

Wood dust contact dermatitis among workers in the furniture making industry

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Abstract

Workers in the furniture making industry are exposed to wood dusts, polish, glue, solvents, cleansers, and preservatives. 22 (1.4%) of all new patients attending the Colombo South Teaching Hospital and the Lunawa District Hospital Skin Clinics for the first time over a period of one year had suspected wood dust contact dermatitis. No previous studies on wood dust contact dermatitis have been reported from Sri Lanka.

The aims and objectives of the study were to determine the common types of wood used in the furniture industry in Sri Lanka and to study the clinical patterns of contact dermatitis to these.

The 22 patients with clinical features of contact dermatitis to wood dusts were studied to assess the patterns of dermatitis, the duration of work in the industry, the presence of any accompanying mucosal symptoms such as asthma, cough rhinitis and red eyes. The patients were patch tested to the European standard battery and the freshly sawn dry and wet wood dusts.

Suriyamara (*Albizia odoratissima*), teak (*Tectonia grandis*), nadun (*Pterocopsis mooniana*) and burutha (*Chloroxylon swietenia*) were identified as the common woods used.

Suriyamara showed the highest incidence of allergic patch test reactions affecting 8 patients and teak had the highest number of irritant reactions. Wood dust related leucoderma was seen in 4 patients and these patients had positive patch test reactions to suriyamara. This is the first report of suriyamara induced contact dermatitis and leucoderma.

Seven workers had associated mucosal symptoms of asthma, cough, rhinitis and red eyes.

Introduction

Wood dust contact dermatitis has been studied extensively in many parts of the world^{1,2,3,4,5,6}. However there are no studies of wood or wood dust contact dermatitis from Sri Lanka. In Sri Lanka a wide variety of hard woods are available for furniture making industry⁷. The furniture industry is common in many parts of Sri Lanka, especially in the South West coastal belt, mainly in the areas from Wellawatta to Panadura⁸.

The furniture industry involves contact with wood dusts among workers, helpers, and in home based small industry, in the household members too. Wood dust is a result of the processes of sawing, cutting and sanding of wood in the preparation for furniture manufacture¹. In addition to wood dusts, painting, lacquering and the use of adhesives like epoxy resins also can cause contact dermatitis.

Wood dust can in addition to contact dermatitis also cause mucosal symptoms, such as asthma, cough, rhinitis and red eyes.

Aims and objectives

1. to determine the common types of woods used in the furniture industry in Sri Lanka.
2. to study the clinical patterns of contact dermatitis to wood dusts and their incidence in the various types of woods used.

Patients and methods

All first visit patients attending the Dermatology Clinics of the Colombo South Teaching Hospital, and the District Hospital, Lunawa, between June 2006 and May 2007, were included in the study. 22 patients were identified as probably suffering from wood dust dermatitis.

These patients were studied in detail, using a standard questionnaire and a detailed clinical and dermatological examination. The distribution, clinical pattern and the type of dermatitis were listed. Any mucosal symptoms, such as asthma, cough, rhinitis and red eyes were noted. Those with any other dermatoses prior to the present dermatitis were excluded. One patient who had dermatitis on the back of the chest was patch tested on the anterior thigh. Patients who were on oral steroids during a period 2 weeks prior to the patch tests and those who had applied topical steroids on the patch test area 3 days prior to the tests were excluded from further

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study. Written consent was obtained from the patients to proceed further with the patch tests.

The common woods used in the furniture industry were identified by information from the work places and the patients. Suriyamara types (*Albizia odoratissima*), teak (*Tectonia grandis*), nadun (*Pteriocopsis mooniana*) and burutha (*Chloroxylon swietenia*) were identified as the common woods used and were patch tested on all patients. In addition any other labeled type of wood dust brought by the patients as being currently used in their work place was also so tested.

The patients were patch tested using the European standard patch testing kit, and using wet and dry uncontaminated fine wood dust powder, labeled and freshly obtained from the work places, with the help of the patients. Wet wood dust was prepared by adding 2 to 3 drops of distilled water to a small quantity of the wood dust⁹. Wood dust patch testing was carried out using the identified common wood dusts and any other wood dusts the patient brought as being used at that time at the work place. The patch tests were read 48 hours and 96 hours after applying them.

