

ALLERGIES IN THE WORKPLACE

CONTACT DERMATITIS IN THE TEXTILE INDUSTRY

Lerato Maiphetho, BSc Med, MB ChB

Occupational Medicine Registrar, Occupational and Environmental Health Research Unit, School of Public Health and Family Medicine, University of Cape Town

ABSTRACT

Introduction: The textile industry provides a workplace where workers are prone to develop occupational skin diseases (OSDs), commonly manifesting as irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD). Since these are compensatable diseases, it is vital that the attending health care worker understands the processes involved in the long and complex textile production chain, in order to identify the causative substance.

Case report: We present a case of a machinist who has been working in the textile industry for 33 years who had eczema. The standard patch test showed that she was allergic to thiuram mix, cobalt chloride, nickel sulphate and colophony. She had an irritant reaction to wood mix and composite mix.

Discussion: The textile production chain is long and complex with irritants and allergens found throughout this chain. It starts with producing the fibre (raw material), which is spun and twisted into a yarn. A yarn is then knitted and woven into a fabric (grey fabric). These grey fabrics are then prepared, dyed and finished to become a cloth that is ready to be manufactured into garments. We discuss the clinical findings in our patient and their relevance to her occupation.

Summary: The textile industry has a long and complex production chain which involves using many substances that are either irritants and/or allergens. It is important for a health care worker to know the process and the substances used in order to make the right diagnosis of occupational skin disease.

INTRODUCTION

The textile and clothing industry is one of the economically significant industries of the industrial world,¹ and is South Africa's sixth largest manufacturing sector employer.² The Western Cape is the leading clothing-textile region, employing 170 000 of the 4.2 million people living there,³ thus making it the most significant industrial source of employment in this province.³

This industry has been documented to have one of the longest and most complex industrial chains in the manufacturing sector.⁴ Irritants and allergens found along this chain⁵ put the workers that come into contact with them at risk of developing an occupational skin disorder (OSD).

OSDs are one of the most common work-related illnesses,⁶ commonly manifesting as irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD).^{7,8} The causative agents for ICD and ACD can be the textile material (fibre, yarn and fabric), the finishing agents (resins and chemicals), dyes, unrelated agents such as soaps, perfumes, infections,^{9,10} the workplace environment (heat and vibrating machinery) and the physical characteristics of the worker (hyperhidrosis, damaged skin and underlying skin disease).¹¹

Occupational ICD and ACD are compensatable diseases; therefore it is important to prove that they are caused or aggravated by conditions in the workplace.¹² The health care worker must therefore have an understanding of the processes involved in the long and complex textile production chain and a full grasp of the workplace situation.⁷

We report a case of occupational contact dermatitis occurring in the local textile industry, highlighting the importance of a detailed work history and work visit (if necessary) in order to arrive at the correct diagnosis in a patient presenting with dermatitis.

CASE REPORT

A 51-year-old machinist of 33 years standing presented with a 2-month history of itching, swelling, redness and blistering which was followed by dryness, cracking and bleeding of the skin. The rash started on the hands and legs, later spreading to involve the face, ears and trunk. It was relieved by using a steroid cream and worsened by sweating. She related the current flare to working with new materials namely, stretch denim and ramie.

The problem started initially in 1973, 4 months after she started working in a leather factory. The only asymptomatic period occurred in 1987, when she was unemployed. The symptoms recurred in 1988 when she resumed employment in a clothing factory. She has type 2 diabetes, and there was no history of childhood eczema or asthma, but her mother has eczema.

Physical examination of the skin was consistent with chronic eczema. Erythematous, lichenified areas were evident on the hands, ears, trunk and feet (Figs 1 and 2). There were no signs of a fungal or bacterial infection. She was otherwise well.

A patch test was done using a battery of 43 international standard allergens. The allergens were applied under occlusion in Finn chambers for 48 hours. Readings were done 24 hours after removal of the chambers. Strong allergic reactions were observed to thiuram mix, cobalt chloride, nickel sulphate and colophony. Irritant reactions were noted to woodmix (pine, spruce, birch and teak) and composite mix.

A workplace assessment was undertaken to determine the relevance of these findings. The patient's main task was machine-stitching garments. This entailed the regular use of metal nippers which contained nickel and an electric sewing machine which had a foot pedal made of rubber. She also worked in the finishing department where they used hair spray to stiffen certain garments after ironing so that the shape was maintained. Steam from a central source was piped to hand irons for pressing garments. Water used for this process was housed in metal tanks. A chemical

Correspondence: Dr LP Maiphetho, Occupational and Environmental Health Research Unit, School of Public Health and Family Medicine, University of Cape Town. Tel 021-404-3027, fax 021-556-7721; e-mail lmaiphetho@pgwc.gov.za

