Original Research Paper

Volume-9 | Issue-10 | October - 2019 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Dermatology

TO STUDY PREVALENCE OF PATCH TEST RESULTS IN POTTERY WORKERS WITH SUSPECTED CONTACT DERMATITIS WITH INDIAN STANDARD SERIES AND 'AS IS' PATCH TEST

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ABSTRACT

BACKGROUND: Pottery making is a traditional family business in India. Prevalence of contact dermatitis (ACD) in potters is estimated to be 5-10%.

AIMS: To study the prevalence of allergic contact dermatitis in potters and to study prevalence of patch test results with Indian standard series and 'as is' patch test in the symptomatic potters.

METHODS AND MATERIAL: Potters with or without history of allergic contact dermatitis were included. History and clinical examination were followed by patch testing with Indian standard series and with the clay material 'as is' in symptomatic potters. Results were studied and correlated with demographic profile, history of symptoms, direct or indirect contact with the clay.

RESULTS: Thirty-one potters participated in the study. Most of the potters (9/31) were in 4th decade with M:F ratio of 1:1.5. Twelve of 31 potters were working in this occupation since 11 to 20 yrs and 9 of 31 potters had daily contact with clay was for 10 to 12 hrs. Itching, scaling, oozing were common complaints. Forearm was the most commonly affected site. Out of 31 potters 22 were symptomatic. Patch test with universal series was positive in 72.72% of symptomatic patients. While 'as is' patch test was positive in 45.45 % patients.

CONCLUSIONS: Patch testing with Indian standard series and 'as is' with clay material can be an effective method of diagnosing ACD in potters.

KEYWORDS : Allergic contact dermatitis, potters, pottery material, clay

INTRODUCTION:

Pottery is the most ancient craft known to India for centuries for its immense utilitarian value. There is a paucity of literature on the prevalence of contact dermatitis in Potters.

Pottery is the clay that is modeled, dried, and fired, usually with a glaze or finish, into a vessel or decorative object. Clay is a natural product dug from the earth, which has decomposed from rock. Pottery is made from clay bodies that are clay mixed with additives that give the clay different properties when worked and fired.

Clay may be generally described as 40% aluminium oxide, 46% silicon oxide, and 14% water. There are two types of clays, primary and secondary. Primary clay is found in the same place as the rock and devoid of any sediment. It is heavy, dense, and pure. Secondary or sedimentary clay is formed of lighter sediment and it is finer and lighter than primary clay. [1] Glazes are made up of materials that fuse during the firing process making the pot vitreous or impervious to liquids. The Kumbharwada is a community of Kumbhars (Potters). This community has thousands of potters' family living there. Both males and females in the family are engaged in this business. Females work part time after completing their household activities. [2]

The Kumbharwada potters use a special type of clay, which is procured from neighbouring cities. The yearly consumption of clay used by potters varies from 2-3 trucks for small producers to 12-14 trucks for the large producers.[2]

Pottery making has evolved with introduction of new modern technologies that are time saving and cost effective. Some of the potters still use traditional methods due to the financial constraints while others use electric wheels instead of the manual wheels.

Different steps are followed in the process of pottery making. The first step is to obtain and prepare the clay. The clay is prepared by adding water to obtain a moistened, sticky texture. Traditionally the clay is thrown on the ground and red sand is added to it. Then it is mixed by walking up and down the clay with the feet (dancing the clay). Then the smooth and elastic clay is kneaded by hand on a board and then rolled into a ball (Wedging the Clay). Then it is molded into pottery on the potter's wheel to form pots. Prepared pots are then set aside to air dry. Then designs are carved into the pottery on the surface with any sharp pointy object or material. After that the pottery is set aside to finish the drying process. [1,2]

Once the pots are dried, they are ready for glazing. Pots may be entirely covered in one color of glaze by being run under a waterfall of glaze, by spraying or by manual coating. Main constituents of glazes are lead compounds and finely divided quartz. Coloured glazes also contain trivalent chromium, cobalt, copper, nickel, antimony, manganese and cadmium compounds, usually 0-3%.

