Patient perceptions about nutrition and skin health: a survey study characterizing patient opinions and information resources

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Abstract

Background: Numerous studies in the clinical literature have explored the link between nutrition and skin physiology. However, it is unclear whether patients visit their dermatologists with knowledge of these studies, and unknown where they obtain their skin health information. We characterized patient perceptions surrounding nutrition and skin, including what patients identified as aggravating and alleviating foods and their information sources.

Methods: We administered a questionnaire to 409 participants attending University of California (UC) Davis Dermatology and Pacific Skin Institute in Sacramento. This survey assessed their perception on the influence of nutrition. We stratified responses by diseases.

Results: Of the 409 respondents, 83% believed that nutrition affects skin health. Respondents with healthy skin were not more likely to agree than those with skin conditions in general (P=0.34). Those with skin conditions also more likely received their information from reputable sources, defined as physicians and scientific journals (P=0.02). Additionally, respondents who disagreed were more likely informed by reputable sources (P=0.002), but when online blogs were included as reputable, this relationship was less significant (P=0.046).

Conclusions: As online resources become more accessible, it is important for providers to know about changing patient perspectives. Our findings may help improve how dermatologists counsel patients about nutrition.

Keywords: nutrition, skin, diet

Introduction

Research suggests that our diets play a role in the health of our skin, with different foods yielding positive or negative effects [1]. Although not commonly studied, some researchers have concluded that higher intake of green and yellow vegetables [2] and lower intake of saturated fats and carbohydrates [3] are associated with younger looking skin. Similarly, another study found that consuming more vegetables, legumes, and olive oil appeared to be protective against cutaneous actinic damage whereas a higher intake of meat, dairy, and butter appeared to be positively associated with skin damage [4].

Nutrition has also been studied in the context of common dermatologic conditions. For example, research has suggested an association between acne vulgaris and foods commonly found in the Western diet, including margarines, oils, bread, sugar, salt, nuts, eggs, and pork [5]. Chocolate [6] and dairy products [7] have been implicated in acne vulgaris exacerbation. For psoriasis, the literature is unclear, with some studies suggesting that foods with systemic anti-inflammatory effects, such as olive oil and fruit, help treat psoriasis, whereas pro-inflammatory foods such as dietary fat, alcohol, and gluten should be avoided [8,9]. Research is more limited for seborrheic dermatitis, rosacea, and eczema.

Table 1. *Chi-square tests comparing attitude toward nutritional effect on skin versus skin condition.*

	Agree		Disagree		Total		
	N	%	N	%	N	$\chi^2(1)$	P value
Healthy	159	84.57	29	15.43	188		
Skin Condition	179	81.00	42	19.00	221	0.907	0.3409
Acne	38	82.61	8	17.39	46	0.136	0.7127
Eczema	25	69.44	11	30.56	36	6.312	0.0120*
Psoriasis	31	72.09	12	27.91	43	5.130	0.0235*
Rosacea	9	81.82	2	18.18	11	0.064	0.8005
Seborrheic Dermatitis	13	81.25	3	18.75	16	0.135	0.7132
Other	86	84.31	16	15.69	102	0.005	0.9429

*N is the number of responses; % is percentage of the total skin condition. $\chi^2(1)$ is the chi-square value (with one degree of freedom) after two-by-two tests of independence between attitude versus. skin condition. The control group ("Healthy") was first compared with "Skin Condition," which included all participants who were not in the "Healthy" group. For example, of the 188 total Healthy participants, 159 or 84.57% agreed with the statement "Nutrition affects skin health." Of 221 total participants with a Skin Condition, 179 agreed and 42 disagreed. The two-by-two chi-square (Healthy, Skin condition versus. Agree, Disagree) value then was 0.907 at P=0.3409. *significant at P<0.05. The Skin Condition group was then stratified by individual skin conditions. The $\chi^2(1)$ for each of these rows represents a two-by-two chi-square test using the individual skin condition and the Healthy group (e.g. Healthy, Acne versus Agree, Disagree).*

For patients who have these common skin conditions, or those at high risk for developing them, such information can be especially pertinent. Our study characterizes how patients believe nutrition influences their skin health and identifies some common foods they perceive as beneficial or detrimental for their skin.

