

## Clinical Profile of Nail Changes in Systemic Diseases



### Medical Science

**KEYWORDS :** clubbing, platynychia, onychomycosis, koilonychias, onycholysis

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### ABSTRACT

**Background:** Nail changes occur in a wide variety of systemic diseases which requires careful examination of fingernails and toenails.

**Aims and Objectives:** The present study was conducted to evaluate the frequency of various nail changes, in patients who have nail involvement with systemic diseases and to assess the specificity of nail changes with disease status.

**Materials and Methods:** Patients 360 in number were selected randomly in whom nail changes were associated with systemic diseases attending Dermatology opd and inpatients of other departments. Patients in whom nail changes were associated with trauma, primary muco-cutaneous disease were excluded.

**Results:** Maximum patients were in the age group of 31-50 years accounted for 63%. Most frequent nail involvement was clubbing found in 40.8% patients, followed by pallor 32.5%, Beau's lines 11.4 %, and platynychia 8.9 %. Most frequent system associated with nail changes was respiratory system which included 41.1% patients, followed by hematopoietic system 13.9%, renal 13.3%, GIT 12.5%, endocrine 4.4% and cardiovascular system 2.8%.

**Conclusion:** Nail changes were most commonly seen in patients with systemic illness more than 6 months. Diabetes or hypertension was found in 28.3% patients. Most frequent nail involvement was clubbing followed by pallor, Beau's lines. Most frequent system associated with nail changes was respiratory system, hematopoietic system, renal, GIT and liver. Clubbing was mostly seen in patients having pulmonary Koch's. Terry' nail was found relatively specific in the patients of liver cirrhosis. HHN (half and half nails) confirms the diagnosis of chronic renal failure.

### Introduction:

Nail changes may be the earliest presentation of various diseases, in many situations nail changes may precede, co-exist or follow the disease state which may be clue to systemic involvement.

Nail abnormalities in systemic disease can be broadly classified as follows:

#### 1. Nail abnormalities less specifically associated with systemic disease <sup>1</sup>:

- Splinter hemorrhages
- Beau's lines
- Onycholysis
- Pitting
- Koilonychia

#### 2. Nail abnormalities more specifically associated with systemic disease:

- a. True leukonychia
- b. Apparent leukonychia
- c. Clubbing

#### 3. Nail abnormalities associated with disease of a specific organ system:

- Renal disease-half and half nails, koilonychias, dystrophic Nails
- Pulmonary disease: Yellow nail syndrome, Shell nail syndrome, clubbing
- Gastrointestinal disease (Table-1)<sup>2</sup>
- Cardiovascular and hematological conditions (Table-2)<sup>3</sup>

#### 4. Nail abnormalities associated with specific syndromes or genodermatoses

### Aims and Objectives :

- To evaluate the frequency of various nail changes,

in patients who have nail involvement with systemic diseases.

- To assess the specificity of nail changes with disease status.

### Materials and Methods:

Selection of the 360 cases was done randomly in whom nail changes were associated with systemic diseases; among patients attending Dermatology opd and inpatients of rest other departments in a tertiary care teaching institute in a period from 2013 to 2015. Both male and female patients of all age groups were included. Exclusion criteria were set as those patients in whom nail changes were associated with trauma, primary muco-cutaneous disease.

After obtaining consent detailed history including drug intake, present and past medical history (hypertension, diabetes mellitus and cardiac disease) was taken. General, systemic and nail (both finger and toe nails) examination was done. Various investigations were done according to patient's clinical association such as haemogram, BSL, LFT's, kidney function test, KOH mount and nail biopsy.

Daniel <sup>4</sup> highlighted important points relating to examination of nails.

- Always examine all 10 fingernails and 10 toenails.
- Study the nails with fingers completely relaxed and not pressed against any surface.
- Blanch the fingertip to see if the pigmented abnormality is grossly altered. This test may aid in differentiating discolouration of vascular bed of nail from the discolouration of the nail plate.

