ORIGINAL REPORT

Chronic Pruritus in Older Adults: Prevalence, Associations, and Pruritus-specific Quality of Life

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Chronic pruritus is a burdensome condition that frequently affects older adults, yet its epidemiology and impact on quality of life in the ageing population remain underexplored. This cross-sectional study examined the prevalence of chronic pruritus, its associated factors, and pruritus-specific quality of life in 4,474 participants (median age: 72 years; range: 48–99, 58.8% female) from the population-based Rotterdam Study. Questionnaires assessed current, 12-month, and lifetime chronic pruritus, along with the ItchyQoL. Multivariable logistic regression identified factors associated with chronic pruritus, and linear regression assessed factors linked to pruritus-specific quality of life. Principal component analysis explored the ItchyQoL's dimensional structure in this older population. Chronic pruritus prevalence was 8.6% (current), 10.5% (12-month), and 18.6% (lifetime). Female sex, older age, smoking, atopic dermatitis, psoriasis, self-reported dry skin, asthma, steatotic liver disease, polyneuropathy, depressive symptoms, anxiety, and poor sleep were associated with higher odds of chronic pruritus. Among those with current chronic pruritus, pruritus-specific quality of life was moderately impaired, with the greatest impairment associated with atopic dermatitis and psychological symptoms. Principal component analysis identified 4 ItchyQoL dimensions, extending beyond the original 3 domains. Given the cross-sectional design, directionality cannot be inferred. These findings highlight chronic pruritus as a prevalent, multifactorial condition in older adults, with significant psychological impact and implications for multidisciplinary management.

Key words: chronic itch; pruritus; epidemiology; associated factors; quality of life; older adults.

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SIGNIFICANCE

Chronic pruritus, or long-lasting itch, is a distressing condition that frequently affects older adults, yet its frequency and impact on quality of life in the ageing population remain poorly understood. In this large population-based study of over 4,400 older individuals, nearly 1 in 5 reported having experienced chronic pruritus. It was associated with skin conditions, other medical disorders, and especially psychological symptoms such as depression, anxiety, and poor sleep. Atopic eczema and psychological symptoms had the greatest impact on quality of life. These findings highlight the need for better recognition and multidisciplinary care in older populations.

Pruritus (itch) is a skin sensation that provokes the urge to scratch (1). Chronic pruritus (CP), defined as intermittent or continuous itch lasting 6 weeks or more (2), is a condition with substantial physical and psychological impact (3, 4).

CP affects approximately 22% of individuals at some point in life, with prevalence increasing with age (5). Older adults may be particularly susceptible due to age-related skin changes (e.g., impaired barrier function, altered pH, reduced sebaceous and sweat gland activity), immunosenescence, comorbidities, and polypharmacy (6, 7). CP has diverse causes, including dermatological (e.g., atopic dermatitis [AD], psoriasis, dry skin), systemic (e.g., uremic or cholestatic pruritus), neuropathic (e.g., peripheral neuropathy), psychogenic, and medication-induced (5). When the cause remains undetermined, CP is classified as chronic pruritus of unknown origin (CPUO).

Beyond physical discomfort, CP is linked to depression, anxiety, and sleep disturbance, likely reflecting bidirectional interactions between itch and psychological symptoms (8–11). Although the adverse impact of pruritus on health-related quality of life (QoL) is documented, most research focuses on select pruritic conditions in specific populations (12–16). Data on the epidemiology and psychological burden of CP in the general older population remain limited. While targeted therapies, including biologics, have advanced treatment for select pruritic diseases (17), older adults are often underrepresented in trials due to age and comorbidity exclusions (18, 19).

This study aimed to assess the epidemiology of CP and pruritus-specific QoL in a large, population-based cohort of older adults from the Rotterdam Study. We sought to: (*i*) determine the point, 12-month, and lifetime prevalence of CP; (*ii*) identify demographic, lifestyle, dermatological, systemic, neurological, medication-related, and psychological factors associated with CP; (*iii*) assess the impact of CP on pruritus-specific QoL using the ItchyQoL questionnaire and identify associated factors; and (*iv*) explore the multidimensional structure of pruritus-specific QoL in older adults using principal components analysis (PCA) of the ItchyQoL, which was originally validated in dermatological patients (20).

METHODS

Study population

This cross-sectional study was embedded in the Rotterdam Study, a population-based cohort in Ommoord, Rotterdam, the Netherlands. Its study design has been described elsewhere (21). The Rotterdam Study was approved by the Medical Ethics Committee of Erasmus MC and the Dutch Ministry of Health, Welfare and Sport. All participants provided written informed consent.

The Rotterdam Study includes 17,931 participants across 4 cohorts (RS-I to RS-IV; overall response rate 65%). RS-I started in 1990 with 7,983 individuals aged ≥55 years (response rate 78%). RS-II was added in 2000 with 3,011 participants, also aged ≥55 years (response rate 67%). In 2006, RS-III included 3,932 participants aged ≥45 years (response rate 65%). RS-IV started in 2016 with 3,005 participants aged ≥40 years (response rate 45%). Participants are re-examined every 3 to 6 years at a dedicated research centre.

In May 2023, a structured Dutch questionnaire assessing health topics, including validated questions on CP and pruritus-specific QoL (20, 22), was sent to all consenting participants by post or digitally. One reminder was sent in June 2023. Data on other variables were drawn from follow-up visits closest to time of questionnaire completion (visit number indicated after cohort name): RS-I-7 (between 2018 and 2020); RS-II-5 (2021–2024); RS-III-3 (2021–2024); and RS-IV-1 (2016–2020).

Assessment of chronic pruritus and pruritus-specific quality of life

CP prevalence was assessed using 3 closed-ended questions translated and back-translated from German by certified translators: "Have you ever had chronic itch?", "Have you experienced chronic itch in the past 12 months?", and "Are you currently experiencing chronic itch?" (22).

