

Supplementary material

A Conceptual Disease Model of Symptoms and Impacts in Adults With Prurigo Nodularis: A Qualitative and Literature-Informed Study

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Table S1. Ovid Algorithm and Records Identified

Search Number	Search Term	Results
1	exp *prurigo nodularis/ or (prurigo nodularis or nodular prurigo).ti	1,566
2	(case report or case series or woman or man or child or adolescent or female or male or boy or girl or infant).ti. or exp case report/ or exp case study/ or case report\$.jn. or case report\$.jx	6,840,752
3	(Congress or Ephemera or "Meeting Abstract" or "Introductory Journal Article" or News or "Newspaper Article" or Biography or Editorial or Comment or Overall).pt. or (commentary or editorial or comment or mouse or mice or rat or rats or animal).ti	6,410,865
4	in vitro study/ or In Vitro Techniques/	2,022,179
5	exp juvenile/ or exp Child/ or exp infant/ or (Pediatric\$ or Paediatric\$ or children or baby or babies).ti,ab	8,190,170
6	exp clinical trial/ or exp randomized controlled trial/ or (random\$ or RCT or CCT or trial).ti,ab	6,145,881
7	1 not (2 or 3 or 4 or 5 or 6)	787
8	limit 7 to (article or article in press)	572
9	limit 8 to yr="2011-Current"	442
10	remove duplicates from 9	303
11	limit 10 to English language	285

Abbreviations: ab, abstract; CCT, control clinical trial; exp, exploded; jn, journal name; jx, juxtaposition; pt, publication type; RCT, randomized control trial; ti, title; yr, year.

Table S2. Design characteristics and prurigo nodularis symptoms reported by study selected

First Author (Year)	Study Objective	Design	PROs Used	Sample Size & Diagnosis	Symptoms for CDM	Impacts for CDM
D'Amiano (2025) [27]	To examine the lived experience of itch and its treatment in a diverse adult patient cohort with PN	Prospective, qualitative interviews conducted in the US	Study-specific questionnaire	23 patients with PN	Constant burning, stinging, itching	Overall QoL, sleep quality, school/job performance, relationships, social life, concentration, excessive fatigue, mental health, concerns about appearance, self-esteem, depression/hopelessness, anxiety, stress, exhaustion, intrusive thoughts
Ficheux (2025) [28]	(1) To analyze and compare with controls perceived stress, stigmatization, body dysmorphia, anxiety, depression, and itch-related QoL in patients with CPG (2) To identify variables predicting the above	Prospective, observational, cross-sectional questionnaires-based study conducted in 17 European countries	EQ-5D3L, PHQ, GAD, PSS-10, DCQ, itch severity (0 [no itch] to 10 [worst itch]), and 5-PLQ	2,914 overall (patients and controls)	Itch (~100%), burning (55.7%), stinging (41.6%), pain (42.0%).	Suicidal ideation related to skin disease. Patients with PN had statistically significantly worse outcomes in all PRO results
Frankel (2025) [43]	(1) To identify associations between PN and mental health disorders (2) To evaluate whether these associations can be attributed to hemodialysis burden	Retrospective, database analysis on psychiatric comorbidities, using a global registry of patients' records	n.a.		n.a.	Association with trichotillomania, delusional disorders, inhalant-related disorders, obsessive-compulsive disorder, borderline personality disorder, depression, anxiety, schizoaffective disorders
Lu (2025) [29]	To determine if self-reported itch intensity or objective measures of disease severity predict QoL and sleep quality in PN.	Prospective, questionnaires-based study conducted in the US	DLQI, WI-NRS, 5D Sleep, 5D Distribution	63 patients with PN	Itch; high number of body sites involved; correlation with sleep quality	Sleep

