INTRODUCTION

Nevus sebaceous (NS) was first described by Jadassohn as a circumscribed hamartomatous lesion composed of sebaceous gland in 1895.[1] Pinkus designated the term “organoid nevus” as it is not confined to sebaceous gland but involves proliferative changes in sweat glands and hair follicles as well.[2]

NS presents as well-defined area of alopecia with smooth surface and yellowish discoloration during the infantile stage.[3] The second stage in the life history of the organoid nevus occurs during adolescence and is characterized by an increase in the thickness of the lesion, which may then show a smooth surface with nodularities [Figure 1].[4]

In adult or third stage, lesions become more verrucous and lobulated [Figure 2]. Importantly, various appendageal tumors including benign and malignant such as trichoblastoma, syringocystadenoma papilliferum and basal cell carcinoma develop during this stage. Hence it is very important to follow the course of NS for early detection of neoplasms. Trichoscopy, being in vivo diagnostic technique, can be utilized in this condition, as it demonstrates specific trichoscopic patterns. Patterns of NS on trichoscopy are evaluated. Materials and Methods: Study was conducted in SN Medical College, Bagalkot. It is a case series study. Ten patients with NS were studied using polarised dermoscopy. All NS lesions were subjected to histopathology for confirmation of diagnosis. Correlation of histopathological changes and trichoscopic patterns was done. Data were tabulated in Microsoft excel sheet. The results are presented in proportions and percentages. Results: Total of 10 patients including 6 males and 4 females were present in the study. The mean age was 20 years. Two patients were with childhood stage and 8 patients were with adulthood stage of NS. Trichoscopy showed ‘cobble stone pattern’ in 20% and ‘cerebriform pattern’ in 80% of patients. Histopathological features showed numerous and hyperplastic sebaceous glands with primordial hair follicles which were consistent with NS in all the patients. Conclusion: Trichoscopy helps in the diagnosis of NS with specific patterns. Yellowish globules in the cobblestone pattern and cerebriform patterns are specific to childhood and adult stages of NS respectively. Hence, trichoscopy is good, non-invasive diagnostic technique in NS. Authors strongly recommend regular trichoscopic examination of NS.

Key words: Cerebriform, cobblestone, histopathology, nevus sebaceous, patterns, trichoscopy
neoplasms. Trichoscopy, being noninvasive and in vivo diagnostic technique, can be utilized in this condition as it plays a vital role in the diagnosis of this condition by demonstrating specific trichoscopic patterns.\textsuperscript{[8]} Hence, it can be a good bedside diagnostic tool to identify various tumors developing within NS. Here, authors have described the patterns of NS on trichoscopy and also the importance of trichoscopic examination is being highlighted.

**MATERIALS AND METHODS**

This study was conducted in S. Nijalingappa Medical College, Bagalkot, South India. It is a case series study. Ten patients with clinically suspected NS lesions were included in the study. Ethical clearance was obtained by the Institutional Ethical Committee and informed consent was obtained from patients. Dermlite 3 dermoscope ($\times 10$ magnification) with polarized lights was employed in the study. Sony camera (Digital, 14 Mega pixels) was attached to save the images. Ultrasound gel was applied either on the faceplate of dermoscopy or on the skin lesions and then lesions were observed through the eyepiece of dermoscopy. All NS lesions were subjected to histopathology for confirmation of diagnosis. Correlation of histopathological changes and trichoscopic patterns was done [Table 1]. Data collected are analyzed and tabulated in Microsoft excel sheet. The results are presented in proportions and percentages.

**RESULTS**

A total of 10 patients including six males and four females were present in the study. The mean age was 20 years (minimum 10 years and maximum 30 years). Duration of lesions was ranging between 10 and 30 years as lesions were present since birth in all the patients. Two patients were below 13 years (11 and 13 years) with childhood stage of NS and eight patients were aged more than 19 years who exhibited adulthood stage of NS. There were no patients with the infantile stage of NS in our study. The single lesion was present on the scalp in each patient. Yellowish plaques were seen on the scalp in 20% of patients. The verrucous, lobulated and nodular tumor was observed in remaining 80% of patients.

