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Impact of Food on Dermatological Diseases with Special Reference to Acne Vulgaris, Vitiligo, Psoriasis, Hyperpigmentation, and Urticaria and Effect of Azadirachta Indica and Momordica Charantia on them

Research Article

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Abstract

Introduction: Many people in India suffer from skin diseases like acne vulgaris, vitiligo, psoriasis, and urticaria. The number of calories people eat, and drink has a direct impact on their weight. Ample research has established that foods and diet patterns can protect against heart disease, stroke, diabetes, and other chronic conditions. Hence, the above-mentioned skin-related diseases are expected to be associated with the nature of the foods consumed.

Objectives: The primary objective of the study is to test if suffering from skin diseases like acne vulgaris, vitiligo, psoriasis, and urticaria is associated with the nature of foods consumed by the person. The secondary objective is to find out if any food can cure those diseases.

Methods: A cross-sectional observational study was carried out to find the association of foods with the dermatological diseases mentioned above. A cohort study method was used to find out how food can cure these diseases. Hypotheses were tested by data collection and analysis.

Results: A statistically significant difference in skin diseases is observed between people who preferentially take sweet, bitter, and junk foods and those who do not. The same is observed for those who have taken Azadirachta indica, commonly known as neem, or Momordica charantia, commonly known as karela or bitter-gourd, and those who have taken neither of the above as food regularly.

Conclusion: The skin diseases like acne vulgaris, vitiligo, psoriasis, and urticaria is found to be associated with the nature of foods consumed by the person. Regular consumption of neem and bitter gourd can cure those diseases..

Keywords: Impact of Food; Dermatological Diseases; Azadirachta Indica; Momordica Charantia

Introduction

Skin disease affects people of all ages. It prevails all over the world at a significant level. The overall point prevalence of any skin disease was found to be 61.2% [1]. The prevalence of skin diseases in the general population in different geographic regions of India varies from 7.9% to 60% [2, 3, 4]. 9.4%, 0.5–2%, 2-3%, and 1.1% of the global population suffer from acne vulgaris, vitiligo, psoriasis, and urticaria, respectively. The incidence of urticaria is 15%[5, 6, 7, 8]. A large sample study across four Indian cities revealed that more than 80% of the population presents skin color heterogeneity on the face, irrespective of age and gender [9]. Cardiovascular diseases, stroke, and type 2 diabetes are affected by foods. Dietary factors were estimated to be associated with a substantial proportion of deaths from heart disease, stroke, and type 2 diabetes. Taking Azadirachta indica (neem) and Momordica Charantia (karela or bitter gourd) in food was found to improve diabetes[10]. So, the nature of the food consumed is expected to be associated with dermatological diseases, which is an area of concern considering their prevalence.

Acne vulgaris is a common cutaneous inflammatory disorder of the pilosebaceous unit that runs a chronic course. It can lead to hyperpigmentation, scarring, and adverse psychological effects. The role of genetic, psychologic, and androgens was studied, and its management evolved [11-14].

Vitiligo is a T-cell-mediated autoimmune disease that can be treated with immune-targeting mutants. The bottleneck in vitiligo research is defining stability in vitiligo. Many attempts have been made to define it based on clinical, histological, or immunological parameters, with variable results. There are two main goals of any vitiligo treatment: the first is to stop the arrest of further depigmentation, and the second is to induce re-pigmentation. However, most of the published studies discussed re-pigmentation as the main outcome [15-18].

In 2014, the World Health Organization recognized psoriasis as a serious non-communicable disease and highlighted the distress related to misdiagnosis, inadequate treatment, and stigmatization of this disease. Effective treatment for pustular psoriasis remains an area of high unmet need [19, 20].

Hyperpigmentation disorders, such as post-inflammatory hyperpigmentation and melasma, are common conditions affecting all skin types. They are largely benign and are influenced by numerous endogenous and exogenous factors. There are multiple approaches for the treatment of hyperpigmentation, including photoprotection, topical treatment, systemic medications, and procedural interventions. Key challenges in the management of pigmentary disorders such as melasma and post-inflammatory hyperpigmentation are their resistance to treatment, tendency to recur after treatment, and the risk of exacerbating hyperpigmentation with many treatment modalities [21-23].