Cornman (2024) [30]	To assess disease severity and QoL in patients with PN	Prospective, cross-sectional, questionnaires-based study conducted in the US	DLQI, ItchyQoL, WI-NRS, 5-D Pruritus Scale, BDI	40 patients with PN	Itch	Reduced QoL, depression
Jiang (2024) [22]	To identify research studies that investigated the association between PN and the odds of depression, anxiety disorders, and suicidal ideation/self-harm	Systematic review and meta-analysis	n.a.	14 articles with over 24,000 patients with PN	n.a.	Depression, anxiety, suicidal ideation/self-harm
Murota (2024) [31]	To assess disease burden and treatment satisfaction among patients with PN	Prospective, cross-sectional survey conducted in Japan	GQ, NRS for pruritus, burning sensation and sleep disturbance, SF-8, DLQI, PHQ-9, WPAI, and TSQM-9	97 adults with PN	Itch, burning sensation	Sleep disturbance, depression, work productivity and impairment, absenteeism, presenteeism, productivity loss, activity impairment, physical health
Pereira (2024) [32]	To study the association between comorbidities relevant to PN, itch intensity, and QoL impairment	Prospective, cross-sectional, questionnaires-based study conducted in 12 European countries	WI-NRS, 5-PLQ	513 patients with CNPG	Itch	Hypertension, depression, impaired QoL
Schielein (2024) [33]	To assess the psychosocial impact and coping strategies of patients with PN	Prospective, qualitative interviews conducted in Germany	Study-specific questionnaire	10 patients with PN (5 female, 5 male)	Constant itch, uncontrollable scratching behavior, visibility of skin lesions	Stress (as a result of symptoms), disconsolateness, heightened irritability, health anxiety, suicidal ideation, interpersonal relationships, discrimination or pitiful behavior—social avoidance and isolation, change in self-perception, impact on concentration, scratching difficult to hide at work, leisure activities, reduced travel, spent time alone, negative impact on mood, clothing choices, depression, burden of treatment

Taghaddos (2024) [44]	(1) To describe demographic and clinical characteristics and treatment outcomes of patients with PN (2) To describe the effectiveness of NB-UVB and conventional systemic therapies, including methotrexate and cyclosporine	Retrospective, patients-record analysis conducted in Canada	Itch severity NRS (0 to 10)	81 patients	Itch (100%), dry skin and xerosis (53%), pain (17%), burning sensation (5%), involvement of lower (93%) and upper extremities (69%) as most common areas	Depression, anxiety, substance use disorder, personality trait disorder, bipolar disorder, post-traumatic stress disorder, ADHD, eating disorder, schizophrenia
Xiong (2024) [45]	(1) To assess and compare itch and insomnia among patients with moderate to severe PN, AD, psoriasis, rosacea, or NMSC (2) To evaluate potential correlation between itch intensity and sleep disturbances severity	Retrospective, cross-sectional, questionnaires-based study conducted in Canada	PP-NRS, AIS	177 patients: 40 with PN, 40 with AD, 40 with psoriasis, 24 with rosacea, and 33 with NMSC	Itch, sleep disturbance	Itch and sleep disturbance worse in PN
Issa (2023) [23]	To discuss current understanding of the clinicopathologic and epidemiological features of PN, cutaneous and non-cutaneous comorbidities, and psycho-dermatologic aspects of the disease	Narrative review	n.a.	n.a.	Itching, skin lesions, bleeding, pain	Sleep disturbance, mental health symptoms, stress
Joel (2023) [46]	To evaluate the association of PN with sleep disorders	Retrospective, population-level, matched-cohort-database analysis conducted in the UK	n.a.	4193 patients, 4193 controls	n.a.	Insomnia, sleep disorder

Kwatra (2023) [24]	(1) To describe the burden of comorbidities, sequelae of disease, inflammatory disease signatures, and the impact of PN in African American and Asian patients (2) To explore challenges in the recognition and diagnosis of PN and describe methods to increase awareness of PN among dermatologists	Narrative review	n.a.	n.a.	None	Comorbidities: AD, chronic hepatitis C, chronic kidney disease, congestive heart failure, COPD, depression, HIV, type 2 diabetes, xerosis cutis, neurotic excoriations, asthma, urticaria, depression, anxiety, use of anxiolytics and antidepressants, schizophrenia, mood disorders, eating disorders, ADHD, substance use, self-harm, longer hospital stays, increased cost of care
Misery (2023) [34]	To assess the impact of chronic PN on daily life and stigmatization	Prospective, cross-sectional, questionnaires-based study conducted in France	DLQI, PUSH-D, EQ-5D-3, VAS, Epworth sleepiness scales	70 patients with chronic PN	n.a.	Absenteeism, activity impact, refusing an invitation, sleep, leisure or sport activity, stigmatization
Rodriguez (2023) [19]	To explore patients' perspectives on their PN symptoms and the impacts of the condition	Prospective, qualitative interviews conducted in the US	Study-specific questionnaire, itch NRS, sleep disturbance NRS	21 adults with severe PN	Itch, pain, bleeding or scabbing, dry skin, lumps or bumps, crust on the skin, burning, stinging, lesions or sores, skin discoloration, raw skin, rough skin, hot sensation, tingling, cold sensation, swelling or inflammation, sensitive skin, exudate, throbbing or pulsating, odor, acne, skin infection, oozing	Sleep, interference with daily life, feelings or mood, relationships, social life, work or school, exhaustion or tiredness, financial
Han (2022) [47]	To investigate the relationship between psychiatric comorbidity, socioeconomic status, and mental health utilization among patients with PN	Retrospective patients-record and database analysis conducted in the US	n.a.	288 patients	n.a.	Psychiatric disorder, mood disorder, depression, major depressive disorder, anxiety disorder. Psychiatric disorders did not have significant association with socioeconomic status

