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Original Article

Fingers soaking with saliva as a cause of chronic paronychia among infants

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Abstract

Background Paronychia is a common dermatological complaint characterized by inflammation of the lateral and/ or proximal nail folds. Most childhood paronychia is acquired through the habit of finger sucking which represent the dominant etiologic factor in predisposing this age group to watery and irritant component of saliva with oral microbial flora which ultimately results in infection of the nail fold with resultant paronychia.

Objective To record infants and children with chronic paronychia in whom the finger sucking with saliva contamination was the main predisposing factor.

Methods In this case descriptive study, all children with chronic paronychia were enrolled during the period from 2013 to 2022. A thorough history, complete skin and hair examination were done for every child aiming to exclude the possible etiological factor other than finger sucking incriminated in its development.

Results Fourteen patients, 8 males (57.1%) and 6 (42.9%) females, with age ranging from 6 -18 months with mean 13.78 months suffering from chronic paronychia during nine years' time period were involved in the present study. Finger sucking history was elucidated in 9 (64.3%) patients while the remaining 5 (35.7%) patients were just fingers soaking with mouth saliva as a part of playing as described by their parents. With regards to fingers affected by paronychia in all presenting patients, a total of 25 fingers were affected, 13 (52%) left hands fingers, and 12(48%) right hands fingers were involved .The frequency of the involved fingers in decreasing orders was thumb 12 (48%) , index 8 (32%) , middle 2 (8%), little 2 (8%) and lastly the ring 1 (4%). The nail fold swelling was the standard observation in all the presenting children affecting 25 fingers (100%). Other nail changes include ridging, nail plate dystrophy, pitting, and onycholysis were observed.

Conclusion Infantile chronic paronychia is not uncommon dermatological problem that results from fingers soaking with saliva as a part of mouth sucking and fingers contamination with saliva. There is swelling of nail folds with nail dystrophy. It is a benign condition but annoying for the parents.

Key words
Chronic paronychia; Saliva; Finger sucking; Soaking; Nail fold swelling.

Introduction

Paronychia is a common annoying illness of the hands and less commonly the feet characterized by inflammation of the lateral and/ or proximal nail folds as a result of disruption of protective barrier between nail plate and nail folds precipitated by infectious or non-infectious

factors.[1]

It affects both adults and children with very rare case reports of paronychia developed in neonatal period. The habit of finger sucking in childhood period represents the dominant etiologic factor in predisposing this age group to a variety of infectious pathogens which ultimately result in infection of the nail fold with resultant paronychia.[2] Finger sucking is a common practice in children disappearing spontaneously in preschool age. It is usually associated with gratification and self-palliation while they suck or bite their fingers. Many complications are associated with this habit such as dental deformities, finger deformities, and chronic paronychia. Older children with persistent finger sucking habit may be in need for psychiatric consultation.[3]

Paronychia can follow acute or chronic course depending on the duration of disease. In acute paronychia, which usually lasts less than 6 weeks duration, the direct or indirect trauma to the nail fold from ordinary activities like dishwashing or minor traumatic events like manicure, nail biting or sucking is the most common precipitating events which usually follows 2-5 days later by bacterial invasion of the nail with subsequent development of erythema, swelling and tenderness of the proximal and/or lateral nail folds with ultimate collection of pus under the nail folds that may result in transient or even permanent nail damage if not treated. Of note, chronic paronychia may complicate recurrent acute one.[4]

Bacteria is the most common pathogen implicated in acute paronychia followed by viral and fungal etiology. Staphylococcus aureus is the most common bacterial species followed by Streptococcus pyogenes, Pseudomonas aeruginosa and Proteus vulgaris. Viral paronychia includes herpetic whitlow and orf paronychia while fungal paronychia is seen mostly in children with a habit of sucking thumb. [5]

Treatment of acute paronychia is by topical and/ or systemic antibiotics. If there is abscess formation, the pus should be drained surgically. [6]

Chronic paronychia is an annoying health issue of housewives with multifactorial predisposition, but the chronic moisture from daily work results in damage of nail cuticle with subsequent separation of proximal and lateral nail folds forming a dead space allowing the entrance of infectious pathogens, water, detergents and other irritant materials beneath the nail folds leading to inflammation responsible for the main presentations of chronic paronychia including swelling of the nail folds and subsequent nail dystrophy; in what called wet theory. The main infectious etiologies implicated in pathogenesis of chronic paronychia are yeast particularly candida albicans and intestinal bacteria which are considered as a secondary invader. The reported nail changes in patients with chronic paronychia were cuticle loss, swelling of nail fold, ridging, pitting, onycholysis and nail plate dystrophy.[7] In addition, immunosuppression including diabetes mellitus, and human immunodeficiency virus infection facilitate secondary colonization.[8] Prevention through protection of fingers during daily activities by gloves remains the most reliable method. Applying topical nystatin

