International Journal of Research in Dermatology
Bhindora PK et al. Int J Res Dermatol. 2022 Mar;8(2):249-253
http://www.ijord.com

DOI: https://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20220494

Original Research Article

Clinico-histopathological study of tattoo reactions in tertiary care center

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Received: 09 January 2022
Accepted: 16 February 2022

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ABSTRACT

Background: Tattooing is nowadays very common practice especially among young people and we are witnessing a gradual increase of numerous potential reactions to tattoos. Purpose of this study was to identify the various tattoo reactions and to correlate it with histopathological examination and early interventions to decrease further morbidity.
Methods: From December 2017 to September 2019, patients reporting with reactions due to tattooing were included in the present study after obtaining informed consent. A detailed history regarding the onset, duration and colour used for tattooing were collected and noted. Cutaneous examination and biopsy were done in all cases to know the type of reaction.
Results: The analysis included 50 patients who had tattoo reactions. The most common age group affected was 16-30 years, with slight male predominance. Most of the cases (64%) with tattoo reaction presented to us within 1 to 4 months of disease presentation. Clinically, most cases had granulomatous reaction 23 (46%). On histopathology, granulomatous reaction was the most common type observed. Red colour dye was the most common colour associated with reaction seen. Clinico-histopathological correlation of various types of tattoo reaction revealed consistency with diagnosis in 17 (34%) patients, clinically as well as on histopathological examination.
Conclusions: Lack of strict regulations by government and increased fashion trends increase complications associated with tattoos. Red inks are the most frequently associated with tattoo reactions. Granulomatous type reactions are a frequently reported pattern of inflammation seen in tattoo.

Keywords: Tattoo reactions, Granulomatous, Red ink

INTRODUCTION

Tattooing is a very old practice involving insertion of ink pigment of the desired color into the dermis. It is prevailing among most of the societies worldwide and is becoming increasingly common in developing countries. Furthermore, it is becoming more prevalent among rural youngsters of India due to increased enthusiasm toward newer fashion trends.

The word tattoo is derived from Tahitian word tatu which means to mark something.[1] Broadly, tattoo can be classified as temporary, which last for weeks or permanent tattoo which last for life. Tattoos can be classified as decorative (professional and amateur), cosmetic, traumatic, medical and iatrogenic.[2]

Tattooing is the process in which, a high amount of tattoo pigment is injected into the skin. Pigments are industrial products and consist of a wide variety of chemical substances, including by-products and impurities. The major component is the coloured particles, which can be divided into 2 classes: inorganic carbon particles, carbon black, which are exclusively found in black tattoos and organic pigments, e.g. azo and polycyclic pigments and contained heavy metals such as mercury, chromium or

cadmium, resulting in the typical colours yellow (cadmium sulphide), mercury sulphide (red) or chromium oxide (green).[3]

Pathogenic mechanisms implicated in reactions to tattoo pigments included a localized, T-cell mediated, delayed hypersensitivity response (lichenoid and sarcoidal reaction). In addition, allergic reactions have been observed in the form of type I and III reactions, according to Coombs and Gell classification.

Reaction of tattooing can be divided into cutaneous or systemic and can have an impact on the quality of life. Cutaneous reactions can occur either immediately or be delayed. There are various types of reactions like acute inflammatory reaction, eczematous hypersensitivity, photoaggravated, granulomatous, interface reaction patterns. Although there was no universally accepted classification, the complications were often classified according to the clinical and histological features with some overlap. Types of histopathological reactions includes allergic hypersensitivity, granulomatous, interface, pseudolymphomatous, oncologic and infectious.[4]

This study was aimed to collect various types of tattoo reactions, to find out any correlation between various inks and specific reactions, to study histopathological findings in patients with tattoo reactions and to study clinical and histopathological correlation of tattoo reaction.