Participants reporting current CP were asked to rate peak itch intensity over the past 24 h on a Numeric Rating Scale (NRS) ranging from 0 (no itch) to 10 (worst imaginable itch) (23). Additionally, they were asked to complete the ItchyQoL, a 22-item questionnaire measuring pruritus-specific QoL across 3 domains: Symptoms (6 items), Functioning (7 items), and Emotions (9 items) (20). Items were rated on a 5-point Likert scale (1="Never" to 5="Always"), with higher scores indicating greater impairment and thus worse pruritus-related QoL.

Variables of interest

Variables were selected based on prior literature and previously published research (24). These included demographic, lifestyle, dermatological, and non-dermatological factors (systemic, neurological, medication-related, and psychological). Detailed definitions are given in Appendix S1. Demographic and lifestyle variables included sex, age at questionnaire completion, body mass index (BMI), cigarette smoking status, alcohol consumption, education level, and skin colour.

Dermatological factors included self-reported possible AD (based on UK Working Party criteria [25]), psoriasis, and dry skin. Skin colour and presence of AD, psoriasis, and dry skin (localized and generalized, analysed collectively as a single variable) were assessed by dermatology-trained physicians during full-body skin examinations (26).

Systemic conditions included self-reported asthma, diabetes mellitus, renal function (estimated glomerular filtration rate [eGFR]), liver stiffness and steatotic liver disease (including both metabolic-dysfunction associated steatotic liver disease [MASLD] and metabolic and alcohol-associated liver disease [MetALD]), and self-reported thyroid disease (hypothyroidism or hyperthyroidism).

Neurological conditions included polyneuropathy (possible-to-probable or definite) and history of stroke. Medication use was categorized into cardiovascular medications (e.g., anti-hypertensives, diuretics, vasoprotectives, beta-blockers, calcium-blockers, and ACE inhibitors) and central nervous system medications (e.g., anaesthetics, analgesics, anti-epileptics, psycholeptics, psychoanaleptics, and others) (27).

Depressive symptoms were assessed using the Centre for Epidemiologic Studies Depression scale (CES-D; clinically relevant depressive symptoms defined as score ≥16) and anxiety symptoms with a 6-item version of the Hospital Anxiety and Depression Scale–Anxiety subscale (HADS-A; more information is given in Appendix S1) (28-30). The Pittsburgh Sleep Quality Index (PSQI) assessed sleep quality, with scores > 5 indicating poor sleep (31).

For self-reported psoriasis and liver disease, data were unavailable at RS-I-7, RS-II-5, and RS-III-3; therefore, preceding visits were used.

Statistical analysis

Descriptive statistics summarized the population. Skewed continuous variables were reported as medians with interquartile ranges (IQR), and categorical variables as frequencies with percentages.

Missing exposure data were handled using fully conditional specification with 30 imputations prior to regression analyses; outcomes were not imputed.

Associations between factors and chronic pruritus

Logistic regression analysis was used to examine associations between factors and current CP as outcome. First, all demographic and lifestyle factors (sex, age, skin colour, BMI, education, smoking, alcohol use) were entered into a unified model. Factors with an unadjusted $p < 0.05$ were retained. Next, each dermatological (e.g., self-reported or observed AD, psoriasis, dry skin) and non-dermatological (e.g., asthma, diabetes mellitus, thyroid disease, liver disease, renal function, stroke, polyneuropathy, cardiovascular and central nervous system medication use, depressive and anxiety symptoms, sleep quality) factor was added individually to this reduced model to assess independent associations. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). False discovery rate (FDR) correction was applied to adjust for multiple comparisons. The same modelling strategy was applied to lifetime and 12-month CP as alternative outcomes to assess robustness.

Factors associated with pruritus-specific quality of life

ItchyQoL domain scores were calculated by summing responses within each domain: Symptoms (range 6–30), Functioning (7–35), Emotions (9–45), and the total score (22–110), with higher scores indicating worse pruritus-specific QoL.

Linear regression analyses were used to examine associations between factors and pruritus-specific QoL, with the total and domain-specific ItchyQoL scores as outcomes. Factors included: demographic and lifestyle factors (sex, age, skin colour, BMI, education, smoking, alcohol consumption); dermatological conditions (AD, psoriasis, dry skin), defined by either self-report or observation during skin examination and analysed as composite variables; and non-dermatological factors (asthma, diabetes mellitus, renal function, liver stiffness, steatotic liver disease, stroke, hypothyroidism, polyneuropathy, cardiovascular and central nervous system medication use, itch intensity [NRS], depressive symptoms, anxiety symptoms, and sleep quality). Hyperthyroidism was excluded due to very low prevalence (< 2%).

Each factor was first examined in univariable models, followed by inclusion of all factors in multivariable linear regression models. Results were reported as beta coefficients (β) with 95% CIs. FDR correction was applied to adjust for multiple comparisons in both univariable and multivariable models.

Principal component analysis of ItchyQoL

To explore the underlying dimensional structure of the ItchyQoL in our sample and compare it with the original domains (Symptoms, Functioning and Emotions), PCA with Varimax rotation was applied to ItchyQoL items. Sampling adequacy and suitability of the data for PCA were assessed using the Kaiser–Meyer–Olkin (KMO) statistic and Bartlett's test of sphericity. Components with eigenvalues > 1 were retained; factor loadings ≥ 0.40 were considered meaningful.

To examine whether associations with pruritus-specific QoL differed by underlying dimension, univariable linear regression models were repeated using the PCA-derived component scores as outcomes instead of the original ItchyQoL total and subdomain scores.

Analyses were performed using SPSS Statistics version 28.0.1 (IBM Corp, Armonk, NY, USA). Reporting adhered to STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines (32).

