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Walaa Ahmed Ramadan

¹ Department of Public Health and Community Medicine, Occupational Health and Industrial Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

² Department of Public Health and Community Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

Rania Mustafa Elsallamy

¹ Department of Public Health and Community Medicine, Occupational Health and Industrial Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

² Department of Public Health and Community Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

Safinaz Elsaied Shalaby

Department of Public Health and Community Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

Elsayed Abd Elrahman Elkafas

Department of Public Health and Community Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

Corresponding Author:

Walaa Ahmed Ramadan

¹ Department of Public Health and Community Medicine, Occupational Health and Industrial Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

² Department of Public Health and Community Medicine, Faculty of Medicine, Tanta University, Tanta, Egypt

Assessment of health status among workers of textile dyeing industry in the middle region of the Nile Delta Egypt

Walaa Ahmed Ramadan, Rania Mustafa Elsallamy, Safinaz Elsaied Shalaby and Elsayed Abd Elrahman Elkafas

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Abstract

Background: Dyeing industrial process involves use of broad range of harmful chemical substances, organic solvents, fixatives, variety of bleaches and dyes used for preparation and coloration that may affect health of occupationally exposed workers

Aim of the work: To evaluate adverse health effects occurring as a result of exposure to different physical and chemical Occupational hazards on workers in textile dyeing industry.

Subjects and Methods: Our cross sectional study was performed in The Textile Dyeing unit at spinning factory in the middle region of the Nile Delta in Egypt in a period of 6 months from August 2022 to January 2023. The study subjects were 100 workers occupationally exposed to textile dyes. The study tools were interview questionnaire and clinical examination for workers.

Results: The most frequent nasal symptoms were runny nose and block nose 22% and 20% respectively. The most frequent skin symptoms was itchy and blisters 68.4% and 52.6% respectively. The most location of skin symptoms was hands (58.8%). The most certain substance were strong acid and alkali. The majority were improve when off work (89.5%). Ear show that the most frequent symptoms was difficult hearing and tinnitus 30% and 8% respectively. GIT and liver show that the most frequent symptoms was Constipate & bloat and Gastritis 26% and 20% respectively.

Conclusion and Recommendations: The working environment in textile dyeing industry expose workers to different chemical hazards that leads to multiple health disorders.

It is recommended to regularly check those workers for early identification of such health hazards with medical intervention in due time.

Keywords: Textile, dyes, occupational health, workers, health disorders

Introduction

Color has a significant role in the human world. People have a tendency to wear clothes of diverse colors and shades, consume food that is has a visual decoration, and even ingest colorful medications. It is not surprising, therefore, a substantial amount of research has been dedicated to the study of color generation. Currently, the market offers a wide range of over ten thousand commercially available dyes, with an annual production volume of over seven lakh tons ^[1].

A significant proportion of the global human population is subjected to exposure to a diverse range of harmful substances within their environment or workplace. The textile industry is not an exception, it emerged as a result of the industrial revolution during the 18th century, when the production of clothes on a large scale became a prominent sector. Textile industry workers are primarily subjected to a diverse range of harmful substances including toxic dyes, bleaching agents, salts, acids, alkalis, and heavy metals such as cadmium, copper, zinc, chromium, iron, among others. Additionally, they may encounter potentially carcinogenic compounds such dyes, organic solvents, and fixatives during the printing process ^[2].

The textile industry encompasses various procedures, one of which is dyeing. Due to the inherent nature of this work and the associated exposure, workers often report many issues ^[3]. Reactive dyes are widely incorporated in the textile industry owing to their capacity to form robust covalent bonds with fibers ^[4]. While reactive dyes possess favorable technical characteristics, their utilization has been associated with harmful impacts on both textile factory workers and the environment ^[5]. Dyes exhibit a diverse range of structural variations, including but not limited to acidic, basic, disperse, azo, anthraquinone-based, and

metal complex dyes (among others). The textile sector is the primary consumer of dye substances. In the course of the coloration procedure, a substantial proportion of the synthetic dye fails to bond and is subsequently discharged into the waste stream [6].

Associated health disorders among exposed workers on:

Skin causing: occupational contact dermatitis, skin irritation, and itching. Up to 40% cloth dyeing workers of Jaipur, India have contact dermatitis [7].

Respiratory system: Respiratory sensitization including chronic bronchitis, occupational asthma, coughing, wheezing, chest tightness, and breathlessness [8]. A cross-sectional study conducted in Iran revealed a noteworthy rise in acute and chronic respiratory issues among individuals employed in the textile dyeing industry [9].

