

Table SI. All articles included in the review

No	Year	First author	Study design CR, case report (N=1); CS, case series (N<5); CSS, cross-sectional study; RD, retrospective design (N>=5) PD, prospective design; RCT, randomized controlled trial	Nail change (O = onychomade sis; B = Beau's lines)	Number of Subjects (Numerator = Patients with onychomade sis or Beau's lines, Denominator = Total study subjects)	Mean age (years)	Sex (Male (M) : Female (F))	Disease duration (months)	Number of involved toenails (location, L = left; R = right, B = both)	Number of involved fingernails (location, L = left; R = right, B = both)	Sympto m (pain, itching, etc)	1. infectious disease (except onychomycosis) 2. trauma 3. microtrauma (active hobbies/ sports) 4. autoimmune 5. systemic ds (non-autoimmune) 6. medication (1=chemotherapeutic agents, 2=antiepileptics, 3=antibiotics, 4= retinoids, 5=metal, 6=etc) 7. neonatal/hereditary 8. anatomic anomaly 9. neurological/neuromuscular 10. concurrent OM (confirmed by PAS or culture) 11. idiopathic or etc.	disease information	1. treatme nt 2. informa tion 3. unknown (months)	Mean follow- up time (months)	0. unknown 1. Complete resolution 2. Improved 3. Stationary 4. Worsened 5. Improved with sequelae	Recurr ence
1	1937	Sherry-Dottridge	CR	O	1	29	F	36	m	10	.	11	bronchiectasis	3		0	
2	1948	Shapiro	CS	O	3	46	F	.	0	10	pain	11	nail polish base coat	2		2	
3	1963	Patnaik	CR	O	1	26	M	1	2(B1T)	10	.	11	penicillin allergy	3		0	
4	1966	Aberg	CR	B	1	68	M	.	0	10	.	5	myelomatosis	2	2	3	
5	1971	Petrakis	RD	B	7/21	.	.	.	.	m	.	1	Asian flu	3		0	
6	1980	Weismann	CS	B	2	52	M	.	0	m	.	5	Zinc deficiency d/t alcoholic liver cirrhosis	2		0	
7	1980	Burkhart	CR	B	1	75	F	.	10	10	.	11	pustular psoriasis	3		0	
8	1981	Weismann	CR	B	1	7	F	2	0	3(B1F, L4F)	.	5	Zinc deficiency d/t sucrose malabsorption	3		0	
9	1981	Parameswara	CR	O	1	28	M	2	m	m	.	4	pemphigus vulgaris	3		0	
10	1981	Bures	CR	B	1	28	M	.	.	2 (B1F)	.	5	Kawasaki disease	3		0	
11	1982	Wolf	CR	B	1	0 (GA 30wks)	F	at birth	10	10	.	2	intrauterine distress?	3		0	
12	1982	Sweren	CR	B	1	54	M	several months	m	10	0	5	gout, hypertension, diabetes mellitus	3		0	
13	1982	Breathnach	CS	O	3	32	1:2	.	10	10	.	6(2)	carbamazepine induced toxic epidermal necrolysis chemotherapy	3	2	0	
14	1983	Kochupillai	CS	O	2	31.5	M	.	m	m	.	6(1)	(cyclophosphamide, vincristine, prednisolone) for	2	6	1	
15	1983	Fulton	CR	O	1	65	M	3	0	2(B1F)	.	4	malignant lymphoma pemphigus vulgaris	3		0	
16	1984	Tucker	CR	B	1	70	M	.	0	m	0	6(1)	Razoxane for psoriasis	2		1	
17	1984	Colver	CS	B	4	17.25	F	12	3	10	.	11	dysmenorrhea chemotherapy (mustine hydrochloride, vincristine, prednisolone) for mycosis fungoides	3		0	
18	1986	Singh	CR	B	1	50	M	.	0	10	.	6(1)	hydrochloride, vincristine, prednisolone) for mycosis fungoides	3		0	
19	1988	Ward	RD	B	6	32	M	.	0	1.833333333	.	2	bilateral neuralgic amyotrophy	2		1	
20	1988	Bernsen	CR	B	1	63	M	.	0	m	.	9	bilateral neuralgic amyotrophy	3	17	0	

21	1989	Patki	CR	B	1	35	F	.	0	10	.	6(3)	dapsone for borderline lepromatous leprosy	1	dapsone discontinuation, systemic steroid, topical emollient, topical halcinonide 0.1% cream under occlusion	2wks	0
22	1989	Mishra	CR	O	1	31	M	.	10	10	.	6(2)	carbamazepine for generalized partial seizure disorder	1		10.5	1
23	1990	Pilapil	CR	O	1	4	M	1	m	m	.	5	Kawasaki syndrome	2		2	2
24	1990	Patki	CR	B	1	36	M	24	2(B1T)	m	.	11	Recurrent erythema nodosum leprosum	3			0
25	1990	Lauber	CR	B	1	62	M	.	10	10	.	4	pemphigus vulgaris chemotherapy(mechlorethamine/vincristine/procarbazine/prednisone) for Hodgkin's disease	3			0
26	1991	Requena	CR	B	1	56	F	.	2(B1T)	10	.	6(1)		2			2
27	1992	Bergner	CS	B	61	45.5	M	.	0	m	.	4	Alopecia Areata	2			0
28	1993	Roberts	CR	B	1	6	F	.	0	5(L1,2,3,4,5F)	.	2		3			0
29	1993	Colvett	CR	B	1	53	M	.	m	m	.	5	fever of unknown origin	3			0
30	1994	Tosti	RD	O	3/272	8.9	2:1	.	10	10	.	4	Alopecia Areata	2	66	2	
31	1994	Price	CS	B	2	16	M	.	0	2(L1,4F) / 1(R1F)	.	2	fracture/deep laceration	1	66	2	
32	1994	Patki	CR	B	1	.	.	.	.	.	.	5	type II lepra reaction chemotherapy (arabinoside)	3	66	2	
33	1994	Lemez	RD	B	22	.	.	.	.	.	.	6(1)	C/daunorubicin) for acute myeloid leukaemia (AML) chemotherapy (etoposide, adriamycin, cyclophosphamide, vincristine, bleomycin, prednisone) for malignant Childhood reflex sympathetic dystrophy	2			2
34	1994	Ben-Dayana	CR	B	1	74	M	.	10	10	.	6(1)		2			1
35	1995	O'Toole	CR	B	1	13	M	5	0	4(R1,2,3,4F)	.	9		2	18	0	
36	1995	Harford	CR	B	1	13	M	1	0	5(R1,2,3,4,5F)	.	2	fractured and immobilized wrist	2			1
37	1995	de Berker	RD	B	7	59	4:3	6	.	.	.	4	Immunobullous disease	3	24	0	