Urticaria, also known as hives among people, is a very common disease characterized by erythematous, edematous, itchy, and transient plaques that involve the skin and mucous membranes. Auto-inflammatory conditions characterized by urticarial rashes, fever, increased C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), and increased neutrophils should be considered when a patient presents with severe treatment-refractory urticarial rashes. At least 20% of people suffer from this disease at least once in their lifetime [24- 26].

An extensive literature review reveals that a lot of research has been carried out to identify the reasons, diagnosis, association with stress, and other factors and their management. How the nature of foods consumed by the population affects them and whether taking food can prevent or cure them has not been studied. So, the research question is whether suffering from the above-mentioned skin diseases is associated with the nature of the food consumed by the person. First stage of research revealed persons taking neem or bitter gourds in their food, are not suffering from skin diseases. So,the second research question is whether taking neem or bitter gourd as food can cure those diseases. The null hypotheses to test the association of food with those diseases are formulated as follows:

1. The suffering from acne vulgaris is independent of the nature of the food consumed.
2. The suffering from vitiligo is independent of the nature of the food consumed.
3. The suffering from psoriasis is independent of the nature of the food consumed.
4. The suffering from hyperpigmentation is independent of the nature of the food consumed.
5. The suffering from urticaria is independent of the nature of the food consumed.
6. Prevention or cure of acne vulgaris is independent of consumption of neem or bitter gourd as food.
7. Prevention or cure from vitiligo is independent of consumption of neem or bitter gourd as food.
8. Prevention or cure of psoriasis is independent of consumption of neem or bitter gourd as food.
9. Prevention or cure from hyperpigmentation is independent of consumption of neem or bitter gourd as food.
10. Prevention or cure from urticaria is independent of consumption of neem or bitter gourd as food.

If the first five null hypotheses are rejected, the association of food with the above-mentioned skin diseases will be established. Similarly, rejection of the last five hypotheses will establish that regularconsumption of neem or bitter gourd as foodcan prevent or cure those diseases.

Objectives

The primary objective of the study is to find out whether suffering from skin diseases named acne vulgaris, vitiligo, psoriasis, hyperpigmentation, and urticaria is associated with the nature of food consumed by people.

The secondary objective of the study is to find out the extent of

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association between food and the above-mentioned skin diseases and how those diseases can be prevented or cured by regular consumption of neem or bitter gourd as food.

Methodology

The study was carried out in two stages. The first stage was an observational, analytical, and cross-sectional study to find an association between the nature of foods and the skin diseases mentioned above. The second stage was a cohort study to establish whether changing food habits can cure or prevent skin diseases. A prospective study design was used. The study population consisted of people living in eastern and northern India. The target population was the people who came to two tertiary health care facilities of northern and eastern India for treatment. A sample was selected from the study population randomly with a computer-generated random number table and screened for eligibility based on inclusion and exclusion criteria. Sample size (n) was determined based on the confidence level, standard deviation among the population, and required precision as per the formula (n = Z^2 *p * (1 - p) /d^2); however, at least 30 samples were required to be taken [27, 28]. The confidence level for the study was 95% (multiplier for confidence level Z = 1.95), and as the prevalence varies from 7.9% to 60%, the maximum sample size was taken (the maximum sample size came when prevalence was taken at 50%, that is, p = 0.5). The desired precision (d) was 0.01 (1%). Hence, the maximum sample size was calculated as 950. A total of 1800 samples were collected to ensure that at least 30 samples were collected from each category (from each disease, each gender, each age group, and not having any of the mentioned diseases). The food habits of the participants not suffering from skin diseases were sought, and in the second stage of research, the participants were asked to follow those diets to observe the extent of their disease. For the second stage of research, five sets of groups with three groups in each set (A1, A2, A3; B1, B2, B3; C1, C2, C3; D1, D2, D3; and E1, E2, E3) were formed, and 30 participants were taken in each group. Stratified random sampling was done so that participants in each set of groups were similar. Participants in sets A1, A2, and A3 were similar and cases of clinically diagnosed acne vulgaris; similarly, B1, B2 and B3 were similar and cases of vitiligo; in this way, C1, C2 and C3; D1, D2 and D3; and E1, E2 and E3 were clinically diagnosed cases of psoriasis, hyperpigmentation, and urticaria, respectively.

