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A Cross-Sectional Study of Epidermal inclusion cyst- Usual and unusual sites

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Abstract

Background
Epidermal inclusion cysts (EIC) are the most common cutaneous cysts and can occur anywhere on the body. These cysts can occur anywhere on the body, typically present as nodules directly underneath the patient's skin, and often have a visible central punctum. It commonly results from the trauma to the pilosebaceous unit in the hair-bearing area. In areas without hair, these cysts are considered implantation and proliferation of squamous epithelium into the dermis due to injury.

Objective
It is to evaluate the clinicopathologic details of the usual and unusual sites of the epidermoid cyst.

Material & Method
Patients of epidermal inclusion cysts encountered over 1 year from January 2023 to December 2023 were evaluated. A total of 70 cases were studied retrospectively. The clinical details including age, gender, sites, and dimensions were noted. The histopathological findings were evaluated and correlated with the clinical findings.

Result
The highest incidence was observed in the age group of 21–30 years (21.4%, 15/70) and the most commonly affected region was the head and neck region (60%, 42/70). The size of cysts ranged from 0.5 to 8 cm in diameter with a mean of 2.9 cm. The unusual sites observed in this study were 1 at the plantar aspect of the foot and 1 at the dorsal aspect of the foot. 3 cases were reported from the upper eyelid, 1 from the breast, 1 from the chest, 2 from the gluteal region, and 1 from the finger. Histopathological findings included rupture of epidermoid cysts with giant cell reaction.

Conclusion
Epidermoid cysts are common benign intradermal or subcutaneous tumors, but they can have unusual presentations and histopathological findings.

Recommendations
Epidermoid cysts need early diagnosis and treatment as they can cause cosmetic and functional impairment.

***Keywords**: Epidermal inclusion cyst, implantation, pilosebaceous unit, squamous epithelium*
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Introduction
The most prevalent cutaneous cysts are called epidermal inclusion cysts. There are other synonyms for epidermal inclusion cysts, such as inclusion cyst, keratin cyst, infundibular cyst, epidermal cyst, and epidermoid cyst. These cysts can appear anywhere on the body, usually as nodules just under the skin, and frequently include a visible center punctum. They can typically be moved freely. These cysts vary in diameter from a few millimeters to several centimeters. Lesions may not change over time, or they may get bigger over time. It is not possible to anticipate with any degree of accuracy whether an epidermal inclusion cyst will grow, inflame, or stay dormant. Cysts that are infected or fluctuant are typically bigger, erythematous, and more visible to the patient. The patient will frequently experience pain from the cyst as a result of the inflammatory reaction, which may manifest as a fluctuant-filled nodule beneath the skin. Keratin, not sebum, is almost always present in the center of epidermoid cysts. This keratin frequently has a "cheesy" look. Moreover, epidermal inclusion cysts are not sebaceous cysts because they do not come from

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sebaceous glands. An "epidermoid" cyst should not be referred to as a "sebaceous" cyst. Regretfully, the terms are frequently used synonymously in real life.[1]
The scalp, face, neck, trunk, and extremities are the usual places where it manifests. There are also a few documented examples involving the palm, sole, fingers, breast, and external genitalia of both sexes. The trauma to the pilosebaceous unit in the hair-bearing region is the cause of these cysts. These cysts in hairless places like the palm and sole are thought to be epidermal inclusions owing to trauma from things like sewing needles, crush injuries, or HPV infections, which cause the squamous epithelium to proliferate and implant into the dermis.[2]
The study aims to evaluate the clinicopathologic details of the usual and unusual sites of the Epidermoid cyst.

Method

Study design

A Retrospective cross-sectional study

Study setting

The data for this study were obtained from the Department of Pathology, Patna Medical College and Hospital (PMCH), Patna, India where a retrospective study for one year (Jan 2023- Dec 2023) was done, and 70 cases including both usual and unusual sites of EIC obtained.

Inclusion Criteria

- Patients of all ages and both sexes.
- Patients with confirmed diagnoses through clinical examination and histopathological analysis.

