
18 Raw Food Diets: Health Benefits and Risks

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18.1 HISTORICAL BACKGROUND

Humans have always pursued ways to improve health and prolong life. Besides other lifestyle factors, diet was always and is still a factor associated with desires and hopes in this connection. Pythagoras (570-500 B.C.) proclaimed vegetarianism to be an ideal way to fulfill this dream. During the nineteenth and twentieth century many movements for healthy and life prolonging lifestyles were initiated. Based on personal and clinical experiences a number of pioneers, most of whom were physicians, developed dietary therapy regimens which aimed to support healing and were not conceived as long-term diets. Most concepts were designed to bring people back to a natural way of life. One basic aspect of these diets was the recommendation for the consumption of exclusively or mostly natural food, meaning unheated and unprocessed food items.

One proponent of a natural diet was the Swiss physician Maximilian Bircher-Benner (1867-1939) who documented the healing effects of a diet consisting only of selected fresh and unprepared foods. He developed a holistic therapy going back to the principles of Hippocrates (460–370 B.C.). Bircher-Benner also tried to lead his patients to a natural lifestyle. The main focus of his therapy was a simple diet

with foods that have a healing effect. He considered all natural raw and fresh food as wholesome and therefore adequate to support the self-healing ability of the body. It was his understanding that processing or heating food reduces its wholesomeness, since it leads to a loss of healing power. For severe illnesses Bircher-Benner recommended a strict vegan raw food diet. Two of the three meals per day, he advised, should comprise of only fruits and nuts; the other one of raw vegetables, fruits, and nuts (Leitzmann et al., 1999).

In the U.S. a group of physicians started a movement in 1822 that came to be known as Natural Hygiene. Herbert Shelton (1895–1985) made this movement very popular after World War II. His writings are still being read today (Shelton, 1964). His idea was that the deterioration of health occurs only when natural life laws are broken and that by means of a wholesome nutrition a self-cleaning process of the body is activated. Adherents of Natural Hygiene recommend a raw food diet consisting mainly of fruits. Apart from nutrition, other factors like physical activities, fresh air, and sunshine are claimed to be necessary to support health. There are many points of view within the Natural Hygiene movement. For example, one is that only the consumption of food items that have ripened in sunlight (fruits, vegetables, nuts, and seeds) is recommended.

Today the very popular Fit-for-Life program, developed by Marilyn and Harvey Diamond (Diamond and Diamond, 1985) is also based on Natural Hygiene. One basic element of this program is the concept of body cycles. According to that principle, the body prefers certain times of the day for the intake of food, for utilizing nutrients, and for excreting the metabolic products. The concept requires that before noon only fruits should be eaten. No other foods are allowed in the morning. Also, for the rest of the day foods with a high water content like raw fruits and vegetables are advised. In addition fruits should never be consumed simultaneously with other foods. The Diamonds recommend separate consumption of foods rich in protein and foods rich in carbohydrates. Processed and concentrated foods as well as meat, dairy products, cereals, and legumes are considered to be “dead” foods. The human being is seen as a frugivore. The Fit-for-Life program is predominantly a vegetarian raw food diet.

Today’s raw food movement is very divergent. The diet can span from pure raw food to diets in which foods are not processed, chopped, or mixed with other food items. A study of the literature shows that raw food diets are subdivided into vegetarian and nonvegetarian type (Figure 18.1). Some regimens contain meat and meat products, others solely fruits. Staple foods like meat, dairy products, and cereals and cereal products are largely avoided. Therefore, fruits and vegetables make up a high percentage of the food consumed. The main reasons for practicing a raw food diet, as stated by its followers, are to attain health, to prevent illness, and to live in a natural and healthy way for a long time (Koebnick et al., 1995, 1997c).

Within the raw food movement, the theory of Guy-Claude Burger has a special position. According to his instincto-therapy, the body knows exactly what kind of food, and which and how much of a nutrient is needed in a certain situation. The smell and taste senses help the body to select the right food. Only if a food item smells and tastes good to a person may it be eaten at that time. The body indicates

