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IMPACT OF POLLUTION GENERATED BY THE TEXTILE INDUSTRY ON HEALTH AND ENVIRONMENT

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ABSTRACT

The textile industry of the world is bound to be huge because it fulfils one of the basic requirements of people. It is growing continuously as a resulting in the increase in demand as well as population all over the world. The textile industry is considered to be one of the most pollution causing industries of the world. This research discusses the effects of pollution taking place as a result of the production processes of the textile industry as well as its negative effects on our health and overall environment.

Keywords – Pollution, textile industry, environment, health.

INTRODUCTION

Clothing is considered to be one of the basic needs of a person. Due to it, the global textile industry is growing day by day for fulfilling the human desire for having and wearing stylish and fashionable clothes. In the modern world, pollution is one of the main challenges faced by many of the countries of the world that is increasing exponentially causing harm to the overall environment. The industry for the production of textile is considered to be one of the most complex, technologized and oldest industries of the world. The main strength of the industry comes from the demand and strong base for production of a big range of producing fibres and yarns from jute, silk, cotton and wool; that also includes the synthetic fibres (nylon, acrylic and polyester etc.). It is due to human nature for always being attractive looking and wearing trendy clothes for striking an impression on others and representing the personality. In the modern world, almost every person wants to wear stylish and fashionable clothes to enhance their personality and impressing others. But, these desires of the human has an adverse impact on the health and the overall environment to a great extent (Hasanbeigi & Price, 2015).

Studies reveal that almost five per cent of the landfill space of the world is utilized by the waste from the textile industry. It is also be considered that the processes of textile dyeing and various treatments are responsible for up to twenty per cent of the pollution in the fresh water. The pollutants being released from the global textile industry is causing an unbearable loss to the environment. It causes the land to get polluted and becomes infertile in the long run. It has been observed that a large number of harmful fertilizers and pesticides are used in the production of cotton (Kant, 2012).

EFFECTS OF POLLUTION BY TEXTILE INDUSTRY ON HUMAN HEALTH

Textile production is not harmful to the health and environment in all the phases and processes involved in fabric production that lead to the production of garments. The main is the use of the chemicals and materials for the production of the fabrics that depreciates the balance of ecology. The chemicals used in textile products can cause serious health hazards. There are a lot of resources utilized in the production of textiles including chemicals, water and energy. Mostly the dyeing process requires the consumption of a very high volume of water. It is interesting to know that there is a huge variety of above 10,000 dyes that are used for the printing and dying of textile products. It is, therefore, the apparel products that are purchased and used by the people may have those chemicals that can be damaging for the health. Once the product is washed, the negative impact of it becomes inevitable for the environment as well (Som, Wick, Krug & Nowack, 2011).

There are various procedures applied to the material that finally result in the form of a finished product. This report considers most of the processes including the production of fabrics to the garments production and the overall applied procedures are also taken into account; also including the use of different chemicals and materials. It is important to know that many hurtful chemicals are possible to be acquired by the skin of a person, even by digestion or simply inhaling them. The materials used in textile production may become the main cause of allergies for some people. It can become the cause of cancer and mutagenesis in rare cases.

It is therefore very important to consider the adverse effects of the textile industry on the health of humans and the environment. There is a dire need for the chemical analysis of the production material and fabrics that may be beneficial for producing a fabric that will be free from harmful effects and substances (Padhi, 2012).

There is a need for conducting detailed research conducted ascertaining the link of chemicals in fabrics that cause health problems in humans. It has been observed that there are many chemicals that are used in textile production or are found in the finished garments become the cause of various diseases like cancer, lung, kidney and liver issues, and neurotoxicity in some people. Many fabrics that are sold as being called wrinkle-resistant are mostly produced by using formaldehyde that has been linked to causing skin allergies, nose and eye irritation (Wittcoff, Reuben & Plotkin, 2012).

There are a lot of chemicals used for textile production that are considered to be potentially hazardous. Some of these chemicals are:

- Nano Silver, commonly present in the antimicrobial textile products.
- Azo dyes; are generally used for colouring textiles.
- Phthalates; usually found in the waterproof textiles, replica leather and plastic raincoats (Verma, Dash & Bhunia, 2012).