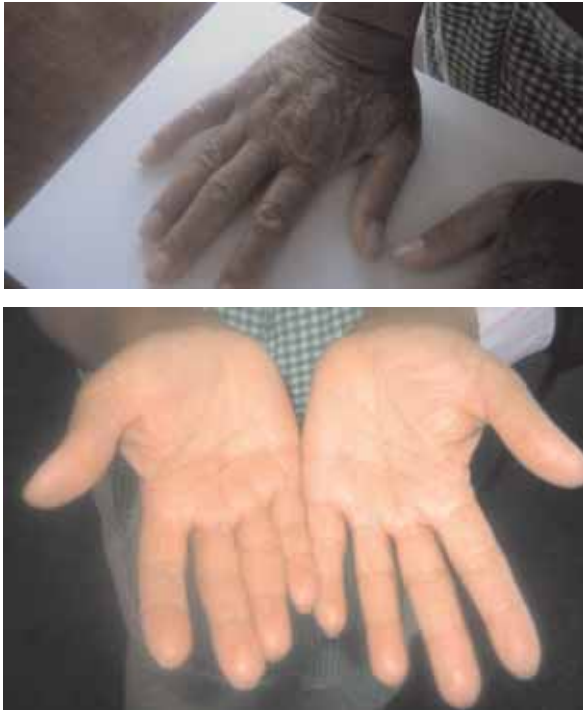


Fig. 1a & b. Contact dermatitis on the hands.

mixture (Dyno spot) was used to remove stains from the finished product. A variety of fabrics were used to make garments dependent on the order being executed. The predominant fabrics used were cotton, lycra and mixed nylon/cotton.

DISCUSSION

Clinically, this worker had an ACD with probable superimposed irritant dermatitis. The history of work-related onset flares with exposure to specific materials and resolution when away from work strongly supports an OSD.

To interpret the patch test findings and their occupational relevance, understanding the work tasks and processes and a familiarity with the substances used in the textile industry is essential, in order to advise the patient on how to avoid hazard exposures in the workplace.

The following discussion outlines the textile production processes and the dermatological effects of the substances used in each process. The significance of the patient's patch test results, namely allergic reactions to nickel sulphate, cobalt chloride, thiuram mix and colophony, can then be explained relative to her work and the workplace environment.



Fig. 2. Lichenified area on the foot.

Production process of cloth

The production of cloth involves a chain of complicated processes. Fibres, the raw materials, are spun or twisted to form yarns. The yarns are woven or knitted to form fabrics. The fabrics are then cleaned, washed, desized and singed in preparation for the finishing and colouring processes.^{1,12} The finishing process involves altering the appearance and properties of the fabric, and altering its colour (Fig. 3).¹ The finished piece of fabric is cloth from which different products can be made, like clothing, carpets, home and industrial textiles.¹³

Even though our patient is employed as a machinist making garments at the end of the production chain, the chemicals used throughout this production chain have to be considered even though they may only be present in small amounts.

Contact dermatitis in each process

Fibres

Fibres can be natural or man-made (Table I, Fig. 4).¹ The natural fibres are obtained from vegetables (cotton, flax, ramie, manilla, sisal, kapok and coir), animals (sheep wool, camel wool, goat mohair or cashmere, angora and silk) and minerals (asbestos). The man-made fibres are of vegetable origin (latex or regenerated cellulose), synthetic (polyamide, polyester, polyacrylic, polyethylene, polypropylene, modacrylic and elastane) or inorganic (glass and metal).¹

Fibres commonly cause ICD and rarely cause ACD. The synthetic fibres (e.g. polyesters) and wool fibres tend to be the irritants, and this has been linked to the surface structure and diameter of the fibres. An example of a chemical irritant is mercaptobenzothiazole, which is used in the manufacture of polyesters.¹¹

The chemicals and materials used in the production of the fibres can cause allergies. In the polymerisation of nylon 6 fibres, ε-caprolactam is a known allergen¹ as are proteins of the *Havea brasiliensis* plant, the sap of which is used in the manufacturing of natural rubber latex fibres.¹⁴

Yarns

These are made by twisting or spinning both natural and man-made fibres (e.g. wool and sewing thread).¹ The irritants and allergens in yarns are the same as those found in the fibres. The sizing process (adding substances to the fibre to stiffen it and thus protect it from damage during high-speed spinning) exposes the workers to irritants such as starch or polyvinyl alcohol (used as size)¹⁵ and 2,3-epoxypropyl trimethyl ammonium chloride, which is a potent allergen and irritant.⁸ Other irritants include spinning oils, and heat.^{4,8}

Fabric

These are made from both natural and man-made fibres by interlocking the yarns to produce woven and knitted fabrics (e.g. shade nets and wool).¹ They are manufactured by either spinning or weaving.¹⁴ As with yarns, the sizing process (to protect fabric from damage during high-speed weaving) also exposes the workers to irritants such as starch or polyvinyl alcohol (used as size)¹⁵ and 2,3-epoxypropyl trimethyl ammonium chloride.⁸ Other irritants include weaving oils, warping oils and heat.^{4,8}