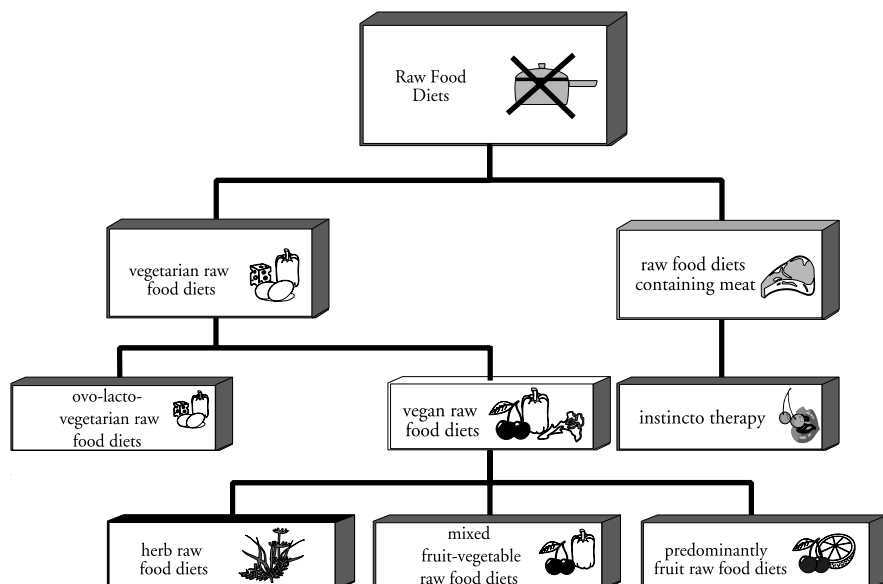


FIGURE 18.1 Different forms of raw food diets.

when enough of this food has been eaten since it then starts to taste bitter. This instinct works only with natural, unprocessed foods. For all raw foods, even eggs, fresh meat, and fish, the body indicates whether it needs it or not. Burger's instincto-therapy is an omnivorous, strictly raw food diet (Burger, 1992).

The definition of raw food diets according to the Giessen Raw Food Working Group is an attempt to develop a basis for comparison of data reported in the literature (Table 18.1).

TABLE 18.1
Definition of Raw Food Diets

Raw food diets consist predominantly or exclusively of unheated foods, mainly of plant origin (partly of animal origin).

Some foods are included that require a certain degree of heating for their production (e.g., cold-pressed oils and honey) as well as foods that require a certain amount of heat during their processing (e.g., dried fruits, dried meat and fish, certain nuts).

Furthermore, cold-smoked produce (e.g., meat and fish) as well as pickled or fermented vegetables can be included in a raw food diet.

Source: Giessen Raw Food Working Group.

Even though raw food diets are claimed to improve health, the arguments for the different diets are not always in agreement with current scientific knowledge. However, persons following these diets report subjective improvements of their well-

being. Since raw food diets — from a scientific point of view — can be very unbalanced, the question arises whether such a diet is suitable to guarantee or even improve the nutrition and health status when practiced on a long-term basis.

18.2 RESEARCH ON RAW FOOD DIETS

To evaluate the health benefits and risks of raw food diets it is necessary to examine the effects of such diets scientifically. Therefore, it is also essential to investigate persons following raw food diets on a long-term basis and also persons whose diets contain different amounts of raw food. So far, only a very few studies on raw food diets have been conducted. The few publications report only on selected aspects of the nutrition and health status of raw food dieters. Most of those studies are short-term interventions that include only small numbers of participants eating extreme forms of raw food diets.

Douglass et al. (1985) investigated 32 outpatients with essential hypertension of whom 28 were overweight. They were shifted to a diet with an average of 62% of their energy intake as uncooked food for a mean duration of 6.7 months. The results show a mean weight loss of 3.8 kg and a mean reduction of the diastolic blood pressure of 17.8 mmHg. Switching back to the cooked diets canceled the beneficial effects of the uncooked diet in some patients.

Ling and Hänninen (1992) examined the effect of eating an uncooked extreme vegan diet (living food diet) and then readapting to a Western-type diet on the enzyme activities of the fecal microflora and on toxic substances in the blood. Nine volunteers switched to an uncooked vegan diet for one month and switched back to their usual diet during the following month. During those two months, nine controls consumed the usual diet. The activity of bacterial enzymes, which were investigated in connection with colon cancer risk, decreased within the first week of dietary intervention: fecal urease by 66%, cholesterylglucuronide hydrolase by 55%, β -glucuronidase by 33%, and β -glucosidase by 40%. Those lower levels remained until the previous diet was reinstituted and then they returned to previous values within a fortnight. Phenol and *p*-cresol concentrations in serum and urine declined during the raw food period and increased to normal values within one month after returning to the usual diet. This study shows that an uncooked extreme vegan diet modifies the colonic environment, which may be related to a lower risk of colon cancer for raw food dieters.