Health Impacts of Pollution on Workers in the Textile Industry:

With the advancement of industrial machines that have become smarter, faster and more complicated; there are also many new hazards attached to them. Now the processes and the material utilization have become complex to some extent,

and they have injected new potential hazards to the health of the workers in the textile industry. The workers are now expected to properly work by adjusting the mechanization of industry, the thirst for increased production and job stress are ignored, and they are utilised by the application of the worst pressure. Although the process of textile production has changed to some extent and is changing continuously, most of the hazards related to the health of workers are the same as they were before (Kim, Jahan & Lee, 2011).

The textile industry has a lot of departments involved in the processes of dyeing, weaving, spinning, finishing and printing, and various other processes important for converting fibre into a garment or finished fabric form. The production of garments involves performing extreme repetitive and very high speed performing tasks that often require unnatural and awkward body positions of the workers; that may result in a lot of musculoskeletal disorders to be faced on a temporary or permanent basis in worst cases. There are a lot of health hazards faced by the workers of the textile industry including the following (Meena, Dangayach & Bhardwaj, 2014).

1. Pollution and Exposure to Chemicals:

The textile industry workers are exposed to a lot of chemicals, most including those workers that perform various tasks including printing, dyeing and finishing. There are a lot of strong chemicals used in the production activities in the textile industry. Studies have proved that there is a relationship between formaldehyde and various types of cancer including lung, nasal and brain cancer, and leukaemia that can be deadly. Long term exposure to formaldehyde may result in eczema and respiratory problems.

Accidental inhalation of chemicals and their contact with skin can also result in many serious issues related to health (Lacasse & Baumann, 2012).

2. Pollution and Exposure to Cotton Dust:

The workers of the textile industry involved in the spinning and processing of cotton are highly exposed to heavy amounts of cotton dust along with the exposure of soil and a lot of pesticides. It results in increased respiratory disorders among the workers. Brown Lung is a fatal disease that is caused due to excessive exposure to cotton dust. The symptoms of this disease include cough, shortness of breath, chest tightening and intense wheezing (Ertaş, Acemioğlu, Alma, & Usta, 2010).

3. Pollution and Exposure to Noise:

In the textile industry, it has been observed that there are generally high levels of noise in most of the processing units, especially in developing countries. Having noise exposure, in the long run, is noted to be the cause of loss in hearing and damaging the eardrum of staff and workers. It also causes many other problems like a drop in the efficiency, absenteeism, anxiety, annoyance, variation in the blood pressure and the pulse rate of the employees. Sleep disorder is one of the main issue caused by noise pollution. Although noise causes a lot of grave health issues, still these problems are not addressed due to the slow and long term nature of these issues, maybe because the discomfort and effects are not highlighted immediately (Fuente & Hickson, 2011).

4. Environmental and Public Health Issues:

The finished textiles products and apparel industry generally cause relatively less pollution to the environment by clearing into water, air and soil. But, the issue of discarding formaldehyde is still present in the retail textile

industry that becomes the main reason for the related allergies, causing irritation and respiratory problems among the customers and sales force as well. In addition to that, there are a lot of other processes in the textile industry that cause many other fears of contamination of the environment, including the yield of lead-based apparel beautifications and their rubberizing.

In the modern globalized industry, there are a lot of possible adverse effects related to the exposure of different fabric actions and formaldehyde that become the base of the formation of 'green' industry. The finished products and apparels require natural fibre to be used for the sewing processes instead of the materials having synthetic-fibre. It is to be noted that these materials are natural and are not treated using different means for the processes of finishing and crease-resistance. Mostly, the extremely dirty, crowded and unpleasant conditions of the textile producing factories are responsible for the diffusion of various diseases that cause infections. Studies have revealed that tuberculosis is among the most common diseases that affect the workers and health of the public mainly caused due to the processes in the textile industry (Aderaw, Engdaw & Tadesse, 2011).