Methods

Anonymous responses were collected over two months at dermatology clinics at UC Davis and Pacific Skin Institute in Sacramento, California. This anonymous survey was determined to be exempt by the UC Davis Institutional Review Board. We surveyed 409 participants, 18 years of age and over. Age and gender questions were not included in the questionnaire, so there is no data on age or gender distribution of the partipant pool. The questionnaire utilized a Likert scale to assess how strongly respondents agreed or disagreed with the statement, "Nutrition affects skin health," and asked them to identify foods they believed had positive or negative effects on their skin. The Likert scale is a measure from 1 to 5; 1="Strongly disagree," 2="Disagree" 3= "Neutral, 4="Agree," 5="Strongly agree." The survey also asked whether they had a skin condition and their sources of information.

We analyzed data using chi-square tests of independence with one degree of freedom, P<0.05 being considered significant. The values represent the comparison between the control (healthy skin) and each skin condition versus attitude (**Table 1**). Less common conditions, including skin cancer, vitiligo, pemphigus vulgaris, and lichen sclerosis were analyzed together in the 'Other' category. When counting responses, only "Agree" and "Strongly agree" on the Likert scale were included in the chi-square analysis as "Agree." The remaining responses to the statement "Nutrition affects skin health" were included as "Disagree" for the analysis. Chi-square analysis was also performed to determine if attitude or skin condition has an effect on the reputability of sources used by patients to obtain information (**Table 2**). We defined reputable sources as physicians and scientific journals, whereas all other sources were classified as non-reputable and a separate comparison was made that included online blogs as a reputable source.

Respondents also answered by free response when listing foods with positive and negative skin effects, identifying up to three foods for each type. Foods were then grouped into 18 categories (**Table 3**). Foods which were similar to one another or too specific were grouped together into one category.

For example, "chips," "fatty foods," and "fried foods" were all grouped under the main category "Fatty/fried foods." Responses were then counted, and the percentage of total responses by category was determined. We also stratified responses by skin diseases, including acne vulgaris, eczema, seborrheic dermatitis, psoriasis, and rosacea.

Results

A total of 409 participants completed the survey. Of all participants, 83% believed that nutrition affects skin health. Respondents without skin conditions (85%) were no more likely to agree than those with skin conditions (81%), (**Table 1**). When stratifying the 5 common skin conditions and the other more rare conditions, a similar proportion of respondents across acne vulgaris, rosacea, seborrheic dermatitis, and 'other' agreed that nutrition affects skin health. Patients with atopic dermatitis (P=0.0120) and psoriasis (P=0.0235) were less likely to agree that nutrition affects skin than patients with healthy skin.

When comparing skin condition and source of information, we found that those with skin conditions (68%) were more likely than those without (57%) to get their skin-related information from a reputable source (P=0.0172), (**Table 2**). Moreover, we found that respondents who disagreed (79%) were more likely to get their information from a reputable source than those who agreed (60%), (P=0.002419). When online blogs were included as reputable in addition to physicians and scientific journals, this relationship was not as significant (P=0.046162).

Of the food groups, fruits/vegetables and water were the highest identified positive influencers of skin health with 45% and 30% of all patient selections, respectively (**Table 3**). Fruits/vegetables was identified by 67% of those with acne, 47% of those with eczema, 53% of those with psoriasis, 64% of those with rosacea, and 69% of those with seborrheic dermatitis. Water was identified by 40% of those with acne, 39% of those with eczema, 42% of those with psoriasis, 18% of those with rosacea, and 38% of those with seborrheic dermatitis.

On the other hand, fried/fatty foods and high-glycemic index foods were the most frequently identified as negative influencers of skin health among those with acne, eczema, psoriasis, rosacea, and seborrheic dermatitis. Fried/fatty foods were identified to be negative by 58% of those with acne, 50% of those eczema, 33% of those with psoriasis, 55% of those with rosacea, and 50% of those with seborrheic dermatitis. It was the highest identified negative influencer, making up 33% of all selections. High-glycemic index foods was the second highest identified negative influencer with 28% of all selections. It was identified by 49% of those with acne, 31% of those with eczema, 37% of those with psoriasis, 55% of those with rosacea, and 44% of those with seborrheic dermatitis.

