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The impacts of oral health symptoms, hygiene, and diet on the development and severity of psoriasis

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Abstract

Numerous studies have suggested a correlation between oral health, the oral microbiome, and various dermatologic conditions, particularly psoriasis. In this study, we utilize a specially designed questionnaire administered to 265 patients at The Ohio State University's dermatology clinics to explore the relationship between psoriasis and a combination of factors that included dietary habits, oral health, and oral hygiene practices. Age, family history of psoriasis, previous diagnosis of strep throat or rheumatoid arthritis, and oral pain or discomfort experienced within the last 12 months were all found to be significant predictors of psoriasis. Additionally, higher body mass index scores, poor gum health, and speech difficulties related to dental problems were all correlated with more severe psoriasis symptoms. Conversely, patients who reported consuming fresh fruit at least once a day experienced milder symptoms. Our goal is to develop a better understanding of how and why psoriasis incidence is correlated with some of the oral health factors under review.

Keywords: psoriasis, oral health

Introduction

Many patients are interested in dietary or lifestyle modification to control or reduce their risk of psoriasis. Known psoriasis risk factors include genetics, smoking, and obesity [1]; emerging risk factors for psoriasis appear to be poor oral health maintenance and periodontitis [2, 3]. Our study objective was to examine the differences in oral health symptoms, hygiene, and dietary practices between psoriasis and control populations to identify any potential modifiable risk factors that could shape future treatment and prevention recommendations.

We performed a retrospective case control study and surveyed 100 psoriasis and 165 control adult patients from dermatology clinics. We explored topics such as duration of the patient's skin condition, patient reported outcomes, and dietary choices and used the validated WHO adult survey for oral hygiene practices supplemented with additional targeted questions [4]. The three most common visit reasons within the control population included *1)* contact dermatitis, *2)* skin cancer examination, and *3)* acne vulgaris. Logistic regression was performed on the presence or absence of psoriasis and linear regression was performed on the product of the Body Surface Area (BSA) and the Physician Global Assessment (PGA), [5]. Stepwise univariate analysis was used to identify variables demonstrating $P<0.05$, which were assimilated into a preliminary multivariable model. Known risk factors, including smoking, obesity, and family history of psoriasis, were included in the models to control for covariance. Obesity was utilized in this study rather

than diabetes owing to its similar predictive value [6]. Variables were then removed from the model if their inclusion decreased the adjusted R^2 value [7].

Conclusion

Stepwise logistic regression (**Table 1**) revealed age (OR=1.03, 95% CI=1.01–1.05), family history of psoriasis, (OR=5.04, 95% CI=2.61–9.73), personal history of strep throat (OR=2.0, 95% CI=1.08–3.7), personal history of rheumatoid arthritis (OR=4.18, 95% CI=1.34–13.06), and experience of oral pain or discomfort within the past 12 months (OR=1.99, 95% CI=1.05–3.79) to be significant predictors for psoriasis.

Linear regression comparing disease severity revealed that higher body mass index scores were correlated with more severe psoriasis symptoms based on the BSA×PGA score severity (coefficient=1.3, 95% CI 0.01–2.5), (**Table 2**). Additionally, psoriasis patients who rated their gum health as poor or very poor exhibited significantly more severe psoriasis symptoms (coefficient=71.1 95% CI 8.3–133.9). Similarly, patients who reported experiencing difficulties with their speech because of dental problems were experiencing a significant increase in psoriasis severity (coefficient=49.5, 95% CI 7.0–91.9). Conversely, patients who reported consuming fresh fruit at least once a day experienced milder symptoms (coefficient=-60.2, 95% CI -107.4 to -13.0).

Limitations of this study include recall bias (retrospective surveys) and selection bias (only psoriasis patients who receive treatment were included). Collinearity among various predictors may limit differentiation of some linked oral health behaviors. However, our study utilized a larger sample size than many previous studies and also included many variables that were not considered by previous studies.

Ultimately, this study demonstrates early evidence of multiple oral self-care, hygiene, and dietary practices associated with the development and severity of psoriasis. Although further research is necessary regarding these microbiome, oral health, and dietary associations, this study offers preliminary associations indicating that dermatologists should consider screening for dental health and counsel for improved dietary health in psoriasis patients.

Potential conflicts of interest

Dr. Ben Kaffenberger, has research funding/clinical trials from the Dermatology Foundation, Biogen, Celgene, Eli Lilly Co, and Veloce Biopharmaceuticals. Dr. Jessica Kaffenberger has received research funding from Janssen, Novartis, Abbvie, AnaptysBio, Bristol-Myers, Celgene, Regeneron, Corrona, Eli Lilly, Pfizer and Xbiotech.