5. Ergonomic Issues Caused by The Textile Industry:

There are a lot of ergonomic issues noted in various departments involved in the production activities of textiles and garments. It is mainly due to the harmful and insecure working environment for the staff working in those departments. There are a lot of issues faced by the staff regularly that include insufficient lighting and ventilation.

In most of the departments, there are no safety protection measures taken for dealing with any kind of emergency condition. These include the availability of the safety equipment including alarms, fire extinguishers and most basic first-aid kits in every department. Workers should also be provided with the protective tools and items including the safety gloves for avoiding any type of possible accident or injury that also help them perform the job confidently and efficiently continuously (Meena, Dangayach & Bhardwaj, 2014).

There are a lot of ergonomic problems faced by the staff in different units of the textile manufacturing industry. The staff and workers are vulnerable to catch a lot of industrial diseases including but not limited to neck pain, back pain, shoulder pain and a lot of muscle and disorders of the bones. It is to be noted that most of the ergonomic issues and diseases are faced by the workers and staff of the textile industry from the developing countries as compared to the developed countries (Sealetsa & Thatcher, 2011).

EFFECTS OF POLLUTION BY TEXTILE INDUSTRY ON THE ENVIRONMENT

The exponential growth of the global textile industry in the modern era has resulted in the increased demand for textiles and fabrics by the consumers. Although, the growth in demand for the textile products is good news for the industry, for the environment the case is not the same. We start from a very basic level and then go into the depth of the impact of pollution caused by the textile sector on the environment. The raw materials for the production in the textile industry are the crops including Linum,

cotton and hemp that consume a large quantity of water for different processes required to get the finished textile products. Cotton is considered to be a plant that is very thirsty. For the production and protection of these valuable plants, a lot of herbicides and pesticides are utilized by the producers that eventually affect the environment. Again, in this case, cotton has proved to be one of the yields that require a lot of pesticides for safe and secure growth (Hung, Wang & Shammas, 2012).

On the other hand, there are a lot of textile products that utilize a lot of resources that affect the environment. For example, the production of rayon, that is a synthetic fabric that is manufactured by using the flesh of wood, caused a great loss in the form of many old forests to shrink due to the extensive wood requirements. In the production process, the wood flesh is treated with a variety of strong chemicals that also result in the adverse effects on the environment. The synthetic fibres including polyester and nylon that are the most used artificial textile products, these are produced by utilizing a lot of fossil fuels and some petrochemicals. The production of these fibres requires a lot of energy as well as water resources. There are a lot of greenhouse gases formed in the processes of the manufacturing of nylon that pollutes the environment and the air we breathe in. The synthetically produced fibres lack the ability of biodegradation, meaning that the products made of nylon take a very long time to decompose that can lead to many decades (Ghaly, Ananthashankar, Alhattab & Ramakrishnan, 2014).

The manufacturing of textile products incorporates a lot of processes that include dyeing, bleaching and washing of the materials that also consume big amounts of water.

As a result of these processes, there are a lot of bi-products formed that include a variety of salts, surfactants that assist the mixing of dyes into textiles, and some other processing agents including detergents that add into the water and harm the environment due to the non-decomposing nature. There are a lot of strong chemicals and some harmful substances like lead, arsenic and mercury used in the printing and dyeing processes while producing textiles and garments (Wang, Xue, Huang, & Liu, 2011).

There are many uncountable impacts of the textile industry on the environment that cannot be estimated easily due to a lot of diversity and having strong effects all over the world. The main impacts of the textile industry affecting the global environment can be discussed as below:

1. Raw Materials:

The industry of textile and clothing demands a big share of raw materials production that is one of the main cause of its impact on the environment, which even occurs in the case of the production of crops to get natural fibres. Cotton is used in more than 43% for all the fibres for the manufacturing of textiles causes a lot of environmental problems as its production consumes a lot of pesticides, water, fertilizers and even it requires a lot of space for manufacturing. These severe impacts can be reduced to a great extent by producing bio cotton that requires comparatively less quantity of water and causes low pollution as compared to the normal cotton fabric. Natural fibres have a very heavy impact on the environment, especially silk that has many adverse impacts including the participation in the global warming,

exhaustion of the natural resources of the world, excessive use and loss of water; and the release of the greenhouse gases (Baban, Yediler, & Ciliz, 2010).

