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Original Research Article

Histopathological spectrum of skin lesions in a tertiary health care centre – A retrospective study

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ABSTRACT

Background: Skin is the body's largest and most complex organ, performing a wide range of functions. Environmental factors, genetics, cleanliness standards and social norms all influence the type of skin lesions that exist in different countries and regions. The skin lesions can vary from inflammatory to neoplastic. In clinically alike dermatoses, skin biopsy is used to provide significant information to the pathologist and dermatologist.
Aims: The aim of the study is to identify and discuss the histopathology of different types of skin lesions, as well as their prevalence, age, sex distribution and location of lesions among hospital patients and compare the results with other relevant studies.
Materials and Methods: The study was a retrospective observational study undertaken for the duration of three years in the Pathology Department of a tertiary health care center. Skin biopsy slides stained with hematoxylin and eosin were studied and classified after a detailed histopathological study under light microscope.
Results: 178 cases of skin lesions in total were evaluated having a 1.5:1 male to female ratio. Nonneoplastic lesions constituted 30.33% of skin lesions, while benign and malignant tumors constituted 55.05% and 14.6% of skin lesions respectively. In neoplastic lesions, keratinocytic tumors were the most common tumor type. The most common malignant tumor was squamous cell carcinoma, whereas epidermal inclusion cyst was the most prevalent benign tumor. The head and neck were the most prevalent sites for skin lesions.
Conclusion: Most of the skin lesions can be accurately diagnosed by histopathological evaluation of biopsy of lesions in combination with clinical findings.

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1. Introduction

Epidermis, dermis and subcutis are the three anatomical components of skin, which is a complex structure with several roles.[1,2] Rudolph Virchow described the skin as a protective covering for internal organs that are more delicate and functionally intricate. Later, the skin has been appreciated as a complicated and the biggest organ in the body, in which many vital activities are managed by finely regulated cellular and molecular interactions.[3] It is made up of a variety of cell types and structures that work together and interdependently e.g., squamous epithelial cells, melanocytes, dendritic cells, lymphocytes etc.[3] Multiple variables influence skin diseases, including the climate, education, financial status, area, race, hereditary factors and social norms.[4] Skin tumors are classified into keratinocytic tumors, melanocytic tumors, adnexal tumors,

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soft tissue tumors, neural tumors, hematolymphoid tumors, and inherited tumor syndromes by the WHO classification of skin tumors editorial and consensus conference in Lyon, France.[5] The frequency of skin lesions has risen considerably over the past owing in part to increased sun exposure, necessitating various forms of surveillance.[6]The types of skin lesions range from inflammatory lesions to neoplasms.[7] Skin diseases are amongst the most frequent health problems in India.[8] Clinicopathological correlation provides a significant clue to come to a diagnosis. Skin biopsy is a simple, quick, economical and outdoor technique which yields sufficient material for conclusive diagnosis and follow up.[9] We studied skin lesions at department of Pathology of the institute in order to gather vital information on skin lesions in surrounding population.

2. Materials and Methods

A hospital based retrospective, observational study was done in Pathology Department of a Government Medical College and Hospital of Northern Odisha over a period of 3 years. This hospital is a newly established tertiary care hospital which cater patients from the tribal areas of Northern Odisha.

Inclusion criteria- All non-neoplastic and neoplastic lesions related to skin irrespective of age and sex were included in this study.

Exclusion criteria- Inadequate skin biopsies and inconclusive diagnosis were omitted from the study.

Sampling procedure- Institutional Ethics Committee consent was sought before initiating the study. All the skin biopsies received in histopathology section from November 2017 to December 2020 were recovered from the departmental records and analyzed. Particulars were procured on socio-demographic variables and on clinical history, such as age, sex, clinical presentation and site of the biopsies from patient requisition forms and histopathology registers. Aside from the Hematoxylin and Eosin staining, special staining and re-staining was performed whenever needed from the unstained slides prepared from blocks. Slides were scrutinized under light microscope.

2.1. Statistical analysis

The data were entered in Microsoft Excel spreadsheet in tabulated form and the statistical analysis were carried out. The relative frequency of various lesions, site of distribution and socio-demographic data like distribution of diseases with respect to age and sex were evaluated and correlated with identical studies.

