



# An Explorative Study on Knowledge and Awareness of Health Problems Related to Usage of Fabric Dyes by Road Side Dyers in Delhi, India

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## ABSTRACT

Chemical dyes are occupationally used as coloring agents because of their ability to form covalent linkage to textile fibers. The individuals as part of their job as dyers are exposed to various allergenic substances and irritant vapors of these dyes and may be at risk of potential health hazards. The growing number of individuals involved in such unorganized sector draws an urgent attention for improving the occupational safety and health standards. There is a great concern worldwide that these dyers should be provided awareness about the potential risk factors associated with the usage of these dyes. There is also a need to assess the health risks associated with their occupation. Hence the present study was carried out on a sample of road side dyers that involved their random health survey to investigate the potential health risk factors associated with this profession. The study indicated lack of knowledge and casual attitude of the dyers making them prone to health hazards linked to chemical dyes.

Keywords: attitude and practice, dye, occupational health, protective devices, safety

## INTRODUCTION

Chemical dyes used for dyeing fabrics have adverse effects on human health and environment (1). These dyes are responsible for occupational respiratory problems in workers exposed to them (2-5). Other studies have observed dermatological (6, 7), immunological (8, 9) and ophthalmological (7) ailments in these workers. Further, the unused dye solutions are discarded in the surroundings without any treatment which lead to contamination of water (10). Environmental pollution, thus caused has ill effects not only human health but also other organisms. However, negligible information is available at national level regarding the occupational health problems and safety cover of this section of workers. Local road side dyers are particularly ignorant about the harmful effects of these chemicals (1, 11). It is also reported that there is a lack of awareness about the

protective devices available for the same. This encouraged us to take up the task of identifying the often unnoticed and unattended health problems faced by these dyers sitting in almost each corner of the market.

The present survey based study aim to identify the health issues associated with exposure of local road side dyers of different parts of Delhi to chemical dyes and also to evaluate their awareness about occupational health problems, attitude towards and practices for preventing these problems. In this study, the amount of dyes actually adsorbed on the fiber compared to the quantity used by the dyer for each dyeing was also assessed to estimate the quantity of these chemicals discharged in the surroundings and thereby resulting in environment contamination.

## METHODOLOGY

A detailed questionnaire was prepared to interview dyers for their knowledge about the occupational health hazards and their attitude towards the dyeing profession. The questionnaire included questions seeking information about their mean-age, gender, level of education, socio-economic background, understanding of issues related to occupational health, awareness about the need and use of protection devices, ailments, frequency of reoccurrence of ailment, smoking or drinking habits, occupational history including working hours to identify long term and chronic effects of these dyes on their health. It also included a listing of all substances (dyes as well as reagents used to remove stains on their hands) used in work environment, handling of dye stocks at their home or at work place, awareness about the toxic effects of the dyes being used, preventive measures adopted, effect of treatments if taken in case of any ailment related to their occupation, complaints of their customers regarding any adverse effect of the dye used on their fabric and inclination of their kids towards the same occupation. In case of any ailment or adverse effect observed in the dyers, the symptoms were explored with regard to their nature (dermatological, ophthalmological, musculoskeletal and pulmonary disorders); duration and gender effect.

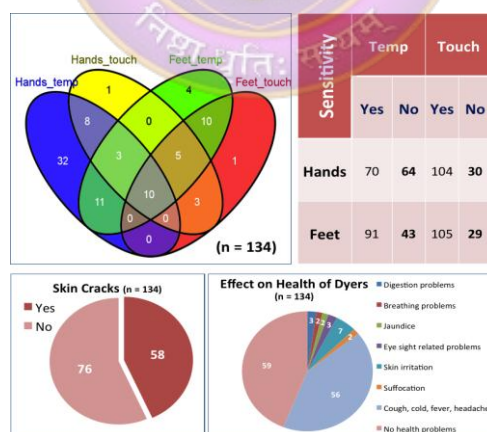
The local markets in different parts of Delhi were surveyed to identify dyers for the study. To check the extensiveness of the questionnaire, pilot studies were conducted and the enriched questionnaire was used for the final data collection. In total, 134 subjects participated voluntarily in this study. The informed consent was taken from all the subjects. Through face-to-face confidential audio-recorded interviews using a pre-structured questionnaire and physiological examination, the dyers were asked to identify the body parts which were affected during dyeing process. The spirometric functions were recorded and assessed using portable spirometer. The interviews were conducted in Hindi for the convenience of dyers. However, for the sake of easy compilation of data after the interviews, the original language of the questionnaire was kept English. To estimate the proportion of dye adsorbed onto the fabric, the unused dye was recovered from the aqueous dye solution left after dyeing the fabric. Different dye solutions were collected from these dyers. These dye solutions were then concentrated by evaporation and dry weight was determined for the known volume of the solution. The amount of the dye so recovered was compared to the actual amount of the dye used for making the solution.

