Dissemination of Nutritional Knowledge in Germany – Nutrition Circle, 3D Food Pyramid and 10 Nutrition Guidelines

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Key Words

Wholesome diet • Nutrition circle • 3D food pyramid • German Nutrition Society • Reference values

Abstract

Background/Aims: Presentation of the general concept of the German Nutrition Society for a successful dissemination of nutritional knowledge. **Methods:** Evaluation of actual material used for nutrition education and teaching. **Results:** In Germany, different validated instruments on the basis of actual scientific evidence are available. Quantitative aspects can be easily enlightened with the help of the *Nutrition Circle*. Information concerning optimal personal behavior (lifestyle) is transported using a flyer with *10 Nutrition Guidelines*. The *3D Food Guide Pyramid* is an encouraging new instrument to establish new teaching programs with a high level of acceptance. It is planned to establish target-specific food guide pyramids, e.g. for adolescents, aged persons (considering gender), people with increased physical activity and others. Tests with target groups (health professionals, teachers, young consumers) showed a high rate of acceptance and demonstrated successful application of the German concept of dissemination of dietary guidelines. **Conclusion:** Using modern communication technology, it is feasible for the consumers and the health professionals to download gender- and age-specific scientific information as well as validated tools for successful nutrition education.

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Introduction

Dissemination of nutritional knowledge is a valuable and widely accepted preventive measure to diminish the incidence and prevalence of chronic (non-communicable) diseases in a population. In Germany, the German Nutrition Society (Deutsche Gesellschaft für Ernährung, DGE) owns the task to establish and publish scientifically sound food-based guidelines for a balanced and wholesome diet.

In close cooperation with our sister societies in Austria and Switzerland, reference values for nutrient intake are first established [1]. These nutrient-based recommendations are then ‘translated’ into food-based dietary guidelines with the aim to inform the consumer how a wholesome diet should be composed as well as to teach health professionals working in the different fields of nutrition education.

The goal of the present review is to describe in detail the general procedure *from nutrients to food* and to present new educational tools for a successful dissemination of dietary guidelines.

Quantitative Aspects – the *Nutrition Circle*

According the so-called ‘nutritive’ approach (transfer of actual reference values for essential nutrients into food patterns) [2], the *Nutrition Circle* (fig. 1) illustrates the

Fig. 1. The *Nutrition Circle*.

recommended daily intake in weight percent of 7 food classes (cereals/grains, vegetables, fruits, milk products, meat/fish, oils/fats, beverages) as calculated on the basis of energy, macro-, and micronutrient needs (quantitative aspects; visualized by the respective sector area except for beverages). Considering age- and sex-specific dietary allowances (calculations made for 4 groups: men and women aged 25–51 and >65 years, respectively) and a physical activity level (PAL) of 1.4, exemplary daily plans using common foods are composed. The goal is to cover reference values for all nutrients when considering the daily intake averaged over 7 days. Food choice is strongly adjusted to the ‘5-a-day’ principle (5 servings of fruit and vegetable per day) and the idea to use food with a high nutrient density (e.g., whole grain cereals). Food products with a known poor nutritional quality like sweets and alcoholic/energy-rich beverages are not considered.

The *Nutrition Circle* convincingly demonstrates that it is possible to provide almost all essential and important non-essential nutrients in adequate amounts by choosing

high-quality food products available in supermarkets and traditional groceries. To cover iodine needs, 2 g of iodinated salt have to be consumed daily. The actual RDA for folate (folic acid) is difficult to reach even when folate-rich vegetables are consumed regularly in high amounts. In line with political measures already taken for example in USA and Canada [3], the DGE is, thus, in favor to enrich flour often used in bakeries with synthetic folic acid (150 µg/100 g) [4] to improve average intake of folate/folic acid. The low vitamin D intake from food is counteracted by its endogenous synthesis in the skin catalyzed by UVB exposition. Following the advice given in the *Nutrition Circle*, the percentage of energy from fat ranged from 28 to 31%; carbohydrates and protein provide 52–53% and 16–17%, respectively.

Indeed, the *Nutrition Circle* only considers foods with a known high physiological quality and, thus, has to be seen as a target which should be reached by the consumer.

