**Evaluating the longitudinal course of sleep disturbance in atopic dermatitis**

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**Background:** Atopic dermatitis (AD) is a chronic relapsing inflammatory skin disease that is characterized by pruritus and eczematous lesions of the skin. AD is often associated with nocturnal pruritus, scratching and skin pain, which can cause profound sleep disturbances (SD) and related quality of life (QoL) impairment. However, little is known about the longitudinal course of SD in AD.

**Objective:** To evaluate the longitudinal course and predictors of SD in children and adults with AD.

**Methods:** A prospective, dermatology practice-based study was performed (n=402). Patients were assessed at baseline, and follow-up visits at approximately 6, 12, 18 and 24 months. Sleep assessments included: number of nights of SD from AD, Numeric Rating Scale (NRS)-SD from AD, Patient-Reported Outcomes Measurement Information System (PROMIS) SD and Related-Impairment (SRI). Repeated-measures linear regression models were constructed to examine sleep over time. Models included eczema area and severity index (EASI), NRS worst-itch and skin pain, and time as fixed-effects. Covariables included age (continuous), sex (male/female), race (white/non-white), and insurance (Private/Medicaid/Medicare/Uninsured).

**Results:** Overall, 63.4% and 31.8% of patients reported ≥1 and ≥5 nights of SD from eczema in the past week at any visit; only 6.7% and 0.8% reported persistent (≥3 visits) SD on ≥1 and ≥5 nights. At baseline, SD ≥1 and ≥5 nights were associated with non-white race/ethnicity ($P<0.05$). Among those with ≥1 and ≥5 nights of sleep disturbance from eczema at baseline, 36.6% and 18.5% continued to report those sleep disturbances at one or more follow-up visits, respectively. Similarly, among patients with NRS-SD scores ≥7 out of 10 sleep at baseline (18.4%), 14.9% reported NRS-sleep scores ≥7 at one or more follow-up visits; 0% reported NRS-sleep scores ≥7 at ≥3 visits. All sleep scores significantly improved over time (Kruskal-Wallis, $P<0.0001$). In longitudinal regression models, the number of nights with disturbed sleep from eczema was significantly associated with age (adjusted beta [95% confidence interval]: 0.0236 [0.008-0041]), EASI (0.045 [0.024-0.065]), NRS-itch (0.082 [0.023-0.141]) and NRS-pain (0.143 [0.080-0.206]). NRS-SD was associated with NRS- itch (0.186 [0.069-0.302]) and skin pain (0.186 [0.065-0.306]). PROMIS SRI scores were only associated with NRS itch (0.691 [0.315-1.07]). PROMIS SD scores were not associated with any variables.

**Conclusion:** SD have a heterogeneous longitudinal course in AD patients, with many having fluctuating SD, and a subset with persistent SD. AD signs, itch and skin pain are the major significant predictors of SD in AD patients. SD is an important domain to be assessed and managed in AD patients.