The finishing of yarns and fabric

Preparation

Before being dyed the yarns and fabric go through a preparation process, which involves removing all for-

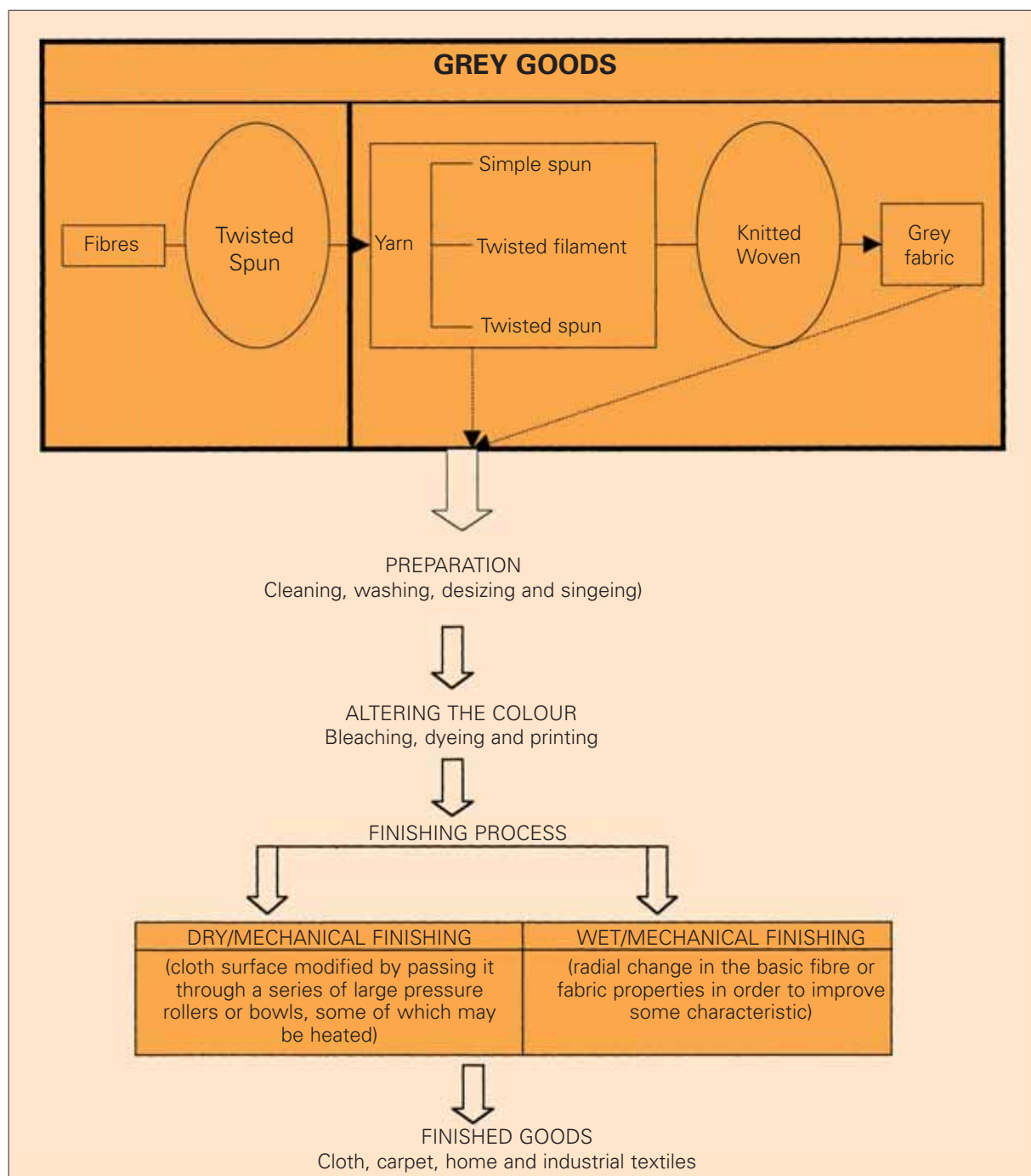


Fig. 3. Production process of fabric from fibre.¹ The dotted lines show that both yarn and fabric can go through the processes of preparation to finishing.

eign material from the product.¹ This involves scouring (washing to remove impurities and plant materials), desizing (removal of size to allow easy dyeing), bleaching (improving the whiteness, destroying micro-organisms, uniformly increasing the affinity of the yarn/fabric for dyestuff and stripping stains/dyes from the yarn/fabric) and mercenisation (treatment of cotton to prevent shrinking during normal washing and improve strength and dye uptake).^{8,16,17}

Workers come into contact with many chemicals during these processes. Irritants such as sodium peroxide and sulphuric acid are used to remove natural impurities and plant material, respectively.^{15,16} On the other hand, synthetic fabrics and protein-fibre fabrics contain few or no natural impurities and are therefore washed with water and less irritating mild detergent or sulphated alcohols.¹

During mercenisation workers are exposed to the irritant sodium hydroxide (caustic soda)^{8,15,16} The oxidative bleaches (e.g. hydrogen peroxide, sodium perborate, chlorine and potassium permanganate) and the reductive bleaches (e.g. thiourea dioxide, sodium bisulfite and sodium formaldehyde sulfoxylate) are known irritants.^{8,15,16} Chlorine compounds used to prevent shrinking of wool during the dyeing process are also irritants.