Table 2. *Chi-square tests comparing information source versus skin condition and versus attitude.*

	Reputable		Non-reputable		Total		
	N	%	N	%	N	$\chi^2(1)$	P value
Healthy	107	56.91	81	43.08	188	5.680	0.0172*
Skin Condition	151	68.33	70	31.67	221		
Agree	202	59.76	136	40.24	338	9.201	0.0024*
Disagree	56	78.87	15	21.13	71		
Adjusted to include online blogs as reputable:							
Agree	259	76.63	79	23.37	338	3.976	0.0462*
Disagree	62	87.32	9	12.68	71		

*This table includes three chi-square tests of independence (with one degree of freedom), each of which is a two-by-two test between the selected columns and rows. For example, $\chi^2(1)=5.680$ at P=0.0172 is the test result for the two-by-two table Healthy, Skin Condition versus. Reputable, Non-reputable. *significant at P<0.05. The second and third chi-square values use the two-by-two of Agree, Disagree versus. Reputable, Non-reputable; the third is an adjustment of the second, with the only difference being that online blogs were included in the definition of "Reputable."*

Discussion

Much of our results on patient perception seems to reflect existing research. Fruits/vegetables was identified as the number one positive influencer of skin health across all 5 skin conditions (**Table 3**), reflecting studies that suggested fruits and vegetables are protective against skin aging and sun damage [2,4] and yield improvement in certain inflammatory skin conditions such as psoriasis, seborrheic dermatitis, and eczema [9-11]. The same was true for fried/fatty and high-glycemic index foods, the top two food categories identified as negative influencers in each of the 5 respective skin conditions. Several studies have pointed to generally negative effects of these foods on skin health [3,4], including acne, psoriasis, seborrheic dermatitis, and eczema [5,8,10,12].

More specifically, dairy product consumption was one of the top negative influencers (31%) identified among acne patients, and is similarly identified by several studies as a trigger of acne [7,13]. Additionally, alcohol was considered a key negative trigger (16%) by psoriasis patients and cited as proinflammatory in literature[8].

Some surprising findings include lean/white meat as top positive influencers for both seborrheic dermatitis (31%) and rosacea (18%) and vitamins/minerals for acne (16%). Across all skin conditions, water was the most frequently identified

Table 3. *Patient selections of positive and negative influencers of skin health, by skin condition.*

	Skin Conditions											
	Acne (%)		Eczema (%)		Psoriasis (%)		Rosacea (%)		Seborrheic Dermatitis (%)		Percent of All Selections (%)	
Food Category	**Pos**	**Neg**	**Pos**	**Neg**	**Pos**	**Neg**	**Pos**	**Neg**	**Pos**	**Neg**	**Pos**	**Neg**
Alcohol	--	4.44	--	8.33	--	16.28	--	9.09	--	12.50	--	6.88
Antioxidants	4.44	--	5.56	--	4.65	--	9.09	--	6.25	--	4.08	--
Caffeine	--	6.67	--	5.56	--	2.33	--	9.09	--	--	--	3.21
Dairy	--	31.11	--	8.33	--	11.63	--	9.09	6.25	6.25	0.51	11.01
Drugs	--	2.22	--	--	--	2.33	--	--	--	6.25	--	1.38
Eggs	--	--	--	2.78	--	--	--	--	--	--	--	0.46
Fatty, Fried	--	57.78	--	50.00	--	32.56	--	54.55	--	50.00	--	33.03
Fatty, Red Meat	2.22	8.89	--	2.78	--	9.30	--	27.27	--	12.50	0.51	6.42
Fruits, Vegetables	66.67	--	47.22	--	53.49	4.65	63.64	--	68.75	--	44.90	0.92
High-Glycemic	--	48.89	--	30.56	--	37.21	9.09	54.55	--	43.75	0.51	28.44
Lean, White Meat	4.44	--	2.78	--	4.65	--	18.18	--	31.25	--	--	--
Nuts, Soy	2.22	--	--	8.33	--	--	9.09	--	--	12.50	1.02	2.29
Probiotics	6.67	--	2.78	--	2.33	--	9.09	--	--	--	3.06	--
Shellfish	--	--	--	8.33	--	4.65	--	--	--	--	--	2.29
Spicy	--	11.11	--	2.78	--	2.33	--	--	--	--	--	3.21
Unsaturated Fats	8.89	--	11.11	--	11.63	--	9.09	--	12.50	--	8.16	--
Vitamins, Minerals	15.56	2.22	5.56	--	6.98	--	9.09	--	12.50	--	7.65	0.46
Water	40.00	--	38.89	--	41.86	--	18.18	--	37.50	--	29.59	--