**Results:**

In our study, maximum number of the patients 140 (38.9%), were seen in the age group of 41- 50 years of age followed by the age group of 31-40 years with number of patients being 88 (24.4%). Youngest patient was 12 years old male child. Mean age in our study was 43.7 years. Out of 360 patients 211 (58.6%) were males while 149 (41.4%) patients were females while inpatients were 85.8% (n=309) compared to 14.2% (n=51) outpatients.

Amongst 360 patients, 96.4% (n=347) patients presented with systemic symptoms and only 3.6% (n=13) presented with nail symptoms. Out of 13 patients who presented with nail changes, 9 had platynychia / koilonychia, which led to the diagnosis of nutritional anemia. Four patients had onychomycosis which led to the diagnosis of diabetes mellitus.

Nail changes were more frequently seen in the patients who were symptomatic for more than six months (64.2%). Among the patients who had illness for the shorter duration (<1 month), only 4 (1.1%) patients were found to have nail changes.

Total of 102 (28.3%) patients had associated disorders. Diabetes was associated with 33 (9.2%) patients while hypertension was seen in 59 (16.4%) patients. Both hypertension and diabetes were found in 10 (2.8%) patients.

Most frequent system involved was respiratory system (41.1%) followed by hematopoietic (13.9%), renal (13.3%), GIT (12.5%), endocrine (4.4%) and CVS (2.8%). Patient with multiple systems involvement accounted for 11.9% of cases.

In our study, clubbing was the most frequent nail change, accounted for 147 (40.8%) patients, followed by pallor 32.5%, Beau's line 11.4%, platynychia 8.9%, longitudinal ridging 8.6%. (Table -3) In respiratory system cases with clubbing (n=113) pulmonary tuberculosis 53(36%) was most frequent followed by bronchiectasis 15(10.2%), chronic bronchitis 14(9.5%), lung abscess 13(8.8%). (Table-4)

Involvement of cardiovascular system with nail changes accounted for ten cases. Out of this, clubbing (30%) was most frequent followed by longitudinal ridging, longitudinal melanonychia and onycholysis, which accounted 20% each. Beau's line contributed 10% of patients.

Involvement of respiratory system with nail changes accounted for 148 cases. Out of this most frequent nail change was clubbing (76.4%) followed by longitudinal ridging (8.2%), beau's line (6.8%) and brittle nails (2.7%). Ragged cuticle and diffuse melanonychia accounted for 2% each while longitudinal melanonychia and onychomycosis seen in 1 case each.

Gastrointestinal tract and liver disease with nail changes accounted for 45 cases. Out of this clubbing (24.4%) was the most frequent change followed by pallor (17.8%) and yellow discoloration (15.6%) of nail plate. Longitudinal ridging and beau's line accounted for 11.1% each, while onycholysis was seen in 8.3% of patients. Ragged cuticle was found in 4.4% of cases, while Terry's nail and longitudinal melanonychia contributed 2.2% each.

In our study, renal disease with nail changes accounted for 48 cases, out of which most frequent was pallor of nail plate (33.3%) followed by Beau's line (14.6%). (Table no-5) Nail changes associated with hematopoietic system ac-

counted for 50 cases, out of which most frequent nail change was pallor which accounted for 44% of patients, followed by platynychia (36%), koilonychia (20%) and longitudinal ridging 2%.

Nail changes associated with endocrine system accounted for 16 cases, out of which most frequent nail change was onychomycosis (56.3%) followed by beau's line (18.8%). Splinter hemorrhage, ragged cuticle, pallor of nail plate and diffuse melanonychia accounted for 6.3% of cases each.

Nail changes associated with multiple system involvement accounted for 43 cases, out of which pallor (95.3%) of the nail plate was most frequent followed by clubbing (32.6%), beau's line (30.2%), platynychia (27.9%), brittle nails (18.6%) and ragged cuticle (16.3%).

Among nail abnormalities associated with specific conditions HHN (Half and half nail) was seen in three patients and all of them had CRF. Similarly Terry's nails were found in two patients and both of them had liver involvement. Platynychia and koilonychia were seen in patients who had involvement of hematopoietic system, either exclusively or with some other system.