Liver: A study conducted on individuals employed in the dyeing business has revealed a notable elevation in liver enzyme levels among workers who have been exposed to organic solvents [10]. The liver assumes a pivotal role in the process of detoxification and serves as the primary site for chemical-induced tissue harm [11].

Kidneys and urinary bladder: certain types of dyes can produce bladder cancer& kidney damage [12-13].

Eyes: lacrimation that may end to permanent blindness.

Nose including rhinitis and sneezing.

Ears: Hearing impairments. In addition, musculoskeletal disorders have been reported [16].

Dyes are easily ignitable, may cause fire hazards& serious burns [17].

Occupational diseases and injuries exert a significant influence on the economy as a result of the reduction in productive working hours, the provision of compensation to affected individuals, and the depletion of manpower resources [18]. According to the Occupational Safety and Health Ordinance (Cap. 509), employers operating within this particular industry are obligated to prioritize the safety and well-being of their workers and employees throughout several stages, including the handling, storage, transport, and disposal of chemicals [19].

Despite the well-documented occupational dangers and negative health consequences associated with the textile dyeing industry, the concept of workplace health and safety is frequently disregarded. However, it is important to note that there is limited existing research on the subject of workplace hazards in textile dyeing units in Egypt.

Aim of work

To assess adverse health effects resulting from exposure to different physical and chemical Occupational hazards on workers in textile dyeing industry.

Materials and Methods

Study Design: Cross-sectional study.

Place and duration of the study

The present study was carried out on a sample of 100 male workers who were exposed to various textile dyes. These individuals were picked from the textile dyeing unit at a spinning facility located in the middle region of the Nile Delta in Egypt. It started from the first of August 2022 till the end of January 2023.

Data collection and tools of the study

A) Pre-designed structured interview questionnaire

The participants in this study had an interview using a structured questionnaire developed by the researchers. The questionnaire collected personal information and a comprehensive occupational history, including age, place of residence, level of education, marital status, job title, length of work experience, availability of health services for workers, participation in job-related training, and utilization of personal protective equipment. The medical history of the patient was assessed, encompassing both present and historical health conditions. This included a review of their history of diabetes mellitus, hypertension, renal, liver, or heart disorders, as well as any previous surgeries, blood transfusions, drug therapies, and current prescriptions. Additionally, the family history of any hereditary diseases was also taken into consideration.

B) The clinical examination included the following

1. General examination (vital signs, skin, eyes and characteristic odor),
2. Neurological examination,
3. Gastrointestinal system examination,
4. Cardiovascular system examination
5. Respiratory system examination

Compliance with ethical standards

The research study received approval from the Research Ethics Committee (REC) at Tanta Faculty of Medicine. The study was conducted with the official authority of the factory management, and informed consent was gathered from all participating workers.

Statistical analysis of data

The data acquired was systematically structured, tabulated, and subjected to statistical analysis using the Statistical Package for Social Science (SPSS) version 20, developed by IBM®SPSS® Inc. in Chicago, USA. The data of a qualitative nature, also referred to as categorical data, were displayed in the form of frequency and percentage distribution. On the other hand, the data of a quantitative nature, also known as numerical data, were given as the mean and standard deviation (SD). To conduct comparisons between groups, the independent samples t-test and Chi-square test were employed for numerical and categorical variables, respectively.

Results

Table 1: Distribution of studied workers according to Sociodemographic characteristics and duration of work

Sociodemographic characteristics	Exposed workers	
	No. = 100	%
Age (years)		
< 30	5	5.0
30	16	16.0
40	29	29.0
>50	50	50.0
Mean ±SD	47.99 ± 9.625	
Range	22-60	

Residence		
Urban	27	27.0
Rural	73	73.0
Marital status		
Single	4	4.0
Married	90	90.0
Widow	6	6.0
Education		
Illiterate	8	8.0
Primary	12	12.0
Secondary	65	65.0
University	15	15.0
Duration of work (years)		
≤10	23	
11-20	27	23.0
21-30	36	27.0
>30	14	36.0
Mean ±SD	20.80±10.368	14.0

Table (1): presents the distribution of the study sample based on sociodemographic parameters. The age of workers in the study varied between 22 and 60 years, with a mean age of 47.99±9.625 years. The majority of participants in the study group (73.0%) hailed from rural regions. Ninety percent of the workforce

was found to be married. The majority of individuals (65.0%) possessed a degree of education that was at the secondary level or higher. One-third of the workers had a work duration varying between 21 to 30 years, with a mean of 20.80±10.368.