Trichoscopy demonstrated yellowish globules arranged in a “cobblestone pattern” in 20% of patients [Figure 3]. In 80% of patients, globules were brown in color and two patterns were observed. In one pattern, globules were arranged in “cerebriform pattern” [Figure 4] and in another, globules characterized by crater at center with peripheral striations or extensions [Figure 5]. In one patient, lesions of NS were in transition phase and trichoscopy demonstrated orange and brown globules in the cerebriform pattern. This pattern was appearing as lava flow of an erupting volcano [Figure 6].

Skin biopsy was taken from each lesion using 4 mm punch. Histopathology in childhood stage revealed normal epidermis with numerous, hyperplastic sebaceous glands and small, primordial hair follicles. Apocrine glands were noted with dilated lumina [Figure 7].

In adulthood stage, there was epithelial hyperplasia and papillomatosis. In the dermis, large sebaceous glands, ectopic apocrine glands, and primordial hair follicles were noted in histopathology [Figure 8]. Trichoscopic patterns and their histopathological correlation are shown in Table 1.

**DISCUSSION**

NS is a benign adnexal tumor appears at birth requiring no intervention. When proliferative growth starts, numerous neoplasms grow in along with NS. There are reports of benign as well as malignant tumors developing in NS. Basal cell carcinoma, syringocystadenoma papilliferum, trichoblastoma, and hidradenoma are documented to arise in NS.\textsuperscript{[9]} In a report, authors described six tumors including syringocystadenoma papilliferum, tubular apocrine adenoma, sebaceoma, pigmented trichoblastoma, and superficial epithelioma with sebaceous differentiation and tumor of follicular infundibulum appearing in NS.\textsuperscript{[10]} Because of benign nature of NS, some authors are an opinion that excision is not mandatory.\textsuperscript{[11]} Hence, it is important and necessary to follow-up the lesions of NS when excision is not planned during childhood.

Trichoscopy is now widely used as a tool to diagnose many pigmented and nonpigmented cutaneous lesions. It visualizes the subtle sub-surface structures in a magnified view. Thus, it aids in the detection of new neoplasms arising in NS including both benign and malignant.\textsuperscript{[12]}

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**Table 1: Depicting dermoscopy patterns corresponding to histopathological changes**

| Dermoscopy patterns            | Histopathology changes                  |
|-------------------------------|-----------------------------------------|
| Yellowish globules in cobblestone pattern | Dermal conglomerations of numerous and hyperplastic sebaceous glands |
| Brown globules in cerebriform pattern | Epithelial hyperplasia and papillomatosis |
Figure 1: Clinical image of nevus sebaceous in childhood stage showing lobulated yellowish tumor

Figure 2: Clinical image of nevus sebaceous in adulthood stage showing verrucous growth

Figure 3: Trichoscopy of nevus sebaceous in childhood stage demonstrating yellowish globules arranged in cobblestone pattern. Inset: Schematic image

Figure 4: Trichoscopy of nevus sebaceous in adulthood stage showing fissures and ridges in cerebriform pattern

Figure 5: Trichoscopy of nevus sebaceous in adulthood stage showing globules with crater at center with peripheral striations or extensions

Figure 6: Trichoscopy of transition phase of nevus sebaceous showing brown and orange globules in cerebriform pattern. It appears as lava flow of an erupting volcano. Inset: Schematic image
The infantile stage of NS is specifically characterized by the presence of yellow lobed structures, bright yellow spots that are not associated with hair follicles. It is difficult to discriminate NS of the infantile stage from other congenital lesions on the scalp. Aplasia cutis, especially membranous type looks similar to infantile stage of NS clinically. In a report, Tosti and Piraccini described the trichoscopic patterns of aplasia cutis. Neri et al. reported a case where in trichoscopy was useful in differentiating early sebaceous nevus and aplasia cutis congenita in an infant. However, authors could not observe infantile stage of NS in this study.

