# Indian Journal of **Dermatological Research**



Volume 3, Issue 1 - 2024 © Kundu A, et al. 2024 www.opensciencepublications.com

## 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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Article Information: Submission: 11/06/2024; Accepted: 02/07/2024; Published: 08/07/2024

### 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

## Kundu A

## 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. Autoinflammatory 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

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 crosssectional study) were: 1. Participants were given consent. 2. Age:  $\geq$  12 years, but  $\leq$  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

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

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Not taking sweet foods frequently  4  601  605  9.1.1  0.66  4.56    Column Total  24  1576  1600  24  1.50  1.69	Taking Sweet foods frequently	20	975	995	14.9	2.01	
Column Total  24  1576  1600  24  1.50    Taking Satly foods frequently  4  537  541  8.1  0.74  3.15    Not taking Satly foods frequently  4  537  541  8.1  0.74  3.15    Taking bitter foods frequently  1  572  573  8.6  0.17    Not taking bitter foods frequently  23  1004  1027  15.4  2.24  10.46    Column fotal  24  1576  1600  24  1.50  10.46    Taking bitter foods frequently  2  871  893  13.4  2.46    Not taking wick foods frequently  2  705  707  10.6  0.28  12.51    Taking Saty foods frequently  24  1576  1600  24  1.50  1.49    Taking Saty foods frequently  25  970  995  19.3  2.51  4.49    Taking Saty foods frequently  8  533  541  10.5  1.48    Taki	Not taking sweet foods frequently	4	601	605	9.1	0.66	4.56
Taking Sally foods frequently  20  1039  10.99  15.9  1.89    Not taking Sally 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    Not taking bitter foods frequently  23  1004  027  15.4  2.24    Column Total  24  1576  1600  24  1.50    Taking junk foods frequently  2  705  707  10.6  0.28  12.51    Column Total  24  1576  1600  24  1.50  12.51    Mot taking Sweet foods frequently  2  705  707  10.6  0.89  2.51    Not taking Sweet foods frequently  2  970  9605  11.7  0.99  2.51    Not taking Sally foods frequently  31  1569  1600  31  1.49    Taking Junk foods frequently  1  572	Column Total	24	1576	1600	24	1.50	
Not taking Salty foods frequently  4  537  541  8.1  0.74  3.15    Column Total  24  1576  1600  24  1.50  10.45    Taking bitter foods frequently  23  1004  1027  15.4  2.24  10.46    Column Total  24  1576  1600  24  1.36  10.46    Taking junk foods frequently  22  871  893  13.4  2.46  1.251    Column Total  24  1576  1600  24  1.251  1.251    Column Total  24  1576  1600  24  1.51  1.251    Column Total  24  1576  1600  24  1.36  1.251    Taking sweet foods frequently  25  970  995  19.3  2.51  4.49    Salty foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94  1.32	Taking Salty foods frequently	20	1039	1059	15.9	1.89	
Column Total  24  1576  1600  24  1.50    Taking bitter foods frequently  1  572  573  8.6  0.17    Not taking bitter foods frequently  23  1004  1027  15.4  2.24    Column Total  24  1576  1600  2.4  1.50    Taking junk foods frequently  22  705  707  10.6  0.28    Column Total  24  1576  1600  2.4  1.50    Column Total  24  1576  1600  2.4  1.50    Number of persons suffered from Psortas:    Persons Observed  Persons observed  Total  2.51    Taking Swet foods frequently  25  970  995  19.3  2.51    Taking Swet foods frequently  23  1036  1059  20.5  2.17    Not taking swet foods frequently  31  1569  1600  31  1.94    Taking Salty foods frequently  1  572  573  11.1  <	Not taking Salty foods frequently	4	537	541	8.1	0.74	3.15
Taking bitter foods frequently  1  572  573  8.6  0.17    Not taking bitter foods frequently  23  1004  1027  15.4  2.24  10.46    Column Total  24  15.76  1600  24  1.50  10.46    Taking junk foods frequently  22  871  893  13.4  2.46  1.21    Column Total  24  15.76  1600  2.4  1.50  1.21    Column Total  24  15.76  1600  2.4  1.50  1.21    Number of persons suffered from Psorias:    Taking Sweet foods frequently  25  970  955  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94  4.49    Taking Sweet foods frequently  23  1036  1099  2.51  4.49    Column Total  31  1569  1600  31  1.94  1.52    Column Total  31  1569  1600  31<	Column Total	24	1576	1600	24	1.50	
Not taking bitter foods frequently231004102715.42.2410.46Column Total2415761600241.501.501.501.501.50Not taking junk foods frequently270570710.60.281.501.501.50Column Total2415761600241.50<	Taking bitter foods frequently	1	572	573	8.6	0.17	