3. Results

178 cases of skin lesions in total were studied, among which 107 cases (60.11%) were males and 71 cases (39.88%) were females, with a male to female ratio of 1.5:1. The non-neoplastic lesions and malignant tumors were more frequent in males, while benign tumors had an equal incidence in males and females [Table 1].

Tumors were detected in people of different ages, from 4 to 83 years. Maximum number of cases observed in 21 – 30 years and 41 – 50 years age group with 32 cases each with a male predominance [Table 2].

Benign keratinocytic tumors were more often seen in younger age group 11-20 years (23.91%), however malignant keratinocytic tumor more prevalent in older age group 61-70 years (30%). Malignant melanocytic tumors were seen most frequently (75%) in 51-60 years age group. Benign adnexal tumors were prevailing in 41-50 years of age (33.33%). The keratinocytic tumors (66 cases, 37.07%) were the most common tumor type in the study [Table 3].

Benign tumors were most frequent, 98 cases (55.05%), which was followed by non-neoplastic lesions (54 cases, 30.33%) and malignant tumors (26 cases, 14.6%) [Figure 1].

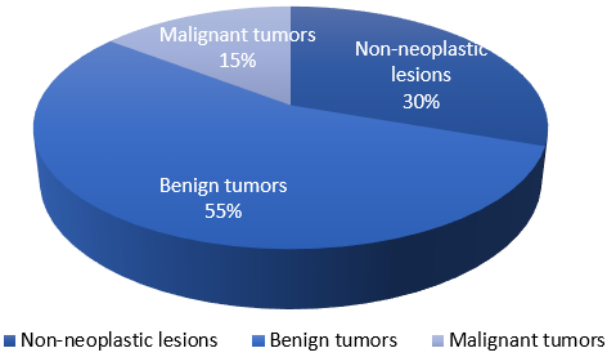


Figure 1: Pie diagram showing frequency distribution of neoplastic and nonneoplastic lesions (n=178)

Most common non-neoplastic lesions were chronic nonspecific inflammatory lesions (35 cases, 64.81%) followed by granulomatous lesions (12 cases, 22.22%). Other non-neoplastic lesions were granulation tissue (five cases), spongiotic dermatitis (one case), and pemphigus foliaceus (one case) [Table 4].

Amongst benign neoplastic category, the keratinocytic tumors (46 cases, 46.92%) were the most prevalent type, followed by vascular tumors (17 cases, 16.32%), lipomatous tumors (14 cases, 14.28%), tumors of the fibrous tissue of skin (ten cases, 10.2%), adnexal tumors (six cases, 6.12%), neural tumors (four cases, 4.08%) and melanocytic tumor (one case, 1.02%) in the present study. In keratinocytic tumors, epidermal inclusion cyst (22 cases, 22.44%) was the most common benign cyst, followed by squamous papilloma (16 cases, 16.32%) and seborrheic keratosis (four cases, 4.08%) [Table 5].

In malignant neoplastic category, the keratinocytic tumors were greatest with 20 cases (76.92% of malignant tumors). In our study, squamous cell carcinoma (15

Table 1: Gender specific distribution of non-neoplastic, benign and malignant lesions of skin

Sex	Non-neoplastic		Benign		Malignant		Total
	No of patients	%	No of patients	%	No of patients	%	
Male	42	77.77	49	50	16	61.53	107(60.11%)
Female	12	22.22	49	50	10	38.46	71(39.88%)
Total	54	100	98	100	26	100	178

Table 2: Distribution of lesions in different age group and sex

Age group (Years)	Male		Female		Total	Percentage
	No. of patients	%	No. of patients	%	No. of patients	%
1-10	5	4.67	3	4.22	8	4.49
11-20	18	16.82	13	18.30	31	17.41
21-30	17	15.88	15	21.12	32	17.97
31-40	17	15.88	11	15.49	28	15.73
41-50	18	16.82	14	19.71	32	17.97
51-60	13	12.14	8	11.26	21	11.79
61-70	14	13.08	6	8.45	20	11.23
70-80	4	3.73	1	1.40	5	2.80
>80	1	0.93	-	-	-	-
Total	107	100	71	100	178	100