The data collected was statistically analyzed to find the correlation among the variables like gender, age, time spent in that occupation, awareness about health and safety. Since smoking in this class of workers is common, a comparison of health was also made based on smoking habits of the subjects.

## RESULTS

Local road side dyers (n=134) involved in fabric dyeing processes in different parts of Delhi were interviewed using a simple random sampling technique. The knowledge and awareness of dyers about health problems related to usage of fabric dyes as well as any safety measure taken by them was explored using a questionnaire. The work experience as dyers ranged from 6 months to approximately 15 years. The majority of them had discontinued their education after primary level, some even before this level because of their poor economic background. It was observed that the fabric dyes and additional chemicals used in textile coloring have damaging effects on the health of the dyer (Figure-I). Dyers exposed to these dyes were found to suffer from skin irritation, skin rashes, scaling, occasional bleeding often from the affected area on the hands and forearms (in some cases loss of sensation), itching and stinging noses, sneezing, watery and sore eyes. Some dyers have developed a short-term allergy to certain dyes. However most of them have revealed that they are experiencing a reduced skin sensitivity of their hands (Figure I) and some have also admitted to experience the reduced memory which was not found to be age related.

The dyers were found to be sensitive towards even the minimal exposure to some specific dyes like *Indian Pink* (as called by local dyers) developing respiratory problems like severe coughing (Figure-IC). This particular dye is available in form of very light powder that immediately disperses in air, which affects the nasal passage leading to unusual breathlessness or wheezing (respiratory sensitization). Some dyers have reported that they become sensitized straightaway while some have admitted to be quite resistant in initial years and developing sensitivity after years of exposure. The lungs health of dyers was judged using forced expiratory vital capacity (FVC) data collected and was compared with the non-dyers in the similar age group. However, no correlation was found between the diseased condition and personal hygiene or educational background of the dyers. Literacy level or the experience was found to have no relation to the use of personal protection devices by the dyers



**Figure 1:**A.Venn diagram showing the sensitivity of hands and feet of the dyers for temperature (Hands\_temp and Feet\_temp respectively) and touch (Hands\_touch and Feet\_touch respectively) (n = 134).

**B.** Pie diagram showing the proportion of the dyers (n = 134) with skin cracks.

**C.** Pie diagram showing different types of health problems in the dyers (n = 134).

Additionally, dyers are commonly using *Hypo* (sodium thiosulphate) and *Bleach* (sodium hypochlorite) to remove dyes from their hands (12). Common bleach causes moderate mucosal irritation, the extent of which depends on concentration and duration of contact. In case of severe exposure, permanent pulmonary damage can occur leading to chemical irritant induced type of asthma (respiratory sensitization), an unusual breathlessness (12). It has also been reported that long term exposure to bleach is harsh on skin and nails (13). Hypo though less severe than bleach, causes dermatitis, eye irritation leading to redness and continuous pain in eyes on long-term exposure. The skin of hands of these dyers has become dry and patchy. Almost every dyer has accepted that the sensitivity of their hands towards hot and cold feeling is lost (Figure IA). Many have accepted that they cannot feel the sensation of a crawling insect on their hands. Dyers have developed small patches on skin under frequent exposure to dye solution. Some dyers have reported that they become sensitized straightaway and others after years of exposure to these reactive dyes.