10 guidelines of the German Nutrition Society (DGE) for a wholesome diet

German Nutrition Society
www.dge.de

1. Choose from among many different foods

Enjoy the great variety of food. A well-balanced diet is characterized by variety, suitable combination and adequate quantity of foods rich in nutrients and low in energy.

2. Eat plenty of cereal products and potatoes

Bread, pasta, rice, grain flakes, preferably made of whole grain, and potatoes contain nearly no fat, but plenty of vitamins, minerals, trace elements as well as dietary fibre and phytochemicals. If possible combine these products only with foods low in fat.

3. Fruit and vegetables - take "5 a day"

Eat 5 portions of fruit and vegetables a day, if possible fresh, cooked for a short time only or in form of juice - ideally along with each main meal and also in between meals: That way you'll get plenty of vitamins, minerals, dietary fibre and phytochemicals (e.g. carotenoids, flavonoids). That's the best you can do for your health.

4. Milk and dairy products daily, fish once to twice a week; meat, sausages and eggs in moderation

These foods contain essential nutrients, e.g. calcium in milk, iodine, selenium and omega-3 fatty acids in saltwater fish. Meat is favourable because of its high level of available iron and of the vitamins B1, B6 and B12. However, 300-600 g of meat and sausages per week are sufficient. You should choose low-fat products; this applies to meat and dairy products in particular.

5. Low-fat diet

Fats supply with essential fatty acids, fat soluble vitamins and energy. Too much fat from food can promote overweight and probably cancer. Too much saturated fatty acids promote, in the long run, cardiovascular diseases. Prefer oils and fats from plants (for example canola oil or soybean oil and margarine with this ingredients). Watch out for invisible fat in some meat products, dairy products, biscuits and sweets and also in various fast food and convenience products. Restrict your dietary fat to 70-90 g per day.

6. Sugar and salt in moderation

Food and beverages containing sugar and sugar substitutes should be consumed only occasionally. Be creative in using herbs and spices. Add little salt. At any rate use iodized salt.

7. Plenty of liquid

Water is vitally necessary. Make sure your daily liquid ration is about 1 ½ litre. Prefer water - carbonated or not carbonated - and other beverages low in energy. Alcoholic drinks should be consumed only occasionally and if, in small amounts only.

8. Make sure your dishes are prepared gently and taste well

Cook food at low temperatures, if possible for a short time only, use little water and little fat. This will preserve the food's natural taste, protect nutrients and prevent formation of harmful compounds.

9. Take your time and enjoy eating

Eating consciously helps to eat healthy. Arrange dishes attractively. Take the time for eating. It's fun, makes you aware of the great freedom of choice and promotes the feeling of satiation.

10. Watch your weight and stay active

A balanced diet, plenty of physical activity and sports (30-60 min/d) fit together. Proper weight improves your well-being and promotes health.

A well-balanced diet keeps one healthy and promotes efficiency and well-being. The German Nutrition Society has established 10 guidelines based on most recent scientific knowledge. They will help you to stick to a healthy diet and still enjoy food.

Fig. 2. The 10 Nutrition Guidelines.

Physical, Social and Technological Aspects – 10 Nutrition Guidelines

In addition to distinct nutritive aspects, the *10 Nutrition Guidelines* (fig. 2) consider important factors of life-style (e.g., eating out, wellness), physical activities (recommendation to regularly perform sports), and household (e.g., food processing, storage). This one-page flyer can be easily understood and brought into practice by the consumer. In contrast to the *Nutrition Circle*, the *Nutrition Guidelines* do not only focus on the 'optimal behavior' but give more 'real' advice to follow a wholesome diet and lifestyle in daily routine.

Qualitative Aspects – the 3D Food Pyramid

Graphs are mandatory educational tools for a successful dissemination of nutritional knowledge. Pyramids, circles and other geometric forms are frequently used to help consumers in realizing nutritional guidelines [5, 6]. In recent years, the number of graphs published has increased tremendously, but unfortunately it is not always possible for the consumers to follow the rationale behind them. Presently available illustrations show obvious cons: provision of only quantitative (amount/portions of foods; see *Nutrition Circle*) or qualitative information (ranking of foods), space limitations, specific target groups (adolescents, young consumers) are not reached. Consequently, the DGE decided to establish a new graphic tool (3D

Fig. 3. The 3D Food Guide Pyramid, 2006.