Aggarwal (2021) [7]	To describe disease characteristics and QoL in PN	Prospective, cross-sectional, questionnaires-based study conducted in the US	Itch NRS, DLQI, PSQI, 5-D Itch Scale	231 patients with PN	Itch, prickling, pain, stinging, and burning	Anxiety, depression, atopic triad, impaired sleep, decreased QoL scores
Gwillim (2021) [50]	To determine and compare the impact of nocturnal pruritus on sleep among patients with PN and other severely itchy dermatosis with well-established sleep abnormalities	Questionnaires-based study* conducted in the US *not clear if prospective or retrospective (most likely)	5-point numerical scales assessing itch severity, timing, frequency, and sleep disturbance	39 patients with PN and 81 with AD	Itch, sleep disturbance	Evening and nocturnal pruritus were significantly correlated with sleep disturbance
Pereira (2020) [35]	To establish the clinical profile of CNPG, including its associated burden	Prospective, cross-sectional, questionnaires-based study conducted in 12 European countries	Study-specific questionnaire on demographics, itch, 5-PLQ	406 patients	Sensory symptoms: Itch often or always (71%), burning (39.9%), stinging (35.7%), pain (32.5%)	Itch had a negative impact on everyday life (53%), itch was the most burdensome symptom (49%) followed by visibility and bleeding of skin lesions (21% each). Itch affected interactions with others (37.6%), impaired sleep (42.5%), and affected mood (44.4%). Psychiatric diseases often mentioned in association with CNPG (19%)
Kwon (2019) [25]	To perform a systematic literature review on evidence regarding specific testing and diagnostic evaluation of PN patients	Systematic review and meta-analysis	n.a.	35 articles	Itch	Anxiety, depression, dissociative experiences, sleep disturbance, QoL
Pereira (2018) [36]	(1) To examine perceptions of PN diagnosis and management among members of the EADV (2) To assess alignment among physicians on PN diagnosis and management (3) To improve the diagnosis and management of PN and PN-related pruritus	Prospective, qualitative survey conducted in 13 European countries and India	Study-specific questionnaire	30 EADV members	Chronic itch leading to chronic scratching, itchy/pruritic nodules, scratching, excoriation, chronic pruritus, atopic background, hyperpigmentation	n.a.

Steinke (2018) [37]	To examine cross-cultural differences in pruritus characteristics and QoL among dermatologic patients with CP	Prospective, cross-sectional, questionnaires-based study conducted in 9 European countries	DLQI, ItchyQoL, VAS, NRS, pruritus duration and frequency	552 patients with CP: 162 AD, 94 contact dermatitis, 69 PN, 181 psoriasis vulgaris, 27 linchen planus, 15 mycosis fungoides/Sézary syndrome	Patients with PN had worse scores in all questionnaires	Itch intensity and frequency were significantly higher in PN; QoL was worse
Akarsu (2018) [48]	(1) To determine the frequencies of xerosis and other accompanying diseases of female patients with PN (2) To compare the demographic, clinical, and accompanying disease characteristics by associated xerosis	Retrospective, patients-record analysis conducted in Turkey	n.a.	80 women with PN	Xerosis (60%), atopic xerosis (33.3%)	n.a.
Dhawan (2018) [38]	Unclear - different in abstract and Intro	Prospective, observational, cross-sectional, questionnaires-based study conducted in India	MINI, PHQ-9	150 patients: 50 with PN, 50 with chronic urticaria, and 50 with vitiligo	Not reported	Psychiatric disorders, depression and anxiety, QoL impairment
Zeidler (2018) [26]	To summarize current knowledge of the clinical presentation and therapeutic management of PN	Narrative review	n.a.	n.a.	Hyperkeratotic nodules, itch, scratch	Depression and anxiety, impact on QoL, sleep disturbance, tactile hallucinations, psychological distress, behavioral/adjustment disorder, social isolation
Jørgensen (2017) [49]	To examine the association of PN with anxiety, depression, and suicide	Retrospective, database analysis using national registries (RWE) conducted in Denmark	n.a.	877 patients, 8770 controls	n.a.	Significant association between PN and depression, antidepressant use, anxiety, anxiolytic use; not with suicide