38	1996	Prabhakara	CR	O	1	14	F	4	10	10	.	6(2)	carbamazepine for right temporal epilepsy	1	carbamazepine discontinuation, phenytoin start urea	5	1
39	1996	Fleming	CR	O	1	69	M	.	10	10	.	11	Mycosis fungoides	1	cream	6	3
40	1996	Acharya	CR	O	1	28	M	.	10	10	.	5	Stevens Johnson syndrome	2	40% (6) triamcinolone (5), prednisone	2	2
41	1997	Garcia-Patos	CR	B	1	13	F	.	.	.	.	4	Systemic lupus erythematosus	1	prednisone	4	2
42	1997	Caputo	CR	O,B	1	24	M	.	0	m	.	1	Acinetobacter peritonitis high dose combined	2	chemotherapy (adriamycin, ara-C, etoposide) for AMI Heimler's syndrome	3	0
43	1998	Cetin	CR	O	1	28	F	.	0	10	.	6(1)	chemotherapy (adriamycin, ara-C, etoposide) for AMI Heimler's syndrome	3	docetaxel d/t breast cancer	3	0
44	1999	Tischkowitz	CR	B	1	12	F	.	m	m	.	7	severe gold dermatitis	2		2	1
45	1999	Correia	CS	B	1/4	46	.	.	0	10	.	6(1)	Idiopathic familial onychomadesis	2		6~8	1
46	2000	Ter Borg	CR	B	1	73	F	3	m	m	0	6(6)	Hand foot and mouth disease (HFMD)	2		2~4 years	1
47	2000	Mehra	CS	O	2	12, 30s	F	several years	4(B3F,L4T,R1T), 1(R1T)		0	11	cast immobilization	3			1
48	2000	Clementz	RD	O,B	5	2.68	3:2	4.4weeks	m	m	0	1	Alopecia areata universalis (genetic testing were all negative)	2			0
49	2001	Tosti	RD	O	9	15~42	M	7~30DA	0	m	pain, paresthesia	2	cast immobilization	1			1
50	2001	LaRow	CR	O	1	2	M	congenital	1 (L1T)	all	0	7	cast immobilization	1	nail extraction	2.5	1
51	2001	Kim	CS	O	2	19.5	M	1	0	3 (L2,3,4), 1(L2)	pain, paresthesia	2	anticancer agents	2		7	3
52	2001	Chen	CR	O	1	72	F	4	2(B1)	2(L3,4)	0	6(1)	Right brachial plexopathy by metastatic breast cancer or docetaxel	3			0
53	2001	Camidge	CR	B	1	54	F	4 cycles	0	m(L)	0	9 or 6(1)	Hand foot and mouth disease (HFMD)	2		6 weeks	1
54	2001	Bernier	CS	O	4	20mo	F	several weeks	20 nails , 20nails, 3(B1F,L2F), 3(L1F,R1,2F)		0	1	a critically ill patient with a large pulmonary abscess	2		8	1
55	2001	Wester	CR	O	1	48	M	86days	all	all	0	5	Kawasaki disease	2			5
56	2002	Ciastko	CR	O	1	8	M	several weeks	5	all	all	0	5	Itraconazole	3		0
57	2002	Chen	CR	B	1	61	M	5	all	all	0	6(6)	pemphigus vulgaris	1	prednisone and/or cyclophosphamide		1
58	2002	Cahali	RD	B	1/5	38	1:4	.	0	3 (L2,3,4)	pain	4	acute arsenic poisoning	3	change medication	2	0
59	2003	Uede	RD	B	11/21	.	11:10	3	.	.	.	6(5)	moxifloxacin	1			1
60	2003	Burkhardt	CR	B	1	45	M	1	m	m	0	6(3)					

recurrent

61	2004	Mortimer	CR	B	1	62	F	6cycles	0	all	0	6(1)	anticancer agents	3		0		
62	2004	zereeuw-Hau	CR	B	1	30	F	2	all	all	0	4	Guillain-Barré syndrome	1	IVIG and plasma exchange	24	1	no recurrence
63	2004	Koh	CR	B	1	31	F	3	0	m	0	6(1)	anticancer agents (cytosine arabinoside, cyclophosphamide) after a fingertip (rt thumb)	2		6	1	no recurrence
64	2005	Lee	CR	B	1	36	M	6weeks	0	5 (R1.2.3.4.5)	0	2	crushing injury (cross finger flail)	2		.	1	
65	2005	Bellis	PD	B	1/5b at 4weeks, 17/52 at 8weeks	.	.	16days	.	.	0	2	hypobaric hypoxia of high altitude	3			0	
66	2006	Udayakumar	RD	B	2/100	41~50	70:30	.	.	.	0	5	chronic renal failure on hemodialysis	3			0	
67	2006	Schwartz	RD	B	6	.	.	.	0	m	.	2	deep saturation dives trauma by saturimeter or	3			0	
68	2006	Ruggiero	CR	O	1	4	M	.	2(B1)	0	0	2 or 9	spinal muscular atrophy type I	2		8	1	recurrent
69	2006	Ong	CS	B	2	3	F	.	m	0	0	7	Heimler syndrome	3			0	
70	2006	Dasanu	CR	B	1	52	M	5cycles	0	m	0	6(1)	anticancer agents	1	chemo discontinuation	4	1	
71	2007	Somin	CR	B	1	57	F	.	0	m	0	6(6)	steroid anticancer agents (doxorubicin, vincristine, L-asparaginase, and prednisone)	3			0	
72	2007	Miyoshi	CR	B	1	38	M	3	m	all	0	6(1)	congenital pneumonia	3			0	
73	2007	Kanwar	CR	B	1	2mo	F	2	0	all	0	7		3			0	
74	2007	Czajkowski	CR	O	1	54	M	2	.	.	0	6(2)	SJS induced by carbamazepine	1	Prednisolone and change medication	3wks	2	
75	2007	Chen	RD	B	3/30	6	2:1	7.3cycles	10 toenails, 10 fingernails, 20nails			6(1)	anticancer agents	3			0	
76	2008	Vaccaro	CR	O,B	1	69	M	2 (3cycles)	m	m	pain	6(1)	anticancer agents	1	stop chemo, KMnO4 soaking, gentamicin ointment	3	5 (loss of great toenails)	
77	2008	Sarifakioglu	PD	O	2/250	8.7mo	136:114	.	m	.	0	11	two babies just learning to walk; we thought trauma could be the cause of psychomotor delay	3			0	
78	2008	Salem	CSS	B	5(B)/100 (CRF), 5(B)/100 (control)	46.5 (CRF), 44.26(c onrol)	61:64(LK F), 64:36(co nrol)	.	.	.	.	5	chronic renal failure patients under haemodialysis	3			0	

