

## Review Article

# Food and skin

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**Abstract** Food is essential to keep our body healthy and in perfect harmony. The relationship between food and skin is diverse. Food can help to cure certain skin disorders but it can also trigger or aggravate various other dermatoses. This article highlights the role of different food items in dermatological disorders under various headings.

**Key words** Food, skin changes.

### Background

Everyone needs food for healthy living. Natural foods, vegetables, fruits, cereals and other foodstuffs are essential to keep our body in perfect harmony. Primitive societies also acquired a sophisticated knowledge about the properties of various food items being consumed by them. More than 2,000 years ago, Hippocrates wrote "It appears to me necessary for every physician to be skilled in nature and to strive to know, if he would wish to perform his duties, what man is in relation to the articles of food and drink, and to his other occupations, and what are the effects of each of them to every one".<sup>1</sup> Although these words were written so long ago, it is only within the last quarter of a century that we have begun to pay attention to what man is in relation to the articles of food and drink. The role of food in the induction of various skin disorders has repeatedly been advocated.<sup>2</sup> Food can play a role in healing skin disorders but it can also trigger or aggravate already existing skin diseases. The present article is an endeavor

to underline the role of food in dermatological disorders. The subject will be discussed under different headings e.g.

- i) Diet-related cutaneous disorders
- ii) Diet-related cutaneous signs
- iii) Diet-related cutaneous myths
- iv) Diets beneficial for cutaneous disorders

### 1. Diet-related cutaneous disorders

The role of dietary factors in the induction of disease seems to be underestimated. The diet-related cutaneous disorders can be divided into following categories:

#### A. Genetic metabolic disorders [3,4]

Genetic metabolic defects or enzyme deficiencies, although subtle, may pave the way for the onset of diet-related skin disorders. Examples include:

- Alcohol intake (porphyria cutanea tarda)
- Choline & lecithin containing foods (eccrine bromhidrosis)

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- Menkes' syndrome (failure of copper absorption)
- Diet rich in phenylalanine can aggravate phenylketonuria
- Diet rich in tyrosine and phenylalanine can aggravate tyrosinemia
- Homocysteinurias are inborn errors of amino-acid metabolism

### **B. Nutrient-deficiency diseases**

Nutrient-deficiency can be due to inadequate intake, abnormal absorption or improper utilization. Of all the constituents of food on which normal health is dependent, vitamins and minerals are the most remarkable. The morbid states which are known to result from faulty nutrition in our daily life are as follows:

Scurvy (vitamin C deficiency) and acrodermatitis enteropathica (zinc deficiency) are examples of the deficiency disorders.<sup>2-4</sup> Other diseases are beri-beri, pellagra, rickets, keratomalacia, marasmus, kwashiorkor and slow healing of wounds.<sup>3,4</sup> A complete diet revision will often improve and sometimes resolve the symptoms.

### **C. Nutrient-excess diseases** [3,4]

Excess of various nutrients can also result in certain diseases e.g. carotene excess can lead to carotenemia, hyperlipidemia can cause xanthomas and xanthelasma, hypervitaminosis A results in xerosis and increased phytates result in Refsum's disease.

### **D. Immune mechanism related dietary disorders**

An immune mechanism is involved in the pathogenesis of certain diet-related skin disorders. Examples are atopic dermatitis, urticaria and allergic contact dermatitis. 'Food allergy' is a misunderstood term. Any non-psychological, reproducible unpleasant reaction to a specific food or ingredient is known as food intolerance. It includes food allergy and other reactions to food. It does not include poisoning from bacteria or viruses, chemicals, moulds or other irritants in food.<sup>5,6</sup> Food allergy is a specific type of food intolerance that involves the abnormal reaction of an individual's immune system to common proteins in our food that are harmless to the majority of population.<sup>5,6</sup>

Peanuts, eggs, cow milk, fish & shellfish and sesame seeds are the most common triggers of food allergy, either precipitating or aggravating diseases like atopic dermatitis and urticaria.<sup>7</sup> Certain disorders like Celiac disease, dermatitis herpetiformis, gluten enteropathy and wheat allergy are associated with gluten which causes damage to the lining of the small intestine.<sup>8</sup> Gluten and similar proteins are found in the diet e.g. wheat, rye, oats and barley.<sup>8</sup>