On the other hand, there are some other natural fibres considered including linen, hemp and nettle; that comparatively require fewer pesticides, water and fertilizers. Polyester is considered to be non-biodegradable and is made from fossil fuels. As compared to cotton, it requires less quantity of water, has low-temperature requirements for washing, capable of getting dried quickly and does not needs ironing. Studies have revealed that washing of polyester clothes result in the discharge of a bulk quantity of microplastic fibres that produce a lot of chemicals in the environment that finally end up in the oceans (Dawson, 2012).

The Manmade Cellulosics (MMCs) are bi-products of cellulose extracted from the wood flesh of various trees. The most popular MMC is rayon that is biodegradable and is produced using renewable plants. But the cellulose grows very slow and require a lot of water and use of many pesticides. Therefore, research is ongoing for the utilization of materials including cotton linter, pineapple leaves, cupro and lyocell; that are innovative and possess a lot of sustainability as compared to rayon (Shaikh, Chaudhari & Varma, 2012).

2. Production and Processing in Textile Industry:

A heavy amount of chemicals, water and energy, is utilized in various processes for the production of textiles including the spinning of yarns using the raw materials, weaving the yarns into the fabric, application of various methods for finishing the fabric including dyeing and strengthening of fabrics.

There is a big range of chemicals that are utilized in the making of different types of fabrics. Among those chemicals, some are considered to be harmful to the environment and health as well. According to a study, the process of dying of fabrics may utilize up to 150 litres of water for the production of only one kilogram of fabric. Many textile industries of undeveloped countries release the wastewater used in dyeing in the streams without even filtering it that is very harmful to the environment (Alkaya, & Demirer, 2014).

The finishing and dyeing processes of the textile industry make it one of the worst chemically exhaustive industries all over the world and excessively utilize clean water. There are more than 8000 chemicals used in a lot of processes for the manufacturing of textiles. A lot of these chemicals are very toxic and extremely harmful for the health of humans resulting in direct and indirect problems. Water is also extensively used for washing yarn, printed and dyed yarn and fabric to achieve lively backgrounds and quick washing objectives. Various agents that include different enzymes and soaps made from caustic soda are utilized for this. Only the dyeing unit of the textile industry is responsible for up to 20% of the waste water discharge. There is also a lot of water required to clean the machines used in printing processes. The overall processes for the production of textile products are responsible for the adverse hazards to the overall environment (Günay, 2013).

3. Distribution and Transportation of Textiles and Apparel:

The finished goods and raw materials of the textile industry are transported and distributed by exporting these products by the producers to other countries for consumption, which requires a lot of time and have long routes for delivery.

The main issues in the transport and distribution is the formation of waste in the form of different materials for packaging, bags, tags and hangers including a big quantity of the products that fail to be delivered to the desired destination and remain unsold for a long time in the form of leftovers that are finally discarded due to various reasons (Jackson, 2013).

By discussing the above processes of the production and distribution of the textile industry, it has been learnt that the environmental hazards of the market sector have a lot of global adverse impacts that must be taken care of in the long run for avoiding the collective loss to the environment.

CONCLUSION

The overall impact of the textile industry has been discussed along with special consideration on the health and the environment. By going through the overall text it has been highlighted that the textile industry although provides many trendy and fashionable fabrics and apparels, besides it is responsible for a lot of hazards for the health and the global environment as well. There are some recommendations to minimize the negative impacts caused due to the production of textiles and fabrics. It is very important to educate the staff and workers of the textile industry regarding the hazards of the occupation and how to deal with them. The management of the textile mills and factories make sure for taking the required measures for the protection of staff from the potential threats of the industry and get them trained to deal with such circumstances.

As the various processes and their possible hazards are discussed, there is a dire need to improve the processes for the textile production so that there should be controlled or limited harm to the environment that is mostly due to the pollution of the textile industry.

