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Concepts of Health Maintenance and Promotion: Integrating Nutritional and Botanical Products

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DIETARY/FOOD SUPPLEMENTS AND HEALTH PROMOTION

Dietary/food supplements are products taken by mouth and intended to complement or increase the intake of nutrients and/or other bioactive components present in the diet. Supplements are marketed for their beneficial biological effects and influences on the structure and/or function of the body. Thus, it is appropriate to position the role of supplements in the context of programs directed to keeping people healthy. The World Health Organization (WHO) defines health broadly as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity'.[1] Based on this concept, the WHO then defines health promotion as "the process of enabling people to increase control over their health and its determinants". This process includes a range of environmental and social interventions that act to engage and empower individuals as well as communities to adopt healthy behaviors.

When considering the population as a whole, the approaches used to promote health and their intensity change across the lifespan and are directed to supporting functional ability and intrinsic capacity, particularly across the second half of the life course. Functional ability comprises the health-related attributes that enable people to be and to do what they have reason to value. It is made up of the intrinsic capacity of the individual, relevant environmental characteristics and the interactions between the individual and these characteristics. Intrinsic capacity is the composite of all the physical and mental capacities of an individual. During adolescence and young adulthood, there is a period of relatively high and stable capacity, though promoting it to optimal levels and maintaining it for as long a period as possible are dependent on promoting good nutrition, physical activity, safe environments, and education. Subsequent declines in capacity are not exactly defined by age, though older people will mostly be found in these phases. However, it is important to note that the trajectories differ markedly among individuals, influenced significantly by environmental factors affecting health. The needs of people in these phases of the life course are used to help frame public-health actions that should be applied, particularly by building personal skills and knowledge, along with broader environmental strategies and health systems to detect and control risk factors for disease early.

APPROACHES TO HEALTH MAINTENANCE AND PROMOTION

Most efforts to maintain and/or promote health address social determinants can prevent or influence modifiable risk behaviors. Social determinants of health include cultural, economic, and political conditions. Modifiable risk behaviors are well known, with examples including poor eating/nutrition, physical inactivity, and tobacco use. While there are numerous programmatic approaches to health maintenance and promotion, common features of most involve: (a) raising awareness of healthy behavior via communication; (b) empowering behavior change through education to increase knowledge about modifiable risk factors; (c) regulations or policies that mandate public agencies or organizations to encourage healthy decision-making; and (d) changing environments or structures such that healthy choices are more readily available.[3]

Health maintenance and promotion programs, often including goals for disease prevention, are based on an array of often-overlapping theories and models that can be useful for planning and evaluation efforts. For example, the Stages of Change (or Transtheoretical) Model structures interventions for how an individual or community integrates new behaviors and goals at each of several stages: (a) pre-contemplation, when there is no intention of taking action; (b) contemplation, when intentions and plans to take action are considered; (c) preparation, when intentions to act are realized with some initial steps; (d) action, when behavior changes for a short period of time; (e) maintenance, when behavior has been changed and continues long-term; (f) termination, when there is no desire to return to previous negative behaviors.[4]

Ecological models take into account multiple levels of interaction and interdependence of key physical and sociocultural factors influencing personal health behaviors such as: (a) intrapersonal attitudes, beliefs, knowledge and personality; (b) interpersonal interactions which can provide social support or create barriers to interpersonal growth; (c) institutional regulations and policies as well as informal structures that promote or constrain healthy behaviors; (d) formal or informal social norms of the community that can enhance or limit healthy behaviors; and (e) local or national laws and policies the regulate or support health actions such as early detection, control, and management of health matters.[5,6]

The Health Belief model has been used to guide health promotion and disease prevention programs by focusing on individual beliefs about health conditions, which predict individual health-related behaviors.[7] Key components of the model require gauging the presence of perceived susceptibility, perceived severity, perceived benefits of action, perceived barriers to action, cues to action, and sense of self-efficacy among the target population. This allows for a determination as to how best to: (a) convey the consequences of the health issues associated with risk behaviors; (b) communicate to the individual or group the steps involved for taking a recommended action and highlighting its benefits; (c) provide assistance in identifying and reducing barriers to action; and (d) promote skill development and provide support that enhances self-efficacy.

The Social Cognitive Theory is grounded on how people learn from their own individual experiences.[8] This approach focuses on the person: (a) believing that he/she has control over and is able to execute the behavior, i.e., self-efficacy; (b) understanding and having the skill to perform the behavior; (c) expecting the behavior will determine the outcome; (d) valuing the outcome of the behavior change; (e) regulating and monitoring the behavior, i.e., self-control; (f) observing the outcomes of others performing the behavior; and (g) providing oneself or receiving reinforcing incentives or rewards for the behavior change.

Although public-health strategies are tailored to the structure and needs of the population as a whole, as noted above, health maintenance and promotion are best considered as being person-centered with recognition of where each resides on a continuous trajectory of ability and capacity. The interaction between the individual and his/her environment results in trajectories of both intrinsic capacity and functional ability.