### **E. Miscellaneous disorders**

Among the enormous variety of chemical compounds that are present in diet; thiols, isothiocyanates, phenols and tannins seem to be responsible for inducing pemphigus<sup>7</sup> (**Table 1**). Their role is well-documented in genetically predisposed subjects.<sup>7</sup> Cigarette smoking is a factor in premature facial wrinkling.<sup>9</sup> Certain foods like saturated fat, meat, ice cream, soft drinks, cakes, potatoes,

**Table 1** Chemical compounds with acantholytic potential [7]

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Thiol allyl compounds Garlic, onion, leek, chives
Isothiocyanate producing glucosides Mustard, radish, turnip, cabbage, cauliflower, sprouts
Phenols Mango, cashew, pistachio, black pepper
Tannins Cassava, red chilies, tea, red wine, cherry, raspberry, blackberry

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butter and margarine also promote wrinkling.<sup>9</sup>

There is a possible pathogenic role of diet in some skin diseases without any convincing evidence. These include psoriasis, seborrheic dermatitis, acne etc.<sup>7</sup> Current research work has hypothesized that alcohol reduces the bodies' ability to repair certain types of cell damage that can lead to cancer.<sup>10</sup>

## 2. Cutaneous signs named after food items

The range of clinical diagnoses that can be achieved in the skin far exceeds that for any other organ system. Clinical history and often additional investigations may be required to make or to refine a diagnosis, but examination of the skin is of paramount importance. Because the skin is readily visualized and most physical signs do not need to be actively elicited, the diagnostic process appears easy. Here, we enumerate physical signs in skin diseases that have been named after different food items and our purpose is to highlight the understanding of the diagnostic importance of these signs.<sup>11</sup>(Table 2).

## 3. Diet-related cutaneous myths

Myths are pure fictions and misconceptions among general public. While logic doesn't seem to play a big factor in myths, they are still abundant. There are a great deal of misconceptions regarding foods and its relation with cutaneous disorders. Some of these misconceptions are centuries old. However, thanks to scientific research, many of the real factors behind blemishes are now known. Under this heading, we enlist few myths that prevail amongst people; and present an overview regarding this important issue (Table 3)<sup>12-13</sup>

Acne is one of the common skin diseases and many diet-related myths are associated with this disorder. Ecologic studies have suggested that the incidence of acne is low in non-Western societies and increases with adoption of Western diet.<sup>14</sup> A wide variety of food items have been postulated to be associated with acne including milk and other dairy products, chocolate, nuts, eggs and pork. In a large cohort study of women, the intake of milk during adolescence was associated with history of teenage acne.<sup>14</sup> They found positive associations with vitamin D either from foods or supplements. Vitamin D positively interacts with testosterone's actions in several organ systems. They hypothesized that the hormonal content of milk may be responsible for its association with acne. Milk contains estrogens, progesterone, the androgen precursors androstenedione and dehydroepiandrosterone-sulphate and 5-alpha reduced steroids like 5-alpha androstandione, 5-alpha pregnanedione and dihydrotestosterone, some of which have been implicated in comedogenesis.<sup>14</sup>