**Discussion:**

Maximum patients were in the age group of 31-50 years and accounted for 63% of patients. Males were more frequently affected with male to female ratio being 1.4:1.

Total 96.4% patients presented with systemic symptoms and 3.6% patients with nail changes as their presenting complaint, in which after investigation we found out systemic involvement. In our study, nail changes were most commonly seen in 64.2% patients who had systemic illness for more than 6 months duration. Associated disorders were found in 28.3% patients in this study in the form of hypertension 16.4% and diabetes mellitus with 9.2% patients. Ten patients were having both, diabetes mellitus as well as hypertension.

Most frequent nail involvement was clubbing and was found in 40.8% patients, which is similar to the study done by Abraham S, Kamath N P<sup>5</sup> in 435 cases, in which commonest nail changes associated with systemic diseases was clubbing, contributing to 21.3% of patients. Platynychia and longitudinal melanonychia were seen in 8.9% and 0.8% of patients respectively, which is much lower in compare to the study done by Abraham S, Kamath N P where longitudinal melanonychia and platynychia were present in 17.2 and 14.2% of patients respectively.

In our study, HHN was found specific for renal system involvement and more precisely for chronic renal failure. Presence of HHN almost confirms the diagnosis of chronic renal failure. But HHN is not present in each and every case of CRF<sup>6</sup>, so its absence cannot rule out presence of CRF.

Terry's nail was found relatively specific for GIT & Liver system and both the cases were seen in the patients of liver cirrhosis. But it may also present in pulmonary Koch's and CHF<sup>7</sup>. So Terry's nail is less specific than HHN in confirming the diagnosis of their respective systems.

Similarly, pallor, platynychias & koilonychias indicate the involvement of hematopoietic system either exclusively or in many cases in combination with some other system.

In our study, most frequent system associated with nail changes was respiratory system which included 41.1% patients followed by hematopoietic system which included 13.9% patients

In our study, clubbing was most frequent (40.8%) nail change and was found mostly in patients having respiratory system involvement. Out of 147 patients of clubbing, 113(76.9%) patients had involvement of respiratory system. In respiratory system, 53 (36%) patients had pulmonary Koch's, indicating Koch's as one of the common infectious cause of clubbing, which is similar to the study done by Andrew L. et al.<sup>8</sup>, in which they found clubbing in 16.9% of pulmonary Koch's patients. Other causes of clubbing in respiratory system included bronchiectasis, seen in 15(10.20%) patients followed by chronic bronchitis in 14(9.5%), lung abscess in 13(8.8%), interstitial lung disease in 10(6.8%), empyema in 6(4%) and pyopneumothorax in 2(1.4%) patients.

Out of 147 patients of clubbing,<sup>11</sup> had involvement of liver and gastrointestinal tract system. Among 11 patients, 8 (5.4%) were of liver cirrhosis and 3 (2%) had chronic active hepatitis, indicating both of them as a frequent cause of clubbing in GIT and liver system. Epstein et al<sup>9</sup> found clubbing in 29% of patients of chronic active hepatitis and 24% patients of liver cirrhosis. Renal involvement was seen in 4(2.7%) patients of clubbing. All 4 patients were of chronic renal failure. Cardiovascular system involvement was seen in 3(2.04%) patients of clubbing. Among 3 patients, 2(1.36%) of them had sub acute bacterial endocarditis and 1(0.68%) had congestive cardiac failure, which was similar to the study done by Lowes et al<sup>10</sup>, in which they found clubbing in almost half of the patients of infective endocarditis and heart failure. Hematopoietic system involvement was seen in two patients of clubbing, which includes one patient of sickle cell disease and leukemia.

Frequency of various system involvements in patients having nail changes with systemic disease:

#### A) Cardiovascular system:

Out of 10 cases clubbing (30 %) was most frequent, followed by longitudinal ridging, longitudinal melanonychia and onycholysis, which accounted 20% each. Beau's line contributed to 10 % of patients.

