue V.R.S are the identified non-permitted food colours in the examined samples. An unidentified chocolate brown colour is found in few hard boil confectioneries. Survey of this study also revealed that they are also using the colours of the textile.

The health hazard due to consumption of food colours has also been reported by FAO/WHO in 1994. Anaphylactic reactions after consuming natural colours like Annatto were exhibited by certain individuals. (Nish *et al.*, 1991). Food anaphylaxis following ingestion of carmine, a natural dye extracted from the cochnineal insects was reported in women at a dose of 1mg/ kg body wt although the ADI is 0 – 5. mg / kg body weight (Beardowin and Kanny, 1995).

Tartrazine is also a permitted yellow colour. It was frequently found in almost all kinds of examined samples specially in sugar confectioneries. It has been reported to be associated with irritability, restlessness and sleep disturbance in a topic or hypertensive children aged between two and fourteen years (Rowe and Rowe, 1994). A typical case of anaphylactoid purpura associated with tartrazine has been reported (Wuthrich, 1993). Other permitted food colours such as Amaranth, sunsets yellow and Ponceau 4R have also been implicated in adverse reactions in patients with chronic urticaria (Lockey, 1977).

Metanil yellow, the frequently used non-permitted food colour was found to cause toxic methaemoglobinaemia in adult human males 2-4 hours after the consumption of rice coloured with it (Sachdeva *et al.*, 1992). It is also reported to cause cyanosis (Chandro and Nagaraja, 1987). It was observed that RF values of isolated colours from different samples were fourteen red, fourteen blue, eight green, fifteen yellow green in twenty two orange.

In annual report of National Institute of Nutrition 1993, it has been reported that there was a disease outbreak involving 40 school children in Hyderabad. Major symptoms in the affected children were glossitis and burning sensation of the tongue while eating food. The cause was traced to the aniseed mixed with ponceau 4R which were consumed by them. Though ponceau 4R is a permitted food colour, under the PFA Act, it is not permitted to be used in aniseed. In Pakistan no rules and regulations are followed by the manufacturers because government has not implemented any rule

Table 1: Summary of Survey of Collected Different Varieties of Food for Colour Estimation

Category	Sample Analyzed	Samples Containing non-permitted food colours	Samples containing permitted food colours	
			Within PFA Limit	Above PFA Limit
Gulab Jaman	6	3	2	1
Barfi	6	3	2	1
Cham Cham	5	2	1	1
Patisa	5	2	1	1
Ras Gulla	6	2	2	0
Ladoos	5	3	1	2
Kala Kand	5	3	2	1
Jalaebi	5	3	1	2
Toffees	5	2	2	0
Candyes	5	1	1	0
Bubble	5	2	1	1
Chocolate	5	2	1	1
Lolly Pop	5	1	1	0
Street Vendors	5	5	2	3
Total No.	73	34	20	14
Percentage		46.57%	58.5%	41.1%

about the non-permitted food colours. Therefore as a result of this, there is no awareness among the people about health hazards of use of non-permitted food colours.

Conclusion: The result of this preliminary study revealed the frequency of occurrence of permitted colouring matter as well as indiscriminate use of non-permitted colours in some ready to eat foods available in and around Saddar Bazar. The observations indicate that food colours, whether natural or synthetic can induce wide range of adverse reactions in sensitive individuals and these non-permitted colours may be responsible or considered as carcinogenic in nature. Therefore a systematic approach to evaluate the frequency of the occurrence of toxic and non-permitted colours and permitted colours for the estimation will be carried out with in the country. At the same time we must also enforce certain rules or laws to prevent ill effects of using of non-permitted colours as well as permitted colours above permissible level.

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