The effect of a long-term adherence (5.2 ± 3.9 years) to an uncooked, strict vegan diet was investigated by Rauma et al. (1995a,b) in a cross-sectional study with 20 Finnish middle-aged women and 1 man and a longitudinal study with 9 women and 1 man. Compared to a matched group of omnivorous controls, the energy intake of the vegans did not differ. However, in vegans the proportion of energy derived from protein was lower and from carbohydrates was higher, whereas the fat intake did not differ.

Except for copper and zinc, the intake of the other nutrients (vitamin A, vitamin E, and selenium) met or exceeded the RDAs. While the intake of β -carotene, vitamin C, vitamin E, and copper was higher in the vegans, the controls had a higher selenium intake. Zinc and vitamin A intake did not differ between the study groups.

The blood concentrations of β -carotene, vitamin C, vitamin E, and the activity of erythrocyte superoxide dismutase were significantly higher in the vegans than in the omnivores. The better antioxidant status of persons adhering to a long-term and strict, uncooked vegan diet is due to a higher intake of the particular nutrients. The serum vitamin B₁₂ levels in the living-food dieters were significantly lower than in the controls, reflecting a low vitamin B₁₂ intake. During the longitudinal study six of the nine examined vegans showed a continuing deterioration of the serum vitamin B₁₂ concentration. Vegans and omnivores did not differ in the activity of glutathione peroxidase even though the selenium intake of the vegans was lower. Parameters of iron status were also not different between the study groups.

To our knowledge, the only study investigating the effects of different forms of raw food diets — varying in the inclusion of animal products and the amount of raw food over a long-term and with a larger number of participants — is the Giessen Raw Food Study (Koebnick et al., 1994, 1997a,b,c, 1999; Strassner et al., 1997, 1998).

18.3 THE GIESSEN RAW FOOD STUDY

The objective of the Giessen Raw Food Study was the examination of the health behavior and nutrition status of raw food dieters. It was of special interest to investigate the effects of different consumption patterns. Therefore the participants were grouped either according to the inclusion of animal products (omnivores: include all food groups; ovo-lacto-vegetarians: exclude meat, fish, sea foods, and products thereof; vegans: omitting all animal foods from their diet) or according to the amount of raw food consumed (70 to 80%, 80 to 90%, or up to 100% of the total amount of food eaten) (Strassner et al., 1997).

Raw food dieters were recruited by call-ups for project participation in nine different nationwide magazines and by flyers at appropriate lectures, congresses, and self-help organizations. Over 2000 responders were screened by a short qualifying questionnaire. Criteria for further study participation were 25 to 64 years of age, raw food consumption for at least 14 months, proportion of raw food at least 70%, and nonsmokers. A group of 201 adults (94 men and 107 women) were selected for the study. Health habits were investigated by means of a detailed questionnaire. Primary areas of interest in addition to sociodemographic data were food preference and avoidance, health and diseases, as well as physical activity and recreational activities. The questionnaire included a food frequency table over a 1-month period for assessing food intake patterns. A 7-day estimated food record was especially developed and validated for this study (Strassner, 1998).

The participants had followed a raw food diet for at least 14 months, on average for 3.5 years, and with a maximum duration of 38 years. Thus their metabolism had most likely adapted to their new diet. The age of the participants ranged from 25 to 64 years with an average age of 46 years. The group was characterized by a high level of education and a high per capita income. The participants were physically very active — almost half participated regularly in sport activities. Further health-consciousness behavior was also distinctive: all participants were nonsmokers (study criteria), almost 60% did not drink alcohol and the remainder drank only up to 15 g

alcohol per day, less than 30% took medication or supplements and only a few female participants took oral contraceptives. Many of the participants regularly made use of a relaxation technique: 26% meditated for a minimum of 1 hour a week, 21% used self hypnosis, and 21% practiced yoga. About 47% of the participants stated that they fasted regularly. Of these, 57% followed a total fast while 31% followed a juice fast (Strassner et al., 1997; 1998).

Of the group, 64% indicated health concerns as the major reason for changing to a raw food diet, followed by the desire for better performance (9%) and ecological reasons (3%). More than half of the participants (61%) gave a disease as the reason for changing to a raw food diet. Illnesses most often mentioned in this connection were allergies ($n = 12$), gastrointestinal diseases ($n = 9$) and rheumatism ($n = 8$). Most of the participants were highly content with their raw food diet and 98% intended to follow it as a long-term regimen.