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ointment, fusidic acid ointment or even occlusive ointment like Vaseline have been reported to be useful with no statistically significant differences between them.[7]

Paronychia has been reported in association with psoriasis,[9] lichen planus[10] and pemphigus vulgaris.[11]

Paronychia has been observed in many important genodermatosis including but not limited to pachyonychia congenita,[12] primary immunodeficiency diseases,[13] epidermolysis bullosa[14] and chronic mucocutaneous candidiasis.[15]

Acquired and congenital zinc deficiency (acrodermatitis enteropathica) had also been reported as cause of paronychia.[15,16]

In addition, paronychia has been reported as adverse reaction of many anticancer drugs like cetuximab, taxanes and less frequently with capecitabine, methotrexate, and doxorubicin.[17] Other drugs that have been reported as a cause of paronychia are isotretinoin and trametinib.[18,19]

So the aim of this study is to record infants and children with chronic paronychia in whom the finger sucking with saliva contamination were the main predisposing factor.

Patients and methods

In this case descriptive study, all children with chronic paronychia were enrolled during the period from 2013-2022. The study followed the Declaration of Helsinki Principles and informed consent was obtained from patients' parents after an explanation of the nature of the study. Close-up photographs were taken at the same place with constant distance and illumination. For every patient, a thorough history including the duration and progression of disease was carefully gathered. The probable precipitating factors particularly the habit of finger sucking and the associated cutaneous and/ or systemic diseases was obtained. Any patient presented with chronic paronychia lasting more than 6 weeks duration with documented history of repeated finger sucking or mouth playing was included in this study. Those with shorter duration of the disease (less than 6 weeks) or with no documented history of finger sucking habit were excluded from the study. In each patient, complete skin and hair examination particularly in patients with multiple finger involvement was done minutely for any possible hereditary dermatosis. Primarily, the diagnosis based on history and clinical examination. Statistical package for social science (SPSS) version 23 was used for data input and analysis. Data were statistically described in terms of mean, frequencies (no. of cases), standard deviation (SD), male to female ratio and percentage (%).

Results

Fourteen patients, 8 males (57.1%) and 6 (42.9%) females, suffering from chronic paronychia during nine years' time period were presented in the present study. Their ages at presentation ranged from 6-18 months with mean 13.78±3.7 months. The mean duration of the disease was 2.57±0.6 months. Finger sucking history was elucidated in 9 (64.3%) patients while the remaining 5 (35.7%) patients were just mouth playing thus soaking their fingers as described by their parents. Of the 14 presenting patients, only 6 (42.9%) patients presented with chronic paronychia of single finger **(Figure 1)** while more than one finger affected was the chief presentation in the remaining 8 (57.1%) patients. In addition both right and left hand were affected in 6 (42.8%) patients **(Figure 2)** exceeding the single right or left hand involvement which was equally affected [4

Figure 1 Showing an infant with chronic paronychia involving right thumb only.

Figure 2 Chronic paronychia of 9 months infants involving fingers of right and left hands.

(28.6%) for each hand separately]. With regards to fingers affected by paronychia in all presenting patients, a total of 25 fingers were affected, 13 (52%) were left hands fingers and 12 (48%) were right hands fingers as described in **Table 1**.

Of the 25 fingers affected by paronychia the frequency of the involved fingers in decreasing orders was thumb 12 (48%), index 8 (32%), middle 2 (8%), little 2 (8%) and lastly the ring 1 (4%).

Each finger affected by paronychia displayed many nail changes in form of nail fold swelling, ridging, nail plate dystrophy, pitting and onycholysis **(Table 2)**. But the nail fold swelling was the standard observation in all the presenting children affecting 25 fingers (100%) **(Figure 3)**. Also, the present study recorded that the longer the duration of the disease, the more severe nail changes.

Discussion

Finger sucking is a primitive pattern of behavioral manipulation of the human being associated with gratification, relief and calmness disappearing spontaneously in preschool age while persistence of this behavior in older children may signal the need for psychological consultation. The reported hand complications from digital sucking in children may include dental malocclusion, finger deformities and paronychia.[3]

Table 1 Showing the number and the type of fingers affected in each hand.