The pots are then baked/fired in a kiln or oven. This process can be done in an electrical or a traditional dirt oven. Baking removes excess water from the pottery, makes it hard and also changes the color of the clay. The final step is colouring the designs with different colour which is optional.

Prevalence of dermatitis in pottery industry reported to be 5-10% and upto 1% of patients the disease severity is high enough to warrant absence from the work. Low-grade irritant reaction is common, severe eczematous dermatitis is rare in the pottery industry. Higher incidence is seen in 20 and 40 years of age with had dermatitis as a common clinical presentation. [3]

Our Hospital is in the close proximity to this Potters community. Many people from this community visited our OPD with allergic contact dermatitis but they never use to follow up for the patch tests as their daily work used to get compromised. So, we decided to do house surveys and find out the affected people and patch testing was conducted in a community centre.

SUBJECTS AND METHODS:

This descriptive study was conducted in the slums of Kumbharwada after taking approval from Institutional Ethics Committee.

Potters staying in Kubharwada community were included in the study. Pottery workers of age more than 18 years, both the sexes, with or without complaints like itching scaling, fissuring, maceration, hyperpigmentation or chronic relapsing dermatitis were studied. While potters with acute dermatitis, pregnant & lactating women, patients having active lesions at the site of patch application and those on immunosuppressive medications were excluded.

The detailed history including occupational history was recorded in a case record form. Detailed clinical examination was followed by patch testing with Indian standard series. Simultaneously patients were also patch tested with the four types of clay materials commonly used by the potters. Four community visits were done.

First visit: screening visit and patch test application
Second visit: after 48 hours for first reading of patch test
Third visit: after 72 hours for second reading of patch test
Fourth visit: on 7th day for the third reading of patch test

PATCH TESTING WITH INDIAN STANDARD SERIES:
Indian standard series procured from Creative Drug Industries containing 20 allergen was used. The allergens used were Vaseline, balsam of Peru, formaldehyde, mercaptobenzothiazole, potassium dichromate, nickel sulphate, cobalt sulphate, colophony, epoxy resin, parabens mix, paraphenylenediamine, parthenium, neomycin sulphate, benzocaine, wool alcohol, chlorocresol, fragrance mix, thiuram mix, nitrofurazone and black rubber mix. All these allergens were loaded on the Finn chambers. Patches were put on left side of the back.

METHOD OF AS IS PATCH TESTING:
Powder of clay material is dissolved in water to make concentrated solution (1%). Then the different concentrations are made as 0.1% and 0.01% by adding water. [Figure 1] pH (measured by pH strips) of concentrated solution 1% and 0.1% was more than 9 while the pH 0.01% was 6 (pH of product for as is patch should be between 3 to 9). Hence the concentration of 0.01% was selected for as is patch test. These 4 clay material in a concentration of 0.01% was loaded on a Finn chamber, filter papers are placed and then the patch is applied on the right side of upper back.

Figure 1: Four Types of pottery clay used for 'as is' patch test

Results of patch testing were read as per International Contact Dermatitis Research Group (ICDRG) guidelines. [4]

? +	Doubtful reaction ; faint erythema only
+	Weak positive reaction; erythema, infiltration, possibly papules
++	Strong positive reaction; erythema infiltration, papules, vesicles
+++	Extreme positive reaction ; intense erythema and infiltration and coalescing vesicles
-	Negative
IR	Irritant reactions of different types
NT	Not tested

This qualitative data was represented in form of frequency and percentage.

RESULTS:
Thirty-one potters(n=31) were studied. Nine potters belonged to 4th and 5th decade each. Sex prevalence was almost equal with M: F ratio of 1:1.5 suggesting the involvement of females in pottery work. [Figure 2a]

Total duration of working in this occupation ranged from 5 years to 50 years with mean duration of 18.46 years. Twelve potters were working in this occupation since 11 to 20 years. Most of the potters (9) had daily contact with clay for 10 to 12 hrs.