Table 2: Distribution of nasal and eye symptoms among the studied workers

Symptoms	Exposed workers No.=100	
	No.	%
Nose		
Runny nose	22	22.0
Sneezing	6	6.0
Itchy	12	12.0
Blocked	20	20.0
Bleeding	5	5.0
Troubles in smelling odors	12	12.0
Off work improve	38	84.4
Eye		
Burning	11	11.0
Itching	17	17.0
Watery	36	36.0
Chemical splash	8	8.0
Off work improve	49	96.1

Table (2): Show the distribution of nasal and eye symptoms among the studied workers. Nasal symptoms show that, the most frequent symptoms was runny nose and block nose 22% and 20% respectively. These symptoms were improved when off work (84.4%).

Eye symptoms show that the most frequent symptoms was watery eye and itching 36% and 17% respectively and these symptoms were improve when off work (96.1%). Chemical splash were detected in 8% of worker

Table 3: Distribution of skin symptoms among the studied workers

Skin Symptoms	Exposed workers N=100	
	No.	%
Skin rashes	19	19.0
Itchy	13	68.4
Scaly	4	21.1
Red	7	36.8
Blisters	10	52.6
General	2	10.5
Localization	17	89.5
Hands	10	58.8
Legs	3	17.6
Hand and Legs	3	17.6
Face	1	5.9
Certain substance	15	78.9
Dye powder	1	6.7
Strong acid and alkalis	12	80.0
Additives	2	13.3
Off work improve	17	89.5

Chemical burn	20	20.4
Chronic problem	13	65.0
Scars	12	92.3
Hyperpigmentation	1	7.7

Table (3): Show the distribution of skin symptoms among studied workers and it show that the most frequent symptoms was itchy and blisters 68.4% and 52.6% respectively.

The most location of skin symptoms was hands (58.8%). The most certain substance were strong acid and alkali. The majority were improve when off work (89.5%). Chemical burn were detected in about 20.4% of workers.

Table 4: Distribution of studied workers according to systemic manifestation

Systemic manifestations	Exposed workers (n =100)	
	No.	%
Cardiovascular manifestations		
Angina pain	1	1.0
Arrhythmia	4	4.0
musculoskeletal manifestation		
Pain	28	28.0
Neck	4	4.0
Trunk	9	9.0
Upper limb	8	8.0
Lower limb	7	7.0
Numbness	10	10.0
Rigidity	9	9.0
Prevent work	7	20.0
Urinary manifestation		
Dysuria	27	27.0
Hematuria	1	1.0
Polyuria	9	9.0
Renal Pain	2	2.0
Renal Stones	19	19.0
Defective renal functions	0	0.0
Pyelonephritis	1	1.0

Table (4): illustrates the distribution of studied workers according to systemic manifestation. Cardiovascular showed that the most frequent symptoms was varicose veins and arrhythmia 6% and 4% respectively. Urinary system show that the most frequent symptoms was dysuria and stones, 27% and 19% respectively. Regarding musculoskeletal manifestation 28% of studied workers suffer from pain.

symptoms was broken teeth and dental decay 22% and 13% respectively. Ear show that the most frequent symptoms was difficult hearing and tinnitus 30% and 8% respectively. GIT and liver show that the most frequent symptoms was Constipate & bloat and Gastritis 26% and 20% respectively.

Table 5: Distribution of other symptoms among the studied workers

Symptoms	Exposed Group No.=100	
	No.	%
Oral health		
Gum Bleeding	11	11.0
Gum Swelling	2	2.0
Ulcers	10	10.0
Brown teeth	5	5.0
Pits	3	3.0
Broken teeth	22	22.0
Dental decay	13	13.0
Ear		
Difficult hearing	30	30.0
Tinnitus	8	8.0
Pain	3	3.0
Discharge	3	3.0
Audiogram results	2	2.0
GIT and liver		
Recur colic	4	4.0
Recur diarrhea	7	7.0
Constipate & bloat	26	26.0
Gastritis	20	20.0
Jaundice	3	3.0

Table (5): Show the distribution of other symptoms of the studied workers. Oral health show that the most frequent