Dyeing

The dyeing process has been identified as the principal cause of OSD in the industry,¹⁸ although automation has reduced the incidence. Different dyes are used for the different fibres. Reactive dyes are used for natural fabrics (e.g. Procion MX used for cotton, linen, hemp, rayon).⁵ Disperse dyes are used for synthetic fabrics (e.g. Disperse Blue 106 and 124, used in the 100%

Table I. Comprehensive production chain and its dermatological health effects

Process	Products	Chemicals	Health effects
FIBRES			
Natural	Vegetables: cotton, flax, ramie, manilla, sisal, kapok, coir Animal: wool, mohair, cashmere, angora, silk		Irritants Allergens
Man-made	Minerals: asbestos Latex, regenerated cellulose Polyamide, polyester, polyacrylic, polyethylene polypropylene (carpets), modacrylic and alastane Inorganic: glass, metal.	Latex Mercaptobenzothiazole Acrylonitrile compounds (for fleece clothing) Asbestos	Allergens Irritants Irritant
YARN			
	Woven Knitted		Irritants
Sizing	Addition to stiffen the yarn, thus protecting it from damage during spinning and weaving.	Starch and polyvinyl alcohol	Irritants
PREPARATION OF FABRIC			
Cleaning		Water Detergent	Irritants
Washing	Removal of natural impurities	Sodium hydroxide	Irritant
Bleaching	Whitening of fabric	Reducing agents	Irritant
Desizing	Removal of size (starch) from the fabric	Amylase	Irritant
Singeing	Removal of fibrils	Heat	Irritant
Carbonising	Removing plant materials	Sulphuric acid	Irritant
Defibrillation	Removal of fibrils from cotton fabrics	Cellulase	Irritant
Mercenisation	Treatment of cotton yarn or fabric to improve dye uptake	Sodium hydroxide	Irritant
Mordant	Aids bonding of dyestuff to fabric	Chromium compounds (for wool)	Allergens
Scouring	Washing fibres to remove contaminants	Ammonium sulphate Sodium hydroxide	Irritant Irritant
Chlorination of wool	Prevents shrinking when laundered	Chlorine	Irritant
DYEING			
Levelling, anti-migration	Acid dyes (used for wool, silk, nylon)	Acetic acid	Irritants
Padding	Wrapping dyed fabric in plastic		
Binders	Aid dyeing	Acrylic polymers	Irritants
Carriers	Aid dyeing at moderate temperature in polyesters	Potassium dichromate	Allergen
Fixative (soda ash for reactive dyes)	Helps improve washfastness of dye fabric	Calcium hydroxide	Irritant
DYES			
	Disperse dyes (only for normal polyester)	Disperse dyes	Allergens
	Reactive dyes (Cibacrm F, Procion MX (most popular)	Reactive dyes	Allergens
		Eosin Methylene blue Na alginate	Photo-irritants and allergens
CHEMICAL/WET FINISHING			
BLEACHING			
Oxidising agents	Protect dyes from reduction in printing process under acid conditions	Hydrogen peroxide Sodium perborate Sodium percarbonate Chlorine	Irritant Irritant Irritant Irritant