METHODS

The present study was a prospective, open and observational study carried out on 50 patients of tattoo reaction in department of dermatology at a tertiary care centre during a period of 2 years from December 2017 to September 2019. After informed consent, a detailed history regarding the onset, duration and progress of the lesions and precipitating factors were noted and cutaneous examination was to done to know the type of lesion and 4 mm punch biopsies for histology were obtained to verify the type of reactions.

Appropriate specific treatment was given to each patient, and counseling regarding nature of the reaction, importance of avoiding precipitating factors and adherence to the treatment was done.

All the patients reporting with tattoo reaction due to tattooing were included in the present study after obtaining informed consent. Infections and skin diseases localized on tattooed area were excluded.

RESULTS

A total of 50 cases having tattoo reactions were enrolled in this clinical study.

In present study highest prevalence was seen in the age group 16-30 years (48%) with mean age of 25.56 years (Figure 1).

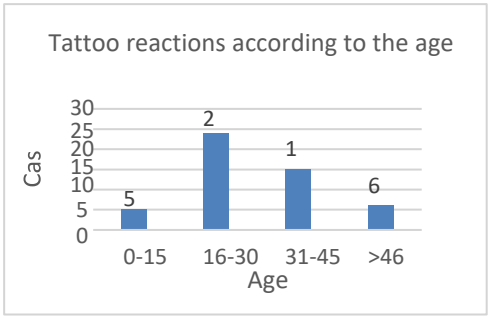

Figure 1: Distribution of patients according to the age.

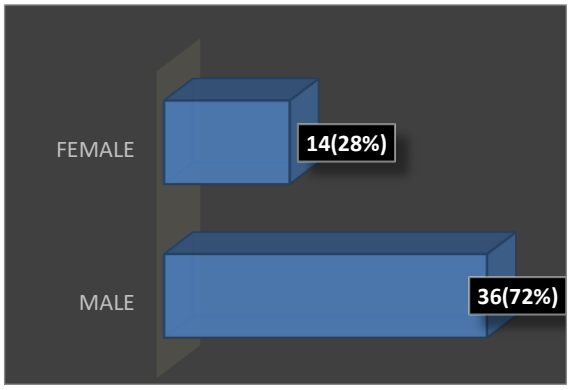

Figure 2: Distribution of patients according to sex.

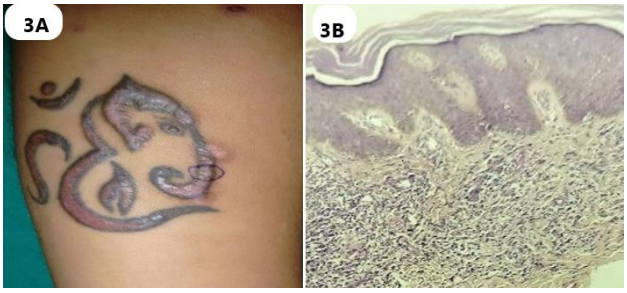

Figure 3: (A) Granulomatous reaction due to red ink; (B) histopathology with classical Langhans giant cell.

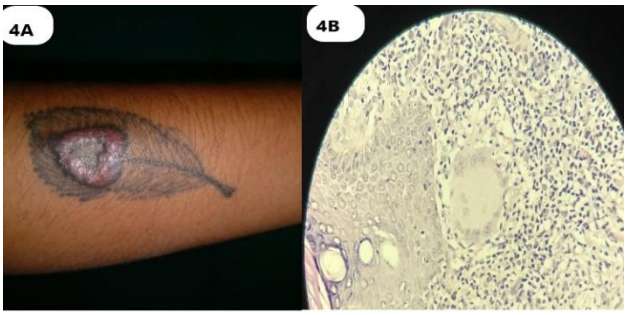

Figure 4: (A) Lichenoid reaction; (B) histopathology of interface dermatitis with band like lymphocytic infiltration.

Table 1: Distribution of patients according to clinical diagnosis of tattoo reaction.