RESULTS

Population characteristics and prevalence of chronic pruritus

Of 7,009 questionnaires distributed, 4,541 were returned (response rate: 64.8%). Among respondents, 4,474 (98.5%) completed CP items and were included in analyses (**Fig. 1**). The median age of included participants was 72 years (range: 48–99, IQR: 63–79), with 58.8% female (**Table I**). Detailed characteristics, including variable-level missingness, are provided in Table SI. Most variables showed low to moderate missingness (0–17.2%), except liver disease (27.0%) and polyneuropathy (46.2%).

Current CP prevalence was 8.6% ($n = 385$; 95% CI: 7.8–9.5%). Among those with current CP, the median total ItchyQoL score was 47 (IQR: 38–59), indicating moderate impairment. Lifetime CP prevalence was 18.6% ($n = 832$, 95% CI: 17.5–19.8%) and 12-month prevalence was10.5% ($n = 470$, 95% CI: 9.6–11.4%) (Table SII).

Associations between factors and chronic pruritus

Among demographic and lifestyle factors, female sex (OR: 1.33, 95% CI: 1.06–1.66), older age (OR: 1.01, 95% CI: 1.00–1.02), and current smoking (OR: 1.64, 95% CI: 1.12–2.40) were independently associated with current CP (Table SIII). These factors were retained in subsequent models.

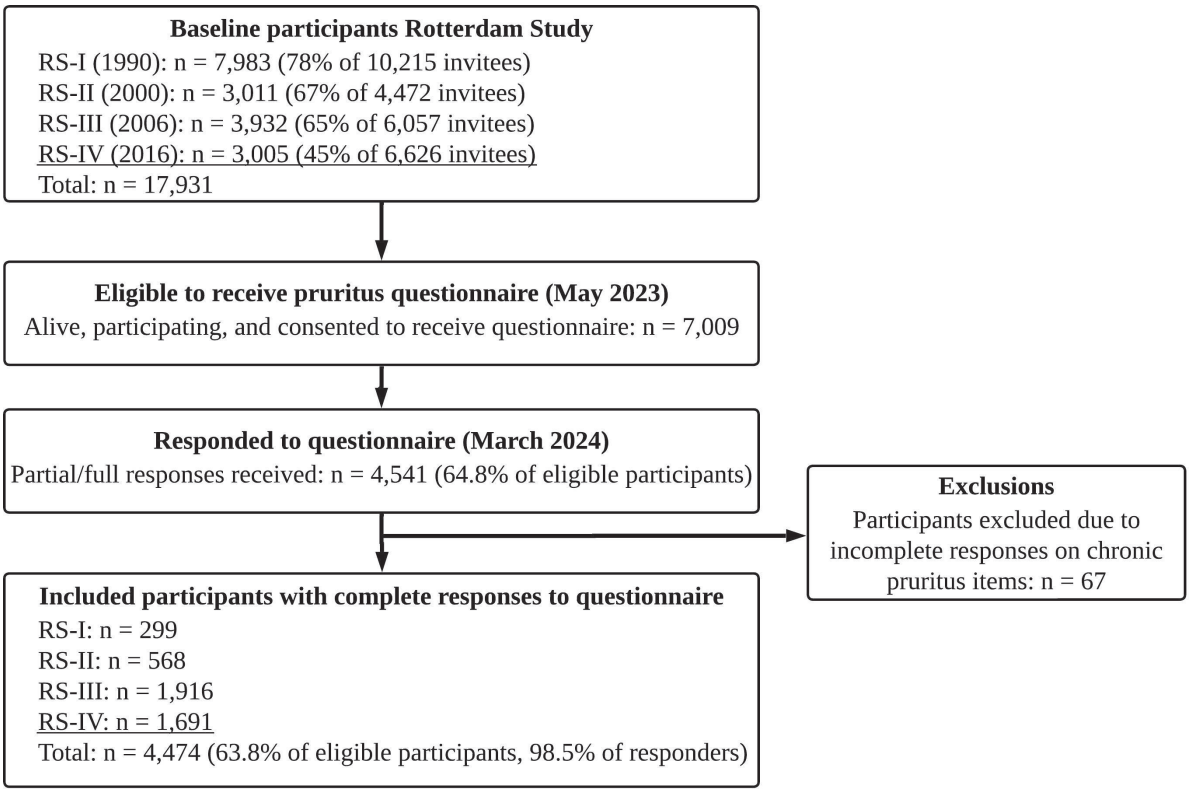

Fig. 1. Flow diagram of inclusion of participants.

When dermatological factors were added individually (**Table II**; **Fig. 2**), both self-reported and observed AD were associated with CP (OR: 2.76, 95% CI: 2.10–3.61 and OR: 2.51, 95% CI: 1.57–4.02), with even stronger associations for psoriasis (self-reported OR: 2.88, 95% CI: 2.00–4.15; observed OR: 3.81, 95% CI: 2.38–6.10). Self-reported dry skin was also associated with CP (OR: 2.21, 95% CI: 1.75–2.80), whereas observed dry skin was not.

Among non-dermatological factors (see Table II; **Fig. 3**), polyneuropathy showed the strongest associations (definite OR: 2.11, 95% CI: 1.12–4.01; possible-to-probable OR: 1.57, 95% CI: 1.12–2.20). Depressive symptoms (CES-D ≥16: OR: 1.54, 95% CI: 1.12–2.11; CES-D, continuous: OR: 1.03, 95% CI: 1.01–1.04), asthma (OR: 1.51, 95% CI: 1.13–2.02), steatotic liver disease (OR: 1.38, 95% CI: 1.09–1.75), anxiety symptoms (HADS-A-6 score, OR: 1.05, 95% CI: 1.01–1.09), and sleep quality (PSQI, continuous: OR: 1.05, 95% CI: 1.02–1.08) were also associated with current CP. No associations were found for diabetes mellitus, renal function, liver stiffness, hypothyroidism, hyperthyroidism, stroke, central nervous system or cardiovascular medication use, or poor sleep (PSQI > 5).