continued overleaf

CHEMICAL/WET FINISHING (cont)			
Process	Products	Chemicals	Health effects
Reducing agents	Used in discharge and stripping processes – flammable	Thiorea dioxide, sodium bisulfite, sodium formaldehyde sulfoxylate)	Irritants
Neutralising bleach (antichlor)	Rinsing the bleach from fabric	Sodium bisulfite Hydrogen peroxide Sodium thiosulfate	Irritants
Neutralising the acid released in antichlor	Sodium carbonate	Irritant	
Protective substances for dyes	Washing indigo-dyed denim – faded appearance	Sodium chlorate	Irritant
	Protect dyes from degradation caused by reducing conditions	Potassium monopersulphate	Irritant
	Stabilise hydrogen peroxide bleaching	Potassium permanganate Na m-nitrobenzene sulfonate Na silicate	Irritants
Starching	Stiffening of fabric	Starch	Irritant
Waterproofing		Polyvinyl chloride	Irritant
Stain removal		Hydrochloric acid	Irritant
		Perchloroethylene	Irritant
		Trichloroethylene	Potent irritant
		1,1,1-trichloroethane	Irritant
Wrinkle-resistant		Urea-formaldehyde resin	Allergen
ACCESSORIES			
Thiuram mix	Found in rubber products and adhesives for leather and vinyl	Tetramethylthiuram monosulfide Tetramethylthiuram disulfide Dipentamethylenethiuram disulfide Tetraethylthiuram disulfide	Skin sensitizer, mild allergen Allergen Allergen Allergen
Colophony (rosin)	Consists of abietic acid. Found in glues, adhesives, printing inks		Allergen
Nickel	Found in tools, scissors, keys, needles, machines		Allergen
Cobalt chloride (accelerator of polyester resin systems, dryers in printing inks)	Found in metal-plated objects, tanned leather and textiles. Machinists at risk		Allergen
Mercaptomix	Accelerators to improve rubber properties	Mercaptobenzothiazole Morpholinylmercaptobez-othiazole Cyclohexylbezthiazyl sulphenamide	Allergens
EQUIPMENT and ENVIRONMENT			
	Machine oil		Allergen
	Ironing (steam, heat)		Irritant
	Sewing (vibration)		Irritant
	Airconditioner		Irritant
WORKER	Skin barrier (age, underlying skin disease)		Irritant
Adapted from Elsner <i>et al.</i> , ¹ Technology-Engineering, ¹⁶ Textiles and Leather Dyeing and Finishing ¹⁷ and Wilson. ²³			

acetate and 100% polyester blue, black, green and violet liners of women's clothing like underwear, blouses, pants, swimming suits, pantyhose, shoulder pads, velvet leggings and body suits).^{5,18,19}

Although ACD is rare, these two dye groups are the source of the main skin sensitisers with the Disperse

group being the most frequent sensitisers.⁸ The Disperse group causes sensitisation both before and after application of the dye to the fabric while the reactive dyes cause sensitisation only before the dye is applied to the fabric, i.e. while mixing the dyes. The Disperse dyes are most frequent sensitisers found on