S. No.	Clinical diagnosis	Present study (n=50)
		N (%)
1.	Granulomatous	23 (46)
2.	Eczematous hypersensitivity	14 (28)
3.	Lichenoid	10 (20)
4.	Granuloma annulare like pattern	3 (6)

Table 2: Histopathological pattern wise distribution of patients with tattoo reactions.

Type of reaction on histopathology	No. of patients (%)
Granulomatous	22 (44)
Lichenoid	15 (30)
Eczematous	6 (12)
Psuedoepitheliomatous hyperplasia	5 (10)
Granuloma annulare like	2 (4)
Total	50

Table 3: Correlation between tattoo dye color and clinical type of reaction.

Type of reactions	Red	Red and black	Red and blue	Red and green	Total
	N (%)				
Granulomatous	13 (43.33)	5	4	1	23
Eczematous	7 (23.3)	3	3	1	14
Lichenoid	8 (26.66)	0	1	1	10
GA pattern	2 (6.66)	1	0	0	3
Total	30 (60)	9 (18)	8 (16)	3 (6)	50 (100)

Table 4: Correlation between tattoo dye color and histopathological type reaction.

Type of reactions	Red	Red and black	Red and blue	Red and green	Total
	N (%)				
Granulomatous	10 (33.3)	6	4	2	22
Lichenoid	10 (33.3)	2	3	0	15
Eczematous	3(10)	1	1	1	6
GA pattern	2 (6.66)	0	0	0	2
Psedoepitheliomatous hyperplasia	5 (16.66)	0	0	0	5
Total	30 (60)	9 (18)	8 (16)	3 (6)	50

Table 5: Clinico-histopathological correlation of tattoo reaction.

Clinical types	Histopathological					Total
	Granulomatous	Lichenoid	Eczematous	GA pattern	Pseudoepithelioma tous hyperplasia	
	N (%)	N (%)	N (%)	N (%)	N (%)	
Granulomatous	9 (18)	11 (22)	2 (4)	0 (0)	1 (2)	23
Lichenoid	5 (10)	3 (6)	1 (2)	0 (0)	1 (2)	10
Eczematous	7 (14)	1 (2)	3 (6)	0 (0)	3 (6)	14
GA pattern	1 (2)	0 (0)	0 (0)	2 (4)	0 (0)	3
Total	22	15	6	2	5	50

In the present study, we found male preponderance with male: female ratio being 1.17:1 with male predominance (Figure 2).

In present study, maximum patients 32 (64%) with tattoo reaction presented to us within 1 to 4 months of tattooing. Among them, 9 (18%) patients presented within 1 month of tattooing. Least patients, 2% presented after 10 months of tattooing.

In present study, on the clinical bases the granulomatous reaction is the most common type in 23 (46%) patients followed by eczematous hypersensitivity in 14 (28%) and lichenoid in 10 (20%). There were 3 (6%) cases of GA pattern were observed (Table 1).

In present study, on histopathological examination, granulomatous reaction was the most common type observed in 22 (44%), in which foreign body granulomatous reactions in 21 (42%) patients and tuberculoid granuloma was seen in 1 (2%) patient, followed by lichenoid pattern in 15 (30%), eczematous in 6 (12%), pseudoepitheliomatous hyperplasia in 5 (10%) and granuloma annulare like pattern in 2 (04%).

Granuloma annulare like pattern was least common observed in present study (Table 2).

In present study, red colour dye was the most common colour associated with reaction seen among 30 (60%) of cases. Among the reaction to red pigment, granulomatous reaction was the most common seen in 13 (43.33%) followed by lichenoid 8 (26.66%), eczematous 7 (23.3%), and GA pattern 2 (6.66%) which was least common type. Tattoo reaction to red and black pigment was the second most common colour seen in 9 (18%) of the total patients (Table 3).