Food Pyramid) (fig. 3) adding important qualitative information for an adequate food choice. Qualitative ranking of food is based on the so-called 'metabolic' approach: consideration of actual data from epidemiological studies describing metabolic and clinical effects of distinct foods and/or food classes [2].

The square base of the *3D Food Pyramid* represents the *Nutrition Circle* (quantitative approach; see above) but condensed to four food classes. The four sloping sides are set to qualitatively rank products (shown as pictures/icons). On the basis of selected criteria, foods were placed on the bottom (green: preferential use), in the middle (yellow: use frequently) and on the top (red: use sparingly) of the triangle.

Foods of mainly plant origin (including cereals, bread and pastries): Major nutritive criteria for the qualitative ranking were energy density and the presence of physiologically valuable substrates like phytochemicals and dietary fiber. The glycemic index was only of minor importance. Preventive effects of distinct foods on the prev-

alence of chronic diseases were additionally considered. At the bottom of this side and, thus, to be consumed in larger quantities, fruits and vegetables are placed (generally low caloric, high in bioactive substrates). The second level is reserved for full bread, potatoes and low fat potato products, rice and white bread. Sweets and energy-rich snacks are at the top and should be consumed sparingly.

Foods of mainly animal origin (including meat, milk and fish products): The nutritional quality within this food class is assessed on the basis of energy density, fat content, fatty acid composition (content of essential fatty acids) and nutrient density with respect to calcium, iron, zinc, selenium, and vitamins B₁, B₂, B₆, B₁₂, and D. Similar to the evaluation of plant-derived food, preventive aspects from epidemiological studies with respect to chronic degenerative diseases were taken into account. The broad basis of the triangle is formed by fish, low-fat milk products, lean red and white meat. With decreasing physiological quality, foods like full-fat milk products/cheese,

fat meat and meat products, eggs and bacon are ranked at the top.

Fats and oils: In addition to the fats delivered by foods of plant and animal origin, this food group should provide only 3% of daily total energy consumption. Decisive criteria for the qualitative assessment were the fatty acid composition (saturated, monounsaturated and polyunsaturated fatty acids; trans-fatty acids; ratio n-6:n-3) and the ratio of vitamin E to the number of double bonds present. In addition, practical aspects (use of oils/fats in cooking) as well as preventive aspects have been considered. Plant oils from canola, olives, soy, walnuts should be preferably chosen, followed by maize and sunflower oil.

Beverages: Assessment of quality was mainly based on energy density (% carbohydrates/l), content of bioactive substrates, glycemic index and caffeine content. At the bottom energy-free beverages (tap/mineral water, sugar-free fruit and herbal teas: consumption not limited) are placed. The yellow color was given to beverages with a carbohydrate concentration <70 g/l (7%; tea/coffee with added sugar, juices diluted with water, alcohol-free beer). The top (use sparingly) of the triangle is occupied by high-calorie beverages like so-called energy drinks and soft drinks. Alcoholic beverages are not considered due to the known risks for abuse.

First tests with target groups (health professionals, teachers, young consumers) showed a high rate of acceptance and demonstrated successful use of this new model in an interactive mode. In addition to computer applications and animations, two-dimensional versions ('nutrition compass') are produced as paper prints and folders.

Summary and Conclusions

In Germany, nutritional knowledge is successfully disseminated using different validated instruments which are based on actual scientific evidence. Quantitative aspects can be easily enlightened with the help of the *Nutrition Circle*. That lifestyle is an important factor to stay healthy is transported using a flyer wording *10 Nutrition Guidelines*. The *3D Food Guide Pyramid* is an encouraging new instrument to establish new teaching programs with a high level of acceptance. Within the concept it is planned to establish target-specific food guide pyramids, e.g. for adolescents, aged persons (considering gender), people with increased physical activity and others. Using modern communication technology, it will be feasible for the consumer to download an individual pyramid considering age, gender, physiological and socio-economic situation.

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