18.3.1 DIETARY HABITS

The food consumption pattern of the investigated raw food dieters showed considerable differences to other dietary regimens. Although the participants drank, on average, less than 1 l/d, they had a liquid intake of about 2.5 l/d from foods with a high water content and met the RDAs. The participants consumed about 2 kg of food a day, most of this raw and of plant origin. The food eaten consisted, on average, of two-thirds fruits (67.8%), almost one-quarter vegetables and legumes (23.3%), and four additional food groups, each making up 1.0–1.5% (cereals and cereal products 1.4%, nuts 1.3%, milk and dairy products 1.3%, seeds 1.0%). Apples, oranges, and bananas were the fruits most often eaten, however, the findings may well be influenced by the season in which the study was carried out (February to April). The daily amount of these fruits consumed (average 100 to 300 g/d) was more than twice as high as that of other fruits (Strassner, 1998).

The participants of the Giessen Raw Food Study adhered to several different raw food diets. This divergence becomes obvious when dividing the participants into subgroups according to the consumption of animal products (Table 18.2). Potatoes, bread, and baked goods as well as cereal products played a marginal role compared to the average Western diet. The consumption of soy products was less than in other alternative dietary regimens. Where foods of animal origin were consumed, these were preferred raw. A number of differences in the consumption of food groups is statistically significant mainly between the vegan diet and the other two diet groups (Strassner et al., 1997).

Instead of the inclusion of foods of animal origin as a criteria for differentiation, the study groups can be divided according to the amount of raw food eaten (expressed as percentage of the total amount of food eaten, without beverages). On this basis three raw food groups (RFG) were formed: 70 to 80% raw food = 75 RFG; 80 to 90% raw food = 85 RFG; 90 to 100% raw food = 95 RFG.

The higher the amount of raw food consumed the more confined was the food selection. The 95 RFG consumed less food of animal origin, cereal products, bread, and baked products but ate more fruits, vegetables, and raw legumes than the 75 RFG; the 85 RFG being in-between. A higher amount of raw food also meant

TABLE 18.2**Mean Food Consumption (g/d) of the Participants Following Omnivore, Ovo-Lacto-Vegetarian, or Vegan Raw Food Diets**

Foodstuffs	Total Participants	Omnivore	Ovo-Lacto- Vegetarian	Vegan
Food, total ²	2098	2293	1948	2144
Raw foods, total ²	1976	2159	1787	2098
Foods of plant origin ²	2050	2190	1908	2141
Foods of animal origin ^{1,2,3}	49	109	40	0
Fruit and fruit products ²	1423	1559	1279	1522
Vegetables and legumes	489	481	477	519
Nuts ¹	28	32	25	29
Seeds	20	21	15	27
Bread and baked goods ^{1,3}	19	27	25	2.2
Cereal products ^{1,3}	29	23	39	18
Soy products ²	3.5	0	3.1	7.7
Dairy products ^{1,2,3}	28	40	38	0
Eggs, total ^{1,3}	3.6	7.1	3.6	0
Meat and meat products ^{1,2}	11	38	0	0
Seafood ^{1,2}	10	36	0	0

Test of significance according to Mann-Whitney (U-test): significant differences between (1) omnivore and vegans, (2) omnivore and ovo-lacto-vegetarians, (3) ovo-lacto-vegetarian and vegans.

a higher weight of the daily consumption. The 75 RFG did not consume raw potatoes, raw meat, raw eggs, and raw milk, while the stricter raw food dieters did.

18.3.2 ENERGY AND NUTRIENT INTAKE

In the ovo-lacto-vegetarian and vegan groups the majority of the participants did not achieve the RDAs for nutrient energy intake when age and gender are considered. The energy intake of the male participants was significantly higher than that of the females. Most of the participants (57%) did not meet the recommended energy intake according to their age.

Apparently, only with a mixed raw food diet did it seem possible for the participants to reach the recommendations for energy, even when the high dietary fiber concentration of the diet is considered. The chief source of dietary energy for the participants is fruit, followed by vegetables, and legumes. The food groups sweets/desserts, sweeteners, drinks, and fats/oils play a relatively unimportant role as energy sources.

The macronutrients ratio of the raw food diets corresponds to the recommendations. Since sufficient energy intake as a whole is problematic, the macronutrients are most likely utilized to a large extent directly as energy sources (Strassner, 1998).

The participants showed on average an insufficient protein intake. Only the more liberal forms of the raw food diets (concerning the amount of plant and raw foods) achieved the recommendations. The average protein intake of the participants cor-

responded to the region of the recommendations minus added safety factors. The protein sources of Western diets play a lesser role in the mixed or vegetarian raw food diets. Almost 50% of the protein intake results from fruits and vegetables; for vegan participants this amounts to about 60%. Nuts and seeds each contribute about 10% to the protein intake (Strassner, 1998).