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Taking junk foods frequently  22  871  893  13.4  2.46    Not taking junk foods frequently  2  705  707  10.6  0.28  12.51    Column Total  24  1576  1600  24  1.50    Number of persons suffered from Persons    Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square    Taking Sweet foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94    Taking Saty foods frequently  8  533  541  1.6  0.89    Column Total  31  1569  1600  31  1.94  0.89    Column Total  31  1569  1600  31  1.94  1.432    Taking bitter foods frequently  10  572  573  11.1  0.17  1.432    Column Total  31  1569  1600  31 <td< td=""><td>Column Total</td><td>24</td><td>1576</td><td>1600</td><td>24</td><td>1.50</td><td></td></td<>	Column Total	24	1576	1600	24	1.50	
Not taking junk foods frequently Column Total  2  705  707  10.6  0.28  12.51    Number of persons suffered from Persons  Vumber of persons suffered from Persons  2  1.50    Parameter  Persons Observed  Total  Persons Expected  % observed  Chi Square Value    Not taking sweet foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94    Taking Sure foods frequently  23  1036  1059  20.5  2.17    Not taking Salty foods frequently  8  533  541  10.5  1.48  0.89    Column Total  31  1569  1600  31  1.94  1.32    Column Total  31  1569  1600  31  1.94  1.32    Column Total  31  1569  1600  31  1.94    Taking Junk foods frequently  29  864  893  17.30  3.25    Not taking junk foods frequently	Taking junk foods frequently	22	871	893	13.4	2.46	
Column Total  24  1576  1600  24  1.50    Number of persons suffered from Psoriasis    Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  25  970  995  19.3  2.51    Mot taking sweet foods frequently  66  599  605  11.7  0.99    Column Total  31  1569  1600  31  1.94    Taking Sathy foods frequently  8  533  541  10.55  1.48    Oclumn Total  31  1569  1600  31  1.94    Taking bitter foods frequently  1  572  573  11.1  0.17    Not taking bitter foods frequently  30  997  1027  19.9  2.92  14.32    Oclumn Total  31  1569  1600  31  1.94    Taking junk foods frequently  2  705  707  13.7  0.28    Olumn Total <td< td=""><td>Not taking junk foods frequently</td><td>2</td><td>705</td><td>707</td><td>10.6</td><td>0.28</td><td>12.51</td></td<>	Not taking junk foods frequently	2	705	707	10.6	0.28	12.51
Number of persons suffered from Psoriasis    Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed % observed  Chi Square Value    Taking Sweet foods frequently  25  970  995  19.3  2.51    Not taking sweet foods frequently  6  599  605  11.7  0.99    Column Total  31  1569  1600  31  1.94    Taking Salty foods frequently  8  533  541  10.5  1.48    Column Total  31  15669  1600  31  1.94    Taking bitter foods frequently  1  572  573  11.1  0.17    Not taking bitter foods frequently  20  864  833  17.3  3.25    Taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  17.90    Column Total  31  1569  1600  31  1.94	Column Total	24	1576	1600	24	1.50	
Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  25  970  995  19.3  2.51    Not taking sweet foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94  9    Not taking Salty foods frequently  23  1036  1069  20.5  2.17    Not taking Salty foods frequently  8  533  541  10.5  1.48  0.89    Column Total  31  1569  1600  31  1.94  1.32    Taking biter foods frequently  1  572  573  11.1  0.17  1.43    Taking junk foods frequently  29  864  893  17.3  3.25  1.43    Taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31 <t< th=""><th></th><th>Number</th><th>of persons suffered from I</th><th>soriasis</th><th> </th><th></th><th></th></t<>		Number	of persons suffered from I	soriasis			
Taking Sweet foods frequently  25  970  995  19.3  2.51    Not taking sweet foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94    Taking Salty foods frequently  23  1036  1059  20.5  2.17    Not taking Salty foods frequently  8  533  541  10.5  1.48  0.89    Column Total  31  1569  1600  31  1.94  14.32    Taking bitter foods frequently  1  572  573  11.1  0.17  292  14.32    Column Total  31  1569  1600  31  1.94  14.32    Taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  19.99  19.93  19.94  19.94  19.93  19.95  19.94  19.94  19.95  19.95  <	Parameter	Persons Observed	Persons not observed	Total	Persons Expected	% observed	Chi Square Value
Not taking sweet foods frequently  6  599  605  11.7  0.99  4.49    Column Total  31  1569  1600  31  1.94    Taking Salty foods frequently  23  1036  1059  20.5  2.17    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    Not taking bitter foods frequently  30  997  1027  19.9  2.92  14.32    Column Total  31  1569  1600  31  1.94  1.94    Taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  1.94    Taking Subte foods frequently  2  705  707  13.7  0.28  17.90    Column Total  628  97	Taking Sweet foods frequently	25	970	995	19.3	2.51	