5 were females and helpers. Their working hours ranged from 8 to 12 hours per day. For 10 patients furniture making was a household industry.

The dermatitis was of a mild nature or of a papular and lichenified type. Seven of these patients also had mucosal symptoms, such as cough, asthma, rhinitis and red eyes.

In this study 9 patients had irritant reactions and 4 had allergic reactions to teak, whereas 2 patients had irritant reactions, and 8 had allergic reactions to suriyamara. Only irritant reactions were noted in both nadun and burutha and that in 1 patient for each wood. Two patients developed allergic reactions to mahogany (*Swietenia macrophylla*). One patient who had been working with the wood attonia (*Alsonia macrophylla*) for many years developed a mild dermatitis of an irritant type.

Eleven patients in the study reacted to more than one wood. Two patients had allergic reactions to both suriyamara and teak, and another to both suriyamara and mara (*Albizia lebbek*), a related family of wood. Allergic contact dermatitis to multiple saw dust allergens have been reported¹⁰. Six patients in the present study had irritant and allergic reactions to two different woods.

Five patients developed a positive patch test for epoxy resin, and 2 to 4-phenyldiamine.

Four patients with positive allergic patch tests to Suriyamara also developed leucoderma in areas of contact with this wood dust. Three patients developed leucoderma on the exposed areas, and one in the flexures. These patients showed no evidence of idiopathic leucoderma. These patients had all stopped work with Suriyamara and the leucoderma had slowly improved.

All 22 of the patients complained of pruritus. Eight had poor sleep due to the pruritus and 6 reported embarrassment due to the pruritus. Five patients had changed occupations and 5 were frequently absent from work, due to the dermatitis. Thirteen patients in the study had used some type of protective wear, mainly goggles.

SPSS version 13 was used to perform some of the data analysis. Paired sample tests and one sample t-tests were used in these analyses. All the data were calculated on the basis of 0.05 significance level.

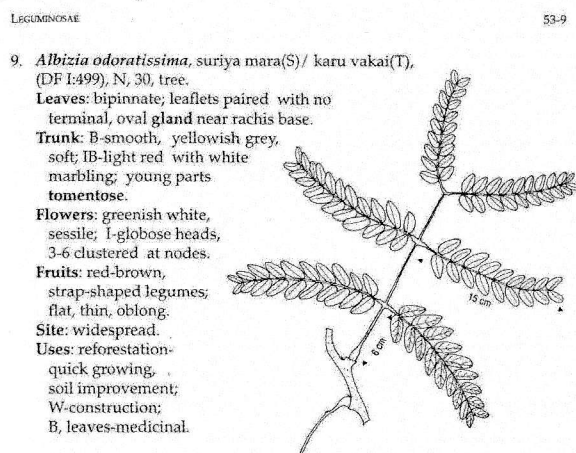


Figure 1. Taxonomy of suriyamara.

Results

22 of the 1570 first visit patients (1.4%) attending the dermatology clinics at the Colombo South Teaching Hospital and the Lunawa District Hospital, were clinically diagnosed as having wood dust contact dermatitis. Of these 17 were male and carpenters, and

Table1. Ten commonest woods used by the study population

No	Common name of the wood	Botanical name of the wood
1	Suriyamara	<i>Albizia odoratissima</i>
2	Mara	<i>Albizia lebbek</i>
3	Teak/Thekka	<i>Tectona grandis</i>
4	Burutha	<i>Chloroxylon swietenia</i>
5	Nedun	<i>Pteriocopsis mooniana</i>
6	Mahogany	<i>Swietenia macrophylla</i>
7	Kolon	<i>Adina cordifolia</i>
8	Welan	<i>Pterospermum canes</i>
9	Hapu	<i>Michelia campaca</i>
10	Kone	<i>Schleichera oleosa</i>

Table 2. Clinical features of wood dust contact dermatitis and patch test results on wood dusts and standard series