Exclusion Criteria

- Patients with incomplete medical records.

Bias

There was a chance that bias would arise when the study first started, but it was avoided by giving all participants identical information and hiding the group allocation from the nurses who collected the data.

Data collection

A total of 70 cases with the epidermal inclusion cyst were selected for the study. A thorough examination of the patient's age, gender, site, swelling period, and associated condition were all noted. The clinicopathological details were taken from the record office for the given period and evaluated with an emphasis on unusual findings related to epidermoid cysts.

Procedure

A histopathological examination of the sample sent post-surgery was done. The tissue was fixed in 10% neutral buffered formalin, then cut sectionally, embedded in paraffin, and stained with hematoxylin and eosin. Finally, these sections were seen under a microscope and allowed for histopathological investigation.

Statistical analysis

The data obtained from the study was arranged in a tabulated manner in an Excel sheet, and the data was then subjected to statistical analysis.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

Results

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Table 1- Region- and site-wise distribution of epidermoid cysts

Region	Site	No. of cases(%)
Head and Neck	Scalp	17(24.2)
	Forehead	5(7.1)
	Upper eyelid	3(4.2)
	Pinna(ear)	3(4.2)
	Preauricular	3(4.2)
	Supraclavicular	1(1.4)
	Postauricular	4(5.7)
	Neck left side	4(5.7)
	Neck right side	2(2.8)
	Mandibular	2(2.8)
	Total	42(60)
Back	Back	8(11.4)
Upper Limb	Forehand	2(2.8)
	Palm	2(2.8)
	Finger	1(1.4)
	Axilla	2(2.8)
	Total	7(10)
Lower Limb	Foot	2(2.8)
	Thigh	3(4.2)
	Gluteal region	2(2.8)
	Total	7(10)
Male genital tract	Scrotum	2(2.8)
Breast	Breast	1(1.4)
Chest	Chest	1(1.4)

A total of 70 cases of epidermal inclusion cysts were included in the present study**.** The age of the patients ranged from 5 years to 75 years with a mean age of 37.67 years and the median age of 36 years. The highest incidence was observed in the age group of 21–30 years (23%, 16/70) and 41–50 (23%, 16/70) followed by the age group of 31–40 (17%, 12/70) years, respectively [Figure 1]. The head and neck region (60%, 42/70) was the most commonly affected region followed by the back (11.4%, 8/70), lower limb (10%, 7/70), and upper limb (10%, 7/70), respectively. The unusual sites observed in this study were breast(1/70), palm(2/70), plantar aspect of foot(1/70), dorsal aspect of foot (1/70), finger(1/70), axilla(2/70), pinna(3/70), scrotum(2/70), chest(1/70), upper eyelid(3/70), gluteal region(2/70), and angle of mandible(2/70) cases. [Table 1] [Figure 2]. The males were more affected than females with an overall male-to-female ratio of 1.5:1. The size of cysts ranged from 0.5 to 8 cm in diameter with a mean of 2.9 cm.

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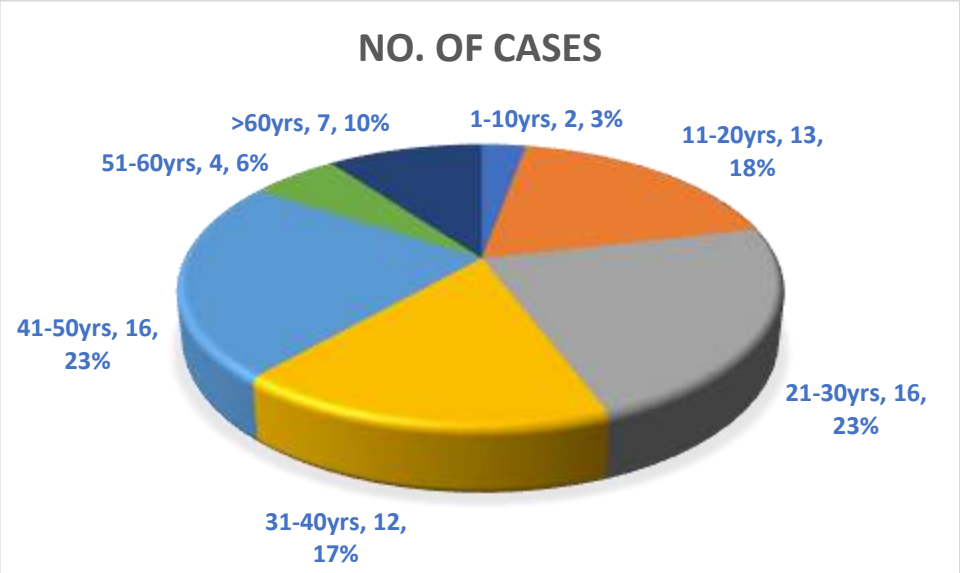