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Taking Salty foods frequently  23  1036  1059  20.5  2.17    Not taking Salty foods frequently  8  533  541  10.5  1.48  0.89    Column Total  31  1569  1600  31  1.94  0.89    Taking bitter foods frequently  1  572  573  11.1  0.17    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    Not taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  1.94    Number of persons ot observed from Hyperspentation    Number of persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  419  576  995  390.5	Column Total	31	1569	1600	31	1.94	
Not taking Salty foods frequently  8  533  541  10.5  1.48  0.89    Column Total  31  1569  1600  31  1.94    Taking bitter foods frequently  1  572  573  11.1  0.17    Not taking bitter foods frequently  30  997  1027  19.9  2.92  14.32    Column Total  31  1569  1600  31  1.94  14.32    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  17.90    Column Total  31  1569  1600  31  1.94  17.90    Number of presons suffered from Hypersymmetric    Versons Doserved  Persons Doserved  Yo baserved  Yo baserved <td< td=""><td>Taking Salty foods frequently</td><td>23</td><td>1036</td><td>1059</td><td>20.5</td><td>2.17</td><td></td></td<>	Taking Salty foods frequently	23	1036	1059	20.5	2.17	
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Taking bitter foods frequently  1  572  573  11.1  0.17    Not taking bitter foods frequently  30  997  1027  19.9  2.92  14.32    Column Total  31  1569  1600  31  1.94    Taking junk foods frequently  29  864  893  17.3  3.25    Not taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  17.90    Number of persons suffered from Hyperson    Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  419  576  995  390.5  42.11  Value  Value    Not taking sweet foods frequently  209  396  605  237.5  34.55  5.49    Column Total  628  972  1600  628  39.25  5.49    Taking Salty foods fre	Column Total	31	1569	1600	31	1.94	
Not taking bitter foods frequently $30$ $997$ $1027$ $19.9$ $2.92$ $14.32$ Column Total $31$ $1569$ $1600$ $31$ $1.94$ Taking junk foods frequently $29$ $864$ $893$ $17.3$ $3.25$ 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 HyperpentationVersons ObservedPersons not observedPersons Expected% observedChi Square ValueTaking Sweet foods frequently $419$ $576$ $995$ $390.5$ $42.11$ $447$ Not taking sweet foods frequently $209$ $396$ $605$ $237.5$ $34.55$ $549$ Column Total $628$ $972$ $1600$ $628$ $39.25$ $642$ Taking Salty foods frequently $425$ $634$ $1059$ $415.7$ $40.13$ Not taking Salty foods frequently $203$ $338$ $541$ $212.3$ $37.52$ $0.62$ Taking bitter foods frequently $175$ $398$ $573$ $224.9$ $30.54$ $30.54$ Not taking bitter foods frequently $447$ $446$ $893$ $350.5$ $50.06$ $60.12$ Not taking junk foods frequently $181$ $526$ $707$ $277.5$ $2560$ $60.12$	Taking bitter foods frequently	1	572	573	11.1	0.17	
Column Total  31  1569  1600  31  1.94    Taking junk foods frequently  29  864  893  17.3  3.25    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 Hyperson source of the second	Not taking bitter foods frequently	30	997	1027	19.9	2.92	14.32
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Not taking junk foods frequently  2  705  707  13.7  0.28  17.90    Column Total  31  1569  1600  31  1.94  17.90    Number of persons suffered from Hyperjementation  Number of persons suffered from Hyperjementation  707  13.7  0.28  17.90    Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  419  576  995  390.5  42.11  549    Not taking sweet foods frequently  209  396  605  237.5  34.55  5.49    Column Total  628  972  1600  628  39.25  5.49    Taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking Salty foods frequently  175  398  573  224.9  30.54  17.25    Taking bitter foods fr	Taking junk foods frequently	29	864	893	17.3	3.25	
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Number of persons suffered from Hyperpignentation    Parameter  Persons Observed  Persons not observed  Total  Persons Expected  % observed  Chi Square Value    Taking Sweet foods frequently  419  576  995  390.5  42.11    Not taking sweet foods frequently  209  396  605  237.5  34.55  5.49    Column Total  628  972  1600  628  39.25  5.49    Taking Salty foods frequently  425  634  1059  415.7  40.13	Column Total	31	1569	1600	31	1.94	
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Taking Sweet foods frequently  419  576  995  390.5  42.11    Not taking sweet foods frequently  209  396  605  237.5  34.55  5.49    Column Total  628  972  1600  628  39.25  5.49    Taking Salty foods frequently  425  634  1059  415.7  40.13    Not taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    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  17.25    Column Total  628  972  1600  814  39.25	Parameter	Persons Observed	Persons not observed	Total	Persons Expected	% observed	Chi Square Value