In childhood stage, trichoscopy revealed yellowish globules in “cobblestone pattern.” Yellowish globules correspond to dermal conglomerations of numerous, hyperplastic sebaceous glands in the histopathology. Yellowish globules are also seen in sebaceous hyperplasia and sebaceous adenoma. In all these tumors, vessels are pushed toward periphery due to hyperplastic glands and these vessels are referred as “crown vessels.” Nevertheless, authors did not describe “cobblestone pattern” in their study which was specifically observed in this study. However, crown vessels were not noted in this study.

There are no reports of trichoscopy in the adult stage of NS in the literature. In the adult stage, trichoscopy of NS demonstrated fissures and ridges which were arranged in “cerebriform pattern.” The color of globules becomes brown in this stage. This pattern correlates to epithelial hyperplasia and papillomatosis in the histopathology. Although this pattern is noted in seborrheic keratosis, comedo-like openings, moth eaten borders, milia-like cysts, and telangiectasia are characteristically observed in

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**Figure 7:** Histopathology of childhood stage of nevus sebaceous shows small and primordial hair follicles with numerous and hyperplastic sebaceous glands (H and E, ×4)

**Figure 8:** Histopathology of adulthood stage of nevus sebaceous shows epithelial hyperplasia and papillomatosis, large sebaceous glands, and ectopic apocrine glands. The hair follicles are primordial (H and E, ×4)

**Figure 9:** Trichoscopy showing globules of nevus sebaceous (red stars). Nodular basal cell carcinoma is characterized by branching vessels (black arrows), blue-gray globules (yellow circles), and white areas (yellow arrows)

**Figure 10:** Trichoscopy showing globules of nevus sebaceous (yellow stars). Superficial basal cell carcinoma demonstrated telangiectasia (black arrows), blue-gray globules (yellow circles), and white areas (red arrows)
seborrheic keratosis.[16] These are conspicuously absent in NS.

Interestingly, regular trichoscopic examination of NS detected the development of basal cell carcinoma in two patients which was not evident on clinical examination. One patient with 25 years of age developed nodular basal cell carcinoma in the adult stage of NS during 8 months of follow-up [Figure 9]. Trichoscopic features of nodular basal cell carcinoma included arborizing telangiectasia, white structures and blue-gray globules on the tumorous growth. These patterns were characteristic of basal cell carcinoma as described by Menzies et al.[17]

Authors could observe the development of superficial basal cell carcinoma in another patient with 22 years of age in 6 months of follow-up. Telangiectasia, blue-gray globules, and white structures were noted [Figure 10]. These patterns were consistent of superficial basal cell carcinoma.[18] However, in this study pinkish-white background, which is characteristic of superficial basal cell carcinoma, was not noted. This is probably because of the brown complexion of Indian patients.

De Giorgi et al. described occurrence of multiple neoplasms in NS which were evaluated by trichoscopy and authors were of the opinion that trichoscopy was not useful in the detection of new growths in NS.[19] However, in a study by Enei et al., who observed the development of basal cell carcinoma in the facial NS by dermoscopy.[20] In this study also, trichoscopy played a vital role in the documentation of new growths in NS. Hence, it is evident that trichoscopy is best diagnostic tool in the detection of neoplasms occurring on NS particularly in the adult stage.

In one patient, NS was rapidly growing and attained big size within months. Trichoscopy demonstrated brown and orange globules in the cerebriform pattern. Here, brown globules represent matured and hyperplastic sebaceous glands and orange globules correspond to immature sebaceous glands in histopathology. This particular pattern was appearing as lava flow of an erupting volcano. Authors believe that this is because of transition phase of NS. However, this was observed in one patient further studies are required in this regard.

CONCLUSION

Trichoscopy helps in the diagnosis of NS with specific patterns. Yellowish globules in the cobblestone pattern and cerebriform patterns are specific to childhood and adult stages of NS respectively. It also aids in the detection of new growths in the lesions of NS. It is useful especially when resection of NS is not planned. Hence, trichoscopy is good, noninvasive diagnostic technique in NS. Authors strongly recommend regular trichoscopic examination of NS. Further studies involving large sample size are suggested.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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