Twenty-five potters were involved in activities leading to direct contact with clay like transportation of raw material, mixing of clay, shaping of mud and strengthening etc.[Figure 2b] Mixing of clay and shaping with hands were the most commonly performed activities by them. While 6 of them were involved in activities requiring indirect contact with clay like painting and carrying prepared pots. 70.96 % potters (22/31) in our study were symptomatic.

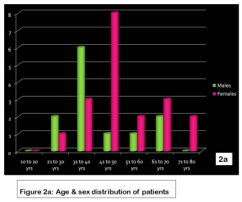

Figure 2a: Age & sex distribution of patients

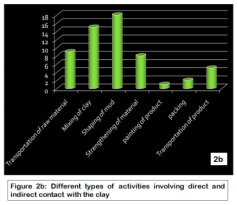

Figure 2b: Different types of activities involving direct and indirect contact with the clay

Symptoms ranged from itching, scaling, dryness of skin, burning sensation over hands and feets, redness over the area of contact, fissuring over palms and soles, oozing and hyperpigmentation. Itching (100%), scaling (63.63%) and dryness (45.45%) were the most common complaints (Table 1). These symptoms were recurrent. Duration of symptoms ranged from less than 1 month to almost 5 years. Most of them used water for cleansing the clay after work while very few used soap and water for cleansing. None of them used any other protective measures like gloves or boots during work.

Contact with particular type of clay which is available in rainy season was found to be common aggravating factor. Medications, improvement when away from work were the common relieving factors in symptomatic potters.

Forearm was the most commonly affected site followed by dorsum of hands and feet. The other affected sites were fingers, arms, legs, face, sole and dorsum of feet.

Cutaneous examination revealed varied morphology of lesions like erythema, fissuring, eczematization on palms [figure 3a], dorsum of hands [figure 3b], forearms [figure 3c], eczematization with secondary infection on forearms, dorsum of feet [figure 3d] and legs. Other Hyperpigmentation, xerosis and scaling on forearms were the other common findings.

Figure 3a: Erythema & fissuring on palms

Figure 3b: Eczematization on dorsum of fingers with nail changes (Beau's lines and paronychia)

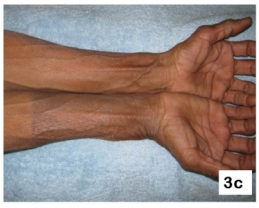

Figure 3c: Eczematization and post inflammatory hyperpigmentation on forearms

Figure 3d: Eczematous plaques on feet

Six patients showed concomitant presence of diseases like scabies, wart, melasma, photoaging, vitiligo, and urticaria. History of atopic dermatitis was present in 4 of the 22 symptomatic potters and 2 of 9 asymptomatic potters.

Nail changes were seen in 15% of patients included paronychia, nail dystrophy, Beau's lines, longitudinal melanonychia, tinea unguium.
Patch test with Indian Standard series was positive in 16 of 22 symptomatic (72.72%) potters and 1 of 9 asymptomatic potters. Potassium dichromate was the commonest antigen from Indian Standard series, seen 45.45 %(10/22) of symptomatic patients. [Figure 4a] Other positive allergens were nickel, thiuram mix and fragrance mix. (Table 2). Most of the positive reactions from universal reactions showed 1+ and 2+ positivity.

Patch test with clay material 'as is' (4 types of clay) was positive 10/22 (45.45 %) patients and was negative in 9 asymptomatic patients.

Four types of clay material were tested in these 22 symptomatic & 9 asymptomatic potters. Out of these red clay (product 1) showed positive reaction in 6 potters and yellow clay (product 4) showed positive reaction in 4 potters. [Figure 4b] None of the asymptomatic potters showed positive reaction to red and yellow clay.

Most of the positive reactions from 'as is' products showed grade 2+ positivity (6/10).

Figure 4a: Positive patch test with allergens of Indian standard series e.g. Potassium dichromate, Nickel and Cobalt

Figure 4b: Positive patch test "as is" with clay material

DISCUSSION:

This descriptive study was conducted in Kumbharwada where the pottery making is done as a family business; in order to study the results of patch test in the potters and to evaluate the results of patch tests in them.

