Psoriatic Arthritis and Hearing Loss: Data from the National Health and Nutrition Examination Survey

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INTRODUCTION

- Psoriatic arthritis (PsA) is a seronegative inflammatory arthritis, which affects up to 30% of patients with psoriasis,^{1,2} representing up to 1% of the general population.³
- Several recent studies demonstrated an association between hearing loss and psoriasis. However, these analyses were limited by small sample size and inability to control for potentially confounding variables.

OBJECTIVES

- To determine the independent relationship of psoriatic arthritis with hearing loss in a nationally-representative sample of the US population.
- To evaluate the downstream impact of psoriatic arthritis on mental well-being and explore the extent to which this impact is mediated by hearing loss.

METHODS

- Retrospective cohort study using the National Health and Nutrition Examination Survey (NHANES), which provides a nationally-representative sample of the US population (2003-2006 and 2009-2010) on adult patients (≥ 20 years).
- Study group: patients with a coincident diagnosis of psoriasis and arthritis. Hearing impairment measured using participant responses and pure-tone audiometry (PTA) of the best hearing ear and self-reported hearing function (from 1-excellent to 4-deaf)..
- Association of psoriatic arthritis with above outcomes was modeled using multivariable generalized linear and ordinal logistic regression models, adjusted for demographics and medical comorbidities.
- Structural equation models (SEM) were developed to explore the extent to which hearing impairment mediates the effect of psoriatic arthritis on mental health.

RESULTS

TABLE 1. Population Characteristics

Study Group	Sample size	Percent
PsA	113	1.1%
Psoriasis or arthritis	2303	21.4%
Neither	8331	77.5%
Overall	10,747	

TABLE 2. Unadjusted association between psoriatic arthritis and hearing loss

Outcome variable	PsA	Psoriasis or Arthritis	No PsA	P Value
PTA, mean (SD)	30.7 (18.8)	26.8 (16.9)	14.9 (14.5)	<0.001
Hearing Function, N (%)				
Excellent	66 (58.4)	1505 (65.3)	6984 (83.8)	0.002
Some difficulty	40 (35.4)	679 (29.5)	1221 (14.7)	
A lot of difficulty	7 (6.2)	111 (4.8)	114 (1.)	
Deaf	0 (0.0)	8 (0.3)	11 (0.1)	

TABLE 3 Multivariate linear and logistic regressions between psoriatic arthritis and hearing loss

Outcome Variable	Group	Odds Ratio	95% CI	P Value
Hearing Function	Control	ref	ref	ref
	Intermediate	1.48	1.31, 1.67	<0.001
	PsA	1.74	1.18, 2.58	0.006
Outcome Variable	Group	Coefficient	95% CI	P Value
PTA	Control	ref	ref	ref
	Intermediate	0.78	-0.35, 1.92	0.177
	PsA	5.01	0.83, 9.19	0.019

TABLE 4. Multivariate linear and logistic regressions between psoriatic arthritis and mental health outcomes

Outcome Variable	Group	Coefficient	95% CI	P Value
Number of Days with Poor Mental Health in Last Month	Control	ref	ref	ref
	Intermediate	2.05	1.65, 2.46	<0.001
	PsA	2.37	0.88, 3.87	0.002
Outcome Variable	Group	Odds Ratio	95% CI	P Value
Visit to Mental Health Professional in Last Year	Control	ref	ref	ref
	Intermediate	1.54	1.29, 1.85	<0.001
	PsA	1.94	1.12, 3.36	0.019
Depression	Control	ref	ref	ref
	Intermediate	1.85	1.52, 2.26	<0.001
	PsA	2.66	1.51, 4.69	<0.001

SUMMARY

- In unadjusted analyses, PsA was significantly associated with hearing impairment using both quantitative (PTA) and qualitative measures of hearing function, resulting in approximately a 15 dB decrement in hearing function compared to the control group - a difference between mild hearing loss and normal hearing (30.7 vs 14.9, $p < 0.001$, Table 2).
- After adjusting for demographic and medical comorbidity variables, PsA was independently associated with a 1.7-fold increased odds of self-reported hearing impairment ($p = 0.006$) and a 5.01 dB increase in the PTA threshold ($p = 0.019$) compared to normal controls (Table 3).
- PsA was also independently associated with poorer psychiatric outcomes, including 2.37 more days of self-rated poor mental health over the last month, a nearly 2-fold increased risk of seeking mental health care over the last year, and a 2.7-fold increased risk of depression compared to the control group (Table 4)
- SEM analysis revealed that hearing impairment mediated 6.4%, 7.0%, and 8.6%, of the effect of psoriatic arthritis on depression, days of poor mental health, and seeing a mental health provider, respectively.

LIMITATIONS

- Retrospective study design precludes making causal inferences.
- Inability to evaluate for presence of PsA using formal diagnostic criteria
- However, this is mitigated by our observation of a similar proportion of psoriatic and general population affected by PsA as in recent literature.
- Inability to controlling for treatment effects, with our results likely underestimating true effect of psoriatic arthritis on outcomes.

CONCLUSIONS

- This is the first study to evaluate impact of psoriatic arthritis on hearing loss on a population level in the US.
- PsA is independently associated with hearing loss – using both qualitative and quantitative metrics. This is likely driven by TNF-alpha mediated damage to the osicular chain, labyrinth, and cochlea resulting in both conductive and sensorineural hearing loss.
- The hearing loss, in turn, partially mediates an association with clinically meaningful poorer psychiatric outcomes.
- Need for increased awareness of hearing impairment and downstream psychiatric comorbidities when treating patients with psoriasis and PsA

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