Table 3: Age distribution of prevalent skin tumors

Age in years	Keratinocytic tumor				Melanocytic tumor				Skin adnexal tumor			
	Benign		Malignant		Benign		Malignant		Benign		Malignant	
	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%
0-10	3	6.52	-	-	-	-	-	-	-	-	-	-
11-20	11	23.91	-	-	-	-	-	-	1	16.66	-	-
21-30	9	19.56	1	5	-	-	-	-	1	16.66	-	-
31-40	2	4.34	3	15	1	100	1	25	1	16.66	-	-
41-50	7	15.21	3	15	-	-	-	-	2	33.33	-	-
51-60	4	8.69	5	25	-	-	3	75	-	-	-	-
61-70	7	15.21	6	30	-	-	-	-	1	16.66	-	-
70-80	3	6.52	1	5	-	-	-	-	-	-	-	-
>80	-	-	1	5	-	-	-	-	-	-	-	-
Total	46	100	20	100	1	100	4	100	6	100	-	-

Table 4: Frequency distribution of non – neoplastic lesions of skin

Non neoplastic lesions	No. of cases	Percentage (%)
Chronic nonspecific inflammatory lesion	35	64.81%
Granulomatous lesion	12	22.22%
Granulation tissue	5	9.25%
Spongiotic dermatitis	1	1.85%
Pemphigus foliaceus	1	1.85%
Total	54	100%

cases, 57.69%) were found to be the most frequent malignant tumors followed by malignant melanoma (four cases, 15.38%). Other malignant tumors were basal cell carcinoma, comprising three cases (11.53%), verrucous carcinoma, two cases (7.69%) and MPNST, two cases (7.69%) [Table 6].

Most common site of involvement of skin lesion was head and neck (39.88%) followed by trunk (34.83%). Non-neoplastic lesions were more often seen in the trunk (53.7%). Benign tumors were present commonly over head and the neck (52.04%), whereas malignant tumors were seen frequently over trunk (42.3%) [Table 7].

4. Discussion

A male predominance of 107 cases (60.11 %) was found in our study, with 1.5:1 male to female ratio. Gaikwad et al.,[7] Yella et al.,[10] Kumar et al.[11] and Grover et al.[12]

Table 5: Frequency distribution of benign skin neoplasms

Benign tumors		No of cases	Percentage	Total
Tumors of the epidermis	Seborrheic keratosis	4	4.08%	46(46.92%)
	Squamous cell papilloma	16	16.32%	
	Keratoacanthoma	1	1.02%	
	Squamous dysplastic lesion	1	1.02%	
	Epidermal inclusion cyst	22	22.44%	
	Dermoid cyst	2	2.04%	
Melanocytic tumors	Intradermal nevus	1	1.02%	1(1.02%)
Tumors of fibrous tissue involving the skin	Dermatofibroma	2	2.04%	10(10.2%)
	Dermatofibrosarcoma protuberans	1	1.02%	
	Keloid	3	3.06%	
	Fibroma	1	1.02%	
	Nodular Fascitis	1	1.02%	
	Elastofibroma	1	1.02%	
	Fibromatoses	1	1.02%	
Lipomatous tumors of skin	Lipoma	9	9.18%	14(14.28%)
	Fibrolipoma	4	4.08%	
	Spindle cell lipoma	1	1.02%	
Vascular tumors	Capillary Hemangima	10	10.2%	17(17.34%)
	Cavernous Hemangioma	4	4.08%	
	Vascular hamartoma	1	1.02%	
	Pyogenic granuloma	2	2.04%	
Tumors of Neural tissue	Neurofibroma	3	3.06%	4(4.08%)
	Schwannoma	1	1.02%	
Tumors of the epidermal appendages	Trichilemmal cyst	1	1.02%	6(6.12%)
	Trichoepithelioma	2	2.04%	
	Syringocystadenoma papilliferum	1	1.02%	
	Eccrine poroma	1	1.02%	
	Sebaceoma	1	1.02%	
Total		98	100%	100%

Table 6: Frequency distribution of malignant neoplasms of skin

Malignant tumors		No of cases	Percentage
Tumors of the Epidermis	Squamous cell carcinoma	15	57.69%
	Basal cell carcinoma	3	11.53%
	Verrucous carcinoma	2	7.69%
Melanocytic tumors	Malignant melanoma	4	15.38%
Tumors of Neural tissue	MPNST*	2	7.69%
Tumors of the epidermal appendages	-	-	-
Total		26	100%