79	2008	Salazar	RD	O	89 (O associated HFMD)/180 (O)	1.5	.	1	.	.	.	1	Hand foot and mouth disease (HFMD)	3		0	
80	2008	Safari	CR	O	1	3	M	10 DA	m	m	0	7	hyper IgM syndrome	1	antibiotic and IVIG	3wks	2
81	2008	Patel	CR	O,B	1	6 week	F	3.5WA	m	m	0	10	congenital nail candidiasis	1	clotrimazole	4	2
82	2008	Habibi	RD	O,B	6(B), 5(O)/79	42	32:47	15.4	.	.	0	4	pemphigus vulgaris	1	lotion Upon clinical remission, all nail changes were improved	8	1
83	2008	Guhl	CR	B	1	9	M	2	0	all	0	5	after admission to the intensive care unit (immobilization, hypoxia, and drugs)	1	gentamicin and betame	2	1
84	2008	Aksoy	CR	O	1	10	F	.	3 (R1,3,4)	3(R1,2,L3)	0	6(3)	Azithromycin	2		1	1
85	2009	Venugopal	CR	O	1	79	M	10YA	0	all	0	11	Seasonal onychomadesis (winter)	2		24	1
86	2009	Poretti	CR	O	1	3	M	4YA	2(L1,2)	2(B1)	0	6(2)	Valproic acid	1	stop medication	.	1
87	2009	Patsatsi	CR	O	1	60	F	3WA	all	9	pain	4	pemphigus vulgaris	1	prednisolone, topical mupirocin	3	1
88	2009	Osterback	RD	O	.	.	.	1.5	.	.	.	1	HFMD	3			0
89	2009	Makhzoumi	CS	B	2	65	1:1	several months	0	m	0	6(6)	azathioprine	1	stop medication		2
90	2009	Gregoriou	CR	B	1	72	F	4 (4cycles)	10	10	0	6(6)	octreotide (a somatostatin analogue)	3			0
91	2010	Wortsman	CS	O	2/3	44.5	1:1	4	1 (R1T)	2 (R1,3F)	pain	4, 11	Guillain Barre syndrome (1), after onychectomy (1)	3			0
92	2010	Piraccini	CR	O	1	67	M	6	all	all	0	5	Cronkhite–Canada syndrome	1	steroid therapy, aggressive nutritional	23	1
93	2010	Park	CR	B	1	69	M	.	0	m	0	6(1)	anticancer agents	3			0
94	2010	Huang	CS	B	2/1	41	F	.	0	all	0	6(1)	anticancer agents	3			0
95	2010	Guimbao	RD	O	24(HFMD)/27(O)	1.8	13:14	40DA	average 3 nails (1~12)	average 3 nails (1~12)	0	1	Hand foot and mouth disease (HFMD)	3			0
96	2010	Cabrerizo	RD	O	12 (O)/17(HFMD)	1.8	.	2	.	.	0	1	Hand foot and mouth disease (HFMD)	3			0
97	2010	Bonifazi	CR	O	1	26mo	F	1	0	3 (R1,3,4)	0	1	Hand foot and mouth disease (HFMD)	3			0
98	2010	Avery	CR	B	1	14	M	3WA	0	4(R2,3,4,5)	0	2	after an olecranon fracture of the right elbow	2		6	1
99	2011	Wei	RD	O	48(O)/130	2	81:49	.	.	.	.	1	HFMD (Coxsackievirus A6)	3			0

