

Occupationally relevant positive patch test reactions in Indonesian Batik workers

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Batik is a traditional east-Asian textile printing technique. Artisans are increasingly exposed to synthetic dyes because their use is easier and quicker compared to natural (plant-based) dyes.

Methods

We examined 222 workers employed by 16 small enterprises in the Special Region of Yogyakarta in Indonesia. Of these workers, 9 were suspected of having occupation-related allergic contact dermatitis. All 9 workers were patch tested with the European baseline series (Chemotechnique Diagnostics, Vellinge, Sweden), a textile series (Chemotechnique Diagnostics), and the following additional allergens relevant to the Batik industry: paraffin (molecular weight ranges between 250 to 400 Da)¹, brown indigosol, soja and indanthrene in the concentrations and vehicles indicated in Table 1, covered with Hypavix tape and occluded for 48 hours. The results were read at day (D) 3 and D4 , following guidelines of the International Contact Dermatitis Research Group.

Results and discussion

For a summary of the patch test results see the tables 1 and 2. Seven out of the nine patch tested workers had a positive reaction to at least one allergen used in the batik industry. The two remaining subjects suspected of having occupational allergic contact dermatitis had negative results to all of the allergens tested.

Reactive Red 123 was the most frequent relevant sensitising chemical (n=3/7). Indigosol (positive in one subject) is a Vat dye; these dyes are water-insoluble and are not common allergens.^{2,3} Soga, a natural brown dye from plants, was positive in one subject. The natural soga we had patch tested is different from synthetic soga dyes; synthetic soga are naphthols which are less commonly used in the traditional batik enterprises, and had not been patch tested. The main content of soga is tannin.⁴

Malam is a traditional wax that is commonly used in batik processing in Indonesia.⁵ The wax is based on paraffin, and contains a mixture of colophonium, triterpenoid resin, microcrystalline wax and beeswax. However, our subjects refused to be directly patch-tested using malam wax due to an assumption that it will precipitate their skin problems. Therefore, instead of patch testing with malam “as is”, we chose to use the paraffin (30% dispersed in pet.) on which the malam is based; this was positive in two subjects. Although unexpected in view of its chemical composition, paraffin as a skin sensitizer was reported in 12 workers exposed to neat cutting oil: serial patch testing showed strong positive reactions to the chlorinated paraffin fraction of the oil.⁶ Both subjects positive to colophonium worked in the stamping process, and were therefore in contact with malam wax.

Nickel (II) sulfate, potassium dichromate and cobalt (II) chloride hexahydrate were positive in some subjects (data not shown). However, those metals are not used in the traditional batik manufacturing process.

In conclusion, our findings show that traditional batik workers might be exposed to several sensitising materials and therefore the appropriate personal protective equipment (PPE) use is highly recommended.

Figure 1. Traditional batik workers apply malam wax onto the fabrics before the coloring process.

References

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Table 1. Patch test results among 9 subjects suspected of having occupation-related allergic contact dermatitis.

Materials to which workers were exposed	Allergen	Concentration tested	Positive patch test *)	CAS no.
Malam wax	Paraffin	30.0% pet.	2	8002-74-2
	Colophony	20.0% pet.	2	8050-09-7
Dyes	Reactive Red 123	1.0% pet.	3	68959-17-1
	Reactive Red 228	1.0% pet.	1	140876-11-5
	Reactive Red 238	1.0% pet.	2	173995-81-8
	Reactive Blue 21	1.0% pet.	2	12236-86-1
	Reactive Violet 5	1.0% pet.	2	12226-38-9
	Reactive Black 5	1.0% pet.	1	17095-24-8
	Brown indigosol	5% pet.	1	4425-36-9
	Soga	1% pet.	1	-
	Soga	5% pet.	1	-

*) Patients may overlap – see table 2 for details.

Table 2. Workers with occupational allergic contact dermatitis

Gender	Age	Work section		Causes of the skin symptoms	Sensitization
Male	48	Dry work	Wax application (stamping)	Malam wax	Colophonium, Reactive Blue 21, paraffin 30%
Male	35	Dry work	Wax application (stamping)	Malam wax	Colophonium
Male	46	Wet work	Coloring process	Dyes	Reactive Blue 21, soja 1%, soja 5%
Male	20	Wet work	Coloring process	Dyes	Reactive Black 5, Reactive Red 123
Female	43	Wet work	Coloring process	Dyes	Brown indigosol 5%
			Wax removal	Malam wax	Paraffin 30%,
Male	52	Wet work	Coloring process	Dyes	Reactive Red 123 Reactive Red 238 Reactive Red 228 Reactive Violet 5
			Wax removal	-	-
Male	19	All types of work	Pattern making	-	-
			Coloring process	Dyes	Reactive Red 123, Reactive Red 238, Reactive Violet 5
			Wax removal	-	-