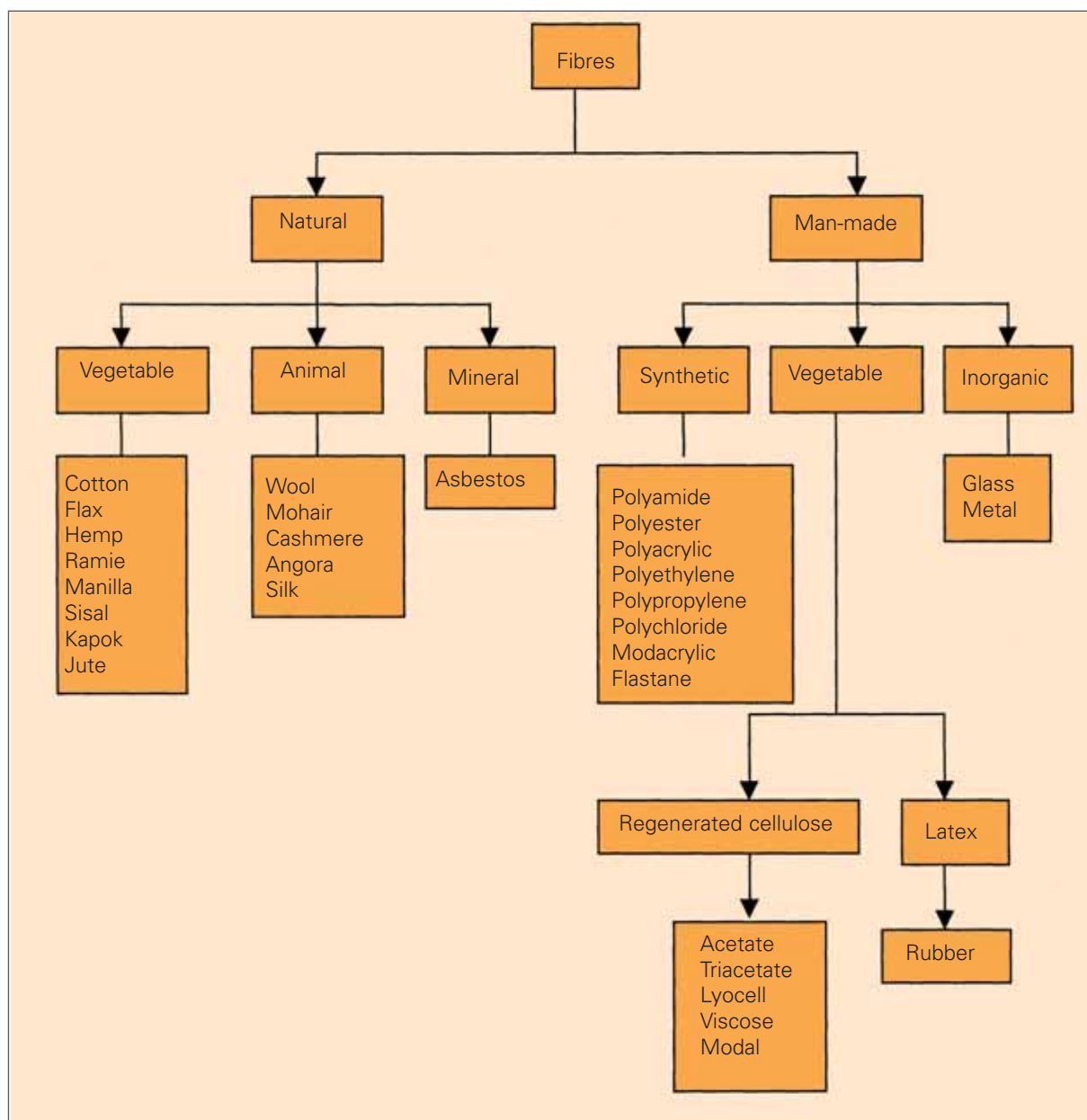


Fig. 4. Types of fibres (Adapted from Elsner et al.)¹

patch testing especially Disperse Blue 106, Disperse Blue 124 and p-aminophenol.⁸ Dyes like eosin, methylene blue and Disperse Blue 35, as well as being allergens are also photosensitisers.²⁰

Chemicals and metals used as mordants to give colour its permanence can be irritants or allergens, for example potassium dichromate used in wool dyeing¹⁵ is an allergen while sodium carbonate,²¹ mixed with reactive dyes, is an irritant.¹⁵

Finishing

Finishing includes a group of chemical and mechanical processes.^{1, 16} Chemical or wet finishing exposes the worker to many hazards because it involves adding chemicals and liquids to change the basic fabric or its properties to improve some aspects¹⁶ (Fig. 3).

Urea-formaldehyde resin used in materials such as a cotton/polyester blend fabric to make the fabric wrinkle-resistant has been reported to be highly allergenic.²² It is suggested that the resin may be the source of allergic reactions to formaldehyde seen in these workers on standard allergen testing.⁵ Common

finishes include fire-retardant and water-repellent finishes. The fire-retardant finish contains a high proportion of irritants such as phosphorus, nitrogen, chlorine, antimony or bromine. The rubber or vinyl used to coat fabrics in the water-repellent finish is an irritant and allergen. Other chemical finishes involve treatments with hydrophobic materials such as waxes, silicones or metallic soaps which are irritants. Solvents such as perchlorethylene, trichloroethylene and 1,1,1-trichloroethane used for stain removal have also been associated with irritant contact dermatitis²³ and systemic disease.

The mechanical or dry finishing process modifies the surface of the fabric. The fabric is passed, in open width, through a series of large pressure rollers or bowls, some of which may be heated, for example gaufering, calendaring, moiré or embossing. This process is essentially mechanised; therefore the worker does not come into contact with any dermatological hazards¹⁷ (Fig. 3).

Our patient did not come into direct contact with the agents discussed above as she used the end product for garment manufacture. Residue on fabrics used for

garment manufacture cannot be ignored. She did however, come into contact with most of the substances which contain the chemicals and metals that were positive in her patch testing, at her work.

Garment manufacture

Colophony

This is a sticky substance found in pines and spruce tree trunks. It is ubiquitous, used in many sticky substances such as adhesive tape, glues, bandages, sealants, chewing gum, varnishes, cosmetics, eye shadows, hair sprays, coating for price labels, etc. It is also known as rosin and prepared from the resin of pine trees. It contains abietic acid which is a cause of ACD.²⁴

The positive reaction in our patient to colophony could be significant as potential exposures to colophony were identified in the hair spray that was used to prevent wrinkling of the finished garment, garment labels and the iron-on stiffening.

Thiuram mix

This is found in almost all rubber products and adhesives for leather and vinyl products. It is also a strong antimicrobial and antioxidant.²⁵ It contains four allergens, namely tetramethylthiuram monosulfide, tetremethylthiuram disulfide, dipentamethylenethiuram disulfide and tetraethylthiuram disulfide.²⁶ These chemicals are used as accelerators in the manufacture of both natural and synthetic rubber. Potential exposures include rubber boots, shoes, rubber soles, garden hoses, and elastic and rubberised clothing (such as stretch-fabric girdles, bras, stockings and waistbands), erasers, balloons, goggles, anti-slip carpet backing and wallpaper adhesives.²³

Our patient was exposed to this allergen when working with stretch denim which, according to her, triggered her dermatitis. Less likely exposures could be coming into contact with the paddle of the sewing machine, especially when wearing open shoes, and the elastic on her underwear. As rubbers glues are used extensively in the leather industry, she was probably initially sensitised in the 1970s, when she first developed contact dermatitis while working with leather product manufacture.

