

A study of clinicopathological correlation of patients with Tattoo reaction

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ABSTRACT

BACKGROUND: Placement of tattoos can be accidental, purposeful, decorative or for medical reasons. In modern times, tattooing is gaining societal acceptance, although obtaining a tattoo remains associated with risk-taking behavior. **MATERIAL AND METHODS:** The present study comprises of 17 cases of tattoo reactions examined clinically and histopathologically at the Department of Dermatology, Venereology and Leprosy, P. D. U. Government Medical College and Hospital, Rajkot, Gujarat. Laboratory investigations including complete blood count, serum hepatitis-B surface antigen, serum HIV, mantoux test, chest X-ray was done in all the patients. **RESULTS:** The combination of Red and Black dye (70.58 %) was most commonly resulted in tattoo reaction. The granuloma annulare like pattern (64.7 %) was the commonest pattern on histopathological examination. **CONCLUSION:** This study aided in finding and reporting the rarely seen Granuloma Annulare like pattern on the histopathological examination of the tattoo reaction lesion and its association with the combination of the Red and Black dye.

Key words: Tattoo reaction, Granuloma annulare like pattern, Red and Black dye

INTRODUCTION

A tattoo is a form of body modification undertaken by inserting indelible ink into the dermis to change the color of the skin. Tattooing for ornamental purposes is an ancient practice that remains popular in modern times.^[1] The number of tattooed people has become more prevalent in the last few years for the continuous development of new trends especially among young people. Despite the increasing number of tattooed individuals, there are currently no legislation or criteria for the safety of tattoos.^[2] In India, composition of tattoo inks is not regulated by law. Frequently, there is no information on packaging regarding warnings, or the guarantee for sterility of the contents. Unregulated practices and variability in ink composition has lead to increased adverse reactions presenting in varied

histological patterns. The composition of tattoo inks is highly variable, and inks can contain numerous potentially allergenic or carcinogenic compounds. A range of neoplasms and inflammatory conditions are seen in association with tattoos, many of which may be attributed to hypersensitivity to tattoo inks.^[1] The most common histological pattern secondary to tattoos is lichenoid followed by eczematous, granulomatous, and pseudolymphomatous. Rarely sclerodermatous and photo allergic reactions are reported. Granuloma annulare (GA)-like palisading granulomatous reaction to tattoo is rare.^[3]

MATERIAL AND METHODS

During the period from July 2013 to August 2015, a total of 17 patients (1 woman, 16 men) were observed at tertiary care center for the development of cutaneous reactions secondary to tattoos. A punch biopsy of the tattoo reaction site for histopathological examination with Haematoxyllin & Eosin stain along with Periodic Acid Schiff stain and Fite-Faraco stain was performed in all patients. Laboratory investigations including complete blood count, serum hepatitis-B surface antigen, serum HIV, mantoux test,

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chest X-ray was done in all the patients. Cutaneous reactions were documented with photographs with digital camera.

RESULTS

The study enrolled 17 patients with tattoo reaction. Among them males (94.1 %) were more commonly affected as compared to females (5.9 %). The most common age group affected with tattoo reaction was 15-20 years comprising 29.41 %, followed by 21-25 years and 26-30 years age group comprising 23.42 % in each group. The interval for the development of reaction was mostly within 3 months (64.7 %) following tattooing. Most of the patients developing reaction were having history of application of both Red and Black dyes for tattooing (52.34 %) followed by only Red dye (41.17 %) and Black dye (5.88 %).

Table 1: Correlation between tattoo dye colour and the type of reaction on histopathology.