Patient No	Sex	Age/years	Duration of job/years	Duration of dermatitis/year	Suspected wood dust	Type of dermatitis	Distribution of dermatitis	Other skin problem	Mucosal symptoms	Patch test wood dust		Patch test standard series
										AR	IR	
1	M	53	25	1	SM	Thickened	Extensive			SM	Teak	14,17,21,22
2	M	61	40	0.75	Teak	Mild	Others		asthma, cough			2
3	M	59	6	2.5	SM Burutha	Thickened	Exposed		cough, rhinitis	Mahogany		10,14,15
4	M	27	8	8		Thickened	Exposed				Teak, MDF	1,17
5	M	50	4	1	SM	Mild	Flexural	Vitiligo		SM, Teak		2
6	F	64	20	4	SM	Mild	Mixed			Teak	SM	
7	F	54	30	30	SM	Thickened	Extensive		cough, red eye	SM, Teak		1,10,19
8	M	45	17	1	SM	Mild	Exposed	Vitiligo		SM	Teak	
9	M	50	25	3	SM	Thickened	Mixed		cough, rhinitis	Mahogany	SM, Teak	
10	M	57	15	13	Attonia	Mild	Exposed			Attonia	Nedun	
11	M	43	25	4	SM	Mild	Exposed			SM	Teak	
12	M	54	30	1	SM	Thickened	Flexural				Teak	14
13	F	43	4	2	Hora	Thickened	Flexural				Teak	
14	M	28	8	0.12	Kos	Mild	Mixed		cough, red eye	Teak	Burutha	
15	M	37	8	5	SM	Thickened	Flexural				Teak	14
16	M	52	20	7	SM	Mild	Exposed		asthma, cough, red eye	SM,	Mara	5,7,8
17	F	42	3	2	Teak	Mild	Exposed					
18	M	47	30	4	Teak	Mild	Flexural					14
19	M	65	40	3	SM,M	Mild	Mixed				Teak	
20	M	38	15	10	SM	Mild	Exposed	Vitiligo	Asthma, cough, red eye, rhinitis	SM		19
21	M	29	10	0.25	SM	Mild	Exposed	Vitiligo		SM		21
22	F	54	5	0.25		Mild	Flexural					

M – Male, F – Female, SM – Suriyamara, AR – Allergic reaction, IR – Irritant reaction

Table 3. Patch test results on wood dust

Wood	Allergic reaction	Irritant reaction
Suriyamara	8	2
Teak	4	9
Mahogany	2	
Nedun		1
Burutha		1
Attonia	1	
MDF		1

Discussion

Wood dust can induce skin and mucosal symptoms. A paired sample test on suriyamara and teak wood dust exposure with mucosal symptoms showed a statistically significant positive relationship.

Wood dust contact dermatitis could either be irritant or allergic. Mild dermatitis can present as itching, scaling, erythema and pigmentation in the early stages but later papular and lichenified patterns are common. Paired sample test on suriyamara and teak wood dust exposure with severity of the dermatitis showed a statistically significant positive relationship with a lichenified and papular dermatitis. Leucodermas in areas of contact dermatitis with positive patch tests for colophony and pine wood dust has also been reported¹⁰. The leucoderma usually seen is a chemical leucoderma with or without an element of post inflammatory depigmentation.

Wood dust associated dermatitis is commoner among workers having the greatest exposure to fine wood dust produced during grinding, cutting, sawing and sanding^{7,8}. Various toxic substances have been identified from woods. Among these are alkaloids and glycosides, saponins, phenols, quinines, stilbens and furocumarins². Sensitizers identified from hard woods are benzo and naphthoquinines and lapachols in teak^{1,4}.

The clinical picture of allergic contact dermatitis is that of an airborne type, but if clothing gives poor or no protection as in many of our patients, sweaty areas such as the axillae, waist band and groins also may be affected. Cross reactions to many woods are common. In irritant contact dermatitis the hands, face, and skin folds where dust accumulates are affected⁴.

Paired samples test on suriyamara and teak wood dust exposure with the distribution of the dermatitis showed a statistically significant relationship with extensive, exposed and flexural distributions.

In this study 9 patients had irritant reactions and 4 had allergic reactions to teak, whereas 2 patients had irritant reactions, and 8 had allergic reactions to suriyamara. One sample t test on positive patch test reactions, and irritant reactions, showed a statistically significant relationship with allergic reactions to suriyamara and teak and irritant reaction to teak.

Among the other woods causing contact dermatitis in this study was Mahogany, which showed positive patch tests in 2 patients. Honduran Mahogany was reported to cause allergic contact dermatitis in previous studies¹². One patient who had been working with the wood Attonia (*Alsonia macrophylla*) for many years developed a mild dermatitis of an irritant type. This wood belongs to the family Apocynaceae, which is known to cause irritant reactions¹³. No previous studies on Attonia are available. This wood has been used infrequently in the furniture industry for small furniture items. The patient in our study has been using this wood for a period of 13 years.