When using lifetime and 12-month pruritus as outcomes, similar patterns were observed (Tables SIV and SV). In the lifetime CP model, diabetes mellitus and central nervous system medication use were additionally significant (OR: 1.29, 95% CI: 1.06–3.57; OR: 1.20, 95% CI: 1.02–1.41, respectively).

Factors associated with pruritus-specific quality of life

Univariable analyses identified worse pruritus-specific QoL to be associated with female sex (β: 4.23, 95% CI: 1.19–7.27), AD (β: 7.18, 95% CI: 3.78–10.57), depressive symptoms (CES-D continuous: β: 0.41, 95% CI: 0.22–0.60; CES-D ≥16: β: 7.96, 95% CI: 3.57–12.36), anxiety symptoms (HADS-A-6: β: 1.39, 95% CI: 0.86–1.92), and poor sleep (PSQI >5: β: 4.86, 95% CI: 1.67–8.04) (**Table III**). In the Functioning domain, psoriasis was associated with greater impairment (β: 2.21, 95% CI: 0.42–4.01). Moderate-to-heavy alcohol consumption was associated with better pruritus-specific QoL (β: –5.14, 95% CI: –8.27 to –2.01).

In multivariable models, AD (β: 6.29, 95% CI: 2.76–9.81) remained significantly associated with poorer pruritus-specific QoL (Table SVI). Anxiety symptoms (β=0.46, 95% CI: 0.15–0.77) were independently associated with greater impairment within the Emotions domain.

Principal component analysis of ItchyQoL

PCA of the 22 ItchyQoL items (KMO=0.930; Bartlett's $p<0.001$) identified 4 components, explaining 59.3% of total variance. The rotated structure diverged from the original ItchyQoL domains and the components were interpreted as: (1) *Social and emotional impact*, (2) *Psychological distress and frustration*, (3) *Lifestyle and environmental burden*, and (4) *Physical symptoms and damage* (Rotated Component Matrix in Table SVII).

Table I. Population characteristics

Variable	Category	Total (n = 4,474)	Current chronic pruritus (n = 385)	No current chronic pruritus (n = 4,089)
Lifestyle and demographic variables				
Sex, *n* (%)	Male	1,843 (41.2%)	135 (35.1%)	1,708 (41.8%)
	Female	2,631 (58.8%)	250 (64.9%)	2,381 (58.2%)
Age, median (IQR)		72 (63–79)	72 (65–80)	71 (62–78)
BMI, median (IQR)		27 (24–30)	27 (24–31)	27 (24–30)
Skin colour, *n* (%)	Pale-to-white	3,152 (70.5%)	270 (70.1%)	2,882 (70.5%)
	White-to-olive	385 (8.6%)	27 (7.0%)	358 (8.8%)
	Dark	194 (4.3%)	16 (4.2%)	178 (4.4%)
Education level, *n* (%)	Low	357 (8.0%)	32 (8.3%)	325 (7.9%)
	Medium	2,503 (55.9%)	216 (56.1%)	2,287 (55.9%)
	High	1,592 (35.6%)	136 (35.3%)	1,456 (35.6%)
Smoking, *n* (%)	Never	1,565 (35.0%)	121 (31.4%)	1,444 (35.3%)
	Former	2,143 (47.9%)	187 (48.6%)	1,956 (47.8%)
	Current	373 (8.3%)	41 (10.6%)	332 (8.1%)
Alcohol consumption	Non-drinker	805 (18.0%)	77 (20.0%)	728 (17.8%)
	Light drinking	816 (18.2%)	71 (18.4%)	745 (18.2%)
	Moderate drinking	1,416 (31.6%)	117 (30.4%)	1,299 (31.8%)
	Heavy drinking	1,044 (23.3%)	84 (21.8%)	960 (23.5%)
Pruritus-specific factors				
Peak (worst) pruritus NRS past 24 h		6 (4–7)	6 (4–7)	NA
ItchyQoL, median (IQR)	Symptom subscore	15 (12–18)	15 (12–18)	NA
	Function subscore	14 (10–19)	14 (10–19)	
	Emotion subscore	18 (14–23)	18 (14–23)	
	Total score	47 (38–59)	47 (38–59)	
Dermatological conditions				
Atopic dermatitis, *n* (%)	Self-reported	456 (10.2%)	82 (21.3%)	374 (9.1%)
	Presence	136 (3.0%)	25 (6.5%)	111 (2.7%)
Psoriasis, *n* (%)	Self-reported	191 (4.3%)	40 (10.4%)	151 (3.7%)
	Presence	90 (2.0%)	24 (6.2%)	66 (1.6%)
Dry skin, *n* (%)	Self-reported	1,920 (42.9%)	228 (59.2%)	1,692 (41.4%)
	Presence generalized dry skin	833 (18.6%)	82 (21.3%)	751 (18.4%)
	Localized dry skin	1,628 (36.4%)	143 (37.1%)	1,485 (36.3%)
	No dry skin	1,263 (28.2%)	91 (23.6%)	1,172 (28.7%)
Non-dermatological factors				
Asthma, *n* (%)		521 (11.6%)	62 (16.1%)	459 (11.2%)
Diabetes mellitus, *n* (%)		776 (17.3%)	77 (20.0%)	699 (17.1%)
Renal function (eGFR), median (IQR)		70 (60–81)	69 (60–79)	70 (60–81)
Liver disease	Liver stiffness, median (IQR)	5 (4–6)	5 (5–6)	5 (4–6)
	Steatotic liver disease, *n* (%)	1,050 (23.5%)	103 (26.8%)	947 (23.2%)
Thyroid disease, *n* (%)	Hyperthyroidism	46 (1.0%)	6 (1.6%)	40 (1.0%)
	Hypothyroidism	124 (2.8%)	18 (4.7%)	106 (2.6%)
Stroke, *n* (%)		150 (3.4%)	10 (2.6%)	140 (3.4%)
Polyneuropathy, *n* (%)	Definite	80 (1.8%)	11 (2.9%)	69 (1.7%)
	Possible-to-probable	615 (13.7%)	66 (17.1%)	549 (13.4%)
	No	1,711 (38.2%)	121 (31.4%)	1,590 (38.9%)
Cardiovascular medication, *n* (%)		1,750 (39.1%)	167 (43.4%)	1,583 (38.7%)
Central nervous system medication, *n* (%)		1,450 (32.4%)	147 (38.2%)	1,303 (31.9%)
Depressive symptoms	CES-D, median (IQR)	4 (1–8)	5 (2–12)	4 (1–8)
	Clinically relevant depressive symptoms (CES-D ≥ 16), *n* (%)	397 (8.9%)	51 (13.2%)	346 (8.5%)
Anxiety symptoms	HADS-A-6, median (IQR)	2 (0–4)	2 (1–4)	2 (0–4)
Sleep quality	PSQI, median (IQR)	3 (1–6)	4 (2–7)	3 (1–6)
	Poor sleep (PSQI > 5), *n* (%)	1,084 (24.2%)	112 (29.1%)	972 (23.8%)