*MPNST- Malignant Peripheral Nerve Sheath Tumor

Table 7: Site of involvement of lesions of skin

Site	Non-neoplastic Lesions		Benign Tumors		Malignant Tumors		Total	
	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%
Head and neck	15	27.77%	51	52.04%	5	19.23%	71	39.88%
Extremities	8	14.81%	25	25.51%	10	38.46%	43	24.15%
Trunk	29	53.7%	22	22.44%	11	42.3%	62	34.83%
Non specified	2	3.7%	0	0	0	0	2	1.12%
Total	54	100%	98	100%	26	100%	178	100%

also found male dominance in their study. Adhikari et al.[13] and Bezbaruah et al.[14] on the other hand, reported a female prevalence in their study. In this study non-neoplastic lesions and malignant tumors were common in males, whereas benign tumors had an equal incidence in males and females, with an overall male preponderance in skin lesions. In Gaikwad et al.[7] study, male predominance was observed when classifying these lesions into neoplastic and non-neoplastic categories. Male preponderance among non-neoplastic lesions was found in the study by Vaghela et al.[15]

The lesions were common in the 21-30 years and 41-50 years age group, with male predominance in our study. Majority of lesions were in the 21-30 years age group, with a male preponderance in the research by Narang et al.[8] and Abubaker et al.,[16] but a female predominance in study by Bezbaruah et al.[14] In contrary to our findings, Yella et al.[10] and Adhikari et al.[13] found a higher predominance in the age group 31-40 years. The study by Mamatha et al.[17] found that most of the patients belonged to the 51–60-year age range, with female predominance (52.4%).

In this study, the most prevalent site of skin lesions was head and neck followed by trunk. Adhikari et al.[13] found that the upper and lower extremities were the most common sites of skin lesions. The eyelid and lip were identified to be the commonest site of involvement in Bezbaruah et al.[14] study.

Benign tumors were prevalent, 98 cases (55.05%), which is followed by non-neoplastic lesions, 54 cases (30.33%) and malignant tumors, 26 cases (14.6%) in this study. Shrivastava et al.[18] in their research established that the frequency of the benign tumors was higher than the malignant tumors. In the study by Gaikwad et al.,[7] Bezbaruah et al.,[14] Abubaker et al.[16] and Sushma et al.[19] the most common entity was found to be neoplastic lesions. In contrast to our study, non-neoplastic lesions exceeded neoplastic lesions in the research by Bharadwaj et al.[4] and Adhikari et al.[13] Achalkar[20] discovered non-neoplastic lesions in 54 % of patients and Bansal et al.[21] found them in 67.9%.

Chronic nonspecific inflammatory lesions, 35 cases (64.81%) were the most frequently reported non-neoplastic lesions, followed by granulomatous lesions, 12 cases (22.22%). In the study by Yadav et al.,[22] chronic nonspecific inflammatory lesions (19.6%) with varying acanthosis and lymphoplasmacytic infiltration in the underlying dermis were the most frequent non-neoplastic lesions, which was similar to this study. Five cases of lupus vulgaris [Figure 2], one case of tubercular fistula in ano and two cases of foreign body granuloma were among the granulomatous lesions of skin. Amid lupus vulgaris cases, majority were in the age range of 21 - 30 years. On the head and neck, four cases of lupus vulgaris were detected, two on the neck, one on the cheek and the other in the infra-auricular area. Bhambani et al.[23] and Savin et al.[24] discovered that 40% and 80% of the cases of lupus vulgaris were on the face, respectively in their studies. In the study carried out by Sabir et al.,[25] the average age of presentation was 22 years, and four out of nine cases of lupus vulgaris were on the face.

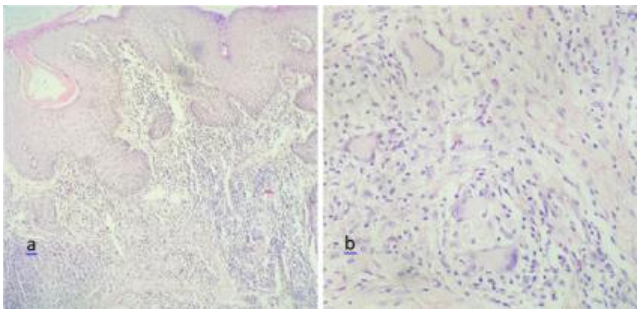


Figure 2: Lupus vulgaris showing non-necrotizing epithelioid cell granulomas in the dermis with presence of langhans giant cells, with peripheral arrangement of nuclei; **a:** H&E stain, 100x and **b:** H&E stain, 400x

Amongst the benign neoplastic categories, keratinocytic tumors accounted for 46 cases (46.92%) as the most frequent type, resembling the study by Bari et al.[26] But skin adnexal tumors were the commonest type in study by Narhire et al.,[6] Shrivastava et al.[18] and Gundall et al.[27] [Table 8].