On histopathological findings red colour dye was the most common colour associated with reaction seen among 30 (60%) of cases. Among the reaction to red pigment, granulomatous reaction was the most common seen in 13(43.33%) and GA pattern 2 (06.66%) which was least common. Tattoo reaction to red and black pigment was the second most common colour seen in 8 (18%) of the total patients. Other reactions were also seen with red and blue in 8 (16%), red and green in 3 (6%) which was less common dye colour causing reactions (Table 4).

On clinico-histopathological correlation of various types of tattoo reaction, 17 (34%) out of 50 patients showed consistent diagnosis clinically as well as on histopathological examination. Among them, granulomatous type of tattoo reaction was the most common in 9 (18%) patients followed by lichenoid reaction in 3 (6%), eczematous reaction in 3 (6%) and granuloma annulare like pattern in 2 (4%) patients. Inconsistent histopathological finding related to the clinical picture in 33 (66%) patients (Table 5) (Figure 3 and 4).

DISCUSSION

The exact prevalence of tattoo reactions in India was not known, but the same trend was continuing in India in recent days with increased number of people accepting tattooing, so as the risks and complications associated with tattooing. Many studies have reported tattoo complications in 2-3% which ranged from infections to neoplasia but a recent study among German-speaking countries had reported it to be 7.3%.[5-7]

In present study, young age group was more commonly involved in tattoo reactions. Tattooing was increasingly common among adolescent and the prevalence among college students were high. In the present study, we found male preponderance with male:female ratio being 1.17:1 comparable to 1.35:1 in Kashyap et al study.[8] Worldwide, there was no specific prevalence in both sexes of tattoo reactions but most of the Indian studies show increased prevalence in males than in females.

Allergic contact dermatitis due to delayed hypersensitivity reaction to different pigments was the most common complication.[9,10] Nowadays, organic colorants were increasingly used in tattoo inks. Red (mercury salt), green (dichromate), blue (cobalt), yellow (cadmium) pigments and black were commonly associated with hypersensitivity reaction.[11]

In present study, red color dye was the most common color associated with reaction seen among 30 (60%) cases. Among the reaction to red pigment, granulomatous reaction was the most common seen in 13 (43.33%) which was comparable to Kashyap et al study.[9] Although reactions to red pigment was the most common, shades of red such as pink, orange, violet and Bordeaux were also associated with tattoo reactions.[12]

Histopathological examination of tattoo reactions involved lichenoid, eczematous, granulomatous, granuloma annulare like and pseudolymphomatous reactions. Lichenoid tattoo reaction was the most common histopathological pattern associated with delayed-type hypersensitivity reactions to tattoo and commonly associated with red ink.[13,14] In present study granulomatous and lichenoid reactions were the most common histopathological findings of tattoo reactions due to red ink in 10 (33.33%) followed by eczematous reaction in 3 (10%).

In present study, consistency in clinical as well as histopathological diagnosis was seen in 17 (34%) out of 50 patients.

Management of tattoo reaction was a great challenge. Diagnostic patch testing often showed negative results may be because suitable patch test solutions were difficult to obtain owing to the low dispersing capacities of most pigments. Allergic reactions can be treated with topical, intralesional or systemic corticosteroids. For refractory skin eruptions unresponsive to medical therapy, surgical or laser treatment may be considered.

In India, strict regulations were lacking and authorities should draw up strict guidelines and regulations. In addition, there was a need for medical education at college level as there was a need to increase awareness in the youth today regarding increased risks of tattooing when carried out in potential unsterile environments. In addition, tattoo parlors should also be educated about the risks involved and the importance of using proper infection control measures.

CONCLUSION

Tattooing is becoming popular among youngsters of rural India. Lack of strict regulations by government and increased fashion trends may further increase complications associated with tattoos. Hypersensitivity reactions are increasing due to use of newer colorants which have less safety data.

Funding: No funding sources

Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Bhindora PK, Patel BK, Bhuptani NV, Surani AS. Clinico-histopathological study of tattoo reactions in tertiary care center. Int J Res Dermatol 2022;8:249-53.