Patient number	*Right hand*					*Left hand*					*Total fingers total*
	Thumb	*Index*	*Middle*	*Ring*	*Little*	*Thumb*	*Index*	*Middle*	*Ring*	*Little*	
1						√	√				2
2						√			√		2
3		√									1
4		√					√				2
5										√	1
6		√				√	√	√			4
7	√					√					2
8	√										1
9	√										1
10		√			√						2
11	√					√					2
12						√					1
13	√										1
14	√	√						√			3
Total fingers	6	5			1	6	3	2	1	1	25

Table 2 Showing the clinical manifestations of infantile paronychia

Clinical presentation	*No.(%) fingers affected*
Nail fold swelling	25 (100)
Ridging	12 (48)
Nail plate dystrophy	11 (44)
Pitting	7 (28)
Onycholysis	2 (8)

Figure 3 An infant and his mother hands displaying features of chronic paronychia. The infant presented with nail fold swelling and nail plate dystrophy of the right and left thumbs.

Finger sucking is a common childhood practice with approximately 31% of children who frequently suck their thumbs thereby increasing the risk of microbial exposure. The repeated exposure of the finger tissue to saliva results in irritation and contact dermatitis of the periungual tissue with subsequent nail plate damage and paronychia.[20]

Saliva is produced from the acini of salivary glands and the saliva pH ranges from 6.0 to 7.0 and it contains 95% water, lysozyme, mucus, lactoferrin, electrolytes, α-amylase and peroxidase. Upon searching literature, no studies discuss the pathophysiologic changes when skin is exposed to saliva. [21]

There is paucity of clinical researches regarding chronic paronychia among infants and children but many studies considered habitual finger sucking as the main predisposing factor for developing pediatric chronic paronychia.[3,22]

In the present study, with regard to finger sucking habit that ends in chronic paronychia in the studied children, the males were affected more than females and the combined right and left hand involvement in finger sucking habit was more than either right or left hand involvement alone. This observation is in contrary to previous reports.[23]

The mean age of the presenting patients was 13.78 months and this represents the time where most children start their digit sucking habit.[23]

In the present study, 14 pediatric patients presented with chronic paronychia with varying severity in whom a habitual finger sucking or mouth playing with saliva soaking was confirmed by parents. This observation is supported by previous published article where saliva is considered to be a chemical irritant.[3,22]

In 8 (57.1%) patients, more than one finger was affected by paronychia and both right and left hands were involved in 6(42.8%) patients. The cause behind this observation cannot be fully explained but one may speculate that continuous sucking of one finger may precipitate pain in the affected finger so the child tried to suck other fingers to avoid pain and to achieve self-palliation with little efforts.

In the present study, the chronic paronychia of the thumb was more common than other fingers paronychia. This observation can be interpreted by tendency of the studied children to frequently suck their thumbs with or without other fingers and this explanation can be supported by previous studies.[20,23]

The nail changes that were observed in the chronic paronychia of the presenting patients were nail fold swelling, ridging, nail plate

dystrophy, pitting, and onycholysis. These changes are similar to that observed in adult patients with chronic paronychia and this is not surprising as the etiopathogenesis of chronic paronychia of adult patients mainly attributed to repeated water and irritant exposure with secondary colonization by bacterial or fungal pathogen.[24] In the same way, the prolonged finger sucking habit in children expose the nail apparatus to the watery and irritant component of saliva with secondary colonization by oral microbes.[20,21]

While chronic paronychia is not un common clinical observation in infants, little is known about the actual prevalence and etiopathogensis of this disease in such age group. The present study does confirm that frequent wetting and soaking of fingers with saliva is the main predisposing factor for infantile paronychia. The pathogenesis of infantile paronychia could be very similar to house wife chronic paronychia [7] where in both conditions there is frequent exposure to liquids like water and saliva, thus there is frequent soaking of nails. This will cause irritation of finger nail folds and enhanced chronic infection with microflora.

Conclusion

Infantile paronychia is not uncommon dermatological problem that results from either fingers sucking or finger soaking with saliva. Single or multiple fingers could be affected of right or left or both hands. Dermatologist and pediatrician should be aware about this infantile problem in order to assure the infants parents.