The nutrient intakes of omnivore, ovo-lacto-vegetarian, and vegan participants showed distinct differences (Table 18.3). For vitamin A, E, B₁, B₆, and C, as well as for magnesium and iron, the median intake of all groups was above the recommendations. For vitamins D and B₁₂, as well as zinc and calcium, none of the groups reached the recommended intakes, whereas the participants following an omnivorous raw food diet had the highest intake of the three subgroups. For vitamins A, B₆, D, and the minerals magnesium and iron, there were statistically significant differences between the omnivore and ovo-lacto-vegetarian intake: the ovo-lacto-vegetarians having the lowest median intake for all nutrients mentioned other than iron (Strassner et al., 1997; National Research Council, 1989; Food and Nutrition Board, 1997, 1998).

With a higher amount of raw food the intake of β -carotene, vitamins D, E, K, B₆, C, and folic acid increased, while the intake of vitamin B₁₂ was extremely low (0.2 μ g/d). The 85 RFG showed the lowest intake of carbohydrates, fat, vitamin B₁ and vitamin B₂, magnesium, calcium, phosphorus, iron, and zinc.

TABLE 18.3
Median Daily Nutrient Intake of Omnivore, Ovo-Lacto-Vegetarian, and Vegan Raw Food Diets

Nutrients	Total Participants	Omnivore	Ovo-Lacto- Vegetarian	Vegan
Nutrient energy (kcal) ^{1,2}	1976	2117	1852	1899
Vitamin A (mg RE) ²	2.4	2.8	2	2.4
Retinol (μ g) ^{1,2,3}	41	121	65	0
β -carotene (mg)	14	15	11	15
Vitamin D (μ g) ²	3.2	4.4	2.9	3.2
Vitamin E (mg)	19	21	19	19
Vitamin B ₂ (mg) ^{1,2}	1.5	1.8	1.4	1.4
Vitamin B ₆ (mg) ²	3	3.7	2.8	3
Vitamin B ₁₂ (μ g) ^{1,2,3}	0.3	1.4	0.3	0
Vitamin C (mg)	442	496	439	424
Magnesium (mg) ²	596	646	570	618
Calcium	738	831	732	714
Iron (mg) ²	19	21	18	18
Zinc (mg) ^{1,2}	8.8	9.9	8.6	8.1

Test of significance according to Mann-Whitney (U-test): significant differences between (1) omnivore and vegans, (2) omnivore and ovo-lacto-vegetarian, (3) ovo-lacto-vegetarian and vegan.

18.3.3 BLOOD PARAMETERS

The low intake of some essential nutrients affects the nutrient supply of the body as observed in their concentration in blood samples (Koebnick et al., 1997b).

The consumption of raw fruits and vegetables results in a low bioavailability of carotenoids. The high intake of β -carotene has a negative influence on the absorption rate. Because of the low intake of vitamin A a high conversion rate of β -carotene into retinol may be expected. This results in a plasma retinol level at the lower end of the standard range. About 70% of the raw food dieters showed β -carotene concentrations within the standard range. The status of vitamin A was good, the one of β -carotene just sufficient.

The high intake of vitamin E did not lead to corresponding high blood concentrations. This may be due to the inhibition of vitamin E absorption because of high concentrations of polyunsaturated fatty acids in the diets.

The nutrient status of vitamins B₁, B₂, and B₆ were within the normal range. The high intake of folic acid led to high concentrations in the blood. But high plasma folate levels may also be due to the low vitamin B₁₂ intake (Dagnelie, 1989). For vitamin B₁₂, critical values were found for about 20% of the raw food dieters. A clear relationship between low vitamin B₁₂ concentrations and increased homocysteine levels are observed (Figure 18.2).

The supply of magnesium was adequate for about half of the group. The serum iron and ferritin concentrations were rather low. With increasing duration of a raw food diet the iron concentrations decreased further and 43% of the men and 15% of the women were anemic.

18.3.4 BODY WEIGHT

Even though most of the raw food diets are considered as a long-term form of nutrition, the Diamonds suggest that their raw food diet may additionally be used to reduce body weight (Diamond and Diamond, 1992; Koebnick et al., 1997c). Furthermore, fasting periods and regular enemas are often recommended by proponents of raw food diets as a method of body cleansing. About half of the participating raw food dieters fasted at least once a year, some of them for several weeks. It is reported that very long fasting periods (>100 days) can result in morphological changes in cardiac muscle, with ECG changes caused by protein deficiency. Even though none of the study participants fasted for such a long period of time, fasting for them could have been a risk because of their low energy stores and low body weight, particularly in association with their low-energy diet.