#### B) Respiratory system:

Out of 148 cases most frequent nail change was clubbing (76.4%), followed by longitudinal ridging (8.5%), beau's line (6.8%) and brittle nails (2.7%). Ragged cuticle and diffuse melanonychia accounted for 2 % of the patients each, while longitudinal melanonychia and onychomycosis both were seen in 0.7% of cases.

Respiratory system is one of the common cause of clubbing, so search for underlying disorder should be done meticulously.

#### C) Gastrointestinal and liver system:

Out of 45 cases clubbing (24.4%) was the most frequent change followed by pallor (17.8 %) and yellow discoloration (15.6 %) of nail plate. Longitudinal ridging and beau's line accounted for 11.1% each, while onycholysis was seen in 8.3 % of patients. Ragged cuticle was found in 4.4% of cases, while Terry's nail and longitudinal melanonychia contributed 2.2% each. Terry's nail was found relatively specific and both the cases were seen in the patients of liver cirrhosis. But pulmonary Koch's and CHF can also cause Terry's nail<sup>7</sup>, so the presence of Terry's nail, points towards the diagnosis of liver cirrhosis but does not confirm it and secondly its absence cannot rule out presence of liver cirrhosis.

#### D) Renal system:

Out of 48 cases most frequent finding was pallor of nail plate (33.3%). Beau's line was seen in 14.6 % of patients which was more frequent in comparison to the study done by Udaya Kumar et al<sup>11</sup> and Ramesh M et al<sup>12</sup>, in which they found Beau's

line in 2% and 1% of cases respectively. In contrast, it was much lower in comparison with the study done by Choudhary S et al<sup>13</sup> in which they found Beau's line as the most frequent finding accounted for 37% of cases. In our study, longitudinal ridging accounted for 10.4% of cases. It was less frequent in comparison to the study done by Choudhary S et al<sup>13</sup> in which they found longitudinal ridging in 16.7% of cases. In our study, clubbing accounted for 8.3% of cases. It was more frequent comparison to the study done by Ramesh M et al<sup>12</sup>, in which they found clubbing in 2% of cases.

In our study, Koilonychias accounted for 6.3% of cases. It was less frequent in comparison to the study done by Udaya Kumar et al<sup>11</sup> and Choudhary S et al<sup>13</sup>, in which they found koilonychias in 18% and 31.5% of cases respectively.

Half and half nails were seen in 6.3% of cases, which was almost similar to the study done by Ramesh M et al<sup>12</sup>, in which they found HHN in 5% of cases. But in contrast, it was much lower in comparison to the study done by Udaya et al<sup>11</sup> and Salem et al<sup>14</sup>, in which they found HHN as the most frequent finding accounted for 21% and 20% of cases. Other nail changes associated with renal diseases were onychomycosis, ragged cuticles and yellow discoloration of nail plates which contributed to 10.4%, 6.3% and 4.1 % of cases respectively.

HHN was found specific for renal system involvement and more precisely for chronic renal failure. Presence of HHN almost confirms the diagnosis of chronic renal failure. But HHN is not present in each and every case of CRF<sup>6</sup>.

#### E) Hematopoietic system:

Out of 50 cases most frequent nail change was pallor which accounted for 44% followed by platynychia (36%), koilonychias (20%) and longitudinal ridging 2%.

Pallor, platynychias & koilonychias indicate the involvement of hematopoietic system either exclusively or in many cases in combination with some other system.

#### F) Endocrine system:

Out of 16 cases most frequent nail change was onychomycosis (56.25%), followed by beau's line (18.8%). Splinter hemorrhage, diffuse melanonychia and ragged cuticle accounted for 6.3% of cases each.