Five patients developed a positive patch test for epoxy resin, and 2 to 4-phenyldiamine. One sample t test on positive patch tests on European standard series showed a statistically significant relationship with epoxy resins. This may be due to the adhesives used in the industry.

The duration of work in the furniture industry varied from 3 years to 40 years. Paired samples test on job duration with the duration of the

dermatitis showed a statistically significant positive relationship.

Thirteen patients in the study reacted to teak with 9 irritant reactions and 4 allergic reactions. Suriyamara showed the highest number of allergic reactions, affecting 8 patients. Irritant reactions to this wood were seen in only 2 patients. There are no prior reports of dermatitis to suriyamara recorded here or in international studies; though it has been classified under hazardous woods

Four patients with positive allergic patch tests to Suriyamara also developed leucoderma in areas of contact with this wood dust. Three patients developed leucoderma on the exposed areas, and one in the flexures. This is also the first report of leucoderma caused by Suriyamara. Suriyamara has been used recently in the furniture making industry, due to the expense, and shortage of hard woods. Two patients with contact leucoderma following occupational allergic contact dermatitis have been previously reported⁶.

All patients in our study complained of pruritus, resulting in poor sleep in 8 patients. Five patients had changed their occupations. Better protective clothing, better hygienic practices such as regular washing and restrictions on the use of more toxic woods would help the quality of life of furniture industry workers.

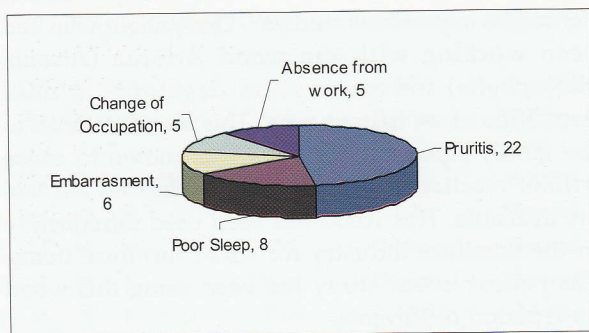


Figure 2. Effect of dermatitis on patients' day today life.

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References

1. Estlander T, Jolaniki R, Alanko K, Kanera L. Occupational allergic contact dermatitis caused by wood dusts. *Contact Dermatitis* 2001; **44**: 213-17.
2. Hartmann A, Schelegal H. Health hazards caused by wood in Switzerland. *Schweiz Med Wochenschr* 1980; **110**: 278-81.
3. Gan SL, Goh CL, Lee CS, Hui KH. Occupational dermatitis among sanders in the furniture industry. *Contact Dermatitis* 1987; **17**: 237-40.
4. Krogh HK. Contact dermatitis caused by true teak (*Tectonia grandis*): an epidemiological investigation in a furniture factory. *Brit J Indus Med* 1962; **19**: 42-46.
5. Hjorth N. Contact dermatitis from saw dust. *Contact Dermatitis* 1979; **339**: 340.
6. Lobo I, Ferreira M, Silva E, Machado S, Selores M. Contact dermatitis in wood workers. *Indian J Dermatol Venereol Leprol* 2008; **74**: 4.
7. Ranatunga MS. Timber and its uses: timber grading and scaling. *The Sri Lanka Forester* 1980; **14**: 67-99.
8. Annual Report, Statistics and Census Department 2007.
9. de Groot A. Patch testing: test concentrations and vehicles for 3700 chemicals. 2nd Ed. Netherlands: Elsevier. 1994.
10. Kumar A, Freeman S. Leucoderma following occupational allergic contact dermatitis. *Contact dermatitis* 1999; **41**: 94-98.
11. Cook DK, Freeman S. Allergic contact dermatitis to multiple saw dust allergens. *Australas J Dermatol* 1997; **38**: 77-9.
12. Occupational dermatitis in Honduran mahogany. *Contact Dermatitis* 1985; **13**: 336-7.
13. Woods B, Calnan CD. Toxic woods. *Brit J Dermatol* 1976; **95**(Suppl 13): 1-97.