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ORIGINAL RESEARCH

Incidence and Potential Co-Morbidities in Facial Pigmentary Demarcation Lines in Indian Populations

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ABSTRACT

Background: The most noticeable part of human body is face. The obvious boundaries on the skin known as Pigmentary Demarcation Lines (PDL) found over face and have clear borders of abrupt transition between more hyper-pigmented skin and areas of normal skin pigmentation due to differences in melanocyte distribution that may be influenced by multiple factors. Facial pigmentary demarcation lines (PDL) directly reflect on patient's physical appearance and self-image as they may contribute to dysmorphism and even central to depressive illness in susceptible individuals posing cosmetic concern for the patient and a challenge for dermatologist. Therefore, it is important for early identification and management of facial skin disorders. Until now, nine different types of PDLs have been described which are designated as Type A to I of which Type F to H PDLs are most common on the face. Etiology involving the whole spectrum of PDL continues to be an enigma and needs further research among Indian population.

Materials and Methods: Total 304 patients between 15 to 75 years of age range were included in study lead between May 2018 to May 2020 after thorough examination for inclusion and exclusion criteria, informed consent and Ethics committee approval. Statistical analysis was done using descriptive and inferential statistical approach using Chi-square test and Fisher's exact test and p value was calculated and considered to be significant if <0.05.

Results: Out of 304 study subjects the frequency of facial PDL type H (50.65%) was most common than type G (29.60%) and type F (19.73%) with male predisposition (79.60%) with agricultural occupations (59.86%) than females and with significant family history from father (41.44%). Most of the present study subjects were of Fitzpatrick skin type IV (50.01%) with hyper-pigmented macules (12.5%) and shown unilateral PDL symmetry (58.22%) with sharp PDL line margins (81.25%). The most common aggravating factor was prolonged exposure to sun light (56.90%) and most of (25.98%) the subjects experienced periorbital melanosis at different times. Diabetes (38.15%) and hypertension (29.60%) were the most common co morbidities observed in study subjects. Using Fishers exact test, p value was calculated and it was found to be highly significant (p=0.003).

Conclusion: Present study pronounces the incidence of facial PDL (types F-H) are sharply common especially amongst the males who are in agricultural occupations with

prolonged sun exposure and with other co morbidities like diabetes, hypertension and tuberculosis. In females the prevalent type was Type H PDL during and after pregnancy. The agricultural occupations with prolonged sun exposure, diabetes, hypertension, tuberculosis and positive paternal family history were shown strong correlation with facial PDL among Indian population irrespective of gender and it was found to be highly significant (p=0.003).

Keywords: Facial PDL, Hypertension, Diabetes, Tuberculosis.

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INTRODUCTION

Facial PDL also known as Futcher's or Voight's lines may appear around puberty and may persist without much change throughout life most often been described in skin of Africans and Japanese (15%-79%).[1] The facial PDLs may have a genetic predisposition,[2] and its incidence in Indian population was reported only 6%.[3-5] In pregnancy, increased incidence of PDLs has been reported wherein the proposed hypothesis being that the cutaneous nerves can be trapped by the growing uterus leading to pigmentation. Facial PDL may be even present from childhood and goes unnoticed, only to become prominent after certain triggering factors like hormonal changes at puberty or pregnancy. Few other triggering factors for Group F PDL reported are acute illnesses such as typhoid, chickenpox, and viral hepatitis. Group F PDL may present as periorbital melanosis. On histopathology, both Group F PDL and periorbital melanosis have been found to have melanophages in upper dermis.[6] Facial PDL should be considered in the differential diagnosis of any facial pigmentation, especially if it is bilaterally symmetrical. Facial PDL present as bilaterally symmetrical, homogenous hyperpigmentation extending from lateral orbit or angle of mouth differentiating from melasma, which is usually blotchy and may occur at different sites such as forehead, nose, etc.[7] Another close differential diagnosis of facial PDL is post inflammatory hyperpigmentation. The chronic course, well-defined margins and the absence of prior history of any skin lesions at the site would help in distinguishing facial PDL from post inflammatory hyperpigmentation. Facial PDL is underdiagnosed, and it is an evolving entity, which requires awareness among dermatologists. Facial PDL and familial periorbital melanosis may represent the same entity.[8]

MATERIALS & METHODS

An observational cross-sectional study designed by authors was conducted in the outpatient department of Dermatology, Santosh medical college and Hospital, NCR Delhi, between May 2018 to May 2020. Patients attending the Outpatient Department for various complaints were randomly selected and examined for the presence of pigmentary demarcation lines. Males and females of total 304 patients between 15 to 75 years of age range were included in study and analysed in terms of demographic profile, various patterns of PDL, association with Fitzpatrick's skin types in patients with pigmentary demarcation lines after informed consent. Statistical analysis was done using descriptive and inferential statistical analysis Package for Social Sciences, and Chi-square test and Fisher's exact test were used; p value was calculated and considered to be significant if <0.05. The subjects were classified into three categories based on Malakar S and Somani VK criteria as follows. Type F: This was first described in Indians by Malakar as sharply demarcated V shaped lines separating a relatively darker zone from a lighter area over the face and these lines are almost always [Figure 1 and Figure 2] bilateral.