**Table 2** Cutaneous signs after food items.

<i>Apple jelly nodules</i>	Apple jelly-coloured nodules seen with diascopy test in lupus vulgaris
<i>Blueberry muffin lesions</i>	Lesions reflecting dermal erythropoiesis in rubella, cytomegalovirus, Coxsackie B-2 infection, congenital syphilis, toxoplasmosis, hereditary spherocytosis, ABO blood group incompatibility
<i>Café au lait spots: Coffee with milk</i>	Neurofibromatosis, tuberous sclerosis, Albright's syndrome, temporal dysrhythmias, pulmonary stenosis
<i>Cayenne pepper spots</i>	Orange or brown pigmentation due to hemosiderin in Schamberg's disease or Majocchi's disease
<i>Champagne bottle</i>	Lymphedema
<i>Cherry angioma</i>	Sign normally present in old age skin
<i>Chicken skin</i>	Pseudoxanthoma elasticum
<i>Framboesiform (Raspberry)</i>	Yaws (the florid lesions)
<i>Ichthyosis</i>	Fish like scales (actually the scales resemble crocodile skin)
<i>Marbled cake skin</i>	Whorled and reticulate pigment loss (hypomelanosis of Ito)
<i>Milk spots</i>	Milia (keratin-filled cyst) pearly white lesions on face
<i>Nutmeg grater appearance</i>	Phryoderma, <i>Demodex folliculorum</i> infection of skin imparting a nutmeg grater appearance to the skin
<i>Onion-skin appearance</i>	Histological examination of dermal nerves shows a peculiar lamination of perineurium known as onion-skin perineurium in lepromatous leprosy
<i>Peau d' orange (orange peel like skin)</i>	Dimpling & induration of skin seen in breast carcinoma, pseudoxanthoma elasticum and pretibial myxedema
<i>Port-wine stain</i>	Nevus flammeus (persistent macular erythema)
<i>Prune belly syndrome</i>	Sign of internal malignancy
<i>Salmon patch</i>	Stork mark (vascular malformation)
<i>Salmon pink colour</i>	The characteristic colour of psoriatic plaque
<i>Strawberry nevus</i>	Hemangioma, angiomatous nevus
<i>Strawberry tongue</i>	Kawasaki disease, scarlet fever
<i>Tripe palms</i>	Enhanced dermatoglyphic change which gives rise to velvety or honeycombed pattern of hands in acanthosis palmaris in internal malignancy (gastric or bronchial carcinoma)
<i>Wafer like scales</i>	Clear cell acanthoma

#### 4. Diets beneficial for skin disorders [9]

Diet can significantly affect the skin and its tendency to wrinkle. Studies suggest that it may be possible to prevent premature ageing, UV skin damage and even skin cancer, by including protective foods in diet, improving the fat quality of diet and increasing the intake of mono-unsaturated fat.

##### A. Foods that protect against wrinkles [9]

Various studies link diet and wrinkles. Foods that protect against wrinkles include

olive oil, mono-unsaturated fat, fish, yogurt, eggs, nuts, legumes, vegetables (spinach, celery, onions, leeks, garlic), wholegrain cereals, fruits (prunes, cherries, apples), water and zinc. The mechanism of action is to resist the activity of damaging free radicals.<sup>9</sup>

##### B. Foods that protect against skin diseases [15]

Barley and lentil are useful in the treatment of various skin diseases. Oilseeds strengthen the roots of hair. Mustard oil massage of body removes xerosis of skin making it soft

**Table 3** Diet-related cutaneous myths [12,13]

- Prickly heat is related to the intake of mangoes
- Healing of prickly heat is accelerated after taking bath in the rain water
- Vitiliginous patches appear after taking fish & milk together
- An apple a day keeps the doctor away
- Eat popcorn to reduce weight
- Having tea darkens the complexion
- Soap (animal fat, vegetable oil) is bad for skin
- Drinking a lot of water leads to beautiful skin
- Natural foods are non-allergenic
- Chocolate and greasy foods cause acne
- Soy protein is related to skin allergies
- Most people with food allergies are allergic to strawberries and tomatoes
- Some people are allergic to sugar
- If you have intolerance to any food item, you are allergic to that food
- Food allergies are not life threatening

and smooth. Cabbage is useful in skin diseases like leukoderma, leprosy and furunculosis. Cucumber helps in leprosy and burning paresthesia. Garlic is useful in skin disorders. Honey is versatile in its qualities. It is helpful in leprosy, wound healing, tuberculosis, piles and complexion. Drinking milk after taking dates makes the body healthy and strong. Dried dates are also sexual stimulant.