100	2011	Shikuma	CR	O	1	5	M	.	2(B1T)	4(L1,2,3F, R1F)	.	1	Hand foot and mouth disease (HFMD)	2		1	
101	2011	Davia	RD	O	221(O)	.	.	.	.	.	.	1 [HFMD, 134(60.6%)]	Hand foot and mouth disease (HFMD)	3		0	
102	2011	Bracho	RD	O	23(O)/32	2.1	19:13	.	.	.	.	1 [HFMD, 19(82.6%)]	HFMD-O outbreak	3		0	
103	2012	Shah	CR	O	1	23mo	M	2	10	10	.	6(3)	penicillin (w erythema multiforme)	3		0	
104	2012	Kim	CR	B	1	49	M	.	10	10	.	6(1)	paclitaxel-cisplatin (lung cancer)	1	4	discontinuation of chemotherapy	0
105	2012	Kaushal	CR	B	1	35	M	.	.	m	.	5	pneumonia w acute respiratory distress	3		0	
106	2012	Hardin	CR	O	1	14	F	3	0	10	pain	11		3		1	recurrent (average 2 or 3 times per
107	2012	Gönül	CR	B	1	34	F	.	0	m(right fingernails)	.	5	complex regional pain syndrome	1	gabapentin	0	
108	2013	Tay	CS	O	4	5.5	2:2	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3		0	
109	2013	Tan	CR	O	1	5	F	5DA	2(B1T)	2(B1F)	.	1	Hand foot and mouth disease (HFMD)	2		0	
110	2013	Shea	CR	O	1	79	F	2	0	3(R2,3,4F)	.	5	cellulitis of the foot, osteoporotic pelvic fracture	2		2	
111	2013	Oji	CR	O	1	25	F	10	0	1(L1F)	.	8	paronychia- ingrowing nail	1	bFGF spray	3	1
112	2013	Ocampo	CR	B	1	77	F	.	0	m	.	5	pneumonia (ICU care) postpartum	3		0	
113	2013	Losa	CR	B	1	.	F	.	.	m	.	5	hyperparathyroidism	3		0	
114	2013	Kocak	CS	O	2	5.5	0:2	.	0	5(R2,4F, L2,3,4F)/1(L2F)	.	1	varicella	2		1	2
115	2013	Khanna	CR	O	1	9mo	M	8.5	0	m(right fingernails)	.	10	onychomycosis (Trichophyton tonsurans)	1	ciclopirox olamine 8% lacquer	1	2
116	2013	Kar	RD	O	3(O)/78	5.13	42:36	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3		0	
117	2013	Gugelmann	CR	B	1	34	M	3.5	.	m	.	5	cardiac arrest chemotherapy q/t acute promyelocytic leukemia (all-trans-retinoic acid w arsenic trioxide)	3		0	
118	2013	Chesnut	CR	B	1	38	M	.	.	10	0	6(1)	Hand foot and mouth disease (HFMD)	3		0	
119	2013	Bettoli	CS	O	2	3.5	2:0	several WA	0/5	4(B1,2F)/5	0	1	Hand foot and mouth disease (HFMD)	2		1.5	1
120	2013	anonymously-Mli	CR	O	1	85	F	4	2(B1T)	m	.	4	bullous pemphigoid	1	oral corticosteroids	3	2
121	2014	Tan	CR	O	1	70	F	6	.	10	.	5	Chronic kidney disease, iron-deficient anemia	3		0	
122	2014	Shin	RD	O	13	33mo	10:3	.	TF mean 7.38	.	.	1	Hand foot and mouth disease (HFMD)	3		0	
123	2014	Scarfi	CS	O	3	27.3	2:1	.	.	10	.	1	Hand foot and mouth disease (HFMD)	2		1.5/2	1

124	2014	Ramirez-Fort	RD	O	1(O)/5	27.4	3:2	.	.	.	.	1	HFMD (Coxsackievirus A6 associated) in adults	3	0
125	2014	Purim	RD	O	24(O)/76	38	46:30	.	.	.	.	3	Sports-related dermatoses among road runners	3	0
126	2014	Oğuz	CS	B	1	22	F	7YA	0	9(except L3F)	.	5	familial Mediterranean fever (on colchicine)	3	0
127	2014	Miyamoto	RD	O	39(O)/254	.	155:99	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3	0
128	2014	Milano	CR	B	1	37	F	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3	0
129	2014	León-Muñños	CR	O	1	2	F	.	.	10	.	1	Hand foot and mouth disease (HFMD)	2	1.5
130	2014	Kim	CS	O	4	3.75	2:2	.	0-2	0-3	.	1	Hand foot and mouth disease (HFMD)	1(1 case)/2(3 cases)	1
131	2014	Graves	CR	O	1	60s	M	3WA	0	10	Tenderness	5	Bazex syndrome (basaloid squamous cell carcinoma)	1	3
132	2014	Goraya	CR	B	1	14	M	several WA	.	10	.	5	meningoencephalitis (presumed viral etiology)	2	0
133	2014	Feder	CR	O	1	9mo	M	.	2(B1T)	0	.	1	Hand foot and mouth disease (HFMD)	3	0
134	2015	Yan	RD	O	14/64	15mo	40:24	5wk	4.7 fingers/toes	.	.	1	Hand foot and mouth disease (HFMD)	3	0
135	2015	Vashisht	CR	O	1	36	M	.	10 (most)	10 (most)	.	5	Langerhans cell histiocytosis	1	2
136	2015	Ryu	CR	B	1	75	M	.	10	10	.	6(1)	chemotherapy d/t malignancy	3	0
137	2015	Podder	CR	O	1	7	F	4DA	0	1 (R2F)	0	1	chickenpox	3	0
138	2015	Marshall	CR	O	1	3	M	2DA	m	m	.	11	Rash 45 days prior (resembling HFMD but no formal diagnosis)	3	0
139	2015	Kinjo	CR	B	1	42	M	.	m	m	.	6(1)	chemotherapy d/t lung cancer (docetaxel monotherapy)	3	0
140	2015	Kim	RD	O	17(O)/21	43.1	3:18	.	.	.	.	2 [12/17(70.6%)]	Great toenail dystrophy	3	0
141	2015	Kasper	CR	O	1	7	F	1	m	m	0	1	Hand foot and mouth disease (HFMD)	3	0
142	2015	Kalasekhar	CR	O,B	1	2	M	.	.	R2F(B), R3F(O)	.	5	Kawasaki disease (KD)	3	1
143	2015	Jacobsen	CR	O,B	1	2	M	.	.	R1,2F(B), R1F(O)	.	1	Hand foot and mouth disease (HFMD)	3	0
144	2015	Irving	CR	O	1	23	M	several MA	0	10	.	1	Hand foot and mouth disease (HFMD)	2	0