Type G: It has been described as two inverted cones lying in close proximity, looking like the letter 'W', with a faint strip of normal pigmentation in between. [Figure 1 and Figure 3]
Type H: This is seen as symmetrical bands of linear hyperpigmentation extending from just below the angle of the mouth to the lateral aspects of the chin. (Figure 1 and Figure 4]

Inclusion criteria:

1. Patients willing for the study
2. Patients of any age.
3. Pregnant women
4. Patients diagnosed of facial hyperpigmentation (F-H scale) Somany et al.

Exclusion criteria:

1. Patients not willing for the study.
2. Patients with a history of using depigmenting or any over the counter fairness creams.
3. Patients with pigmentation secondary to any rash / redness.
4. Patients with other hyper-pigmentary disorders like melasma, nevus of Ota or Ito, melanocytic nevus, lichen planus pigmentosus, Ashy dermatosis and macular amyloidosis.

RESULTS

The demographic profile and other variables of facial PDL were tabulated in table 1. The mean age of study population was 31.20 years. Out of 304 study subjects the frequency of facial PDL Type F, G and H were 19.73% (60), 29.60% (90) and 50.65% (154) cases respectively. The overall gender wise distribution showed the prevalence of PDL in males with 79.60% (242) cases than females with 20.39% (62) cases. Type H PDL shown dominance in both gender comparatively more incidence of 80.51% (124) cases in males than 33.33% (30) cases of females. The family history of facial PDL showed strong correlation of family history from father with 41.44% (126) cases followed by siblings with 17.10% (52) cases and 13.15% (40) cases from mother. All in 304 study patients 28.28% (86) cases does not shown any relation between family history and incidence of facial PDL. Fitzpatrick skin type of IV was predominant in the present study with 50.01% (152) cases succeeded by Fitzpatrick skin type III and V which were with the frequency of (78) 25.65% and (74) 24.34% cases respectively. Majority 80.92% (246) cases of patients were not shown any dermatological changes and the prevalent skin change observed in present study was hyper-pigmented macules with 12.5% (38) cases followed by hyper trichosis with 6.57% (20) cases. The most common provoking factor was found to be sun exposure with incidence of 56.90% (173) cases and in all study females most common provoking factor was pregnancy with the incidence of 62 (20.39%). The incidence of periorbital melanoses was with 25.98% cases of simultaneous occurrence of periorbital melanoses followed by 21.71% (66) cases were unaware of condition and 18.42% (56) cases were shown occurrence of periorbital melanoses at different times. There were 33.88% (103) cases without any incidence of periorbital melanoses till the study time.

Table 1: Demographic profile of patients with facial PDL (Types F-H)

Variables		**Facial PDLs (n=304)**			**Total**
		Type F	**Type G**	**Type H**	
		60 (19.73%)	**90 (29.60%)**	**154 (50.65%)**	**304 (100%)**
Mean age		31.20 yr			
Sex	Male	49 (81.66%)	69 (76.66%)	124 (80.51%)	242 (79.60%)