-- denotes patients did not identify any foods in this category. For example, 66.67% of all patients with acne identified "Fruits, vegetables" as a positive food; none identified it as a negative food. "Fruits, vegetables" as a category made up 44.90% of all selections for positive foods (409 patients × three positive foods = 1227 total positive selections). Note: Percentages within individual skin condition columns may not add up to 100% since each patient identified up to three food categories for both Positive and Negative. The Percent of All Selections column represents a single food category's percentage of total patient selections. Positive and Negative columns here each add up to 100%.

positive influencer (18 to 42%) after fruits/vegetables. Among the negative influencers, fatty/red meat for rosacea (27%) and spicy foods for acne (11%) stood out. Interestingly, caffeine, alcohol, and spicy foods have previously been identified as rosacea triggers [14], yet they were not as frequently identified in our findings (9%, 9% and 0%, respectively.

Clearly, scientific literature informs patient perception and public opinion. However, evidence is often inconsistent between studies and the sheer number of studies makes extracting scientifically-sound conclusions difficult for the layperson. It is understandable why many may turn to easy-to-read sources that may or may not be reputable sources of information.

Interestingly, those who disagreed that nutrition affects skin health more likely received their information from a reputable source. One possibility is that those who deviate from popular opinion are more skeptical and thus likely to devote more time to seeking reputable sources. Additionally, much of the literature is not as definitive as online bloggers make it seem when linking food to skin conditions [15,16]. Therefore, it is not surprising why many who use reputable sources would be more in disagreement that nutrition affects skin health.

Additionally, we found that most patients consult their physician about their skin health (55% physicians versus 26% online blogs). Yet, recent studies show that patients increasingly use the internet for health-related information [17]. Of the plethora of online blogs today about nutrition and skin health, only some publish reputable, research-backed articles. When we included all online blogs as reputable, the relationship between agree/disagree and information source became less significant. It is possible that online blogs tend to "agree" that nutrition affects skin health, but less reputable sites exaggerate these effects with the motive of generating increased clicks and views. Research has also shown a disproportionate representation of skin conditions on the internet. For instance, there is much more content online and on social media about acne vulgaris than about eczema or psoriasis [18,19]. This may explain why patients with eczema or psoriasis were less likely to agree that nutrition affects skin health compared to patients with acne vulgaris.

Certainly, more research must be done before health care providers can make definitive assessments of particular foods and nutrients and recommend specific dietary changes in clinical practice. In the meantime, results from this and similar studies may help shed light on general trends in patient knowledge, such as where they obtain their information and why they make particular dietary choices. Better understanding of patient perceptions at baseline is a step toward more effective nutrition conversations between providers and their patients, streamlining the counseling process and optimizing care.

Conclusion

Most people believe in the positive effects of fruits/vegetables and the negative triggers associated with fried/fatty and high-glycemic index foods. Thus, it is evident that scientific literature influences patient perception and public opinion. Yet, the evidence is often inconsistent between studies, and the literature abounds with low-quality studies with small sample sizes. When there are substantial associations, such as high-glycemic index and dairy products as triggers in acne, mechanisms of action are still not well understood.

Healthcare providers should be aware that patient perspectives may shift as online resources become increasingly accessible. Patients may already avoid certain foods or take nutritional supplements before consulting their physicians. Given that adequate nutrition is crucial for healthy skin, assessing patient perceptions becomes key. Further research on nutrition and skin health is necessary, but in the meantime, results from this study help elucidate patient attitudes and could direct dermatologists in providing better patient education about nutrition.

Potential conflicts of interest

RKS has served on the scientific advisory board of LearnHealth and Arbonne, received honoraria from

Burt's Bees, Regeneron Pharmaceuticals, Abbvie Pharmaceuticals, Sun Pharmaceuticals, Physicians Exclusive, Leo Pharmaceuticals, and Nutrafol. The other authors have no conflicts of interest to declare.

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