antibacterial
ointment
+
palliative
chemotherapy
and
irradiation

oral
prednisolone,
IV
vinblastine, 6
mercaptopurine

145	2015	Grover	CS	O	2	9.5	1:1	.	m/1(L1T)	m/0	itching	5	lichen planus	1	Steroid intralesional injection, oral dapson	2		
146	2015	Clark	CR	O	1	7	F	3WA	.	10	.	1	Hand foot and mouth disease (HFMD)	3		0		
147	2015	Cinotti	CS	O	3	4	.	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3		2		
148	2015	Büyükcam	CS	O	4	5.5	4:0	.	m	m	.	1	Hand foot and mouth disease (HFMD)	2		2		
149	2015	Bishop	CS	O	2(O)/4	66.5	2:2	.	m/10	m/10	.	5	Cutaneous T-cell lymphoma w nail	1	photop heresis, apremil as/acitr etin,pho tophere carbama zepine disconti uation -> levitirac etam	0		
150	2015	Baheti	CR	O	1	10	M	.	10	10	.	6(2)	carbamazepine d/t recurrent partial seizure	1		4	2	
151	2015	Apalla	RD	O	68	6	32:36	.	mean 2.89	mean 5.9	.	1	Hand foot and mouth disease (HFMD)	2		1-4	2	
152	2016	Yuksel	CR	O	1	9	M	2WA	0	4 (R2,3, L1,2)	0	1	Hand foot and mouth disease (HFMD)	2		2	1	
153	2016	Tharkur	CR	O	1	14	M	1	0	2 (L1,2)	0	2	cast immobilization	1	surgery (removal of pyogenic granulo	0		
154	2016	Suchonawani	CR	O	1	38	F	10YA	10 (all)	0	0	11	idiopathic, but having manicure and pedicure with nail polish periodically	2		4	2	recurr ent (3 or 4 times per
155	2016	Nag	RD	O,B	19(O), 5(B)/68	.	.	.	.	.	0	1	Hand foot and mouth disease (HFMD)	2		3	2	
156	2016	Long	RD	O	45/56	.	46:10	.	.	.	.	1	HFMD w nail	2			2	
157	2016	Li	RD	O	14/305	.	.	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3			0	
158	2016	Di Biagio	CR	O	1	41	M	.	.	.	.	1	syphilis	1	benzath ine benzylp enicillin	1	5 (onycholysis)	
159	2016	Chiu	CR	O	1	3	F	several weeks 10DA	2 (B1T)	2 (B1F)	0	1	Hand foot and mouth disease (HFMD)	2		several months	1	
160	2016	Bassi	CS	O	1	1mo	M	.	0	6 (B1,3,4F)	.	11		3			0	
161	2016	Akpolat	RD	O,B	10(O), 5(B)/15	5.1	10:5	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3			0	
162	2016	Agarwal	RD	O	1(O)/31	.	.	.	1(L1T)	0	.	2	casted or braced clubfoot w nail	3			0	

163	2017	Zawar	CR	B	1	55	F	3	4 (B1,2T)	8 (B1,2,3,4)	pain	4		pemphigus vulgaris	1	oral prednisolone, azathioprine We were able to easily move	8	2	
164	2017	Yamaguchi	CR	O	1	66	M	1	10	0	0	6(topical tioconazole)		allergic contact dermatitis to efinaconazole	1	all of the toenails by using tissue forceps and iric	.	2	
165	2017	Vaccaro	RD	O,B	2(O), 3(B)/53	61	9:44	3.5-4 cycles	R1T (O)	all (B), L2,3(O)	pain (O)	6(1)		anticancer agents	3			0	
166	2017	Savant	CR	O	1	35	M	.	m	m	0	4		pemphigus vulgaris chronic selenium toxicity	3			0	
167	2017	Razmi	RD	O	10	32	5:5	.	.	.	.	6(5)		possibly due to locally harvested wheat	3	Prednisolone, mesalazine, multivitamin (few		0	
168	2017	Ong	CR	O	1	49	F	few weeks	10	10	0	5		Cronkhite–Canada syndrom (rare acquired polyposis syndrom)	1			2	
169	2017	Mortada	CR	O	1	9	M	few days	m	m	0	1		Hand foot and mouth disease (HFMD)	3			0	
170	2017	Li	RD	O	16	36.5mo	6:10	1.7	m	m	0	1 (13) , 11 (3)		HFMD (5), common cold (8), scald injury(1), idiopathic(2)	2 (5), 1 (11)	11 patients treated with topical bifonaz stop chemo (oral vitamin B6, a polymyxin ointment, high-energy	3	1	no recurrence
171	2017	Li	CR	O,B	1	72	F	3 (4 cycles)	all (O)	all (B)	pain	6(1)		anticancer agents	1		24	2 (fingernails) 5 (all her toenails exhibited defects or deformities)	
172	2017	Kuehnel	CS	O	4	5.5	2:2	few weeks	m	m	pain	1		Hand foot and mouth disease (HFMD)	3			0	
173	2017	Güler	CR	O	1	23mo	M	3WA	0	3(R1,2,3)	0	6(2)		Valproic acid	1	change medication	6 wks	1	
174	2017	Gan	CR	O,B	1	7	M	4WA	m	m	0	1		Hand foot and mouth disease (HFMD)	3			0	

175	2017	Fustà	CR	O,B	1	36	M	2	all	all	0	1	secondary syphilis	1	penicillin	.	1	
176	2017	Eyer-Silva	CR	B	1	67	M	70DA	.	.	0	1	secondary syphilis	1	penicillin	.	1	
177	2017	Damevska	CR	O,B	1	41	F	1	0	all	0	5	cutaneous leukocytoclastic vasculitis	2		4	1	
178	2018	Sukakul	CR	O	1	77	M	4	5 (R1,L1-4)	3 (R2,L1,L5)	0	4	Pemphigus vegetans	1	oral prednisolone (6)+topical corticos	.	1	
179	2018	Sechi	CR	O,B	1	9	F	5WA	6 (B1,2,3)	2 (L1,3)	0	1	varicella (chickenpox)	2		2	1	
180	2018	Pietkiewicz	RD	O,B	4(O), 5(B)/67	.	2:2(O), 3:2 (B)	.	0	.	0	4	Pemphigus vulgaris	3			0	
181	2018	Pearson	CR	O	1	23	F	4YA	2 (B1)	0	pain	11	Seasonal Onychomadesis (springtime)	1	self-identified behavioral change	.	1	no recurrence
182	2018	Malakouti	CR	O	1	28	F	3WA	0	m	0	1	Hand foot and mouth disease (HFMD)	2			0	
183	2018	Lipner	CR	O	1	20s	F	6	6 (B1,2,3)	0	0	3	Fish Pedicure (small fish called Garra rufa or "doctor fish")	3			0	
184	2018	Li	PD	O	22/51	44mo	25:26	3-8WA	8 (Big), 1(2nd), 1(3rd)	1 / (thumb), 10(2nd), 8(3rd), 5(4th), 2(5th)	0	1	Hand foot and mouth disease (HFMD)	3			0	
185	2018	Jandial	CR	B	1	55	M	.	10	10	0	6(1)	anticancer agents mycophenolic acid and hydroxychloroquine because of onychomadesis, which was considered to be a possible adverse drug autoimmune blistering disorders	2		3	1	
186	2018	Huang	CR	O	1	34	F	.	.	.	.	6(6)		3			0
187	2018	Gopal	CSS	O,B	4(O), 6(B)/40	44.5	1:2.1	3 (B) 1.4	.	.	.	4		3			0	
188	2018	Ehsani	CSS	O,B	1(O,B)/60	49.7	28:32	(Treatment duration 2 qd 2.7YA)	.	.	.	5	Mycosis fungoides (stage III)	3			0	
189	2018	Damasco	RD	O	2/19	61.6	.	2.7YA	.	.	.	5	Sezary syndrome	3			0	
190	2018	Chu	CR	B	1	56	M	.	0	10	.	6(1)	anticancer agents	1	stop chemo	3	0	
191	2018	Baykal	CR	O	1	25	M	6WA	0	3 (L2,3,4)	0	2	sequela of the PG-like lesions after cast immobilization	2	6	12	1 (6)	no recurrence
192	2019	Zawar	PD	O,B	2 (O), 9 (B)/129	56	61:68	.	.	.	.	6(1)	anticancer agents	3			0
193	2019	Tasia	RD	O,B	32 (O or B) /308	3	.	a few weeks or months	.	.	.	1 (30), 7 (2)	Postdelivery Beau's Lines or onychomadesis (2) - stop and caloric intake related to ALP (aluminium phosphide, fumigant) poisoning	2			1	
194	2019	Nakhaee	CR	B	1	24	F	4	.	.	0	5		2		5	1	