Among keratinocytic tumors, epidermal inclusion cysts (22 cases, 22.44%) were the most prevalent benign cysts, followed by squamous papilloma (16 cases, 16.32%),

Table 8: Comparison of distribution of different benign neoplasms of skin

Authors	Keratinocytic tumor	Melanocytic tumor	Skin adnexal tumor
Bari V et al.[26]	45.3%	9.4%	15.7%
Gundall S et al.[27]	20.8%	24.5%	54.7%
Narhire V et al.[6]	20%	16%	28%
Shrivastava V et al.[18]	30.12%	19.27%	50.60%
Present study	46.92%	1.02%	6.12%

seborrheic keratosis (4 cases, 4.08%). The present study included one case of intradermal nevus in the melanocytic tumors, showing nevus cells in the dermis vary from type A cells (large epithelioid) present in nests in the upper dermis to type B cells (small lymphocyte-like) to type C cells (spindled) [Figure 3].

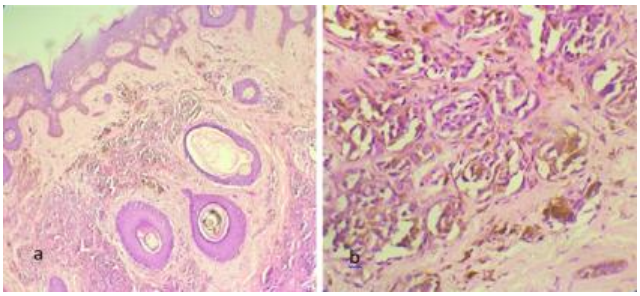


Figure 3: a: Dermal nevus showing nevus cells in the dermis (H&E stain, 100x); **b:** Dermis showing nests of nevus cells (H&E stain, 400x)

In our study, epidermal cysts were the most frequently occurring lesion (22.44%). A study by Bharadwaj et al.[4] (53.2%), Gaikwad et al.[7] (23%), and Achalker et al.[20] (37.5%) described epidermal cyst was identified to be the most prevalent neoplasm. Epidermal cysts are slow-growing, raised, spherical, and firm intradermal or subcutaneous tumors. This cyst is filled with keratin material that is arranged in laminated layers and has a true epidermal wall.[28] We reported 22 skin lesions as epidermal inclusion cysts, out of which one cyst revealed an inflammatory reaction in the wall, probably as a response to keratin following cyst rupture. In the study by Gaikwad SL et al.,[7] 11 cases were reported as epidermoid cysts, out of which four cases showed an inflammatory reaction.

In the present study, vascular tumors constituted 17.34% of benign tumor of skin, out of which ten cases were capillary hemangioma [Figure 4]. Hemangioma had the highest prevalence (10.75%) among benign skin tumors in the study done by Kale et al.[29]

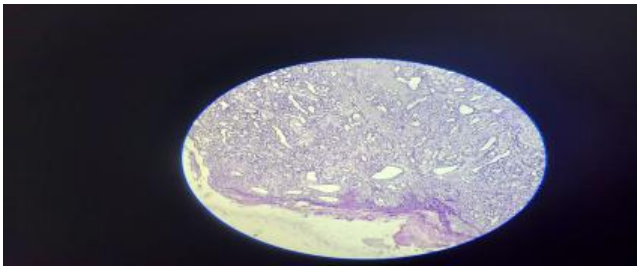


Figure 4: Capillary hemangioma showing lobules of dilated and congested capillaries lined by endothelial cells in an edematous stroma (H&E stain, 100x)

Sixteen cases of squamous papilloma were found in our study constituting 16.32% of benign tumors [Figure 5].