Figure 1- Age-wise distribution of epidermoid cyst

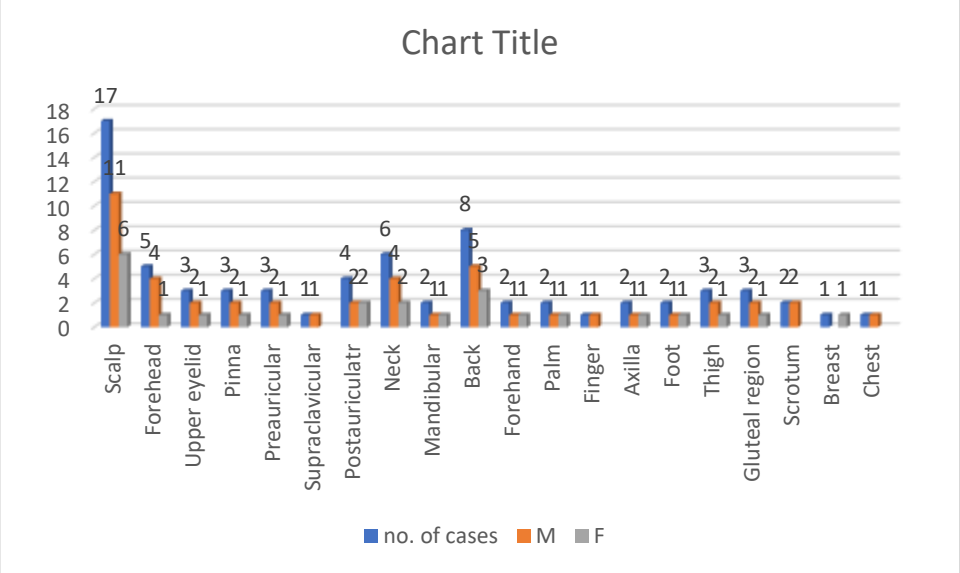

Figure 2- Region-wise distribution of epidermoid cyst with male and female numbers.

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3a- breast

3b- knee joint **3c- left index finger**

Figure 3a, b, and c – Clinical photograph showing unusual sites involved by EIC

Figure 4- EIC gross specimen shows a grey-white unilocular cyst containing pultaceous material.

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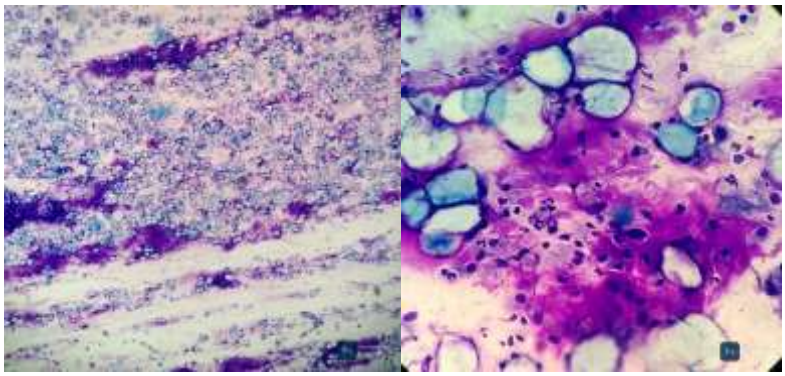

Figure 5- Photomicrograph of the FNAC of epidermal inclusion cyst showing many anucleate squames and few benign nucleated squamous cells in a background containing inflammatory infiltrate.