The dye solution analysis indicated that only 50-60% of the dye used per dyeing gets adsorbed on to the fiber and rest is discarded everyday into common drains without any treatment further polluting the water and surroundings.

## DISCUSSION

The present study involving the health survey of 134 local road side dyers in Delhi clearly indicate the casual approach of dyers in dealing with dyes. These small-unorganized sections of the society generally go unnoticed in form of any occupational health hazards associated with their professions.

This survey has revealed a striking fact about the profession- the dyers most often illiterate or just primary educated know that they are dealing with chemicals that may harm them in the long term. Although they are unaware about the gravity of ill effects these dyes can pose to them. A few dyers believe that working with dyes should not be a problem at all, and others are bit hesitant to reveal about any adverse effect they might be experiencing. They do take measures from their side but are reluctant to admit it publicly out of a fear of losing their profession. Some of the dyers have also admitted to stock the dyes at their house but far from the reach of kids or infants.

It was observed that some of the dyers have developed allergy over time to certain reactive dyes. Their arms were full of rashes, which according to the dyers often transient but do reappear. The dyers have informed that the symptoms of skin sensitization generally improve when they are away from this work for a long time. Some dyers though very few have admitted that after joining this profession, they have experienced slight memory reduction over years. There might be other causes for these symptoms but the effect of dyes cannot be ruled out at all. The exposure to dyes can be avoided to a certain extent by using protecting devices like wearing hand gloves. However, none of the dyers were found to be doing so because of the discomfort with gloves while handling hot dye solutions. But almost every dyer as a regular practice eats jaggery in the evening that according to them cleans their throat and takes away all dye particles inhaled during the day. This is also reported as a common household remedy for cleaning the internal system after being exposed to dust and unwanted particles throughout the day (14).

This research has also brought to notice that almost 40% of the total dye used per dyeing is discharged everyday into common drains without any requisite pre-treatment. The dye effluents are highly toxic containing bleaching agents, heavy metal salts leading to contamination of surface and underground water. Hence, the work culture of local dyers is

not only affecting the health of those who are directly involved but also the health of general public by polluting the water and environment.

During interaction in the present study, the dyers felt inclusive, attended and cared. They have expressed that their employers as well as the Government should take initiatives to provide all required information about the chemicals they are using and the precautions to be taken while handling them via these kinds of surveys and face-to-face interactions. Through this survey, it was conveyed to the dyers that they should use better occupational practices like safety devices including chemical-resistant gloves, apron, covered shoes to stop liquids spilling on feet and glasses for eye protection, improved dyeing techniques, harmless dyes or one with lesser toxicity and proper disposal methods for unused dye solutions and dye-packaging material, etc. They were recommended to keep good hygiene of themselves and their surroundings. They were also told to avoid eating, drinking or smoking in the vicinity of their work place. Dyers were suggested to keep a watch on the effects of dyes on their bodies and consult a doctor, in case of any medical emergency. Dyers with a history of work-related health problems were referred to chest clinics for detailed assessment and were also suggested clinical and immunological investigation to detect specific allergy to a particular chemical dye.

## CONCLUSION

Research in occupational health lets one to develop a better understanding of industrial health problems. In the present study it has been observed that, though the dyers do have an idea about the toxic nature of the chemicals used in their profession, they may not exactly be aware about their organ specific health effects. It was also observed that there is a wide gap between their awareness level and use of precautionary measures. They do take measures from their side but are reluctant to admit it publicly out of a fear of losing their profession. The present study has also brought to notice that large proportion of the dye is thrown everyday into common drains posing environment threats and thus calls for a deeper and safer solution for disposal of dyes after use. Thus, attitudinal change is required and these dyers need to be sensitized towards the harmful consequences of dyes on human health and environment. Further, they must be provided proper training and motivation to implement standard safety precautions.

This explorative study shows the need of further epidemiological analysis to establish the deleterious effects of chemical dyes being used by the local dyers on public health. This initiative may provide a direction to researchers as well as policy makers involved in formulating national health promotion programs for workers in unorganized sector.

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