

A Clinico-Epidemiological Study of Ingrown Toe Nails

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Abstract: *Ingrown toenail or onychocryptosis is a common toenail problem encountered in primary care practice. The commonest symptom is pain in the affected nail which, if left untreated leads to infection, discharge and difficulty in walking, greatly hampering the quality of life of the individual. Ingrown toenails often have a chronic course and can interfere with quality of life. Its exact etiology is unknown but many anatomic and behavioral factors are thought to contribute to ingrown toenails, such as improper trimming, repetitive or inadvertent trauma, genetic predisposition, hyperhidrosis, and poor foot hygiene. The present study aims to study clinical patterns and various epidemiological factors associated with ingrown toenails.*

1. Introduction

Ingrown toenail, also known as Onychocryptosis (from Greek *onyx* nail and *kryptos* hidden) or unguis incarnatus^[1] is a common and painful form of nail disease. The condition most commonly involves the great toes and mainly affects young adults. It occurs when the lateral nail fold is penetrated by the edge of the nail plate, resulting in pain, sepsis and, later the formation of granulation tissue.^[2] As a result of penetration, lateral edge of the nail plate gets embedded in the nail fold (where it acts as a foreign body) resulting in a cascade of inflammation, infection and the reparative process.^[3]

The exact etiology of ingrown toenails is unknown. Various theories have been proposed to explain the etiology of the ingrown toenail and they can be broadly classified according to whether the primary fault is the nail itself or the soft tissues at the side of the nail.^{[4],[5],[6]} One theory is that the nail is not the real culprit, and it is actually the excess skin surrounding the nail which is the real problem.^[6] The persons who develop this condition have an unusually wide area of tissue medial and lateral to the nail and that with weight bearing, this tissue tends to bulge up around the nail, leading to pressure necrosis.^{[6],[7]} A prospective study by Pearson and colleagues^[8] failed to demonstrate any abnormality of the nail in patients with symptomatic ingrown toenails, and suggested that treatment should not be based on the correction of a nonexistent nail deformity. Although it is still believed that the real defect lies in the nail, the controversy of whether there is a nail plate abnormality or overgrown nail folds still exists. Poorly fitting shoes has been suggested as one of the most common causes of ingrown toenails^[9]. Tumors of the nail apparatus, nail infections, systemic or other skin disease may lead to ingrown toenails^[12-14]. However, the mechanism explaining the association is not clearly understood. Subungual neoplasms may cause ingrown toenails due to compression of the nail plate against the nail fold.

The present study aimed to study clinical patterns and various epidemiological factors associated with ingrown toenails.

2. Materials and Methods

This study was undertaken in a tertiary care center in North India. After obtaining informed consent, patients presenting to department of Orthopedics for ingrown toenails from March 2017 to March 2018 were included in the study. Detailed history regarding epidemiological profile of patients, disease duration, distribution, grading, treatment taken, predisposing factors, other nail or systemic disorders, drug intake was obtained. The grading of ingrown toenails was done using classification system proposed by Mozena *et al.* as Stage 1: Inflammatory stage, Stage 2: Abscess formation, Stage 3: Hypertrophic stage and Stage 4: Distal hypertrophic stage. The data was recorded in a tabulated form and analysed using MicroSoft Excel.

3. Results

Clinical characteristics and possible associated factors

A total of 50 patients were enrolled in the study. The mean age of patients was 28 ± 0.5 years with a range of 15 to 55 years. Majority of patients in the study group comprised of males (78%). 70% of the studied patients belonged to rural background and 30% hailed from urban areas. Labourers comprised majority of patients (30%), followed by students (22%), housewives (10%), businessmen (8%), policemen (6%) and private employee (4%).

Duration of disease varied from 1 to 15 years with a mean of 2.6 years. A single patient complained of the deformity since birth. Disease was unilateral in most of the cases (60%), but 40% of patient showed bilateral involvement, though the severity varied between the two limbs. 12% of patients presented with recurrent disease and had history of partial or complete nail avulsion in the past. 52% of patients were managed previously by conservative modalities of treatment, while 39% of patients did not seek any treatment in the past.