**Table 1: Nail changes associated with gastrointestinal and hepatic disorders<sup>2</sup>**

Disease	Nail abnormalities
Acrodermatitis enteropathica	Paronychia, Beau's line
Cirrhosis (biliary)	Clubbing
Intestinal lymphangiectasia,	Yellow nail syndrome
Cronkite Canada syndrome	Triangular ventral nail, Nail dystrophy
Cystic fibrosis	Periungual telangiectasia
Hepatitis (Chronic active)	Clubbing, white lines, Splinter haemorrhages
Jaundice (chronic obstructive)	Clubbing
Porphyria cutanea tarda	Onycholysis, Dystrophy, Clubbing, Absent lunula, Longitudinal bands
Peutz-Jegher syndrome	Brownish pigmentation (punctate or longitudinal)
Regional enteritis	Clubbing, Nail fold capillary abnormalities

**Table 2: Nail changes associated with cardiovascular and haematological conditions: <sup>3</sup>**

Disease	Nail Changes
Anemia (general)	Nail dystrophy
Anemia (iron deficiency)	Koilonychia
Aortic insufficiency	Quincke's pulse (sign)-prominent proximal nail fold capillaries
Bacterial endocarditis (sub acute)	Splinter haemorrhages Clubbing
Fabry's disease	Turtle-back nail configuration
Heart failure	Red lunula, Terry's nail
Hypertension	Splinter haemorrhages
Ischemia (peripheral)	Thin, brittle, ridged nails, Onychoschizia, Koilonychias, Onycholysis,
Leukemia	Splinter hemorrhages
Multiple myeloma	Loss on lunula, Onycholysis
Myocardial infarction	Mee's line, Beau's line
Pernicious anemia	Splinter haemorrhages
Porphyria (erythropoietic)	Blue finger nails, Photoonycholysis
Polyarteritis nodosa]	Splinter haemorrhages
Scurvy	Splinter haemorrhages
Sickle cell anemia	Mee's line
Thrombocytopenia	Splinter haemorrhages
Vasculitis	Splinter haemorrhages

**Table 3: Nail involvement in patients with systemic diseases. (N=360)**

		Number*	%
Color	pale	117	32.5
	yellow	18	5
	brown	3	0.8
Contour	platynychia	32	8.9
	convex	117	32.5
	koilonychia	13	3.6
Clubbing		147	40.8
Lunula	visible	71	19.7
Beau's lines		41	11.4
Longitudinal Ridging		31	8.6
Ragged cuticle		16	4.4
Onychomycosis		14	3.9
Brittle nails		12	3.3
Onycholysis		10	2.8
Diffuse melanonychia		4	1.1
Longitudinal melanonychia		3	0.9
HHN		3	0.8
Terry's nail		2	0.6
Splinter hemorrhage		1	0.3

\*After including the patients who are having multiple system involvement.

**Table 4: Frequency of involvement of various systems in patients of clubbing (N=147)**

System involved (No of patients)* (%)	Cause	No	(%)

RS (113) (76.87%)	pulmonoy Koch's bronchiectasis	53	(36)
	chronic bronchitis	15	(10)
	lung abscess	14	(9)
	ILD	13	(8)
	empyema	10	(6)
	pyopneumothorax	6	(4)
			2
CVS (3) (2.04%)	SABE	2	
	CCF	1	
Liver & GIT (11) (7.5%)	liver cirrhosis	8	(5)
	CAH	3	
Renal (4) (2.7%)	CRF	4	
Hematopoietic (2) (1.4%)	sickle cell disease	1	
	leukemia	1	
Multiple system (14) (9.5%)	pulmonary Koch's & anemia	3	
	lung abscess & anemia	3	
	chronic bronchitis & anemia	5	
	empyema & anemia	2	
	liver cirrhosis and anemia	1	

\*After excluding the patients who are having multiple sys

**Table 5: Nail changes associated with renal diseases (N=48)**

Nail changes		No of patients	%
Color	pale	16	33.3
	yellow	2	4.1
Contour	convex	3	6.3
	koilonychia	3	6.3
Clubbing		4	8.3
Lunula	visible	7	14.6
Longitudinal Ridging		5	10.4
Onycholysis		3	6.3
HHN		3	6.3
Beau's lines		7	14.6
Ragged cuticle		3	6.2
Onychomycosis		5	10.4

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