195	2019	Li	RD	O,B	11 (HFMD)/20 (O or B)	3	.	2	.	.	0	1	Hand foot and mouth disease (HFMD)	3		0	
196	2019	Leung	CR	O	1	20mo	M	2	m	m	0	5	Kawasaki disease	2	4	1	
197	2019	Jaworek	CR	O	1	56	M	2	0	8 (B1,2,3,4)	0	4	Pemphigus vulgaris	3		0	
198	2019	Feng	CR	O	1	34	F	1	10	10	0	6(6)	mycophenolic acid (MPA)	2	after withdra wing MPA	3	1
199	2019	Di Meo	CR	O	1	36	M	2	0	2 (R2,5)	0	2	cast immobilization (for a right wrist fracture)	3		0	
200	2019	Deeb	CR	O	1	30	W	3WA	0	10	0	1	HFMD in a pregnant woman	3		0	
201	2019	Chung	CSS	O,B	2 (O), 6 (B)/235	7.43	123:112	.	.	.	.	11	atopic dermatitis	3		0
202	2019	Chiu	PD	O	11	24.2	5:6	53.4DA	.	.	.	1	Hand foot and mouth disease (HFMD)	3		0	
203	2019	Angel	CR	O,B	1	55	M	3	0	5 [B1, R2,3(O), R4,5(B)]	0	1	pneumococcal bacteremia and severe necrotizing pneumonia	3		0	
204	2019	Alkeraye	CR	O	1	58	M	.	0	L3F	0	4	Mucous membrane pemphigoid	3		0	
205	2020	Xu	RD	O	5/32	4.1	10:6	.	.	.	.	1	Hand foot and mouth disease (HFMD)	3		0
206	2020	Xavier	CS	O,B	2	5	1:1	.	0	10	0	1	Hand foot and mouth disease (HFMD)	2		1	
207	2020	Wang	CR	O	1	5	M	2	0	10	.	4	linear IgA bullous dermatosis	1	dapson e, methylp rednisol one (4)	4	1
208	2020	Trivedi	RD	B	1/500	52.45	251:249	.	0	2 (B1F)	.	6(1)	chemotherapy (paclitaxel + 5-FU + doxorubicin + cyclophosphamide + trastuzumab) dt cancer	3		0	
209	2020	Sugihara	CS	O	2	70	1:1	.	2(B1T)/1(L1T)	0	pain	6(1)	pembrolizumab for metastatic urothelial carcinoma	1	steroid ointment (2wks)	2	
210	2020	Senturk	CR	O	1	47	F	3	10	10	.	1	COVID-19 chemotherapy d/t	3		0	
211	2020	Saraswat	RD	O,B	17(O), 31(B)/205	43	59:65	.	.	.	.	6(1)	malignancy allergic contact dermatitis to tioconazole	3		0
212	2020	Romita	CS	O	3	26.67	1:2	1.5	1(L1T)/1(R1T)/2(B1T)	0	itch	6(topical tioconazole)	allergic contact dermatitis to tioconazole	3		0	
213	2020	Rajput	RD	O,B	1 (O), 28(B)/125	.	.	.	.	.	.	1	leprosy	3		0
214	2020	Ohta	CR	B	1	36	F	6	m	0	0	11	stress related to childbearing	2	3	1	
215	2020	Liu	CR	O	1	7	F	12	0	10	0	7	congenital insensitivity to pain with anhidrosis (CIPA)	1	iodoph ors and NSAIDS vitamin C	3	3
216	2020	Ko	CR	O,B	1	41	F	several months	4 [R1,3,4,5T(O)]	2 [B1F(B)]	0	5	scurvy (vitamin C deficient)	1	supple mentati steroid		0
217	2020	Kanitakis	RD	O	2/8	31	M	71	0	6[R1,2,3,4,5F, L1F]/3[R3,4,5F 1	0	11	sign of gratt rejection in patients with upper extremity allotransplantation HFMD by enteroviruses (18	1	boluses (3 days)	2wk	5 (regrowth of thin and brittle nails)
218	2020	Justino	PD	O	12/40	2.35	28:12	0.71	.	.	.	1	CV-A6, 2 CV-B5, 1 CV-A4, 1 enterovirus C116)	2		0	