Thirty-one potters (n=31) involved in daily activities like direct or indirect contact with pottery material or clay were studied. Most of the potters in our study belonged to younger to middle age group and 7 patients were above 60 yrs of age suggesting that even elderly people are involved in this occupation as a family business.

In our study female preponderance was seen in almost all types of jobs, suggesting active participation of females in family business even though for lesser duration compared to males. Hence suggest the importance of detailed occupational history in females as they can be involved in jobs other than the household. Many males did not come for examination even though symptomatic as they were not ready to leave their job.

Total duration of working in this occupation ranged from 5 years to 50 years with mean duration of 18.46 yrs. Maximum number of potters i.e. 35 % in our study were working in this occupation since 11 to 20 years.

Potters having daily contact with clay for 10 to 12 hrs, were indulged in activities like transportation of raw material, mixing of clay, shaping of mud to make pots and strengthening of pots. These activities require direct contact with clay which may be responsible for increased symptoms in these people.

Recurrent complaints like itching, scaling, dryness of the skin over forearms , hands, feet and legs were the most common presenting symptoms.

Duration of symptoms in symptomatic potters ranged from less than 6 months to 5 years.

Contact with particular type of clay which is available in rainy season was found to be commonest aggravating factor.

Upper extremity was more commonly affected than lower extremity. Forearm was the most commonly affected site followed by dorsum of hands. This could be explained by the inadequate protective measure taken by them. Hands and feet were being the common area of contact with clay is washed more carefully than forearm leading to inadequate removal and persistent contact with the clay leading to dermatitis.

In symptomatic patients features of acute and chronic dermatitis were seen.

Patch test with Indian standard series was positive in 16 of 22 (72.72%) patients. Patch test with clay materials 'as is' was positive 10/22 (45.45 %) patients.

Indian standard series was alone positive in 6 patients. Simultaneous positivity with Indian standard series and 'as is' patch test was seen in 10 patients.

Potassium dichromate was the commonest antigen of universal series, seen 47.61% of patients. Other positive allergens were nickel, thiuram mix and fragrance mix. Potassium dichromate is soluble crystalline material with bright red-orange colour. It is used to introduce chromium oxide into low temperature glazes. As it gives bright red colour its use is very frequent in pottery industry. [1]
Out of 4 clay material used, red clay (product 1) and yellow clay (product 4) showed maximum positive reactions. Red clay was most commonly used by the potters.

Very few studies have reported allergic contact dermatitis in potters. The incidence of allergy to cobalt was high in workers with hand dermatitis who handled wet clay. [5] With increasing automation, this has become less of a problem. Sensitization is reported, especially in those who handle wet clay to perform jobs not done by machines.

Wilkinson et al, have studied hand dermatitis in potters, revealed, 40% of potters who had jobs which involved contact with glaze suffered hand dermatitis. Patch test results were positive in 15 of 26 patients with chromate being the most common allergen followed by cobalt and nickel. Other positive allergens were mercaptobenzothiazole, colophony, abietic acid, OSO oil and fragrance. [6]

Maximum reactions from universal reactions showed 1+ and 2+ positivity while from 'as is' products showed grade 2+ positivity. Lesser grades of positivity and less number of positive reactions with 'as is' product could be attributed to their inappropriate concentration.
Patch test results showed positive correlation with total duration of working in this occupation and total hours of daily contact with clay.
Maximum positive patch tests were seen in potters requiring direct contact with the clay. Potters involved in mixing of clay and shaping of mud showed maximum positive reactions This suggests allergic potential of the clay material as well as utility of patch test in the diagnosis of ACD to pottery material.

Maximum positivity with 'as is' material i.e. clay is seen in potters involved in the job of shaping and strengthening of mud. Maximum positive results with 'as is' patch test were seen with clay 1(red clay), which was the most commonly used clay by the potters.

CONCLUSION:

Patch test with Indian standard series and "as is" test was found to be very useful in the diagnosis of allergic contact dermatitis to pottery material. Results of positive patch test results correlated well with duration of daily contact with the clay. However our study was cross sectional study with the small sample size. Hence the conclusions should be confirmed with large sample size.

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