Discussion
The main results of this study were

Regarding sociodemographic data, our findings align with the research conducted by Ibrahim [20]. Ibrahim's study focused on a textile factory located in Damietta city, which encompasses three major wards: pretreatment and Fiber preparation wards, Spinning and weaving wards, and dyeing and printing wards. The study included a sample of 108 workers. The study group consisted of individuals aged 18 to 60 years, with a mean age of 39.07±12.63 years. Additionally, 40.0% of the participants fell within the age range of 46 to 60 years. Regarding marital status, the analysis revealed that the study group exhibited the maximum proportion (59.3%) of individuals, was married, while the lowest proportion (2.8%) was observed among those, was divorced. In relation to the participants' level of education, it was noted that a majority of the study cohort, specifically 63.9%, possessed a technical secondary education. Conversely, a small proportion, comprising 2.8% of the sample, only completed basic education. Regarding the distribution of nose and eye symptoms among the studied workers. The findings of our study are consistent with those of Ibrahim (20), who observed a high prevalence of health issues resulting from exposure to chemical hazards. Specifically, the majority (81.3%) of the participants in their study experienced health problems, with respiratory tract diseases being the most prevalent (96.7%). Additionally, chest and eye allergies were reported by

60.7% of the participants, while nose allergies were reported by 59.0%. The least common health issue reported was skin disorders, specifically cracked and dry skin, which affected 32.8% of the participants.

Regarding skin symptoms of the studied workers, our results were in consistence with the findings of El-Hadidy *et al.*,^[21] as they reported that exposed workers were significantly more dermatological problems, than those in the comparison group.

The findings of our study were supported by Ibrahim's research^[20], which indicated that a minority of individuals (32.8%) experienced skin diseases characterized by cracked and dry skin.

According to the United States Bureau of Labor Statistics, research findings indicate that occupational skin disorders, particularly allergic and irritant (contact) dermatitis, rank as the second most prevalent category of occupational illnesses, as stated by Laundry and Janes^[22]. Furthermore, Malik^[23] documented that a majority of the groups he examined exhibited skin disorders.

Regarding distribution of muscle and bone symptoms among the studied workers, The findings of our study were supported by the research conducted by El-Hadidy *et al.*^[21], as their study revealed that workers who were exposed to certain conditions reported a higher prevalence of respiratory and dermatological related disorders, musculoskeletal pain, as well as visual and hearing complaints compared to individuals in the control group.

In Ibrahim's study^[20], it was found that 66.7% of the participants in the study group were exposed to various sources of mechanical hazards. These hazards included long hours of standing, long-term sitting, bending for extended periods, heavy lifting, falling/slipping, and sudden movements. The percentages of participants exposed to these hazards were as follows: 83.3% for prolonged standing, 68.0% for prolonged sitting, 50.00% for bending for long times, 50.00% for heavy lifting, 34.7% for falling/slipping, and 31.9% for sudden movements. Regarding the health issues resulting from exposure to mechanical hazards, the research revealed that a significant majority (88.9%) of the participants in the study experienced various health problems. These problems included low back pain, varicose veins, and neck pain, with prevalence rates of 79.2%, 55.0%, and 34.7% respectively. Conversely, the occurrence of more severe health problems such as fractures, ligament tears, and strains was relatively lower, with percentages of 11.1%, 11.1%, and 23.6% respectively among the workers.

Furthermore, Bansal and Yadav (24) reported that the prevalence of back pain among workers in different age groups was as follows: 20% for individuals aged 20-35 years, 14.4% for those aged 36-50 years, and 40.4% for individuals aged 51-65 years, as observed during the duration of the study.

Moreover, a study conducted by Shafik and Abed El-Mohsen^[25] about the Health Promotion Program to Improve health workers in the Torah Cement Factory, revealed that nearly two-thirds of the participants experienced musculoskeletal illnesses.

Conclusion and Recommendations

- The workers within the textile dyeing sector are subject to several health concerns as a result of inadequate working conditions and a lack of awareness among the work-force.
- It is imperative to implement comprehensive policies that obligate fabric dyeing business owners to maintain

comfortable environments for work.

