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A study on health problems faced by workers in silk industry

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Abstract
The main objective of the present study is to throw light on factors associated with health problems faced by workers in silk industry and the safety measures that are to be taken to overcome these problems.

Keywords: Health problems, workers, silk industry, safety measures

Introduction

Sericulture is a labour oriented agro based industry that plays a significant role in elevating the rural economy of India. India is the largest producer and consumer of silk in the world, with silk production of appropriately 20000 million tons which generates a turnover of Rs 25,000 crores of which Rs2500 crores by foreign exchange by employing 5 lakh rearers and rest are stake holders such as reelers, twisters, weavers, printers etc. India is the only country producing all five types of silk namely mulberry, tasar, oak tasar, eri and muga.

The major traditional states that produce silk are Telangana, Andhra Pradesh, Karnataka, Tamil Nadu, Jharkhand, Chattisgarh, Orissa and West Bengal. The pure silk is used as base material for weaving of Kanjeevaram, Banarasi, Mysore, Pochampally, Chanderi, Paithani, Pathola, Baluchari, Tasar,eri and muga silk sariesetc.

Silk production is a blend of ancient techniques and modern innovations. The different components involved in silk manufacturing are

1. Cultivation of mulberry and non-mulberry food plants
2. Rearing of different silkworms
3. Grainages (where are eggs are produced)
4. Reeling of filament
5. Twisting
6. Weaving
7. Printing and dyeing

Package of practices are followed to improve mulberry leaf yield per unit area at low cost. The larvae which hatches from the eggs feeds on food plants and forms cocoons after spinning. The fully grown silkworms spins cocoons around itself by twisting its head in a form of "S" or "8" to form silk which is in liquid state within the silk gland and solidifies on contact with air after being spitted through the spinneret. The silk is an animal protein fiber produced by silkworms in order to encase themselves in the form of cocoons to protect itself from adverse climatic conditions. The next process is silk reeling, wherein the cocoons are boiled in hot water to soften the sericin and then carefully the filaments are reeled from 7-8 cocoons at a time to create a single strand.

The reeled silk is formed into silk yarn or silk thread through throwing. The raw silk skeins are sorted according to their color, size, length after washing in warm water with soap or oil. After skein drying, they are placed on reels from which it is wound on to the bobbins. The strands are then doubled and then given twists based on the kind of silk yarns. To get equal diameter through out its length the yarn is run through rollers. The filament is then weaved, the weaved fabric may be dyed or printed according. Lastly, the silk fabric is subjected to finishing processes in order to improve their appearance, durability and feel. Calendering, cireing and singeing are done to enhance luster and smoothness andsteaming for raising pile weaves. To removes silk wrinkles from the finished fabric, pressing or lustering is done with heated rollers and then soaked in dilute acid to bring luster to silk fabric

Even though silkworm life cycle is ecofriendly, the workers in silk industry are exposed to a number of health problems due to lack of education, unaware of hazards of their occupation general backwardness in the sanitation and poor nutrition. Some of the factors that cause health problems are:

1. Use of organophosphates pesticides for control of mulberry pests
2. Carbon monoxide which is released from use of burnt coal for raising room temperature in winter season
3. Use of formalin (2%) and bleaching powder for disinfection of rearing house
4. Use of bed disinfectants like RKO, Sanjeevini, Surakshaetc made from paraformaldehyde
5. Handling of diseased worms and excreta with bare hands
6. Inhaling the moth scales during grainage processes trigges asthma, conjunctivitis and respiratory problems
7. During reeling, the workers put their bare hands in hot water (45^0c)to feed the cocoons
8. During dyeing of silk fabrics about 70% benzidine based silk colorants such as azo dyes are used.
9. Lead acetate and heavy metal complex dyes used during coloring of silk fabrics affected the brain.
10. The millions of tons of dye effluent isbeing dumped into the rivers which affects the reading and reasoning abilities of child labourers engaged in silk industry.
11. Pentachlorophenol (spray starch) is used to protect the silk garments from mould attack.
12. The women who are easily available at less wagesin reeling sectors are affected by various reproductive, musculoskeletal, menstrual problems and high risk of miscarriages as they stand and are exposed to hot water vapours in ill ventilated reeling units.

Health risks factors in mulberry cultivation

The dicot weeds are controlled by use of 2, 4, D amine, it is reported that there is a connection between this weedicide and blood cancer. For control of monocot weeds, glyphospate is used, carcinogenic potential of this chemical has been reported. The Dichlorvos (DDVP) and Bavistin used for control of mulberry pests are known to induce neurophysiological and behavioural changes in human beings.

Health risks during rearing

a. In winter season in villages, charcoal stoves are used to raise the room temperature during rearing, the carbon di oxide and carbon monoxide silent killers which are produced in the ill ventilated rearing houses if blocked from escaping or dangerous levels are reached, symptoms of toxicity noticed are headache, nausea and vomiting.
b. Un hygienic conditions that prevails due to left over leaves and litter if unattended not only leads to silkworm mortality but also affects the rearers health

Disinfectants used during rearing

1. Formalin is commonly used disinfectant. The effectiveness of formalin depends on concentration, duration of contact, room temperature and humidity at time of spraying
2. The formalin (2%) is more effective at temperature (25%) and humidity (70%) and the efficiency of formalin increases when temperature is raised to 25^0c,utmost care should be taken while spraying as it has a irritant effect on the eye, nose and skin when present in the air at 0.1 ppm levels
3. Bleaching powder (5%) is used for disinfection of rearing house and surroundings, its bactericidal effect is due to release of nascent oxygen and the chlorine produced. Contact with bleaching powder causes skin and eye problems.