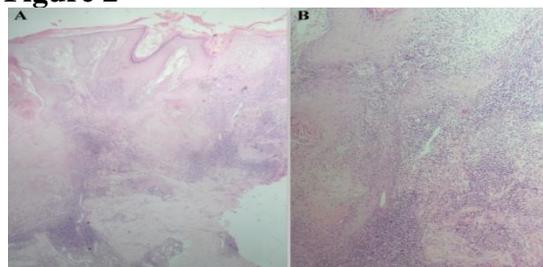
Type of reaction	Red	Black	Red and black	Total
Granuloma annulare like	3	0	8	11
Foreign body granuloma	4	0	0	4
Lichenoid reaction	0	1	1	2
Total	7	1	9	17
%	41.17%	5.88%	52.34%	100%

Figure:1A & 1B



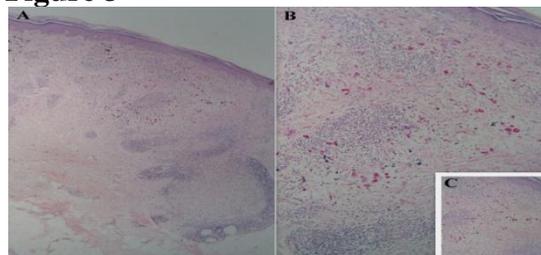
On histopathological examination of the lesions, Palisading Granuloma Annulare like pattern (64.7 %) was the most common

Figure 2



followed by Foreign body granuloma like pattern (23.53 %)

Figure 3



and Lichenoid pattern (11.76 %)

Figure 4

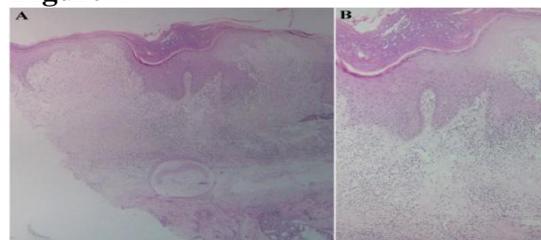


Figure legends:

1. Tattoo reaction
A- following red dye
B- following red and black dye
2. Granuloma annulare like pattern: A focus of mucin deposition along with incomplete collagen degradation was found in superficial dermis surrounded by histiocytes and lymphocytes. Black and red colored pigment was seen scattered throughout the dermis. Rest of the dermis showed both superficial and deep lymphocytic infiltrate. (A-10x, B-40x)
3. Foreign body granuloma
Granulomatous infiltration in the superficial and deep dermis. Black and red colored pigment was seen scattered throughout the dermis. (A-10x, B-40x)
4. Lichenoid reaction tattoo pigment intermixed with infiltrate of lymphocytes at perivascular and periappendageal region (A-10x, B-40x)

Table 2: Histopathological pattern wise distribution of the patients with tattoo reaction

Type of reaction on histopathology	No of patients % (present study)	No of patients% (Bassi et al ²)
Foreign body granuloma	4 (23.53%)	5 (31%)
Lichenoid reaction	2 (11.76%)	4 (25%)
Psoriasiform reaction	0	2 (12.5%)
Pseudoepitheliomatous hyperplasia	0	1 (6.25%)
Pseudolymphomatous	0	4 (25%)
Granuloma annulare like	11 (64.70%)	0
Total	17	16

Among total 11 patients presenting with Granuloma annulare like pattern on histopathological examination, 8 patients had history of application of both Red and Black dye while history of application of Red dye only and Black dye only was elicited in 3 and zero patients respectively. All serological testing and other laboratory results were insignificant except that one patient was found to be HBsAg positive. Mantoux test, Periodic Acid Schiff stain, Fite Faraco stain were negative in all the patients.

DISCUSSION

Tattooing has recently become increasingly popular among young people, giving rise to parallel increase of adverse reactions. Modern, professionally placed tattoos are performed using a tattoo machine that repeatedly punctures the skin to a depth of 1–2 mm, delivering pigmented inks into the dermis. Ink is suspension of pigments, composed of metal salts and organic compounds, the majority of which are considered biologically inert.^[1] Cutaneous hypersensitivity reactions, although most common with red (mercuric sulphide) tattoos, have also been reported with other colors like yellow (cadmium sulphide), brown (iron oxide), blue (cobalt), purple (manganese), green (chromium) and black (carbon) tattoos. Infections with bacterial, viral and fungal species can occur after tattooing, sometimes after substantial delay. With the increasing incidence of tattooing fashion trend in society, the Dermatologists should be able to recognize tattoo complications and also appropriately counsel their patients about the risks of tattoo placement. Several histological reactions to tattoo ink have been described including pseudolymphomatous, lichenoid, granulomatous, scleroderma or morphea-like, sarcoidal, pseudoepitheliomatous hyperplasia, allergic contact dermatitis and photoallergy. Lichenoid reactions are more frequently reported^[8]. Sarcoidosis has been suggested to be a state of granulomatous hypersensitivity, with reactions to different antigens in a variety of organs localized to the tattooed area without the systemic manifestations of