The results of the Giessen Raw Food Study showed a substantial reduction in body weight for participants during long-term consumption of a raw food diet. The body weight first decreased and then usually increased to a level below the initial weight. Consequently, the strict raw food dieters showed a greater loss of body weight than the moderate raw food dieters. Changes in body weight usually indicate a change in energy balance and reflect changes in energy stores and in active body tissues (Shetty and James, 1994). Decreasing body weight and concomitant under-

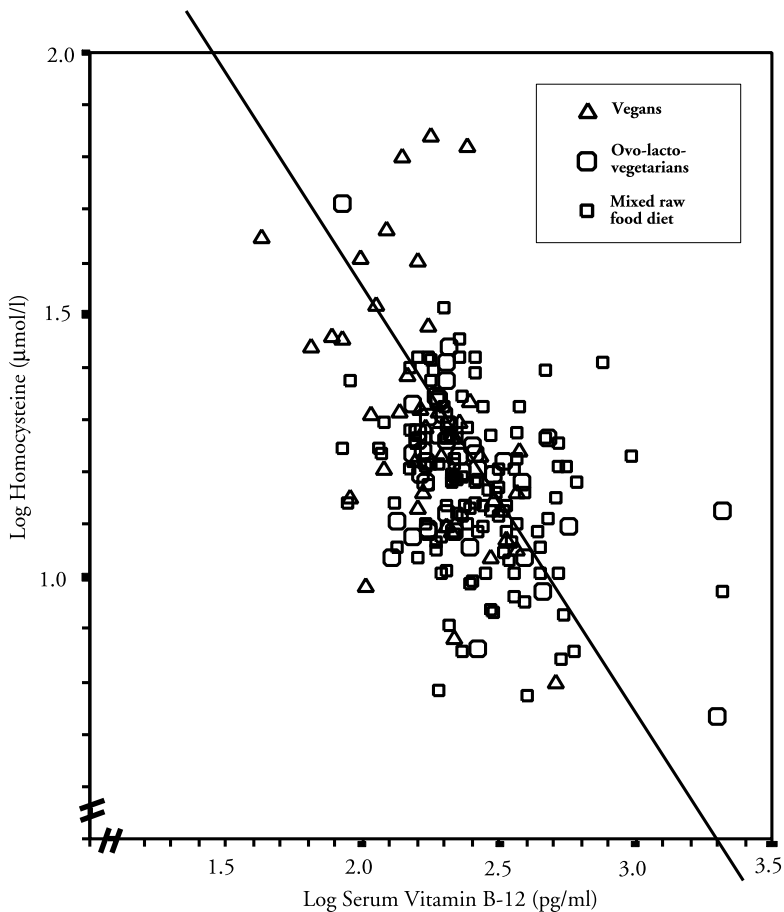


FIGURE 18.2 Relationship between serum vitamin B₁₂ and homocysteine concentrations.

nutrition result in a greater visceral mass to muscle mass ratio (Soares and Shetty, 1991).

The body mass index (BMI) reflects body energy stores and is used as an indicator for chronic energy deficiency (Norgan and Ferro-Luzzi, 1982; Ferro-Luzzi et al., 1992; James, 1994) since it shows a strong correlation with body fat (Naidu and Rao, 1994; Shetty and James, 1994). Most participants of the Giessen Raw Food Study had BMI values within the normal range; however, 25% of the females and 14.7% of the males were below the normal range — in some cases the BMI reflecting a chronic energy deficiency. Undernutrition affects only a small group of the average German population — 5.6% of the females and 3.8% of the males, mostly under the age of 34 years, are underweight. The optimum range of BMI which is compatible with good health is 20.1 to 25.0 kg/m² for males and 18.7 to 23.8 kg/m² for females (WHO, 1985; Shetty and James, 1994). Low body weight is often reported for ovo-

lacto-vegetarians and vegans (Hahn and Leitzmann, 1996), but a BMI reflecting chronic energy deficiency is rarely observed, in contrast to raw food dieters. The main reason for a low BMI for raw food dieters is the consumption of a strict raw food diet. Furthermore, BMI is correlated with the duration of the raw food diet and the vegan regimen (Koebnick et al., 1999).

Very strict raw food dieters have higher odds of becoming underweight than moderate raw food dieters. Therefore, a strict raw food diet has to be considered as a risk to health if practiced for a long time. The absence of obesity in raw food dieters should be seen positively, but their extreme low body weight may be a problem. While an energy restriction for many adults consuming an average Western diet is recommended, a strict raw food diet cannot guarantee an adequate energy supply (Strassner, 1998). A low BMI for raw food dieters indicates low body energy stores and chronic energy deficiency. In a mostly vegan diet like the raw food diets, with low protein and energy intake, protein metabolism can be affected to the point of protein energy malnutrition.