Participants in groups A1, B1, C1, D1, and E1 were asked to take one full neem leaf once a week. Those in A2, B2, C2, D2, and E2 were asked to take 100 grams of bitter gourd daily. Members of A3, B3, C3, D3, and E3 were asked not to change their food habits. The quantity and frequency of neem and bitter gourd to be taken was determined from discussion with persons not suffering from these diseases and taking those foods. The diet was continued for a period of 12 months, with follow-up every month to measure any change in outcome. An improvement in the outcome (acne vulgaris) of participants in group A1 compared to that of group A3 was used to test whether taking neem leaves at regular intervals as food can cure this disease. Similarly, a comparison of the improvement in outcome of group A2 with respect to group A3 was used to test whether consumption of bitter gourds can cure this disease. In the same way, comparisons among sets of groups were used to test the effect of neem and bitter gourd on other diseases.

Inclusion Criteria for the first stage of the study (the cross-sectional study) were: 1. Participants were given consent. 2. Age: ≥ 12 years, but ≤ 60 years. The exclusion criteria were: 1. Pregnant and lactating women 2. The patient is taking immunosuppressive therapy.

The inclusion criteria of the second stage of research were the same as those of the first stage, with additional inclusion of clinically diagnosed cases of the diseases mentioned above for the pair of groups. Exclusion criteria are the same as in first-stage research.

The outcomes were measured using the Global Acne Grading System (GAGS), Vitiligo Area Scoring Index (VASI), Psoriasis Area and Severity Index (PASI), Dermal Pigmentation Area and Severity Score (DPASI), and Urticaria Severity Score (USS) for acne vulgaris, vitiligo, psoriasis, hyperpigmentation, and urticaria, respectively.

The response rate was 90%. Raw data was coded for security, confidentiality, and suitability. Coded data was analysed with the help of statistical data analysis software named SPSS and MS Excel.

The chi square test is used to determine whether two variables are associated or independent. The value of Chi Square is the sum of (expected frequency minus observed frequency) ^2)/expected frequency. If suffering from a disease is independent of any food preference, the proportion of people having the disease and not having the disease will be nearly the same for those taking that food and not taking that food. If the difference is statistically significant, then the association of the disease with that food is established. To calculate chi squared, the following data are required: the number of persons taking a type of food and the disease being observed; the number of persons taking that type of food and the disease not being observed; the number of persons not usually taking that type of food and the disease being observed; and the number of persons not taking that type of food and the disease not being observed. The expected frequency of persons consuming a particular type of food and having the disease is calculated as: total persons consuming that type of food (row total of table) * total persons observed to have suffered from the disease (column total of observed column in the tables) / total number of study participants (column total of total column of the tables). Similarly, the expected frequency of persons not consuming that type of food and having the disease is calculated as: total persons not consuming that type of food * total persons observed to have suffered from the disease / total number of study participants. There are two attributes for food (consuming and not consuming) and two attributes for disease (observed and not observed). So, the degrees of freedom for each attribute are (2-1) * (2-1) or 1. The calculated chi square value is compared with the critical value of chi square for a 95% confidence level and 1 degree of freedom, which is 3.84. If the calculated value of chi square is more than 3.84, the null hypothesis is rejected, and the difference between the suffering observed for people who preferentially eat a food type and those who do not is statistically significant.