BMI: body mass index; CES-D: Centre for Epidemiologic Studies Depression scale; eGFR: estimated glomerular filtration rate; HADS-A-6: Hospital Anxiety and Depression Scale–Subscale Anxiety (6-item version); IQR: interquartile range; NA: not applicable; NRS: Numeric Rating Scale; *n*: number of participants; PSQI: Pittsburgh Sleep Quality Index. Full definitions and missingness per variable can be found in Table SI.

In univariable linear regressions using component scores as outcomes (Table SVIII), psoriasis, depressive symptoms, and anxiety symptoms were associated with Component 1. Female sex, itch intensity, depressive, and anxiety symptoms were linked to Component 2. No factors were significantly associated with Component 3 and 4.

DISCUSSION

In this cross-sectional analysis of 4,474 older adults from the population-based Rotterdam Study, the prevalence of current CP was 8.6%, 12-month CP was 10.5%, and lifetime CP was 18.6%. Demographic (female sex, age), lifestyle (current smoking), dermatological (AD, psoriasis, self-reported dry skin), non-dermatological (asthma, steatotic liver disease, polyneuropathy), and psychological (depressive and anxiety symptoms, sleep quality) factors were associated with CP. Impaired pruritus-specific QoL was most strongly linked to AD, depressive symptoms, anxiety, and poor sleep. PCA of the ItchyQoL identified 4 dimensions: social/emotional impact, psychological distress, lifestyle burden, and physical symptoms, indicating a broader multidimensional

Table II. Logistic regression analyses of current chronic pruritus: dermatological exposures and non-dermatological exposures

Variable	OR[a]	95% CI	*p*-value[b]
Dermatological exposures			
Self-reported atopic dermatitis	**2.76**	**2.10–3.61**	**<0.001**
Observed atopic dermatitis	**2.51**	**1.57–4.02**	**<0.001**
Self-reported psoriasis	**2.88**	**2.00–4.15**	**<0.001**
Observed psoriasis	**3.81**	**2.38–6.10**	**<0.001**
Self-reported dry skin	**2.21**	**1.75–2.80**	**<0.001**
Observed dry skin	1.21	0.94–1.57	0.20
Non-dermatological exposures			
Asthma	**1.51**	**1.13–2.02**	**0.02**
Diabetes mellitus	1.15	0.88–1.50	0.35
Renal function (eGFR)	1.00	0.99–1.01	0.79
Liver disease			
Liver stiffness	1.05	0.99–1.12	0.18
Steatotic liver disease	**1.38**	**1.09–1.75**	**0.02**
Thyroid disease			
Hypothyroidism	1.31	0.67–2.55	0.45
Hyperthyroidism	1.42	0.81–2.50	0.27
Stroke	0.69	0.36–1.33	0.31
Polyneuropathy			
No	Ref		
Possible-to-probable	**1.57**	**1.12–2.20**	**0.02**
Definite	**2.11**	**1.12–4.01**	**0.04**
Central nervous system medications	1.26	1.00–1.59	0.08
Cardiovascular medications	1.16	0.91–1.48	0.27
Depressive symptoms			
CES-D continuously	**1.03**	**1.01–1.04**	**<0.001**
Clinically relevant depressive symptoms (CES-D ≥ 16)	**1.54**	**1.12–2.11**	**0.02**
Anxiety symptoms			
HADS-A-6 score	**1.05**	**1.01–1.09**	**0.02**
Sleep quality			
PSQI continuously	**1.05**	**1.02–1.08**	**0.009**
Poor sleep (PSQI > 5)	1.23	0.97–1.56	0.15

Dermatological and systemic conditions added to statistically significant lifestyle and demographic factors (sex, age, and smoking).
[a]The OR measures the association between lifetime chronic pruritus and never having pruritus, for each analysed variable. [b]p-values are corrected for multiple comparisons using the false discovery rate (FDR). Values in bold represent statistical significance ($p < 0.05$).
CES-D: Centre for Epidemiologic Studies Depression Scale; CI: confidence interval; eGFR: estimated glomerular filtration rate; OR: odds ratio; PSQI: Pittsburgh Sleep Quality Index; Ref: reference variable. Values in bold represent statistical significance ($p < 0.05$).

burden beyond the original 3 subdomains in this older population.

Prevalence estimates in our study, including current CP 8.6% (95% CI: 7.8–9.5%), 12-month 10.5% (95% CI: 9.6–11.4%), and lifetime 18.6% (95% CI: 17.5–19.8%), align with findings from a German population-based study, though slightly higher estimates were reported (13.5%, 16.4%, and 22.0%, respectively) (33). Compared with other older populations, our prevalence estimates fall on the lower end (34–36). Variability likely reflects differences in definitions, age ranges, and cultural or geographic factors (34, 37).