18.3.5 MENSTRUATION

A high percentage of the women participating in the study (70%) had irregularities in their menstruation after changing to a raw food diet (Figure 18.3). A total absence of menstruation was observed in 23% of female raw food dieters of childbearing age. With increasing amounts of raw food the BMI decreased and the odds of amenorrhea increased. The participants judged this as a success of their diet, since proponents of raw food diets view menstruation as a process of cleansing. They claim that when eating enough raw food menstruation stops, so that the cleansing process is no longer required (Shelton, 1964; Burger, 1992). This attitude concerning amenorrhea has no scientific basis and ignores the possibility that amenorrhea may be an indicator of impaired health.

Nutritional deficiencies, low body fat stores, chronic energy deficiency, and low body weight which is related to changes in body composition are associated with amenorrhea (Shetty and James, 1994; Benson et al., 1996). Amenorrhea is also observed with eating disorders like bulimia and anorexia (Kopp et al., 1997; McIver et al., 1997).

A low BMI is indicative for chronic energy deficiency and is associated with amenorrhea. Amenorrhea can result in impaired fertility (Shetty and James, 1994; Fruth and Worrell, 1995; McIver et al., 1997). When estrogen levels are low, changes in mineral, glucose, and fat metabolism accompany amenorrhea. These metabolic changes affect bone and cardiovascular health, increasing the risk of osteoporosis and coronary heart disease in later life (Fruth and Worrell, 1995; McIver et al., 1997).

For the female raw food dieters of this study the odds of having amenorrhea increased with the strictness of the raw food diet. For women of childbearing age there may be further consequences for the unborn child in case of pregnancy.

The incidence of amenorrhea in female raw food dieters is also a sign for future functional problems in the long-term consumption of a raw food diet. As shown in this study, the main determinant for the BMI and the incidence of amenorrhea is the amount of raw food in the diet. On the basis of the obtained data and the reports

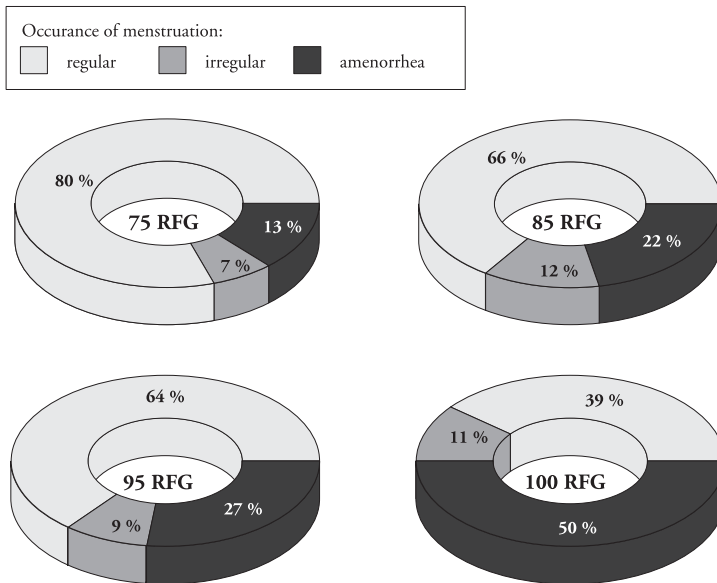


FIGURE 18.3 Classification of menstruation occurrence.

in the literature, a strict raw food diet with amounts of raw food over 90% cannot be recommended (Koebnick et al., 1999).

18.3.6 DENTAL HEALTH

Dental erosions are caused by chemical processes which may be due, among others, to dietary sources like acidic drinks or foods. Since raw food diets often contain large amounts of citrus fruits, they bear a certain risk of dental erosions. About half of the participants ate 9 to 23.5 kg fruit per week. Additionally, about half of the participants ate fruit from 5 up to 16 times a day. A high frequency of fruit intake is considered to be as a risk factor in erosion occurrence (Linkosalo and Markkanen, 1985; Järvinen et al., 1991; Lussi et al., 1991).

To determine the frequency and severity of erosions, a subgroup of 64 females and 66 males consuming more than 95% raw food was investigated using study models (Ganss et al., 1999). A control group of 76 sex- and age-matched outpatients were recruited from a dental clinic.