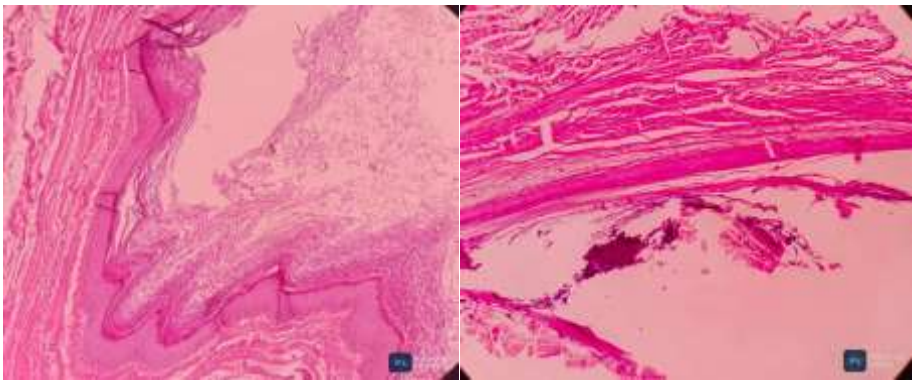

Figure 6- Photomicrograph showing H & E section of keratinous cyst shows a cyst cavity lined by keratinized squamous epithelium and contents of cyst comprises of lamellated keratin.

Histological examination shows cysts lined by stratified squamous epithelium with a granular layer and filled with laminated keratin materials. Seven cases showed ruptured cyst walls with dense chronic inflammatory cells and giant cell reaction.

Discussion

In this study, 70 cases of epidermal inclusion cysts (EICs) were analyzed. Patients' ages ranged from 5 to 75 years, with a mean age of 37.67 years and a median age of 36 years. The highest incidence was in the 21-30 and 41-50 age groups (23% each). The head and neck region was the most commonly affected area, accounting for 60% of cases, with the scalp being the most frequent site (24.2%). Other significant regions included the back (11.4%), lower limb (10%), and upper limb (10%). Unusual sites for EICs included the breast, palm, foot, finger, axilla, pinna, scrotum, chest, upper eyelid, gluteal region, and mandibular angle.

Males were more affected than females, with a male-to-female ratio of 1.5:1. The cyst sizes ranged from 0.5 to 8 cm in diameter, with a mean size of 2.9 cm. Histological examination revealed cysts lined by stratified squamous epithelium with granular layers, filled with laminated keratin. Seven cases exhibited ruptured cyst walls with dense chronic inflammatory cells and giant cell reactions. These findings highlight the diverse anatomical distribution of EICs, with a notable prevalence in the head and neck region, and underscore the importance of considering unusual sites in the diagnosis and treatment of these cysts.

A common benign subcutaneous cystic lesion of the skin, an epidermoid cyst is most typically found on the scalp, face, neck, trunk, and extremities; it is less frequently found on the breast, fingers, palm, sole, male and female external genitalia, and hands.[3–7]

The most often affected region in the current study was the head and neck (60%, 42/70), which was followed by the back (11.4%, 8/70), lower limb (10%, 7/70), and upper limb (10%, 7/70), in that order.

Head predilection is the most usual place. These cysts can have a diameter of a few millimeters to several centimeters. Lesions may not change over time, or they may get bigger over time. It is unknown what specific predictors will determine whether an epidermal inclusion cyst will grow, inflame, or stay dormant. Larger, erythematous cysts that are clinically infectious or fluctuant are typically more obvious to the patient.[3]

Cysts can develop at any age. Equal sex predisposition was shown for these cysts, which primarily afflict young and middle-aged adults.[1] The age groups most frequently impacted in the current study were 21–30 (23%, 16/70) and 41–50 (23%, 16/70). However, with a male-to-female ratio of 1.5:1, men were more impacted in this study than women.