219	2020	Ide	CR	B	1	68	M	2	0	5 [R3,5, L2,3,5]	0	1	COVID-19	3	0
220	2020	Banday	CR	O	1	4.5	M	1.5	0	5 [R1,2, L2,3,5]	0	5	Kawasaki disease	1	1
221	2020	Alobaida	CR	B	1	45	M	1.5	10	10	0	1	COVID-19	3	0
222	2021	Steadmon	CR	O	1	7	M	several days	0	m	pain	1	COVID-19 hand-foot-and-mouth disease (HFMD) by coxsackievirus infection	3	0
223	2021	Sous	CS	O	51	23.1	0.89583	.	2 (great toes+their longest toes)	0	0	5 [27(53%)] 8 [4(8%)] 9 [2(4%)] 10 [2(4%)]	1	2 [32(73%)] 3 [9 (20%)] 4 [3 (7%)]	
224	2021	Sechi	CR	O	1	3	M	1WA	0	1 (R1)	pain	1	HFMD by Coxsackievirus A6 Concurrent Kawasaki disease	2	1
225	2021	Pineider	CR	O	1	17mo	F	4	0	2 (R3, L1)	0	1,5	and non-SARS-CoV2 coronavirus infection	3	0
226	2021	Pilania	CR	B	1	22mo	F	1WA	0	6 (R1,3,4, L1,3,4)	0	5	Kawasaki disease (KD)	3	0
227	2021	Pérez Pico	RD	B	30/209	73.2	.	.	m	0	0	5	Chronic kidney disease	3	0
228	2021	Mathews	CR	O	1	1	F	6	6 (unknown)	10 (all)	0	5	Langerhans cell histiocytosis	1	2
229	2021	Han	CR	O	1	26	M	3	0	3 (R1,2,4)	pain	2	cast immobilization	2	1
230	2021	Deng	CR	B	1	41	F	4	0	m	0	1	COVID-19 CMGT (Congenital)	2	1
231	2021	Buttars	CS	O,B	2	11	M	congenital (132 months)	4 (B1,2T)	0	0	7	malalignment of the great toenail	2	0
232	2021	Arslan	RD	O	3/100	9.1	47:53	.	.	.	.	11	atopic dermatitis	3	0
233	2021	Antony	RD	O,B	13(O), 18(B)/104	38	61:43	.	2 [R1T(O), L1T(B)]	.	.	11	papulosquamous disorders	3	0

Table SII. Summary of studies reported on Beau's lines and onychomadesis (n=233) ^a

	Beau's lines (n=80, 34.3 %)	Onychomadesis (n=124, 53.2 %)	Both (n=29, 12.4 %)
Study design, n (%)			
Case report (case=1)	58 (72.5)	73 (58.9)	12 (41.4)
Case series (cases<5)	9 (11.3)	21 (16.9)	2 (6.9)
Cross-sectional study	1 (1.3)	0 (0)	3 (10.3)
Retrospective study	11 (13.8)	26 (21.0)	11 (37.9)
Prospective study	1 (1.3)	4 (3.2)	1 (3.4)
Number of patients (cases=1,411)	233	908	270
Mean age at onset ^b (years, SD)	41.6 ± 21.9	23.4 ± 23.2	28.1 ± 24.1
Male: Female ^c	1 : 0.8	1 : 0.9	1 : 0.6
Symptoms, n (%)			
Pain/itch	2/0 (2.5)	2/13 (12.1)	3/0 (10.3)
None	33 (41.3)	47 (37.9)	14 (48.3)
Number of involved digits, n (%)			
Fingernails: none, single, multiple	3 (3.8), 0 (0), 66 (82.5)	10 (8.1), 4 (3.2), 81 (65.3)	1 (3.4), 0 (0), 15 (51.7)
Toenails: none, single, multiple	36 (45.0), 0 (0), 26 (32.5)	33 (26.6), 3 (2.4), 60 (48.4)	5 (17.2), 1 (3.4), 10 (34.5)
Management, n (%)			
Treatment	14 (17.5)	34 (27.4)	6 (20.7)
	<ul style="list-style-type: none"> • Treatment of underlying disease (n=8) • Discontinuation of causative drug (n=6) 	<ul style="list-style-type: none"> • Treatment of underlying disease (n=20) • Discontinuation of causative drug (6) • Nail extraction or curettage of pyogenic granuloma (n=3) 	<ul style="list-style-type: none"> • Treatment of underlying disease (n=4) • Discontinuation of causative drug (n=2)

		<ul style="list-style-type: none"> • Urea cream 20-40% (n=2) • Antibacterial ointment (n=1) • bFGF spray (n=1) • Self-identified behavioral changes (n=1) 	
Observation	19 (23.8)	34 (27.4)	8 (27.6)
Outcome, n (%)			
Complete resolution	18 (22.5)	34 (27.4)	8 (27.6)
		<ul style="list-style-type: none"> • Recurrence (n=3) 	
Improved	6 (7.5)	22 (17.7)	3 (10.3)
		<ul style="list-style-type: none"> • Recurrence (n=1) 	
Stable	1 (1.3)	4 (3.2)	0 (0)
	<ul style="list-style-type: none"> • Ongoing underlying disease 	<ul style="list-style-type: none"> • No details (n=4) 	
Worsened	0 (0)	1 (0.8)	0 (0)
		<ul style="list-style-type: none"> • No details (n=1) 	
Improved with sequelae	0 (0)	3 (2.4)	2 (6.9)
		<ul style="list-style-type: none"> • Regrowth of thin and brittle nails (n=1) • Onycholysis (n=1) • No details (n=1) 	<ul style="list-style-type: none"> • Loss of great toenails (n=1) • Nail defects or deformities (n=1)

^a Percentages of studies without detailed data were not included in the table.

^b Studies without specified ages were not evaluated: Beau's line (n=7), onychomadesis (n=6), and both (n=3)

^c Studies without gender were not evaluated: Beau's line (n=12), onychomadesis (n=25), and both (n=12)