Results

The result of first-stage research is shown in (Table 1). The result of second-stage research is shown in (Table 2). A statistically significant difference in the mentioned skin diseases is observed between people who preferentially take sweet, bitter, and junk foods

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Table 1: Chi Square Test Result to find association of skin diseases with food

Number of persons suffered from Acne Vulgaris						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Taking Sweet foods frequently	104	891	995	69.0	10.45	46.86
Not taking sweet foods frequently	7	598	605	42.0	1.16	
Column Total	111	1489	1600	111.0	6.94	
Taking Salty foods frequently	90	969	1059	73.5	8.50	11.00
Not taking Salty foods frequently	21	520	541	37.5	3.88	
Column Total	111	1489	1600	111.0	6.94	
Taking bitter foods frequently	2	571	573	39.8	0.35	55.86
Not taking bitter foods frequently	109	918	1027	71.2	10.61	
Column Total	111	1489	1600	111.0	6.94	
Taking junk foods frequently	106	787	893	62.0	11.87	70.88
Not taking junk foods frequently	5	702	707	49.0	0.71	
Column Total	111	1489	1600	111.0	6.94	
Number of persons suffered from Vitiligo						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Taking Sweet foods frequently	20	975	995	14.9	2.01	4.56
Not taking sweet foods frequently	4	601	605	9.1	0.66	
Column Total	24	1576	1600	24	1.50	
Taking Salty foods frequently	20	1039	1059	15.9	1.89	3.15
Not taking Salty foods frequently	4	537	541	8.1	0.74	
Column Total	24	1576	1600	24	1.50	
Taking bitter foods frequently	1	572	573	8.6	0.17	10.46
Not taking bitter foods frequently	23	1004	1027	15.4	2.24	
Column Total	24	1576	1600	24	1.50	
Taking junk foods frequently	22	871	893	13.4	2.46	12.51
Not taking junk foods frequently	2	705	707	10.6	0.28	
Column Total	24	1576	1600	24	1.50	
Number of persons suffered from Psoriasis						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% observed**	**Chi Square Value**
Taking Sweet foods frequently	25	970	995	19.3	2.51	4.49
Not taking sweet foods frequently	6	599	605	11.7	0.99	
Column Total	31	1569	1600	31	1.94	
Taking Salty foods frequently	23	1036	1059	20.5	2.17	0.89
Not taking Salty foods frequently	8	533	541	10.5	1.48	
Column Total	31	1569	1600	31	1.94	
Taking bitter foods frequently	1	572	573	11.1	0.17	14.32
Not taking bitter foods frequently	30	997	1027	19.9	2.92	
Column Total	31	1569	1600	31	1.94	
Taking junk foods frequently	29	864	893	17.3	3.25	17.90
Not taking junk foods frequently	2	705	707	13.7	0.28	
Column Total	31	1569	1600	31	1.94	
Number of persons suffered from Hyperpigmentation						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% observed**	**Chi Square Value**
Taking Sweet foods frequently	419	576	995	390.5	42.11	5.49
Not taking sweet foods frequently	209	396	605	237.5	34.55	
Column Total	628	972	1600	628	39.25	
Taking Salty foods frequently	425	634	1059	415.7	40.13	0.62
Not taking Salty foods frequently	203	338	541	212.3	37.52	
Column Total	628	972	1600	814	39.25	
Taking bitter foods frequently	175	398	573	224.9	30.54	17.25
Not taking bitter foods frequently	453	574	1027	403.1	44.11	
Column Total	628	972	1600	814	39.25	
Taking junk foods frequently	447	446	893	350.5	50.06	60.12
Not taking junk foods frequently	181	526	707	277.5	25.60	
Column Total	628	972	1600	814	39.25	