The palm, finger, and sole were the rare locations in the upper and lower limbs because they are hairless.[5,7] Two of the cases were in the palm, one in the finger, and two in the sole. The hand's epidermoid inclusion cysts are typically superficial, localized, painless, slowly growing swellings over the palm that are superficial. Occasionally, they develop from deeper structures like phalangeal and tendon bones.[8] The epidermoid cyst in the finger typically appears as a variable degree of pain, swelling, and nail deformity and develops in the terminal phalanx.[9] Males made up both the palm and finger instances in the current investigation. The distal phalanx was impacted by the finger. Little, painless swellings that didn't result in any deformities were present.

The plantar epidermoid cyst is most frequently found on the lateral border of the sole. These cysts are believed to develop as a result of the painful implantation of epidermal cells into the dermis, which happens when the sole is subjected to mechanical pressure while walking, jogging, and standing.[10] Two cases—one in each gender—were discovered in the lateral border of the sole in the current investigation. The epidermis did not exhibit any alterations caused by the virus. Giant cell response and rupture were seen in both cases.

The breast is the rarest place for EICs, and the majority of instances occur in individuals who have had blunt or penetrating trauma, either as a result of an unintentional injury or a post-procedural trauma. Both the epidermal layer and the breast parenchyma can experience these occurrences, of which less than fifty have been documented in the English literature. Possible pathogenic mechanisms of epidermoid cyst formation in breast parenchyma include damage to the epidermis, which implants deeply into the breast tissue, cystic ectasia of the infundibulum of hair follicles, ecstatic duct in fibroadenoma, fibrocystic change or phyllodes tumor undergoes squamous metaplasia of normal columnar cells, or congenital inclusions along the lines of embryonic closure.[11] In the current investigation, a 5-year-old girl kid had one case of tiny epidermoid cysts in the left breast's subareolar skin layer. Clinically, no more breast lesions were discovered.

The majority of the time, an epidermal inclusion cyst in the superotemporal region of the eyelid will not cause any symptoms until difficulties arise. Three cases of EIC involving the upper eyelid, all in the superotemporal region, were included in the current investigation. One instance involved an eight-year-old boy. It is highly unusual for EIC to be present at a site where there was no punctum above the mass at the time of presentation and no tissue break at the time of trauma. Consequently, when making a differential diagnosis of eyelid masses in children exhibiting unusual appearance, it is crucial to take EIC into account.[3]

Although complications including inflammation, secondary infection, and abscess formation are not uncommon, EICs typically have a benign course. Cysts can occasionally grow quickly, burst spontaneously, ulcerate, and develop sinuses. Malignant transformation of squamous cell carcinoma in EICs with extended progression times has been documented infrequently.[5] To completely remove the cyst wall and prevent recurrence, surgical excision is the preferred course of treatment. As an effective substitute for surgical treatment, erbium-doped yttrium aluminum garnet (Er: YAG) laser fenestration has been used to treat EICs recently.[12]

Generalizability

This cross-sectional study on epidermal inclusion cysts (EICs) provides valuable insights into their prevalence, typical and atypical locations, and clinical presentations. However, the findings may be most applicable to similar clinical settings and populations as those studied at Patna Medical College and Hospital. The variability in EIC presentations suggests that while the results are informative, broader studies across diverse demographics and geographic regions are needed to fully generalize these findings to other populations.

Conclusion

Epidermoid cysts are relatively common benign intradermal or subcutaneous tumors involving any site on the body including hair-free sites. In this study, male predominance was seen to be because of women being very tolerant of this mostly painless simple lesion. The head and neck, lower limb, and back were the leading affected sites. The unusual sites such as breast, palm, finger, and upper eyelid have confusing clinical presentation which may enhance the chance of diagnostic dilemma for many reasons.

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

Recommendations

Considering that these cysts have a relatively high risk of recurrence, a thorough histopathological examination is required. Epidermoid cysts need early diagnosis and treatment as they can cause cosmetic and functional impairment. The variations in sites, clinical presentations, and histopathological findings in the present study have added both to the diagnostic and clinical knowledge known so far.

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Conflict of interest
The authors have no competing interests to declare.

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