Associations with female sex and older age are consistent with prior population-based research (33, 37), although female preponderance is not universally reported (34, 35). While smoking is inconsistently linked to CP, prior research shows associations with CP and itchy dermatoses such as AD (34, 38, 39), potentially through mechanisms involving skin changes and immune dysregulation (40, 41). Our previous research links high pack-year exposure to lifetime CP, supporting smoking cessation as a potential strategy (42).

Dermatological conditions showed the strongest associations with CP, particularly AD and psoriasis. Notably, self-reported AD reflected *possible* AD in our study, based on the UK Working Party criteria (25). While AD is well recognized as intensely pruritic, our findings reinforce growing recognition of pruritus in psoriasis (43). The link with self-reported dry skin underscores skin barrier dysfunction in itch pathophysiology and suggests potential for preventive interventions, such as topical moisturisers (44).

Non-dermatological factors, though more modestly associated, affirm important insights. Asthma, likely reflecting shared atopic pathways with AD, and steatotic liver disease were linked to CP. Although pruritus is classically associated with cholestatic liver disease, our findings align with recent United States data linking multiple hepatic conditions, including steatotic liver disease, to CP (45). Diabetes was not associated with current CP but was with lifetime CP, while polyneuropathy, particularly definite cases, was robustly associated. This suggests neuropathic itch primarily occurs when nerve damage is clinically evident, highlighting the importance of optimal diabetes management (46). The absence of significant associations with other conditions, such as reduced renal function or thyroid disorders, may reflect limited statistical power due to the low prevalence of (advanced) disease in this cohort, despite such links being documented previously (38, 47).

Use of central nervous system medication was associated with lifetime CP and showed a trend with current CP. This may reflect both pruritogenic effects (e.g., opioids, stimulants) and therapeutic use (e.g., anti-

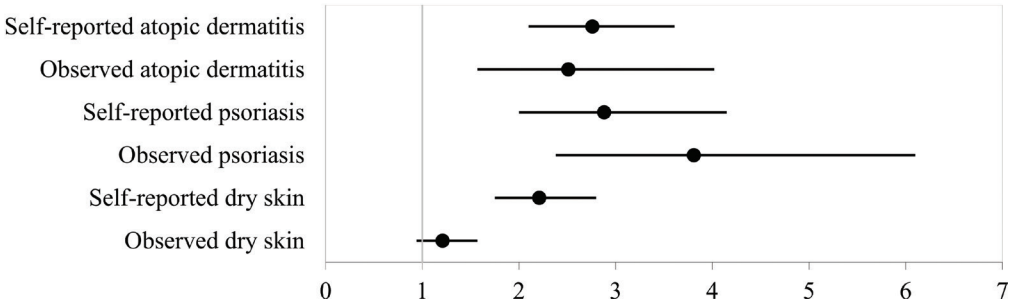

Fig. 2. Forest plot showing adjusted odds ratios and 95% confidence intervals for dermatological exposures associated with current chronic pruritus.

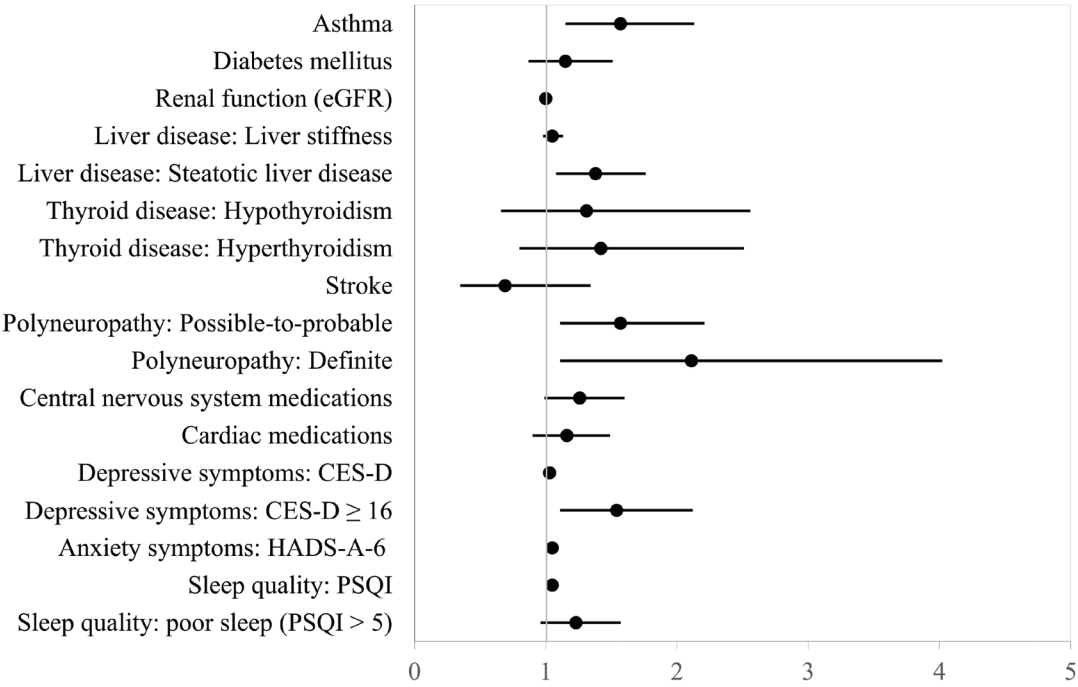

Fig. 3. Forest plot showing adjusted odds ratios and 95% confidence intervals for non-dermatological exposures associated with current chronic pruritus.

depressants, anticonvulsants), suggesting a bidirectional relationship (48, 49). Psychological factors, including depressive symptoms, anxiety, and sleep quality, were associated with CP, consistent with prior research suggesting bidirectional relationships (10, 11, 50).