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Table 1. *Oral health's effect on psoriasis odds determined by logistic regression (259 observations, 16 degrees of freedom, P=<0.001, pseudo R^2=0.1704).*

	Control Population Characteristics	Psoriasis Population Characteristics	Multivariate Odds Ratio (95% CI)	P value	Univariate Odds Ratio (95% CI)	P-value
Age (years)	49.03 [MEAN] 16.3 [SD]	53.62 [MEAN] 16.6 [SD]	**1.03 (1.01–1.05)**	**0.012**	1.01 (1.00–1.03	0.03
Gender						
Male (ref)	70	45				
Female	95	55	0.79 (0.43–1.43)	0.44	0.90 (0.55–1.49	0.68
Race						
White (ref)	125	78				
African-American	26	16	1.65 (0.79–4.20)	0.29	0.99 (0.50–1.95)	0.97
Other	14	6	1.12 (0.34–3.69)	0.85	0.69 (0.25–1.86)	0.46
Location						
Urban (ref)	58	28				
Suburban	75	54	1.50 (0.75–3.00)	0.25	1.49 (0.84–2.64)	0.17
Rural	32	18	1.07 (0.43–2.65)	0.88	1.17 (0.56–2.42)	0.68
Body Mass Index (kg/m^2)	37.19 [MEAN] 53.98 [SD]	30.01 [MEAN] 8.0 [SD]	1.02 (0.99–1.05)	0.26	1.03 (1.01–1.07)	0.018
Family History of Psoriais						
No (ref)	137	54				
Yes	28	46	**5.04 (2.61–9.73)**	**0**	4.17 (2.37–7.34)	0
Personal History of Strep Throat						
No (ref)	104	50				
Yes	61	50	**2.0 (1.08–3.70)**	**0.027**	1.7 (1.03–2.82)	0.038
Personal History of Rheumatoid Arthritis						
No (ref)	157	86				
Yes	8	14	**4.18 (1.34–13.06)**	**0.014**	3.19 (1.29–7.92)	0.012
Number of Natural Teeth						
20 or more (ref)	137	73				
10–19 teeth	12	18	1.29 (0.47–3.58)	0.617	2.82 (1.29–6.16)	0.01

	Control Population Characteristics	Psoriasis Population Characteristics	Multivariate Odds Ratio (95% CI)	P value	Univariate Odds Ratio (95% CI)	P-value
1–9 teeth	1	1	1.50 (0.07–32.2)	0.796	1.88 (0.11–30.4)	0.658
No natural teeth	10	7	1.29 (0.43–3.90)	0.65	1.31 (0.48–3.60)	0.595
Oral Pain or Discomfort over the past 12 months						
No (ref)	121	64				
Yes	39	36	**1.99 (1.05–3.79)**	**0.036**	1.75 (1.01–3.0)	0.045
Partial Denture Use						
No (ref)	158	88				
Yes	7	12	1.99 (1.05–3.79)	0.3	3.08 (1.17–8.10)	0.023
Tobacco Use						
No (ref)	130	82				
Yes	34	18	0.79 (0.37–1.67)	0.537	0.84 (0.44–1.58)	0.589

Table 2: *Psoriasis severity and oral health determined by linear regression (62 observations, P<0.001, adjusted R^2=0.5071).*

	Population Characteristics		Regression Coefficient [Days] (95% CI)	P-value
Body Surface Area x Severity	37.19 [MEAN]	53.98 [SD]		
Age	53.62 [MEAN]	16.6 [SD]	-0.70 (-1.41–0.00)	0.051
Gender				
Male (ref)	33	51.60%		
Female	31	48.40%	-24.3 (-49.0–0.43)	0.054
Race				
White (ref)	49	76.60%		
African-American	8	12.50%	-7.3 (-50.5–35.9)	0.73
Other	7	10.90%	-9.5 (-48.2–29.1)	0.62
Location				
Urban (ref)	20	31.30%		
Suburban	34	53.10%	-0.86 (-30.1–28.4)	0.95
Rural	10	15.60%	-22.4 (-64.1–19.4)	0.29
Body Mass Index (kg/m2)	32.6 (mean)	9.4 (SD)	**1.3 (0.01–2.5)**	**0.047**
Self Rating of Gum Health				
Excellent or Very Good (ref)	27	42.20%		
Good or Average	32	50.00%	12.1 (-12.7–37.0)	0.33
Poor or Very Poor	5	7.80%	**71.1 (8.3–133.9)**	**0.027**
Use of Toothpaste				
No (ref)	3	4.70%		
Yes	61	95.30%	-42.3 (-107.87–23.2)	0.2
Experienced Speech Difficulty over the Past 12 months				
No (ref)	55	87.30%		
Yes	8	12.70%	**49.5 (7.0–91.9)**	**0.023**
Felt Tense because of teeth over the Past 12 months				
No (ref)	54	85.70%		
Yes	9	14.30%	-20.1 (-62.2–22.1)	0.34
Have taken days off work due to oral health over the past 12 month				
No (ref)	60	95.20%		
Yes	3	4.80%	55.2 (-5.9–116.2)	0.075
Consumption of Fresh Fruit				
Seldom/Never (ref)	4	6.50%		
Several Times a month to Several times a week	38	61.30%	-47.5 (-95.5–0.57)	0.053
Every Day or Several Times a Day	20	**32.30%**	**-60.2 (-107.4 to-13.0)**	**0.014**
Consumption of Soft Drinks				
Seldom/Never (ref)	26	41.90%		
Several Times a month to Several times a week	23	37.10%	-0.43 (-26.6–25.7)	0.974
Every Day or Several Times a Day	13	21.00%	21.5 (-8.3–51.3)	0.152
Tobacco Use				
No (ref)	34	65.38%		
Yes	18	34.62%	-3.6 (-31.9–24.6)	0.797