References

1. Rockwell PG. Acute and chronic paronychia. *Am Fam Physician*. 2001; **63(6)**:1113-6.
2. Grome L, Borah G. Neonatal acute Paronychia. *HAND*. 2017;**12(5)**:NP99-NP100.
3. Figueiredo GC, Figueiredo EC. Dystrophic calcinosis in a child with a thumb sucking habit: case report. *Rev Hosp Clin Fac Med Sao Paulo*. 2000;**55(5)**:177-80.
4. Shafritz AB, Coppage JM. Acute and chronic paronychia of the hand. *J Am Acad Orthop Surg*. 2014;**22(3)**:165-74.
5. Durdu M, Ruocco V. Clinical and cytologic features of antibiotic-resistant acute paronychia. *J Am Acad Dermatol*. 2014;**70(1)**:120-6.
6. Ritting AW, O'Malley MP, Rodner CM. Acute paronychia. *J Hand Surg Am*. 2012;**37(5)**:1068-70.
7. Sharquie KE, Noaimi AA, Galib AS.Treatment of chronic paronychia: A double blind comparative clinical trial using singly vaseline, nystatin and fucidic acid ointment. *J Chem Dermatol Sci Appl*. 2013;**3**:250‑5.
8. Relhan V, Bansal A. Acute and Chronic Paronychia Revisited: A Narrative Review. *J Cutan Aesthet Surg*. 2022;**15(1)**:1-16.
9. Nieradko-Iwanicka B. Nail psoriasis - what a rheumatologist should know about. *Reumatologia*. 2017;**55(1)**:44-7.
10. Kharghoria G, Grover C, Bhattacharya SN, Sharma S. Histopathological evaluation of nail lichen planus: A cross-sectional study. *J Cutan Pathol*. 2021;**48(1)**:11-7.
11. Laffitte E, Panizzon RG, Borradori L. Orodigital pemphigus vulgaris: a pathogenic role of anti-desmoglein-3 autoantibodies in pemphigus paronychia? *Dermatology*. 2008;**217(4)**:337-9.
12. Agarwal P, Chhaperwal MK, Singh A, Verma A, Nijhawan M, Singh K, Mathur D. Pachyonychia congenita: A rare genodermatosis. *Indian Dermatol Online J*. 2013;**4(3)**:225-7.
13. de Wit J, Brada RJK, van Veldhuizen J, Dalm VASH, Pasmans SGMA. Skin disorders are prominent features in primary immunodeficiency diseases: A systematic overview of current data. *Allergy*. 2019;**74(3)**:464-82.
14. Tosti A, de Farias DC, Murrell DF. Nail involvement in epidermolysis bullosa. *Dermatol Clin*. 2010;**28(1)**:153-7.
15. Inamadar AC, Palit A. Nails: diagnostic clue to genodermatoses. *Indian J Dermatol Venereol Leprol*. 2012;**78(3)**:271-8.

16. Shah KN, Yan AC. Acquired zinc deficiency acrodermatitis associated with nephrotic syndrome. *Pediatr Dermatol*. 2008;**25(1)**:56-9.
17. Robert C, Sibaud V, Mateus C, Verschoore M, Charles C, Lanoy E, Baran R. Nail toxicities induced by systemic anticancer treatments. *Lancet Oncol*. 2015;**16(4)**:e181-9.
18. Benedetto C, Crasto D, Ettefagh L, Nami N. Development of Periungual Pyogenic Granuloma with Associated Paronychia Following Isotretinoin Therapy: A Case Report and a Review of the Literature. *J Clin Aesthet Dermatol*. 2019;**12(4)**:32-6.
19. Ronsley R, Hounjet CD, Cheng S, *et al*. Trametinib therapy for children with neurofibromatosis type 1 and life-threatening plexiform neurofibroma or treatment-refractory low-grade glioma. *Cancer Med*. 2021;**10(11)**:3556-64.
20. Starace M, Alessandrini A, Piraccini BM. Nail disorders in children. *Skin Appendage Disord*. 2018;**4(4)**:217-29.
21. Gray M, Bliss DZ, McNichol L. Moisture-associated skin damage: expanding and updating practice based on the newest ICD-10-CM Codes. *J Wound Ostomy Continence Nurs*. 2022;**49(2)**:143-51.
22. Lorizzo M, Piraccini BM, Tosti A. Chronic paronychia: different causes and their treatment. *Expert Rev Dermatol*. 2006;**1(3)**:375-8.
23. Thadchanamoorthy V, Dayasiri K. A Study on digit sucking among children presented to a tertiary care paediatric clinic in Sri Lanka. *Cureus*. 2021;**13(2)**:e13306.
24. Shemer A, Daniel CR 3rd. Common nail disorders. *Clin Dermatol*. 2013;**31(5)**:578-86.