Dermatologically, pruritus-specific QoL impairment was greatest among individuals with AD. The limited influence of non-dermatological factors, apart from psychological symptoms, likely reflects the original validation of the ItchyQoL in dermatological populations (20) and warrants caution when interpreting scores in pruritus from non-dermatological causes. Our findings confirm that depressive and anxiety symptoms, and poor sleep, not only relate to CP but also significantly affect pruritus-specific QoL (10, 38, 51). Interestingly, moderate-to-heavy alcohol consumption was linked to better pruritus-specific QoL, possibly due to alcohol's sedative and anxiolytic effects (52). However, given alcohol's health risks, this finding should be interpreted cautiously.

PCA identified 4 ItchyQoL dimensions, diverging from the original 3 subscales. A German validation study also found 4 components, though with different domains from ours (53). These findings suggest that pruritus-specific QoL may manifest differently across populations and languages, emphasizing the need for further validation across diverse cohorts.

Limitations

This study has several limitations. Its cross-sectional design precludes causal inference. Self-reported data may be subject to recall bias. CP and exposure data were not collected simultaneously. Although the range of included factors was extensive, some clinically relevant data (e.g., lesional vs non-lesional skin, prurigo nodularis, urticaria) were unavailable. Despite a relatively high response rate (64.8%), selection bias cannot be excluded, although this risk might be reduced by the broad health focus of the questionnaire. Limited availability of the full HADS-A scale in all Rotterdam Study cohorts may have affected measurement of anxiety. Finally, generalizability may be limited due to the older and predominantly pale-to-white population.

Strengths include the large, well-characterized, population-based sample, and the use of validated instruments and multiple CP outcomes. PCA provided novel insights into the multidimensional burden of pruritus, extending beyond traditional ItchyQoL subscales.

Conclusion

This study provides insights into the epidemiology of CP and pruritus-specific QoL in a large, population-based cohort of older adults. CP was associated with female sex, older age, smoking, AD, psoriasis, self-reported dry skin, asthma, steatotic liver disease, polyneuropathy, and psychological symptoms (depressive symptoms, anxiety, poor sleep). AD and psychological symptoms showed the strongest associations with impaired pruritus-specific QoL. These findings support recognizing CP as a multifactorial condition in ageing populations and the need for multidisciplinary care, including psychological support. PCA results further emphasize the need to validate ItchyQoL across diverse populations.