- Many infections and health issues commonly observed in dyeing units can be prevented via the implementation of appropriate precautions and diligent care.
- In order to safeguard workers from potential harm, it is imperative to furnish them with essential protective gear such as face masks, as well as ensure the availability of first-aid facilities.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Saini RD. Textile organic dyes: polluting effects and elimination methods from textile waste water. *Int J Chem Eng Res.* 2017;9(1):121-136.
2. International agency for research on cancer; IARC; c1997.
3. Sani ZM, Abdullahi IL, Sani A. Toxicity evaluation of selected dyes commonly used for clothing materials in urban Kano, Nigeria. *Eur Exp Biol.* 2018;8(4):26.
4. Affat SS. Classifications, Advantages, Disadvantages, Toxicity Effects of Natural and Synthetic Dyes: A review. *University of Thi-Qar Journal of Science.* 2021;8(1):130-135.
5. Yusuf M. Synthetic dyes: A threat to the environment and water ecosystem. *Textiles and Clothing,* 2019, 11-26.
6. El Harfi S, El Harfi A. Classifications, properties and applications of textile dyes: A review. *Applied Journal of Environmental Engineering Science.* 2017;3(3):00000-3.
7. Upadhyay KK, Pandey AC. Occupational exposure and awareness of occupational safety and health among cloth dyeing workers in Jaipur India. *Iranian Journal of Health Safety and Environment.* 2016;3(2):540-546.
8. Nodoushan MS, Mehrparvar AH, Loukzadeh Z, *et al.* Evaluation of respiratory system in textile-dyeing workers. *Medical Journal of The Islamic Republic of Iran.* 2014;28(88):1-8.
9. Biswas G, Bhattacharya A, Bhattacharya R. A review on the health status of textile dyeing workers. *Medical Science,* 2016, 5(8).
10. Whig J, Bansal B, Mahajan R. Work Place Challenge Spirometric Response in Polyurethane (Isocyanate) Paint. *Ind J Chest DS Allied Sci.* 1994;36(2):73-76.
11. Liaqat I, Arshad M, Arshad N. Changes in selected blood biochemical components of industrial workers occupationally exposed to textile dyes: A preliminary study. *Pakistan Journal of Zoology,* 2009, 41(1).
12. Saran RK, Kumar R, Yadav S. Environmental issues in textiles. *Advanced Functional Textiles and Polymers: Fabrication, Processing and Applications;* c2019. p. 129-151.
13. Bansal M, Yadav RK. Occupational health hazards and awareness of occupational safety among workers of textile dyeing industries in Jaipur, India. *Occupational health.* 2016;2(2):30-38.
14. Wulandari RA, Fauzia S. Effects of Benzene Exposure on Hematological Parameters Shoe-Manufacturing Workers in Bogor, West Java. *Journal of International Dental and Medical Research.* 2019 May 1;12(2):837-41.
15. Singh Z. Health Status of Textile Industry Workers:

- Prevalence and Socioeconomic Correlates of Different Health Problems. *Public Health and Preventive Medicine J.* 2015;1(3):137-143.
16. Bansal M, Yadav R. Occupational Health Hazards and awareness of occupational safety among workers of textile dyeing industries in Jaipur, India, Suresh Gyan Vihar University *International Journal of Environment, Science and Technology.* 2016;2(2):30-38. IISN: 2394-9570.
 17. Biswas G, Bhattacharya A, Bhattacharya R. A review on the health status of textile dyeing workers. *Medical Science.* 2016;5(8).
 18. Kumar P, *et al.* Occupational health and safety in textile industry. *International Journal of Research in Engineering and Technology,* 2014, 3(11). E-ISSN: 2319-1163 | p-ISSN: 2321-7308.t
 19. Armstrong G. Assessing Manufacturing Employee Perceptions of Supervisor Occupational Health and Safety Competencies and Potential for Occupational Health and Safety Training Facilitation (Doctoral dissertation, Indiana University of Pennsylvania); c2020.
 20. Ibrahim AM. Workers' Occupational Hazards at Textile Factory in Damietta City. *Port Said Scientific Journal of Nursing.* 2017 Dec 1;4(2):1-27.
 21. El-Hadidy NM. Occupational health profile of textile dyeing workers. *Egyptian Journal of Occupational Medicine.* 2022;46(2):1-20.
 22. Lundy K, Janes S. *Community Health Nursing .Caring for Public Health.* 1st ed., London: Jones and Bartlett Publisher; c2007. p. 947-952.
 23. Malik N. Perspective of Occupational Health and Safety in Textile Industry. Degree of Doctorate of Philosophy in Rural Sociology. Faisalabad, Pakistan; c2010.
 24. Bansal M, Yadav RK. Occupational health hazards and awareness of occupational safety among workers of textile dyeing industries in Jaipur, India. *Occupational Health.* 2016;2(2):30-8.
 25. Shafik S, Abd El-Mohsen A. Occupational health: Health Promotion Program to Improve Health Workers in Tourah Cement Factory. *Journal of American Science,* 2012, 8(3). Available at: <http://www.americanscience.org>

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