REFERENCES

Hasanbeigi, A., & Price, L. (2015). A technical review of emerging technologies for energy and water efficiency and pollution reduction in the textile industry. Journal of Cleaner Production, 95, 30-44.

Kant, R. (2012). Textile dyeing industry an environmental hazard. Natural science, 4(1), 22-26.

Som, C., Wick, P., Krug, H., & Nowack, B. (2011). Environmental and health effects of nanomaterials in nanotextiles and facade coatings. Environment international, 37(6), 1131-1142.

Padhi, B. S. (2012). Pollution due to synthetic dyes toxicity & carcinogenicity studies and remediation. International Journal of Environmental Sciences, 3(3), 940.

Wittcoff, H. A., Reuben, B. G., & Plotkin, J. S. (2012). Industrial organic chemicals. John Wiley & Sons.

Verma, A. K., Dash, R. R., & Bhunia, P. (2012). A review on chemical coagulation/flocculation technologies for removal of colour from textile wastewaters. Journal of environmental management, 93(1), 154-168.

Kim, K. H., Jahan, S. A., & Lee, J. T. (2011). Exposure to formaldehyde and its potential human health hazards. Journal of Environmental Science and Health, Part C, 29(4), 277-299.

Meena, M. L., Dangayach, G. S., & Bhardwaj, A. (2014). Investigating ergonomic issues among workers in hand block textile printing

industries. International Journal of Business and Systems Research, 8(4), 392-401.

Lacasse, K., & Baumann, W. (2012). Textile Chemicals: Environmental data and facts. Springer Science & Business Media.

Ertaş, M., Acemioğlu, B., Alma, M. H., & Usta, M. (2010). Removal of methylene blue from aqueous solution using cotton stalk, cotton waste and cotton dust. Journal of Hazardous Materials, 183(1-3), 421-427.

Fuente, A., & Hickson, L. (2011). Noise-induced hearing loss in Asia. International Journal of Audiology, 50(sup1), S3-S10.

Aderaw, Z., Engdaw, D., & Tadesse, T. (2011). Determinants of occupational injury: a case control study among textile factory workers in Amhara Regional State, Ethiopia. Journal of tropical medicine, 2011.

Meena, M. L., Dangayach, G. S., & Bhardwaj, A. (2014). Investigating ergonomic issues among workers in hand block textile printing industries. International Journal of Business and Systems Research, 8(4), 392-401.

Sealetsa, O. J., & Thatcher, A. (2011). Ergonomics issues among sewing machine operators in the textile manufacturing industry in Botswana. Work, 38(3), 279-289.

Hung, Y. T., Wang, L. K., & Shammas, N. K. (Eds.). (2012). Handbook of environment and waste management: air and water pollution control (Vol. 1). World Scientific.

Ghaly, A. E., Ananthashankar, R., Alhattab, M. V. V. R., & Ramakrishnan, V. V. (2014). Production, characterization and treatment of textile effluents: a critical review. J Chem Eng Process Technol, 5(1), 1-19.

Wang, Z., Xue, M., Huang, K., & Liu, Z. (2011). Textile dyeing wastewater treatment. In Advances in treating textile effluent. IntechOpen.

Baban, A., Yediler, A., & Ciliz, N. K. (2010). Integrated water management and CP implementation for wool and textile blend processes. CLEAN–Soil, Air, Water, 38(1), 84-90.

Dawson, T. (2012). Progress towards a greener textile industry. Coloration Technology, 128(1), 1-8.

Shaikh, T., Chaudhari, S., & Varma, A. (2012). Viscose rayon: a legendary development in the manmade textile. International Journal of Engineering Research and Application, 2(5), 675-680.

Alkaya, E., & Demirer, G. N. (2014). Sustainable textile production: a case study from a woven fabric manufacturing mill in Turkey. Journal of Cleaner Production, 65, 595-603.

Günay, M. (2013). Eco-friendly textile dyeing and finishing.

Jackson, T. (2013). Material concerns: Pollution, profit and quality of life. Routledge.