	Female	11 (18.33%)	21 (23.33%)	30 (19.48%)	62 (20.39%)
Family history (218 cases, 71.71%)	Mother	14 (23.33%)	16 (17.77%)	10 (6.49%)	40 (13.15%)
	Father	26 (43.33%)	38 (42.22%)	62 (40.25%)	126 (41.44%)
	Siblings	8 (13.33%)	22 (24.44%)	22 (14.28%)	52 (17.10%)
	Not present or not known	12 (20.01%)	14 (15.55%)	60 (38.96%)	86 (28.28%)
Fitzpatrick skin type	III	13 (21.66%)	19 (21.11%)	46 (29.87%)	78 (25.65%)
	IV	33 (55.01%)	46 (51.11%)	73 (47.40%)	152 (50.01%)
	V	14 (23.33%)	25 (27.77%)	35 (22.72%)	74 (24.34%)
Skin changes	Hyper-pigmented macules	8 (13.33%)	8 (8.88%)	22 (14.28%)	38 (12.5%)
	Hyper trichosis	1	10	9	20
		(1.66%)	(11.11%)	(5.84%)	(6.57%)
	None	51 (85%)	72 (80.01%)	123 (79.87%)	246 (80.92%)
PDL symmetry	Bilateral	22 (36.66%)	60 (66.66%)	95 (61.68%)	177 (58.22%)
	Unilateral	38 (63.33%)	30 (33.33%)	59 (38.31%)	127 (41.77%)
PDL margin properties	Sharp	49 (81.66%)	66 (73.33%)	132 (85.71%)	247 (81.25%)
	Blurred	11 (18.33%)	24 (26.66%)	22 (14.28%)	57 (18.75%)
Aggravating factors	Sun	40 (66.66%)	53 (58.55%)	80 (51.94%)	173 (56.90%)
	Pregnancy	11 (18.33%)	21 (23.33%)	30 (19.48%)	62 (20.39%)
	None	9 (15.02%)	16 (17.77%)	44 (28.57%)	69 (22.69%)
Periorbital melanoses (201 cases, 66.11%)	Yes but not known	12 (20.01%)	22 (24.44%)	32 (20.77%)	66 (21.71%)
	Yes , simultaneous	26 (43.33%)	41 (45.55%)	12 (7.79%)	79 (25.98%)
	Yes, different times	14 (23.33%)	16(17.77 %)	26(16.88 %)	56 (18.42%)
	No	8 (13.33%)	11 (12.22%)	84 (54.54%)	103 (33.88%)

The distribution of facial PDL among various occupations was listed in table 2. Farmers or agricultural labour were the most effected patients in our study with incidence of 59.86% (182) ahead of house wives 11.84% (36), working persons 27.96% (85) and students with 3.28% (10) cases. In the present study predominantly 58.22% (177) cases showed bilateral symmetry of demarcation lines whereas the commonness of unilateral symmetrical lines were 41.77% (127) cases and significantly 81.25% (247) cases were developed facial demarcation lines with sharp margins followed by 18.75% (57) cases were with blurred PDL margins. In every observed variable the Type H PDL was very much prevalent followed by Type G and Type F.

Table 2: Distribution of occupation among PDL patients

Occupation	In PDL cases (n=304)	
	Frequency	Percentage (%)
Farmer or agricultural labour	173	56.90%
Housewife	36	11.84%
Student	10	3.28%
Working	85	27.96%
Total	304	100%

Out of 304 study patients 9.21% (28) subjects were healthy without any listed co-morbid clinical conditions and the most prevalent co-morbid condition was found to be diabetes with 38.15% (116) cases followed by hypertension with 29.60% (90) cases, 20.39% (62) cases were suffering with tuberculosis and 2.63% (8) cases were on medication for both diabetes and hypertension [Table 3].

Table 3: Distribution of co-morbid conditions in patients with PDL

Medical history	Frequency (n=304)	Percentage %
Diabetic	116	38.15%
Hypertensive	90	29.60%
Diabetic and Hypertensive	8	2.63%
Tuberculosis	62	20.39%
Without any morbid conditions	28	9.21%
Total	304	100%

[Table 3] shows that after four weeks, five (31%) members of group I and five (17.9%) members of Group II had fully recovered. Eight weeks later, 10 (48.6%) patients in Group I and 6 (21.2%) patients in Group II had fully recovered. The itraconazole-containing group exhibited greater clinical cure rates than the non-statistically significant group at 4 and 8 weeks. At the conclusion of four weeks, there were 58.2% and 17.2%, respectively, of group I and Group II patients who were only partly healed. At the conclusion of eight weeks, group I had a partial cure rate of 44.2%, whereas Group II had a partial cure rate of 21.8%. The rates of failure for the combined treatments in Groups I and II after eight weeks were 6.6% and 57.4%, respectively.

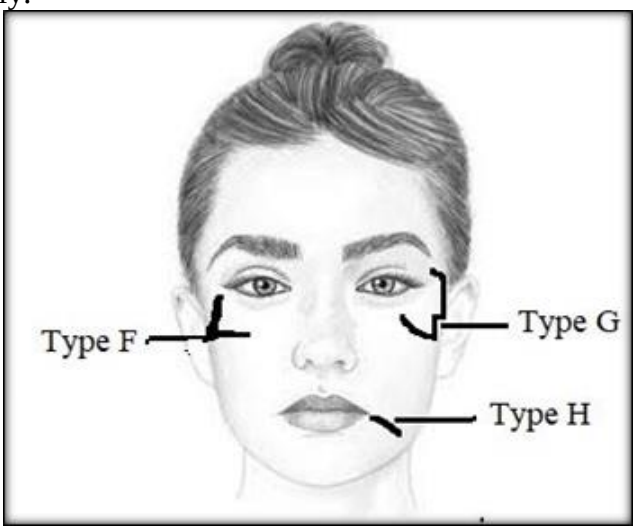

Figure 1: Diagrammatic Representation of Facial Pigmentary Demarcation Lines Type F to H