Table III. ItchyQol linear regression analyses: univariable analyses

Variable	Total score Beta (95% CI)	*p*-value[a]	Symptoms score Beta (95% CI)	*p*-value[a]	Functioning score Beta (95% CI)	*p*-value[a]	Emotions score Beta (95% CI)	*p*-value[a]
Sex: female	**4.23 (1.19–7.27)**	**0.03**	0.42 (–0.46–1.29)	0.62	**2.16 (1.00–3.33)**	**0.002**	1.84 (0.41–3.27)	0.05
Age	–0.13 (–0.26–0.00)	0.13	**–0.08 (–0.11 to –0.04)**	**0.002**	–0.02 (–0.07–0.04)	0.74	–0.05 (–0.11–0.01)	0.27
BMI	0.31 (–0.19–0.45)	0.60	0.03 (–0.07–0.12)	0.83	0.04 (–0.08–0.17)	0.74	0.05 (–0.11–0.21)	0.74
Skin colour: Pale-to-white	Ref		Ref		Ref		Ref	
White-to-olive	1.52 (–4.20–7.24)	0.69	–0.15 (–1.81–1.52)	1.00	1.06 (–1.12–3.24)	0.59	0.61 (–2.09–3.31)	0.76
Dark	3.04 (–4.37–10.44)	0.60	1.37 (–0.85–3.59)	0.46	2.92 (–0.15–6.00)	0.14	1.41 (–1.99–4.81)	0.64
Education level: Low	Ref		Ref		Ref		Ref	
Medium	1.78 (–3.63–7.19)	0.65	0.94 (–0.60–2.48)	0.46	0.67 (–1.42–2.76)	0.74	0.24 (–2.32–2.79)	0.92
High	2.62 (–3.00–8.23)	0.60	1.41 (–0.18–3.01)	0.28	1.34 (–0.83–3.50)	0.42	0.09 (–2.56–2.74)	0.95
Smoking: Never	Ref		Ref		Ref		Ref	
Former	–0.61 (–3.96–2.74)	0.80	–0.52 (–1.46–0.42)	0.53	0.07 (–1.24–1.38)	0.95	–0.40 (–1.98–1.19)	0.76
Current	0.73 (–4.51–5.96)	0.84	0.00 (–1.47–1.47)	1.00	0.28 (–1.78–2.34)	0.88	0.56 (–1.93–3.04)	0.76
Alcohol consumption: Never-to-light	Ref		Ref		Ref		Ref	
Moderate-to-heavy	**–5.14 (–8.27 to –2.01)**	**0.008**	**–1.28 (–2.14 to –0.43)**	**0.03**	**–1.95 (–3.17 to –0.74)**	**0.009**	–1.87 (–3.38 to –0.35)	0.06
Dermatological conditions								
Self-reported and/or observed atopic dermatitis	**7.18 (3.78–10.57)**	**<.001**	**1.59 (0.61–2.57)**	**0.02**	**2.62 (1.31–3.94)**	**0.001**	**3.02 (1.39–4.64)**	**0.002**
Self-reported and/or observed psoriasis	5.47 (0.89–10.08)	0.07	0.82 (–0.49–2.12)	0.46	**2.21 (0.42–4.01)**	**0.05**	2.31 (0.08–4.53)	0.14
Self-reported and/or observed dry skin	1.68 (–3.20–6.56)	0.65	0.02 (–1.38–1.34)	1.00	1.25 (–0.64–3.15)	0.39	0.59 (–1.77–2.94)	0.76
Non-dermatological factors								
Asthma	4.75 (0.79–8.71)	0.07	1.23 (0.11–2.35)	0.16	**2.11 (0.57–3.66)**	**0.03**	1.27 (–0.64–3.17)	0.39
Diabetes mellitus	2.08 (–1.57–5.74)	0.53	0.80 (–0.25–1.84)	0.38	0.44 (–0.98–1.85)	0.74	0.70 (–1.02–2.43)	0.64
Renal function (eGFR)	0.10 (–0.01–0.20)	0.15	**0.04 (0.01–0.07)**	**0.03**	0.02 (–0.02–0.06)	0.59	0.04 (–0.01–0.09)	0.27
Liver disease								
Liver stiffness	–0.02 (–0.93–0.88)	0.96	–0.09 (–0.35–0.17)	0.82	0.00 (–0.34–0.34)	1.00	0.04 (–0.40–0.48)	0.92
Steatotic liver disease	0.40 (–2.90–3.70)	0.84	–0.09 (–1.02–0.83)	1.00	0.25 (–1.01–1.51)	0.84	0.09 (–1.51–1.69)	0.94
Thyroid disease								
Hypothyroidism	2.13 (–3.25–7.51)	0.60	0.10 (–1.52–1.71)	1.00	0.33 (–1.72–2.38)	0.87	1.58 (–1.04–4.20)	0.45
Hyperthyroidism	2.37 (–3.20–7.94)	0.60	0.40 (–1.32–2.12)	0.84	0.95 (–1.58–2.76)	0.74	1.25 (–1.50–4.00)	0.64
Stroke	4.58 (–4.56–13.72)	0.60	0.14 (–2.47–2.76)	1.00	2.67 (–0.85–6.19)	0.29	1.65 (–2.66–5.96)	0.65
Polyneuropathy: No	Ref		Ref		Ref		Ref	
Possible-to-definite	1.02 (–2.46–4.49)	0.68	–0.26 (–1.27–0.74)	0.83	0.48 (–0.88–1.83)	0.74	0.67 (–0.93–2.26)	0.22
Central nervous system medications	3.23 (0.13–6.34)	0.10	0.63 (–0.26–1.51)	0.41	1.22 (0.33–2.41)	0.11	1.34 (–0.16–2.85)	0.27
Cardiovascular medications	–1.37 (–4.44–1.71)	0.60	–0.38 (–1.25–0.50)	0.67	0.10 (–1.08–1.29)	0.93	–1.17 (–2.62–0.28)	0.16
NRS: Intensity of pruritus (1–10) (per 1 unit increase)	0.26 (0.03–0.49)	0.07	0.06 (–0.00–0.13)	0.22	0.09 (0.00–0.18)	0.11	0.11 (–0.00–0.21)	0.16
Depressive symptoms								
CES-D continuous	**0.41 (0.22–0.60)**	**<.001**	0.04 (–0.01–0.10)	0.38	**0.14 (0.06–0.21)**	**0.002**	**0.22 (0.13–0.31)**	**<.001**
Clinically relevant (CES-D ≥ 16)	**7.96 (3.57–12.36)**	**0.003**	1.22 (0.01–2.43)	0.20	**2.67 (0.98–4.36)**	**0.009**	**3.94 (1.80–6.07)**	**0.002**
Anxiety symptoms (HADS-A-6)	**1.39 (0.86–1.92)**	**<.001**	0.18 (0.03–0.34)	0.12	**0.47 (0.26–0.67)**	**<.001**	**0.72 (0.47–0.97)**	**<.001**
Sleep quality								
PSQI continuous	0.45 (0.04–0.85)	0.08	–0.00 (–0.12–0.12)	1.00	**0.20 (0.04–0.36)**	**0.04**	0.25 (0.05–0.44)	0.05
Poor sleep (PSQI > 5)	**4.86 (1.67–8.04)**	**0.01**	0.25 (–0.67–1.16)	0.83	**1.93 (0.70–3.17)**	**0.009**	**2.68 (1.16–4.19)**	**0.003**

BMI: body mass index; CES-D: Centre for Epidemiologic Studies Depression Scale; CI: confidence interval; eGFR: estimated glomerular filtration rate; HADS-A-6: Hospital Anxiety and Depression Scale – Anxiety subscale (6-item version); NRS: Numerical Rating Scale for itch intensity; PSQI: Pittsburgh Sleep Quality Index; Ref: reference category. [a]*p*-values were corrected for multiple comparisons using the false discovery rate (FDR) method per outcome domain. *p*-values in bold indicate significance at FDR-adjusted $p < 0.05$.

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Data availability: Data can be obtained upon request. Requests should be directed towards the management team of the Rotterdam Study (datamanagement.ergo@erasmusmc.nl), which has a protocol for approving data requests. Due to restrictions based on privacy regulations and informed consent of the participants, data cannot be made freely available in a public repository.

Ethics statement: The Rotterdam Study has been approved by the Medical Ethics Committee of the Erasmus MC (registration number MEC 02.1015) and by the Dutch Ministry of Health, Welfare and Sport (Population Screening Act WBO, licence number 1071272-159521-PG). The Rotterdam Study has been entered into the Netherlands National Trial Register (NTR; www.trialregister.nl) and into the WHO International Clinical Trials Registry Platform (ICTRP; https://apps.who.int/trialsearch/) under shared catalogue number NTR6831. All participants provided written informed consent covering study participation, access to medical information from treating physicians, and the use of their data for scientific research.

Conflicts of interest: Although no products produced by Unilever were tested in this study, it is possible that this study could be used to promote products and services in the future, leading to financial gain. The authors declare no other conflicts of interest related to this work.

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