Nickel allergy

Nickel is the only element named after the devil.²⁷ It is commonly used in the production of stainless steel, to prevent corrosion. It is closely related to iron, copper, cobalt and zinc.²⁷ It is ubiquitous – daily exposure to the metal occurs in jeans studs, zips, rings, watch straps, spectacle frames, hooks, suspenders, scissors, knitting needles, sewing machines, dyes, pins and needles to name a few. Nickel is the metal/allergen that is implicated in ACD more than any other metal.^{23, 24, 28}

Our patient was exposed to this allergen in all aspects of her daily life. Work exposures that could have played a role in her presentation include the use of metal nippers, the sewing machine, and various sewing accessories such as pins, needles, studs, snaps, zippers, scissors and material dyes.

Cobalt chloride

This metal is commonly found together with nickel and thus has the same exposure risk and relevance.²⁵ It is also used as a dryer in oil-based paints, printing inks and enamels. It is a pigment in brown hair dyes and make-up and is used for moisture detection.²⁹ This

allergic reaction in our patient probably represents a cross-reaction to nickel.

Contributing factors

Environment

Environmental factors have been shown to cause and aggravate dermatitis. Friction, maceration, dryness, extremes of temperature, ultraviolet exposure and occlusion have all been implicated.^{5,23} Heat (by causing excess sweating) appears to have been an aggravating factor in our patient as her symptoms were worsened by the hot weather during the summer months of December and January.

Skin barrier

Any break in the skin barrier predisposes to contact dermatitis by increasing the penetration of the allergens and irritants. This breach can be caused by many factors but usually it is a cumulative effect of repeated small and varied insults that result in the damage. It has been documented that people with atopic eczema are more at risk of developing contact dermatitis.⁵ Our patient had no personal history of atopy.

Summary

The textile industry is one of the main sources of employment in the Western Cape and South Africa; therefore health care personnel need to be aware of the risks associated with the occupation in order to manage the diseases associated with it correctly. While byssinosis and lung disorders are widely recognised, skin diseases in the industry are disregarded or ignored because of lack of knowledge, and workers are led to believe they are expected sequelae of the work and of no consequence. It is important that health care workers are informed about skin disorders and understand the processes involved at the workplace in order to identify causative substances. This can be achieved by taking a proper work history and work assessment in all patients presenting with contact dermatitis.

Our patient certainly had an occupational disease. The onset while working in the leather industry and the recurrence when re-employed in the textile industry are best explained by the proven allergy to thiurams in rubber finishes used in garment manufacture, in particular stretch fabrics such as stretch denim and lycra. Protection from excess exposure to these fabrics and unnecessary exposure to nickel (plastic-coated nippers) will prevent flares of her contact dermatitis and allow her to continue working.

Declaration of conflict of interest

The author declares no conflict of interest.

REFERENCES

1. Elsner P, Hatch K, Wigger-Alberti W, eds. *Occupational Contact Dermatitis in the Textile Industry. Textiles and the Skin*. Curr Probl Dermatol Basel, Karger, 2003, vol 31, pp114-122. Available from <http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowFrePage&ProduktNr=228219&Ausgabe=0&ArtikelNr=72242&filep=72242fp.pdf> [accessed on 10 September 2006].
2. Infomat. Inc. Textile in South Africa. Accessed from <http://infomat.com/research/infre0000240.html> [accessed on 20 October 2006].
3. Provincial Government of Western Cape. Overview of Western Cape. Cape>Gateway. South African Yearbook 2002/2003. Available from <http://www.capegateway.gov.za> [accessed on 20 October 2006].
4. National Workshop on the Promotion of Organic Fairtrade Cotton. High Social and Environmental Impact in the Industrial Production Stage. Available from http://www.icea.info/doc/Present_Parma_2004%20-%20trad.doc [accessed on 12 September 2006].