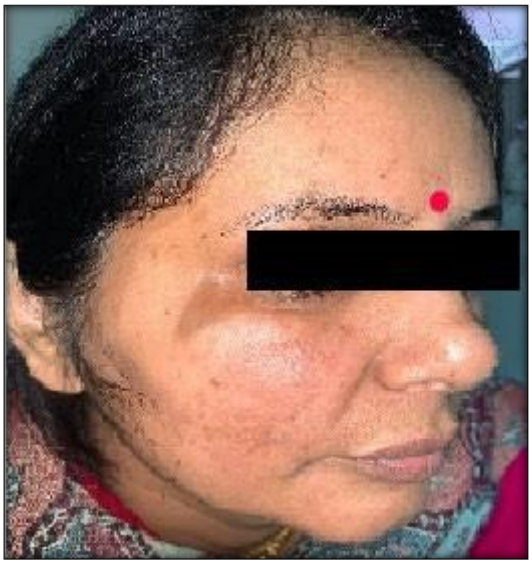

Figure 2: Type F PDL

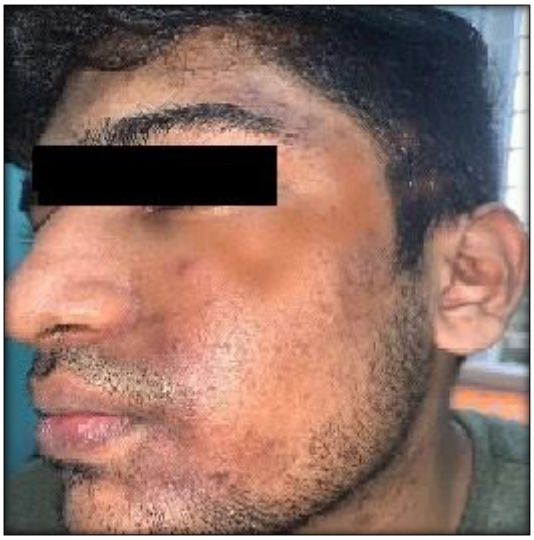

Figure 3: Type G PDL

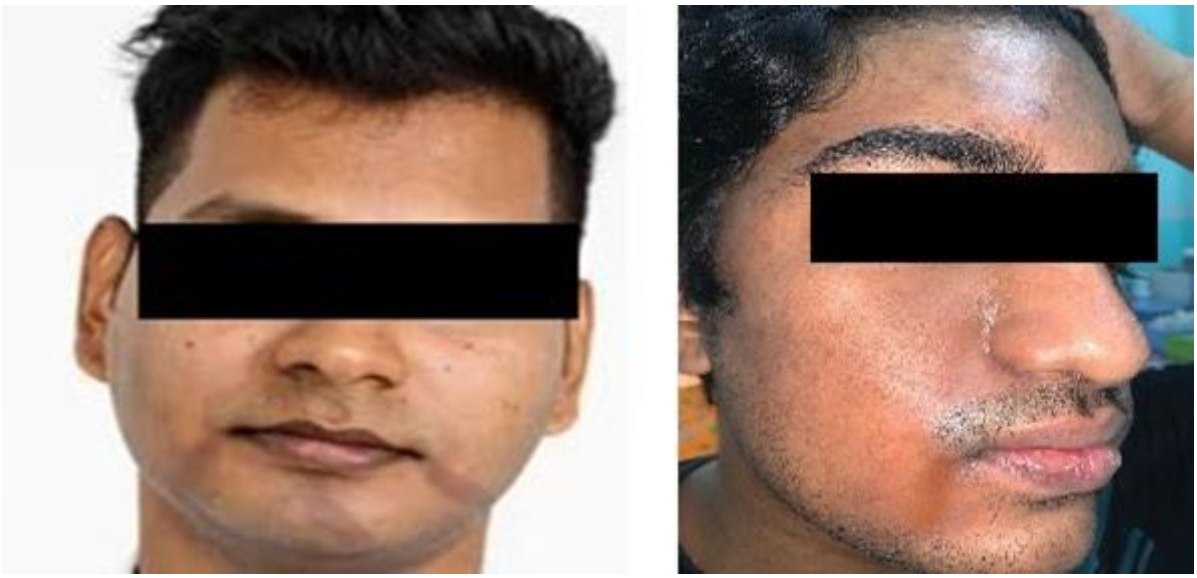

Figure 4: Type H PDL

DISCUSSION

Among facial PDLs type H was the most common (50.65%) followed by type G (29.60%) and type F (19.73%) which was in contrary to studies by Somani et al., and Al-Samary et al., showed type F to be the most common type. Significance of family history was reported in very few studies. An autosomal dominant mode of inheritance of PDLs was suggested by Al-Samary et al., in a survey of PDLs in Japanese. In previous studies among those with facial pigmentary demarcation lines, a family history was positive with 35% cases in Somani VK et al, and 65% in study of Vollum DI et al.[9] However, patients cannot be relied upon for diagnosing PDLs in their relatives and this could account for the variations seen.[10] In our present study family history of PDLs was present in 71.71% (218) cases of which paternal family history was found to be prevalent with 41.44% (126) cases followed by siblings with 17.10% (52) cases and 13.15% (40) cases from mother. All in 304 study patients 28.28% (86) cases does not shown any relation between family history and incidence of facial PDL. A pilot study done by Kathuria et al.[11] on facial PDL shown hyperpigmented macules and hypertrichosis in 44.4% and 11.1% of patients. However, Somani VK et al., in their study noted no skin changes. Study by Lahiri K,[12] and Kathuria et al the incidence of periorbital melanosis was with 92% and 85.7% of which mostly of type F and G respectively and in our study periorbital melanosis was present in 66.11% (201) patients which were mostly of type H and G and our results were nearly consistent with the above results. In a study done by Kathuria et al. 89% patients had bilaterally symmetrical of facial PDLs. In our study, Facial PDLs were dominantly of bilateral symmetrical type in 58.22% (177) cases which was consistent with above earlier work results. In our study, PDL margins were sharply well defined in 81.25% (247) of the facial PDL which is similar and more significant in comparison to the study by Kathuria et al., wherein well-defined margins were noted in 77.7% of patients. In our study, a majority 50.01% (152) of the patients with PDL belonged to the skin type IV followed by Fitzpatrick skin type III and V which were with the frequency of 25.65% (78) and 24.34% (74) cases respectively. In a study done by Al-Samary et al., 92.2% of all patients screened belonged to skin phenotypes of III-V. In our study, a vast majority of patients with PDL had diabeties in 38.15% (116) patients, hypertension in 29.60% (90) cases and tuberculosis in 