Not taking sweet foods frequently  209  396  605  237.5  34.55  5.49    Column Total  628  972  1600  628  39.25  34.55  5.49    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  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking Salty foods frequently  175  398  573  224.9  30.54    Taking bitter foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  60.12    Taking junk foods frequently  447  446  893  350.5  50.06  60.12    Not taking junk foods frequently  181  526  707  <	Taking Sweet foods frequently	419	576	995	390.5	42.11	
Column Total  628  972  1600  628  39.25    Taking Salty foods frequently  425  634  1059  415.7  40.13    Not taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking Salty foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    Column Total  628  972  1600  814  39.25  17.25    Column Total  628  972  1600  814  39.25  17.25    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  60.12	Not taking sweet foods frequently	209	396	605	237.5	34.55	5.49
Taking Salty foods frequently  425  634  1059  415.7  40.13    Not taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking bitter foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    Taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  60.12    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  60.12    Column Total  628  972  1600  814  39.25	Column Total	628	972	1600	628	39.25	
Not taking Salty foods frequently  203  338  541  212.3  37.52  0.62    Column Total  628  972  1600  814  39.25  0.62    Taking bitter foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    Taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  60.12    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  60.12    Column Total  628  972  1600  814  39.25  60.12	Taking Salty foods frequently	425	634	1059	415.7	40.13	
Column Total  628  972  1600  814  39.25    Taking bitter foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    Taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  60.12    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  60.12    Column Total  628  972  1600  814  39.25  60.12	Not taking Salty foods frequently	203	338	541	212.3	37.52	0.62
Taking bitter foods frequently  175  398  573  224.9  30.54    Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    Taking junk foods frequently  447  446  893  350.5  50.06    Not taking junk foods frequently  181  526  707  277.5  25.60  60.12    Column Total  628  972  1600  814  39.25  60.12	Column Total	628	972	1600	814	39.25	
Not taking bitter foods frequently  453  574  1027  403.1  44.11  17.25    Column Total  628  972  1600  814  39.25  17.25    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  60.12    Column Total  628  972  1600  814  39.25  60.12	Taking bitter foods frequently	175	398	573	224.9	30.54	
Column Total  628  972  1600  814  39.25    Taking junk foods frequently  447  446  893  350.5  50.06    Not taking junk foods frequently  181  526  707  277.5  25.60    Column Total  628  972  1600  814  39.25	Not taking bitter foods frequently	453	574	1027	403.1	44.11	17.25
Taking junk foods frequently  447  446  893  350.5  50.06    Not taking junk foods frequently  181  526  707  277.5  25.60  60.12    Column Total  628  972  1600  814  39.25  60.12	Column Total	628	972	1600	814	39.25	
Not taking junk foods frequently  181  526  707  277.5  25.60  60.12    Column Total  628  972  1600  814  39.25  60.12	Taking junk foods frequently	447	446	803	350.5	50.20	
Column Total  628  972  1600  814  39.25	Not taking junk foods frequently	181	526	707	277.5	25.60	60.12
	Column Total	628	972	1600	814	39.25	

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	Vulgari	6				
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			
	Numbe	r of persons cured from V	itiligo					
Parameter	Persons Observed	Persons not observed	Total	Persons Expected	% Observed	Chi Square Value		
Persons taken neem	12	18	30	19.5	40.00			
Persons not taken neem	27	3	30	19.5	90.00	5.77		
Column Total	39	21	60	39	65.00			
Persons taken bitter gourd	14	16	30	20.5	46.67			
Persons not taken bitter gourd	27	3	30	20.5	90.00	4.12		
Column Total	41	19	60	41	68.33			
	Number	of persons cured from Ps	oriasis					
Parameter	Persons Observed	Persons not observed	Total	Persons Expected	% Observed	Chi Square Value		
Persons taken neem	11	19	30	18.5	36.67			
Persons not taken neem	26	4	30	18.5	86.67	6.08		
Column Total	37	23	60	37	61.67			
Persons taken bitter gourd	13	17	30	19.5	43.33			
Persons not taken bitter gourd	26	4	30	19.5	86.67	4.33		
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			

## 05

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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