Errichetti (2015) [39]	To describe the dermoscopic features of PN and the contribution of dermoscopy in the differential diagnosis of such dermatosis	Prospective, dermoscopy study conducted in Italy	n.a.	14 participants with PN	Hyperkeratosis/scales, crusts, erosions, follicular plugging, hemorrhagic spots, dotted/glomerular vessels	n.a.
Konda (2015) [40]	(1) To assess the relationship between pruritus, sleep quality, and depressive symptoms in PN (2) To assess the relationship between IL-6 and serum serotonin with pruritus, sleep quality, and depressive symptoms in PN	Prospective, cross-sectional, questionnaires-based study among patients with PN conducted in South India	HDRS-17, PSQI, PGS	39 patients with PN and 39 controls	Itch: moderate (56.4%, 22), severe (23.1%, 9), mild (26.5%, 8)	Depressive symptoms and their severity were higher in the PN group. In the PN group, serum IL-6 levels were higher, and serum serotonin levels were lower than in the control group
Oh (2015) [41]	To determine the biological, psychological, and social factors associated with the occurrence of PN in patients with underlying endogenous eczema	Prospective, observational, case-control, questionnaires-based study conducted in Singapore	Impact of Skin Disease on Daily Life questionnaire	83 patients: 36 PN, 47 controls	Itch, pain, fatigue, scratching	Impact of the disease on daily life (general, activities, sexual function, eating and sleeping, relationship, stigmatization); psychological (anxiety, negative mood, positive mood); social support; illness cognitions
Dazzi (2011) [42]	(1) To evaluate whether significant symptoms of anxiety and depression are associated with PN (2) To explore personality traits in patients with PN and such symptoms	Prospective, observational, questionnaires-based study conducted in Italy	GHQ, EPQ-R, BDI-II, STAI	40 participants: 20 with PN, 20 controls	n.a.	Anxiety, depression

Abbreviations: 5-PLQ, 5-pruritus life quality questionnaire; 5D, 5-D itch scale; AD, atopic dermatitis; ADHD, attention-deficit/hyperactivity disorder; AIS, Athens insomnia scale; BDI, Beck depression inventory; BDI-II, Beck depression Inventory second edition; CDM, conceptual disease model; CNPG, chronic nodular prurigo; CP, chronic pruritus; COPD, chronic obstructive pulmonary disease; CPG, chronic prurigo; DLQI, dermatology life quality index; EADV, European Academy of Dermatology and Venereology; EPQ-R, Eysenck personality questionnaire–revised; GAD, general anxiety disorder assessment; GHQ, general health questionnaire; GQ, global questions; HDRS-17, Hamilton rating scale for depression; IL-6, interleukin 6; MINI, mini-international neuropsychiatric interview; NB-UVB, narrow band UV therapy; n.a., not applicable; NMSC, nonmelanoma skin cancer; NRS, numeric rating scale; PGS, pruritus grading scale; PHQ, patient health questionnaire; PHQ-9, patient health questionnaire 9; PN, prurigo nodularis; PP-NRS, peal pruritus numerical rating scale; PRO, patient-reported outcome; PSQI, Pittsburgh sleep quality index; PSS-10, perceived stress scale; PUSH-D, patient unique stigmatization holistic tool in Dermatology; QoL, quality of life; RWE, real-world evidence; SF-8, short-form-8; STAI, state trait anxiety inventory; TSQM-9, treatment satisfaction questionnaire for medication-9; US, United States; VAS, visual analog scale; WI-NRS, worst-itch numerical rating scale; WPAI, work productivity and activity impairment