20.39% (62) cases as co-morbid conditions and significantly not consistent with the studies of Somani et al., who reported no associated comorbidities in facial PDL patients. But in a study done by O Miura et al., reported that PDLs may be associated with certain disease states, like pleurisy and pulmonary tuberculosis. In the present study, 21.71% (66) of patients could not recall the onset of PDL which may probably be due to the fact that this condition is asymptomatic, having a benign course with no morbidity. 25.98% (79) of the patients with PDL had insidious onset. In our study, the notorious triggering factor was prolonged unprotected sun exposure in agricultural occupations in 56.90% (173) subjects followed by pregnancy in 20.39% (62) patients. The dominance of PDL in present study in females during and after pregnancy and menopause might be attributed to high and low hormonal levels respectively. This may be due to alteration in levels of certain hormones like low FSH, and low estrogen being the commonest and is consistent with the results of Somani VK et al. and altered levels of follicle-stimulating hormone, progesterone and melanocyte stimulating hormone (MSH). Increase in MSH in pregnancy may trigger inconspicuous melanocytes in areas of peripheral nerves leading to PDL.[13] It is difficult to correlate the abnormal hormonal profile with pathogenesis of facial PDL due to poor data. Pigmentary demarcation lines generally do not need treatment. However, in patients with cosmetically unacceptable facial PDL, the various treatment modalities that have been tried as suggested by Somani VK et al include the use of Kligman regimen which was used as a modality of treatment in patients with facial PDLs. However, only a negligible change in colour was reported. A Glycolic acid peels used in patients not responding to treatment with Kligman regimen. There was about 10% reduction in skin

pigmentation and after stopping the treatment the pigmentation recurred indicates the demand for more effective treatment options in coming future.

CONCLUSION

Present study pronounces the incidence of facial PDL (types F-H) are sharply common especially amongst the males who are in agricultural occupations with prolonged sun exposure and with other co morbidities like diabetes, hypertension and tuberculosis. In females the prevalent type was Type H PDL during and after pregnancy. The agricultural occupations with prolonged sun exposure, diabetes, hypertension, tuberculosis and positive paternal family history were shown strong correlation with facial PDL among Indian population irrespective of gender and it was found to be highly significant (p=0.003).

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