5. Washington State Department of Labor and Industries. *Clothing Dermatitis and Clothing-related Skin Conditions. Safety & Health Assessment & Research for Prevention*. Report: 55-8-2001. August 2001. Available from www.inl.wa.gov/sharp/derm. [Accessed on 10 September 2006].
6. Meding B, Lantto R., Wrangsjö K, Bengtsson B. Occupational skin disease in Sweden - a 12-year follow-up. *Contact Dermatitis* 2005; **53**: 308-313.
7. Lushniak BD. Occupational contact dermatitis. *Dermatologic Therapy* 2004; **12**: 272. Available from <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1396-0296.2004.04032.x?cookieSet=1&journalCode=dth> [accessed on 11 September 2006].
8. Adams RM. Textile workers. *Occupational Skin Disease*, 3rd ed. Philadelphia: WB Saunders, 1999: 724-726.
9. Elsner P. Textiles and the skin. No. 67 Skin, *Karger Gazette* Available from http://www.karger.com/gazette/67/Elsner/art_1.htm [accessed on 11 September 2006].
10. Health & Safety Executive. Causes of Contact Dermatitis in Textile Industry. HSE Research Projects Directory. Available from <http://www.hseresearchprojects.com/projectsearch.aspx?id=225> [accessed on 11 September 2006].
11. Dermatology info. Clothing Dermatitis. Chapter 22. Available from <http://www.dermatologyinfo.net/english/chapters/chapter22.htm> [accessed on 12 September 2006].
12. *Government Gazette*. Compensation for Occupational Injuries and Diseases Act, as amended. Circular Instructions regarding compensation for occupational contact dermatitis. notice 499 of 2004. April 2004.
13. Wikipedia Textile. Available from <http://en.wikipedia.org/wiki/textile>. [accessed on 10 September 2006]
14. Khader Y, Abu-Zaghlal M, Abu-Al Rish I, Burgan S, Amarin Z. Self-reported allergy to latex gloves among health care workers in Jordan. *Contact Dermatitis* 2005; **53**: 339-343.
15. Jiangsu Changfan Group. Textile Industry. Answers.com. Available from <http://www.changfantextile.com>. [accessed on 10 September 2006].
16. TE: Technology-Engineering. Available from http://www.iim.fh-koeln.de/webterm/deuterm/textilveredelung/xml_dat/All.xml [accessed on 10 November 2006].
17. Textile and Leather Dyeing and Finishing. www.pops.int/documents/batbep_advance/intersessional_work/book%2018_textile_and_leather_dyeing.doc. [accessed on 10 September 2006].
18. Karneva L, Elsner P, Wahlberg JE, Maibach HI, eds. Textile Workers. *Handbook of Occupational Dermatology*. Springer. 2000: Chapter 19: 1110-1112.
19. Kunnin A. MD. Top ten skin unfriendly occupations. DermaDoctor. Available from <http://www.dermadoctor.com/pages/newsletter247.asp?WID=%7BAECE738F-FA46-4> [Accessed on 11 September 2006].
20. Haz-map. Occupational Exposure to Hazardous Agents. Textile Dyes. Available from <http://www.haz-map.com/dyes.htm> [accessed on 10 September 2006].
21. Rycroft RJG, Menne T, Frosch PJ. Clothing. *Textbook of Contact Dermatitis*. 2nd ed. Springer-Verlag. 1995: Chapter 14.3; pp 504-514.
22. Carlson RM, Smith MC, Nedorost ST. Diagnosis and treatment of dermatitis due to formaldehyde resins and clothing. *Dermatitis* 2004; **15**(4): 169-175.
23. Wilson D. Dyes and Dyeing Glossary. A Glossary of Terms for Material and Process in Textile Dyeing for Artists. Canada. 2004. Available from <http://list.emich.edu/~dyers/pdfs/dyeglossary> [accessed on 10 September 2006].
24. Jolanki R. Allergic Contact Dermatitis – The Most Common Allergens. Finnish Institute of Occupational Health. March 2003.
25. Lactose.co.uk. Chemical Allergens and Others. Food Allergy. Available from <http://www.lactose.co.uk/foodallergies/index.html> [accessed on 11 September 2006 and 31 January 2007].
26. Mekos Laboratories AS. Thiuram Mix. Patient Information. Available from <http://www.orion-health.co.nz/Info%20Cards/Thiuram%20Mix.htm> [accessed on 11 September 2006].
27. Newton, DE. Nickel. Chemical Elements. Baker LW (ed). UXL-GALE, 2005. eNotes.com. 2006. Available from <http://science.enotes.com/chemical-elements/nickel> [accessed on 11 September 2006 and 31 Jan 2007].
28. Canada's National Occupational Health & Safety Resource. Diseases, Disorders & Injuries. Dermatitis, Allergic Contact. OHS Answers. October 1997.
29. Mekos Laboratories AS. Cobalt. Patient Information. Available from <http://www.mekos.dk/archive/PDF-dokumenter/Cobalt.pdf#search> [accessed on 11 September 2006].

ONLINE CPD ACCREDITATION NOW AVAILABLE FOR CURRENT ALLERGY & CLINICAL IMMUNOLOGY

Current Allergy & Clinical Immunology has been accredited for CPD points in the Clinical category, so you can now earn 2 CPD points for Individual Learning. CPD accreditation is **only** available through the online service; no faxed or mailed responses will receive CPD credits. To obtain CPD credits:

1. Read the journal
2. Answer the questionnaire on p.51 by accessing the online CPD accreditation on the ALLSA website at www.allergysa.org/cpd or follow the links from the home page www.allergysa.org.
3. To register, you will need to enter your name, personal details, HPCSA number and a password.
4. Once you have registered, you will receive an email

confirming your registration. You can either answer the questionnaire immediately or log on at a later date to answer the questionnaire. Please note that each questionnaire has a closing date – the closing date for submission of the March 2007 questionnaire is 31 May 2007.

5. Follow the instructions given on the questionnaire page and online.
6. After you have submitted your answers, they will be marked immediately, and you will be informed of the results and the number of points earned.
7. At any time you will be able to see your current CPD credits from the journal by logging on.