Hygienic conditions to be maintained during silkworm rearing:

Maintenance of hygienic conditions inside and outside the rearing house helps in checking the pathogens that cause silkworm diseases The rearing appliances along with room should be properly disinfected. The rearers who enter the room should not only wash his hands with soaps but also disinfect his feet at the entrance. Diseased, dead and unequal larvae should be picked and disposed into a container filled with bleaching powder or formalin solution during rearing process. Sterilisedcleaning nets areused for bed cleaning. Any negligence of hygienic leads to silkworm diseases, if diseased worms are not removed on time, it putrifies and causes health problems.

The bed disinfectants like Reesham Keet Oushad, Sanjeevini, Suraksha etc. contain paraformaldehyde, benzoic and slaked lime etc which may result in sensitization, inflammation of the eyes (itching and watering).

Problems that are faced in process of silkworm egg production or grainage

Grainages are egg production centers where the disease free layingsof silkworm called industrial seeds are produced on large scale to be supplied to commercial rearers. Grainages may be government or private owned. In grainages, different proceedures are followed namely (1) Preservation of cocoons (2) Moth emergence (3) Coupling (4) Decoupling and (5) Oviposition. During the above mentioned process, the wings of the moth which are minutely scaled triggers asthma, exposure to scales has been associated with adverse respiratory effects, diminished lung functioning, a chest tightness experience by workers after a week end vacation which continues to be high in India. It is reported that 63% of the women are more prone to this problems than men.

Health problems faced by reelers during reeling

The process of unwindingof the single long fibroin by dissolving the sericin is called reeling. Reeling involves a no of preliminary steps like re reeling, twisting, throwing and fabric manufacturing after reeling, while prior to reeling cooking, boiling, deflossing and riddling are carried out before it is made into skiens, books and lastly bales, after which the silk is marketed. the first process in reeling is stifling wherein pupa is killed without causing damage to silk quality. After sorting and riddling, the cocoons are to be cooked.

1. When the cocoons are immersed in hot water (45^0c-65^0 c) to loosen the fibers, the reelers put his bare hands into hot water to pick the silk threads, this leads to blisters in hands leading to secondary infection like dermatitis among female workers resulting in losing an average of ten working days per year. The skin lesions localized on forearms, wrists and fingers are characterized by erythema covered with small vesicles which become chronic and extremely painful if neglected.
2. Facial swelling, skin allergies and ocular inflammation are also noticed in reeling sectors.

In a study from silk industry, the dustiness and lengthy exposure in reeling units are contributory factors for chronic bronchitis among workers in reeling, spinning, weaving sectors of silk industry. In a report by Harindranath *et al.*, in 1985 observed that 16.9%-36.2% of workers are suffering from this disease he also reported that people surrounding the reeling unit were at risk of developing occupational asthma due to continual release of silk allergens in to air.

Three types of silk allergens are there, pupa, cocoon and sericin. As these are not available in India, the raw materials from research centers can be obtained and sent to diagnostic medicare for preparation of allergen extracts for skin prick test. From the studies of Chitra Nagaraju, it was noticed that there is high burden of silk allergen sensitively among worker of silk filature unit in Ramanagar (Karnataka).

3. Temperature extremes during cooking and reeling pose a danger to workers heat stress can cause heat stroke, exhaustion, crampes, rashes, seveaty palms or dizziness and dehydration.
4. Lung and skin diseases are generally caused by chemicals in the reeling basins in an ill ventilated filatures
5. Noise is another common hazard followed by musculoskeletal problems are also faced by the workers as hands and hips are strained during rearing, reeling and weaving.
6. Chronic cough are also noticed among rearers and reelers in silk industry.

Health problems during weaving

The health problems noticed are eye sight, joint pains etc most of the weavers complain about back ache, stress and strain due to weaving

Health problems faced by workers during dyeing of silk filaments

Metal complex dyes find application in silk dyeing due to its fastness properties. Heavy metal toxicity damagesnot only thevital organs but also the physical and mental conditions of the workers. The lead acetate for dyeing of silk cloth, lead nitrate which is used as mordent and oxidizer in dyeing affects the nervous, reproductive systems, reading and reasoning abilities in child workers, hearing and speech delay in adult. Not only the dyes, even the effluents dumped into rivers causes environmental pollution as it contains azo dyes, chromium etc

Problems faced in screen printing sector

During screen printing, the inks, thinner and materials are used, high xylene, toluene and ketones (methyl and ethyl) levels in these solvents causes headache, irritation of eyes.

Health and safety at work place

Health and safety is an area concerned with health, welfare, protection and safety of workers or employees as it is the duty of the employers to take care of his workers. In order to reduce illness and problems which results from exposure in a workplace

The following safety measures are to be followed in sericulture:

1. Ideal rearing houses are to be well ventilated with controlled environmental conditions
2. Rearers have to wear sterile gloves while handling dead worms, disinfectant and bed disinfectants.
3. While using formalin and bleaching powder, it is advised to wear face masks and gloves.
4. Proper environmental conditions, good rearing techniques, quality mulberry leaves and races are needed to prevent /control silkworm diseases.
5. Health education and medical supervision is a must at regular intervals t in silk industry.
6. To prevent noise exposure, adequate lubrication of machineries and interposition of sound baffles is necessary.
7. The workers in reeling unit are exposed to noise pollution hence a hearing protection programmed featuring periodic audiograms is desirable.
8. Provision of good sanitation and hygienic condition in reeling unit with frequent replacement of water in reeling basin is necessary.
9. To prevent musculoskeletal problems proper posture is a must.
10. Thus it can be concluded that a industry grow with employees and employers with the industry hence, health and safety at work place are important for moral, legal and financial reasons.

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