Compared to the control group subjects, those living on a raw food diet had significantly more dental erosions. Only 2.3% of the raw food group (13.2% of the controls) had no erosive defects, whereas 37.2% had at least one tooth with a moderate erosion (55.2% of the controls) and 60.5% had at least one tooth with a severe erosion (31.6% of the controls). Within the raw food group no significant correlation was found between nutrition or oral health data and the prevalence of erosions. Still, even at the lowest intake frequency, lowest amount of fruit eaten, or the shortest duration of the diet already means a risk factor for dental erosions. This

corresponds with the finding that consuming citrus fruits more than twice a day may increase the risk of erosions 37-fold (Järvinen et al., 1991).

This study shows that following a raw food diet bears an increased risk of dental erosion. In the raw food group the median erosions index (percent of affected surfaces of surfaces at risk) was 24.2 compared to 7.4 in the control group (Ganss et al., 1999).

18.4 RAW FOOD DIET AND PREVENTIVE DIETARY RECOMMENDATIONS

Based on large epidemiological studies and other scientific knowledge, dietary recommendations for the prevention of nutrition-related diseases like cancer and coronary heart disease are promoted by experts and public health organizations such as the American Heart Association and the World Cancer Research Institute. The most important recommendations are eating a variety of foods, primarily based on foods of plant origin (vegetables, fruits, and whole grain products), maintaining or reducing body weight, and choosing a diet low in fat, saturated fatty acids, and cholesterol. Moreover, sugar and salt should be used in moderation, and alcohol, if used at all, should be consumed in moderate amounts (Nutrition Committee, American Heart Association, 1996; World Cancer Research Fund and American Institute of Cancer Research, 1997).

The data of the Giessen Raw Food Study show that the raw food dieters have a healthy life style — all participants were nonsmokers (selection criteria), almost 60% did not drink alcohol, less than 30% took medication or supplements, and only a few females who participated took oral contraceptives. Comparing their food consumption with national and international recommendations it becomes obvious that about half of their energy intake derives from fruits and vegetables — increasing with the strictness of the raw food diet. The official recommendation is that 7% or more of the energy intake should be provided by fruits and vegetables (World Cancer Research Fund and American Institute of Cancer Research, 1997). The absolute amount of fruits and vegetables consumed exceeds the recommendation of 400–800 g by at least three times. But the recommendation to eat 600–800 g of starchy or protein-rich foods of plant origin is not met. The study participants eat about half or one-third of it. Only few include meat in their diet.

A comparison with the Vegetarian Food Guide Pyramid is noteworthy. Unrefined and minimally processed foods as well as a variety and abundance of plant foods are emphasized (Haddad et al., 1999). Whole grains and legumes such as soybeans and soy-based products form the basis of the pyramid. On the next level (indicating smaller amounts) are fruits and vegetables, followed by nuts and seeds. This is in contrast to the consumption patterns of the raw food dieters in the study. On average, more than 90% of their diet derives from fruits and vegetables.

It becomes obvious that the food selection of the raw food dieters is too limited to meet the preventive recommendations to their full extent. The higher the amount of raw food the greater the risks. Even though the intake of protective nutrients is high, for some of the essential nutrients the intake is too low to cover the requirements and therefore several nutrient-based deficiencies are hard to avoid. The total nutrient

supply is provided almost exclusively by fruits and vegetables. As a consequence, the intake of nutrients that are usually provided by cereal products and/or foods of animal origin, such as the vitamins D, B₂, B₁₂, and niacin, as well as the minerals zinc, calcium, and iodine, is insufficient (Strassner, 1998). This deficit may even be harmful. For example, the low intake of vitamin B₁₂ may lead to an increase of homocysteine, which is an independent risk factor for coronary heart diseases.

In conclusion, for an evaluation of raw food diets it is necessary to compare them to other diets, including the amount of raw food eaten, the food selection, and the energy intake. On the basis of the data presented, a strict raw food diet is not recommended, especially not for groups at risk such as pregnant or lactating women, children, or the elderly.

Whereas a strict raw food diet cannot be recommended, with adequate nutritional knowledge a moderate raw food diet including foods like whole grain bread or other whole grain products as well as products of animal origin — especially dairy products — may guarantee good nutrition and health status in adults. However, the total amount of food eaten must be sufficient to supply enough energy and protein. The positive and preventive aspects of raw food diets are desirable, especially when practiced for a limited period (Koebnick et al., 1997b).

ACKNOWLEDGMENTS

Supported by a grant from the Stoll VITA Foundation, Waldshut, Germany.
We are indebted to Corinna Koebnick and Gunther Weiss for their expert help.

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