The disease was graded as grade 1 in 26% of patients, grade 2 in 38% of patients, grade 3 in 22% of cases and grade 4 in 14% of cases. Majority of patients (80%) had history of possible predisposing factors in form of ill-fitting footwear, over-zealous nail trimming habits, excessive sweating,

onychomycosis and nail apparatus abnormalities. History of drug intake preceding the onset of deformity was seen in 5 cases. History of diabetes was present in 6 patients. Family history of similar complaints was seen in 10% of cases

4. Discussion

Ingrown toe nails chiefly affects adolescents and young adults. The age group included in our study is consistent with this. Males are predominantly affected in our study as reported in literature (Khunger N *et al*). Majority of the patients in our study were labourers. Frequent occupational trauma in these patients may play a possible etiological role. 60% of the studied patients had unilateral involvement, which is lower than that reported previously (Khunger N *et al*).

In this study, one patient developed ingrown toenail in childhood. He also showed bilateral involvement, however familial involvement and other associated anomalies were all denied. All of other cases occurred in later childhood or in adult patients. Congenital onychocryptosis is an infrequent form of presentation, believed to be due to intrauterine trauma or hereditary transmission.^{[12],[13]} Kinds of ingrown toenails during infancy include hypertrophy of the lateral nail folds, distal-lateral nail embedding, congenital malalignment of the great toenails and overcurvature of the nail plate.^{[14],[15]} Although there are some reports of hereditary ingrown toenails, most of the cases of previously reported ingrown toenails are sporadic, consistent with the results of this study. In some cases a genetic predisposition has been noted and familial cases have been reported.^[16] In previous studies. In our study family history was observed in 10% of cases.

History of use of poor fitting footwear was extractable in 34% of cases. Most cases of ingrown toenails are thought to be due to mechanical deformation of the nail plate. Ill-fitting shoes in this study could be classified as one of such mechanical factors. Extrinsic compression of the great toe by tight footwear and narrow shoes places constant pressure directly on the medial nail wall and indirectly on the lateral wall as the great toe is pushed against the second toe.

History of over-zealous and improper trimming habits were observed as predisposing factor in 22% of patients. Cutting the nail too short allows more bulging of soft tissue leading to an inflammatory reaction and pressure necrosis.^[11] History of hyperhidrosis was obtained from 8% of patients. Excessive sweating and maceration causes the skin of the nail folds to become soft that can be easily penetrated by the nail.

12% of the patients in study group also had onychomycosis. In onychomycotic nails, the nail plate becomes brittle resulting in easy breaking off of nail spicules, making it easier for the nail to pierce the surrounding skin. The thickening of the nail plate caused by onychomycosis may cause mechanical forces to develop ingrown toenail. That is supported by the finding of a previous report that the pincer nail improved after oral antifungal therapy^[11]. It is possible that the ingrown toe nail caused the nail plate to be more

susceptible to fungal infection; however, further study is needed to confirm this possibility.

Nail apparatus abnormality was seen in 4% of the patients. Improper shape of the nail plate, thick nail folds, medial rotation of the hallux (eversion) and reduced nail thickness can play a role in the development of the ingrown toenail.^[11] A nail that is more curved from side to side rather than being flat is more likely to become an ingrown nail and the most severe type is called a 'pincer nail'

Diabetic patients have been found to have a higher incidence of ingrown nails compared with nondiabetic patients.^[17] and similarly a prevalence of 12% of diabetics was seen among the patients. Ingrown toenail and paronychia have been reported secondary to drugs, such as indinavir and indinavir/ritonavir combination.^{[18],[19]} Excess nail fold granulation tissue and ingrown toenail have also been reported with retinoids,^[20] docetaxel,^[21] cyclosporine^[22] and oral antifungal treatment.^[23] History of drug intake preceding onset was seen in 10% of patients

The ingrown toenail continues to be a common source of morbidity worldwide and has a significant impact on the quality of life of an individual. There is no standard treatment for all cases of ingrown toenails. Several treatment methods, including conservative approaches and surgical methods, are used. Surgical therapy can produce a satisfactory result in cases with severe deformity; however, that invasive approach may cause severe discomfort. Conservative therapy requires a longer treatment period but causes less discomfort.

In summary, the results of this study throw some light on various clinical and epidemiological variables associated with ingrown toenails. Some of the findings are consistent with that reported in literature. However the relevance of other epidemiological factors has to be sought through the medium of future studies with larger sample size and comparison group.

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