sarcoidosis. Tattoo has been associated with various cutaneous malignancies like basal cell carcinoma, squamous cell carcinoma and leiomyosarcoma.^[1] In the present study, most of the patients (64.7 %) presented within 3 months following tattooing. On histopathological examination the Granuloma Annulare like pattern was the most common pattern observed (64.7 %) as opposed to a study done by Bassi et al^[2] where Foreign Body Granuloma was the most common pattern and no patient presenting with Granuloma Annulare like pattern [Table 2]. Among Indian literature only one case report done by Kashyap et al^[3] of a tattoo reaction histopathology was suggestive of Granuloma Annulare like pattern. Among Granuloma annulare like pattern on histopathological examination, most of the patients had history of application of both Red and Black dyes, suggestive of its role in development of reaction. [Table 1] Granuloma annulare like pattern on histopathology is generally idiopathic, but has been attributed to a variety of inciting factors.^[3] The exact mechanism for this pattern is unknown but existing theories include type IV delayed hypersensitivity, Th1 inflammatory reaction with IFN- γ provoking lymphocytes, lymphocyte-mediated activation of monocytes, and elastic tissue as the main alteration. Palisading granuloma like pattern is also seen in Granuloma Annulare, Necrobiosis Lipoidica and Sarcoidosis. An early diagnosis through skin biopsy, especially with papulonodular growth within the tattoo pigment, is mandatory since neoplastic conditions are not immediately recognized with clinical examination only. Some tattoo reactions, including pseudocarcinomatous or keratoacanthoma-like reactions, can be difficult to differentiate from true cutaneous malignancies, requiring clinicopathologic correlation.^[1] Once a diagnosis has been established, it is important to remove the lesion. For refractory skin eruptions unresponsive to medical therapy, surgical or laser treatment may be considered. The Q-Switched Nd:YAG system releases high energy in extremely short times (max 6

ns), producing a “photoacoustic” effect that breaks down the derma cells containing the tattoo pigment. Thanks to the rupturing of the membrane of these cells, the pigment is released and eliminated by the lymphatic system. These short laser emissions allow for confining the thermal effect exclusively to the target—in this case the tattoo pigment—therefore safeguarding the surrounding tissues. Moreover, laser systems allow the best aesthetic results without leaving scars if compared with surgery that sometimes may be more radical but capable of injuring the underlying tissue.^[2] Till date only one article of GA-like pattern has been described from India,^[3] so we have compiled this data supporting occurrence of GA-like pattern in tattoo patients more frequently.

CONCLUSION

The medical literature contains numerous case reports on dermatological reactions seen on histopathological examination in patients after tattoo procedure. Most of the studies highlight the low prevalence of granuloma annulare like pattern in patients with tattoo. Our experience on a small number of patients attending our outpatient department contradicts these results as granuloma annulare like reaction is the most common histopathological finding in our study population. To our knowledge, till date only one Indian study^[3] has been published regarding presence of granuloma like pattern in tattoo patients.

Our study is subject to several limitations due to the limited number of patients involved and thus it cannot be extrapolated to general population, although the exact pathogenesis is still unknown. A follow-up of a large cohort of tattooed people would help to assess the accuracy of our findings. This paper also stresses on the importance of ruling out fungal and bacteriological infective foci in patients with tattoo as it may be the cause of frequent granuloma annulare like histopathological picture in tattoo patients.

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