Table SIII. Causes of Beau's lines and onychomadesis ^a

	Beau's lines (n=80, 34.3 %)	Onychomadesis (n=124, 53.2 %)	Both (n=29, 12.4 %)
Infectious disease (except onychomycosis)	6 (7.5) <ul style="list-style-type: none"> • COVID-19 (n=3) • HFMD (n=1) • Asian flu (n=1) • Syphilis (n=1) 	48 (36.9) <ul style="list-style-type: none"> • HFMD (n=43) • Chickenpox (n=2) • COVID-19 (n=2) • Syphilis (n=1) 	13 (43.3) <ul style="list-style-type: none"> • HFMD (n=43) • Chickenpox (n=1) • Syphilis (n=1) • Leprosy (n=1) • Acinetobacter peritonitis (n=1) • Pneumococcal bacteremia and severe necrotizing pneumonia (n=1) • Fever-related (n=1)
Trauma	10 (12.5) <ul style="list-style-type: none"> • Injury, fracture (n=6) • Intrauterine distress (n=1) • Stress related to childbearing (n=1) • Hypobaric hypoxia of high altitude (n=1) • Deep saturation dives (n=1) 	9 (6.9) <ul style="list-style-type: none"> • Cast immobilization (n=7) • Great toenail dystrophy (n=1) • Trauma by saturimeter (n=1) 	0 (0)
Microtrauma (active hobbies/sports)	0 (0)	3 (2.3) <ul style="list-style-type: none"> • Running (n=1) • Fish pedicure (n=1) • No details (n=1) 	0 (0)
Autoimmune disease	7 (8.8) <ul style="list-style-type: none"> • Pemphigus vulgaris (n=3) • Immunobullous disease (n=1) • Alopecia areata (n=1) • Guillain-Barré syndrome (n=1) • Systemic lupus erythematosus (n=1) 	11 (8.5) <ul style="list-style-type: none"> • Pemphigus vulgaris (n=5) • Pemphigus vegetans (n=1) • Bullous pemphigoid (n=1) • Mucous membrane pemphigoid (n=1) • Linear IgA bullous dermatosis (n=1) • Alopecia areata (n=1) • Guillain Barre syndrome (n=1) 	3 (10.0) <ul style="list-style-type: none"> • Pemphigus vulgaris (n=2) • Autoimmune blistering disorders (n=1)
Systemic disease (non-autoimmune)	20 (25.0) <ul style="list-style-type: none"> • Hemodialysis, chronic kidney disease (n=3) • Cardiac arrest (n=2) • Pneumonia (n=2) • Fever (n=2) • Kawasaki disease (n=2) • Zinc deficiency (n=2) • ICU admission (n=1) • Myelomatosis (n=1) • Complex regional pain syndrome (n=1) • Type II lepra reaction (n=1) • Postpartum hyperparathyroidism (n=1) • Meningoencephalitis (n=1) • Gout, hypertension, diabetes (n=1) 	18 (13.8) <ul style="list-style-type: none"> • Kawasaki disease (n=5) • Cronkhite-Canada syndrome (n=2) • Langerhans cell histiocytosis (n=2) • Cutaneous T-cell lymphoma (n=1) • Sezary syndrome (n=1) • Mycosis fungoides (n=1) • Stevens Johnson syndrome (n=1) • Pulmonary abscess (n=1) • Cellulitis of the foot (n=1) • Chronic kidney disease (n=1) • Bazex syndrome (n=1) • Lichen planus (n=1) 	4 (13.3) <ul style="list-style-type: none"> • Kawasaki disease (n=1) • Mycosis fungoides (n=1) • Scurvy (n=1) • Cutaneous leukocytoclastic vasculitis (n=1)
Medication	29 (36.3)	19 (14.6)	5 (16.7)

Chemotherapeutic agents	21 (72.4) <ul style="list-style-type: none"> Docetaxel (n=5) Razoxane (n=1) Anticancer agents (n=15) 	4 (21.1) <ul style="list-style-type: none"> Capecitabine (n=1) Pembrolizumab (n=1) Anticancer agents (n=2) 	5 (100) <ul style="list-style-type: none"> Doxorubicin (n=1) Capecitabine (n=1) Anticancer agents (n=3)
Antiepileptics	0 (0)	7 (36.8) <ul style="list-style-type: none"> Carbamazepine (n=5) Valproic acid (n=2) 	0 (0)
Antibiotics	2 (6.9) <ul style="list-style-type: none"> Dapsone (n=1) Moxifloxacin (n=1) 	3 (15.8) <ul style="list-style-type: none"> Azithromycin (n=1) Penicillin (n=2) 	0 (0)
Retinoids	0 (0)	0 (0)	0 (0)
Metal	1 (3.4) <ul style="list-style-type: none"> Arsenic (n=1) 	1 (5.3) <ul style="list-style-type: none"> Selenium (n=1) 	0 (0)
Others	5 (17.2) <ul style="list-style-type: none"> Contact dermatitis (Gold) (n=1) Itraconazole (n=1) Steroid (n=1) Azathioprine (n=1) Octreotide (n=1) 	4 (21.1) <ul style="list-style-type: none"> Contact dermatitis (topical tioconazole) (n=2) Mycophenolic acid (n=2) 	0 (0)
Neonatal or hereditary disease	3 (3.8) <ul style="list-style-type: none"> Heimler syndrome (n=2) Congenital pneumonia (n=1) 	3 (2.3) <ul style="list-style-type: none"> Congenital insensitivity to pain with anhidrosis (n=1) Hyper IgM syndrome (n=1) Alopecia areata universalis (n=1) 	2 (6.7) <ul style="list-style-type: none"> Congenital malalignment of the great toenail (n=1) Postdelivery (n=1)
Anatomic anomaly	0 (0)	2 (1.5) <ul style="list-style-type: none"> Ingrowing nail (n=1) No details (n=1) 	0 (0)
Neurological or neuromuscular disease	2 (2.5) <ul style="list-style-type: none"> Bilateral neuralgic amyotrophy (n=1) Childhood reflex sympathetic dystrophy (n=1) 	1 (0.8) <ul style="list-style-type: none"> No details (n=1) 	0 (0)
Onychomycosis (confirmed by fungus test)	0 (0)	2 (1.5) <ul style="list-style-type: none"> Trichophyton tonsurans (n=1) No details (n=1) 	1 (3.3) <ul style="list-style-type: none"> Congenital nail candidiasis (n=1)
Idiopathic or others	3 (3.8) <ul style="list-style-type: none"> Pustular psoriasis (n=1) Recurrent erythema nodosum leprosum (n=1) Dysmenorrhea (n=1) 	14 (10.8) <ul style="list-style-type: none"> No details (n=3) Seasonal onychomadesis (winter or spring time) (n=2) Nail polish (n=2) Idiopathic familial onychomadesis (n=1) Two babies just learning to walk (n=1) Viral exanthem (n=1) Bronchiectasis (n=1) Graft rejection (n=1) Atopic dermatitis (n=1) After onychectomy (n=1) 	2 (6.7) <ul style="list-style-type: none"> Atopic dermatitis (n=1) Papulosquamous disorders (n=1)

^aData are presented as n (%), and each was counted even if multiple causes were reported in one study.

COVID-19, Coronavirus disease 2019; HFMD, hand-foot-and-mouth disease