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Number of persons suffered from Urticaria						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% observed**	**Chi Square Value**
Taking Sweet foods frequently	19	976	995	13.7	1.91	5.47
Not taking sweet foods frequently	3	602	605	8.3	0.50	
Column Total	22	1578	1600	22	1.38	
Taking Salty foods frequently	14	1045	1059	14.6	1.32	0.06
Not taking Salty foods frequently	8	533	541	7.4	1.48	
Column Total	22	1578	1600	22	1.38	
Taking bitter foods frequently	1	572	573	7.9	0.17	9.36
Not taking bitter foods frequently	21	1006	1027	14.1	2.04	
Column Total	22	1578	1600	22	1.38	
Taking junk foods frequently	17	876	893	12.3	1.90	4.11
Not taking junk foods frequently	5	702	707	9.7	0.71	
Column Total	22	1578	1600	22	1.38	

Table 2: Chi Square Test Result to find compare cure rate among groups

Number of persons cured from Acne Vulgaris						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Persons taken neem	9	21	30	16.5	30.00	6.82
Persons not taken neem	24	6	30	16.5	80.00	
Column Total	33	27	60		55.00	
Persons taken bitter gourd	11	19	30	17.5	36.67	4.83
Persons not taken bitter gourd	24	6	30	17.5	80.00	
Column Total	35	25	60		58.33	
Number of persons cured from Vitiligo						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Persons taken neem	12	18	30	19.5	40.00	5.77
Persons not taken neem	27	3	30	19.5	90.00	
Column Total	39	21	60	39	65.00	
Persons taken bitter gourd	14	16	30	20.5	46.67	4.12
Persons not taken bitter gourd	27	3	30	20.5	90.00	
Column Total	41	19	60	41	68.33	
Number of persons cured from Psoriasis						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Persons taken neem	11	19	30	18.5	36.67	6.08
Persons not taken neem	26	4	30	18.5	86.67	
Column Total	37	23	60	37	61.67	
Persons taken bitter gourd	13	17	30	19.5	43.33	4.33
Persons not taken bitter gourd	26	4	30	19.5	86.67	
Column Total	39	21	60	39	65.00	
Number of persons cured from Hyperpigmentation						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Persons taken neem	14	16	30	21.5	46.67	5.23
Persons not taken neem	29	1	30	21.5	96.67	
Column Total	43	17	60	54	71.67	
Persons taken bitter gourd	15	15	30	22.0	50.00	4.45
Persons not taken bitter gourd	29	1	30	22.0	96.67	
Column Total	44	16	60	56	73.33	

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Number of persons cured from Urticaria						
Parameter	**Persons Observed**	**Persons not observed**	**Total**	**Persons Expected**	**% Observed**	**Chi Square Value**
Persons taken neem	3	27	30	15.5	10.00	20.16
Persons not taken neem	28	2	30	15.5	93.33	
Column Total	31	29	60	31	51.67	
Persons taken bitter gourd	7	23	30	17.5	23.33	12.60
Persons not taken bitter gourd	28	2	30	17.5	93.33	
Column Total	35	25	60	35	58.33	

(foods cooked fast fried with oil or lot of spices) and those who do not. The difference in frequency of suffering from acne vulgaris is statistically significant for those who prefer salty food and those who do not. For other diseases, the difference is not significant. The persons preferring bitter taste were taking either or both of neem and bitter gourd frequently.

The statistically significant difference in frequency of diseases observed for the groups regularly taking neem or karela compared to those who have not taken either of them at regular intervals.

Conclusion

Skin diseases like acne vulgaris, vitiligo, psoriasis, and urticaria are found to be associated with the nature of foods consumed by the person. Consumption of sweets and junk foods is associated with acne vulgaris, vitiligo, psoriasis, hyperpigmentation, and urticaria. Consumption of salty foods is associated with acne vulgaris. Though suffering from skin diseases is more common for those who consume salty food, the difference is not significant for all those diseases except acne vulgaris. Those who prefer bitter foods like neem or bitter gourd are not likely to suffer from the skin diseases mentioned above.

Statistically significant differences in suffering from skin diseases were observed for groups taking either neem or karela compared to those who have not taken either of these at regular intervals. So, regular consumption of neem and bitter gourd can cure those diseases.

People can prevent the skin diseases mentioned above by selecting appropriate food habits and get cured of those diseases by consuming neem or karela at regular intervals for a period of about one year.

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