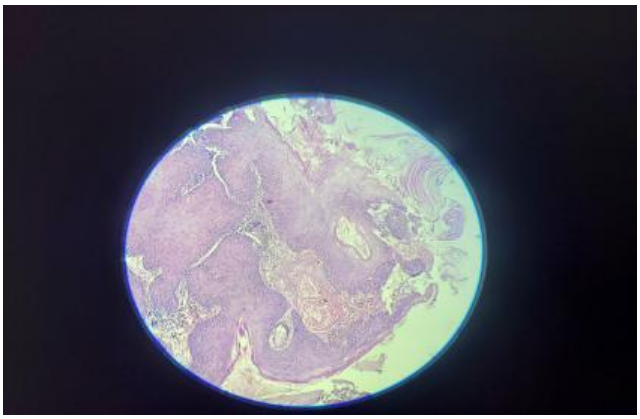


Figure 5: Squamous papilloma showing hyperkeratosis, hypergranulosis and acanthosis of epithelium producing finger like projections with fibrovascular core (H&E stain, 100x)

We reported four cases of seborrheic keratosis, which was 4.08% of benign tumors. Histomorphology revealed hyperkeratosis, acanthosis, and papillomatosis of epidermis, contains pseudo horn cysts, and has a flat base [Figure 6]. In their research, Samanta et al.[30] reported six cases of seborrheic keratosis, out of which two were pigmented variant and four were acanthotic variant.

Similar to the study by Bharadwaj et al.[4] and Sharma et al.,[31] majority of the adnexal tumors were found in the head and neck. We reported two cases of trichoepithelioma that were located on the scalp. Nests of basaloid cells with keratin horn cysts with peripheral palisading were found in trichoepithelioma [Figure 7].

In our study, out of six cases of adnexal tumors, we reported only one case of a trichilemmal cyst with giant cell reaction present on the scalp. In the study by Nayak et al.,[32] trichilemmal cysts were the most frequent lesion, comprising of 30.2% of total cases. Epidermoid cysts were the most prevalent lesions, followed by trichilemmal cysts in Gaikwad et al.,[7] study.

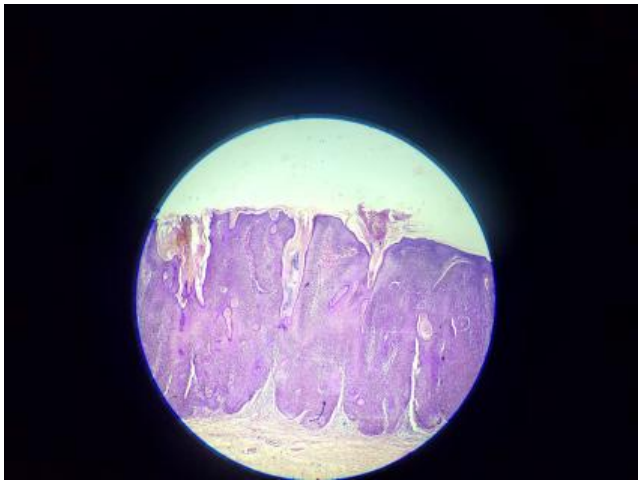


Figure 6: Seborrheic keratosis showing benign keratinocyte proliferations with elongated rete ridges that are interconnected with each other along with horn pseudocysts (H&E stain, 100x)

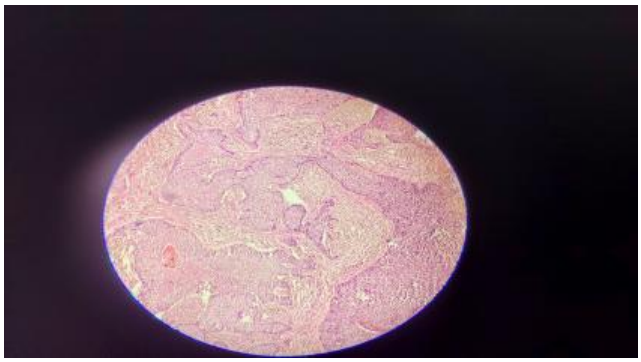


Figure 7: Trichoepithelioma showing fibroblasts encircling and closely associated with nests of basaloid cells (H&E stain, 100x)

Keratinocytic tumors were the most prevalent malignant neoplastic lesions, accounting for 20 cases that is 76.92% of all malignant tumors, with squamous cell carcinoma being the commonest (57.69%) [Figure 8].