### ***C. Role of diet in cancer prevention***

Recent studies suggest that diet is second only to tobacco as a risk factor for cancer, accounting for about 30% of cancers in developed countries.<sup>16</sup> The diet of an average person has changed in quite a few ways in recent times. With the popularity of processed snack foods, many of us are not getting the recommended number of daily servings of fruits and vegetables containing natural plant phytochemicals and phenolic

compounds which have anti-cancer activity currently popular in dermatological research.<sup>10</sup> The phytochemicals that have generated considerable interest among cancer researchers include phytoestrogens (such as isoflavones, coumestans and lignans), isothiocyanates and polyphenols such as flavonoids (i.e. catechins) and flavenols (i.e. quercetin).<sup>10</sup> The risk of melanoma has been shown to be lower in people who get more vitamin D, alpha carotene, beta carotene, cryptoxanthin, lutein and lycopene in their diets.<sup>17</sup> A research group recently discovered that organically grown food crops contained a significantly higher concentration of phenolic compounds and vitamin C than the same crops grown conventionally.<sup>10</sup> Phenolics are potent antioxidants and are thought to have anti-cancer activity, and the role of vitamin C in cancer prevention has also generated interest.<sup>10</sup> Soybeans contain an abundance of phytoestrogens including isoflavones which are believed to protect against certain cancers. In a study on mice, adding soy protein to the diet dramatically reduced the extent of melanoma metastasis.<sup>18</sup> Flax seed is a rich source of lignans, a natural plant phytoestrogen compound with cancer fighting properties especially in melanoma prevention.<sup>10</sup>

Carotenoids such as beta-carotene and lycopene that are found in many yellow and red vegetables are powerful antioxidants that protect cells from free radicals known to damage DNA and leading to cancer. Some carotenoids are vitamin A precursors and vitamin A supplements have also been shown to reduce melanoma tumor size and extent of metastases in mice.<sup>10</sup> One great way of ingesting a large quantity of beta-

carotene (and vitamin A precursors) is by drinking lots of fresh carrot juice. Lycopene, another type of carotenoid that gives tomatoes their red colour, has been shown to reduce the risk of prostate cancer.<sup>10</sup> A diet consisting of one tomato product serving a day or five servings a week has been recommended for protection against prostate cancer and other malignancies.<sup>10</sup>

Several laboratory studies have suggested that cruciferous vegetables containing isothiocyanate compounds help to regulate a complex system of bodily enzymes that defend against cancer and have been shown to arrest cell growth and even kill melanoma cells in culture in the laboratory.<sup>19,20</sup> Isothiocyanates and other plant phytochemicals with cancer fighting properties are very abundant in vegetables like broccoli, Brussels sprouts, cabbage, cauliflower, kale, bok choy, kohlrabi, collard greens, mustard greens, turnips and water cress.<sup>19</sup>

Many fruits contain phytochemicals including flavonoids such as anthocyanins. Anthocyanins like other antioxidants, help in neutralizing the negative by-products of metabolism called free radicals, which can damage DNA molecules and lead to cancer. Antioxidants also counteract environmental carcinogens, protect against cardiovascular disease,<sup>21</sup> fight sun damage to skin and may thwart the effects of Alzheimer's and other age-related diseases. Green tea is rich in polyphenols such as catechins that might prove to be effective for cancer treatment as well. Studies have linked regular green tea consumption with reduced cancer risk. Green tea has also been shown to inhibit some of the cellular changes that result in melanoma metastasis.<sup>10</sup> Whole grains are

rich in antioxidants and phytoestrogens, protective against cancer. The beta-glucan found in whole grains such as barley and oats may play a role in enhancing immune response by stimulating macrophages to attack foreign bodies such as viruses and cancer cells.<sup>10</sup>

It is believed that vitamin E confers protection against some types of cancers.<sup>10</sup> Nuts contain particularly high concentrations of this vitamin. In addition, compounds found in black walnuts such as ellagic acid and juglone have been shown to reduce tumor growth rate in mice.<sup>10</sup> Almonds also contain many phenolic compounds that act as antioxidants.<sup>10</sup>

The knowledge about food is unlimited and its relation with skin diseases needs an extensive study in future to ascertain what effect these things produce upon a man and to understand the diseases which befall a man in consequence of them.

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