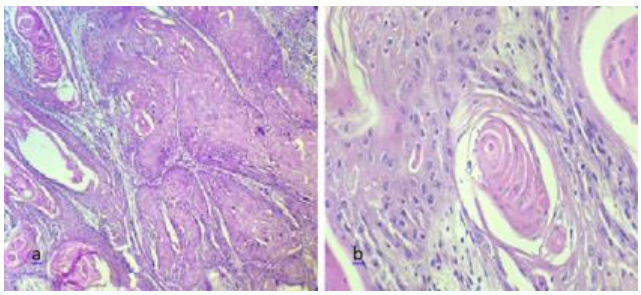


Figure 8: Squamous cell carcinoma showing islands of malignant squamous cell having nuclear pleomorphism, abundant keratinization, intercellular bridges and keratin pearls; **a:** H&E stain, 100x and **b:** H&E stain, 400x

Squamous cell carcinoma was observed to be the commonest malignant tumor by Bharadwaj et al.,[4] Shrivastava et al.,[18] Bansal et al.,[21] Bari et al.,[26] Gundall et al.,[27] Samanta et al.[30] and Deo et al.,[33] which was similar to our study [Table 9].

Table 9: Comparison of distribution of different malignant neoplasms of skin

Authors	Squamous cell carcinoma	Basal cell carcinoma	Verrucous carcinoma
Bari V et al.[26]	45.9%	34.5%	-
Gundall S et al.[27]	46.3%	26.3%	5%
Narhire V et al.[6]	45.5%	9.1%	9.1%
Shrivastava V et al.[18]	27.65%	21.27%	14.89%
Present study	57.69%	11.53%	7.69%

Four cases of malignant melanoma were found in this study constituting 15.38% of malignant tumors [Figure 9]. In the study by Samanta et al.,[30] malignant melanoma constitutes 20.69% of skin malignancy.

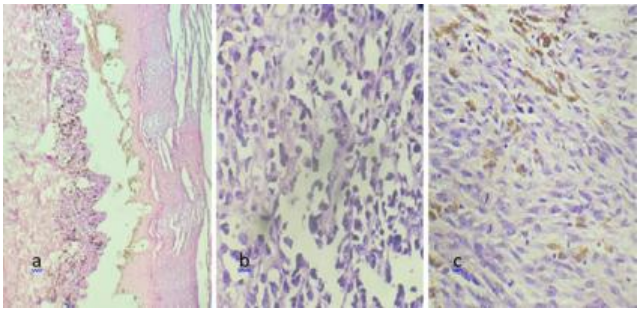


Figure 9: a: Acral melanoma showing lentiginous proliferation of atypical hyperchromatic melanocytes along the base of epidermis and many melanophages (H&E stain, 100x); **b:** Melanoma showing polygonal neoplastic cells (H&E stain, 400x); **c:** Pigmented spindle neoplastic cells (H&E stain, 400x)

We reported three cases of basal cell carcinoma [Figure 10], which constituted 11.53% of all skin malignancy, which was lower than the study by Samanta et al.[30] where basal cell carcinoma constituted 33.33% of all skin malignancy. All the cases with basal cell carcinoma in this study had lesions on the face, which was comparable to the findings of Sabir et al.,[25] Allen AC[34] and Malberger et al.[35]

5. Limitation

Drawback of the study was that convenient sampling was done and the result was not generalizable to the general population.

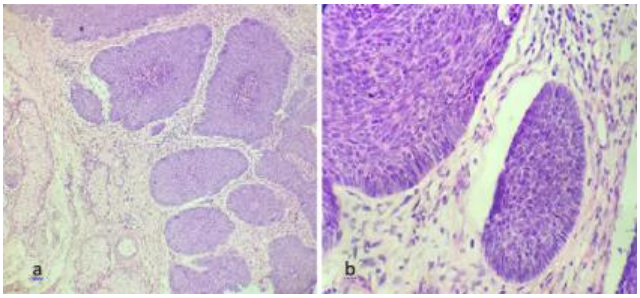


Figure 10: a: Basal Cell Carcinoma showing aggregates of basaloid cells with fibromyxoid stroma and retraction artifact (H&E stain, 100x); **b:** Photomicrograph showing peripheral palisading (H&E stain, 400x)

6. Conclusion

We came across a variety of skin lesions in this study, ranging from non-neoplastic lesions to neoplasms. The gold standard procedure for diagnosing different types of skin lesions is still histopathological analysis of the skin biopsy. Early diagnosis of skin lesions and timely intervention can improve the quality of life of patients and reduce disease burden.

7. Conflict of Interest

The authors declare that they have no conflict of interest.

8. Sources of Funding

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