NUTRITION, SUPPLEMENTS, AND HEALTH PROMOTION

Guidelines are promulgated by many countries as part of health policies to promote positive changes in eating behaviors, ensure that nutritional needs are met, and reduce the risk of conditions associated with poor dietary patterns.[3] It is widely appreciated that positive changes in individual diet and physical activity behaviors, and in the environmental contexts and systems that affect them, can substantially improve health outcomes. Dietary guidelines are also used by government officials and health professionals to develop relevant programs, policies, and communications for individuals and communities. Nonetheless, dietary guidance, particularly through actions to educate individuals and communities, has not successfully changed dietary patterns. This situation is widely recognized and, in some countries, has resulted in mandatory fortification of foods such as iodine in salt, vitamin A in milk, and folic acid in refined flour. Nonetheless, significant shortfalls in the intake of vitamins and essential minerals are common. The term "hidden hunger" has been coined to denote a chronic lack of micronutrients whose effects may not be immediately apparent but whose consequences may be long-term and profound.[9-11]

MICRONUTRIENTS IN HEALTH PROMOTION

There is a broad consensus that the control of vitamin and mineral deficiencies has the potential, if fully implemented, to offer one of the greatest opportunities to improve lives and accelerate development at a low cost and in a short period of time.[12,13] However, it is often underappreciated that this is not simply a question of treating severe deficiency in individuals or specific communities but of the need to reach out to whole populations to protect them against the consequences of the subclinical conditions associated with inadequate intake and its associated consequences. It is a common misperception that people residing in the developed countries of the world eat a nutritionally balanced diet and are not prey to hidden hunger, the state of being adequately fed but undernourished due to the lack of micronutrients. However, this is not the case; indeed, the current prevalence of hidden hunger in these regions gives cause for concern.[10-13] For example, the Dietary Guidelines for Americans 2015-2020 note more than 85 percent of adults in the United States consume less than the Estimated Average Requirement (EAR) for vitamins D, E, choline, and potassium; more than 40 percent consume less than the EAR for vitamins C and K as well as calcium and magnesium.[14] Underconsumed nutrients are more numerous and greater among vulnerable populations such as older adults and those with a low socioeconomic status.[2,15,16] Importantly, nutrient shortfalls have been found to be less prevalent among those who consume fortified foods and, more markedly so, among those who chose supplements.[17,18] The value of supplementation as both a personal and public health approach has been noted, with particular emphasis on vulnerable populations (e.g., in infants, older adults, and pregnant women) and at-risk groups, including those with food insecurity, obesity, restricted or suboptimal eating patterns, and on certain medication regimens.[19-21]

CONTRIBUTION OF SPICES AND BOTANICAL PRODUCTS TO HEALTH PROMOTION

While the vital importance of micronutrients to health promotion is universally accepted, less attention is provided to other bioactive dietary components, particularly those derived from plant foods. For example, many plants are used as culinary spices as well as flavorings and colorants in foods and, importantly, many of these same plants are also used as ingredients in dietary supplements, though attending regulations in each case are different.[22] Botanicals used as spices include leaves of bay, rosemary, and sage; seeds from flax and fenugreek; dried fruit of black pepper, cayenne pepper, and paprika; bark from cinnamon; roots from chicory and licorice; rhizomes of ginger and turmeric; bulbs of garlic; flowers of saffron; and flower buds of clove. Some putative key bioactive principals of selected common spices and some of their effects on the structure/function of the body are listed in the table below.

Spice	Plant Name	Putative Bioactive	Structure/Function
Cayenne	*Capsicum annuum*	capsaicinoids	chemoprevention, thermogenic
Cinnamon	*Cinnamomum*	cinnamaldehyde, cinnamic acid, cinnamate	antibacterial, anti-inflammatory, glucoregulation
Garlic	*Allium sativum*	Allicin, alliin, diallyl polysulfides, S-allylcysteine	antioxidant, endothelial function, immunoregulation
Ginger	*Zingiber officinale*	gingerols, shogaols, zingerone	antiemetic, endothelial function, sialaogue
Pepper	*Piper nigrum*	Piper nigrum	endothelial function, nootropic, thermogenic
Rosemary	*Rosmarinus officinalis*	camphor, rosmarinic acid, caffeic acid, carnosol	antioxidant, endothelial and gastrointestinal function
Tumeric	*Curcuma longa*	curcuminoids	anti-inflammatory, chemoprevention, detoxification, nootropic

As noted above, a key element of most approaches to health promotion and health maintenance involve efforts to empower the individual through self-efficacy - that a person's beliefs regarding his or her power to affect situations strongly influences both their power to effectively face challenges and make good choices, particularly with regard to behaviors affecting health.[4] Personal belief systems often incorporate feelings and perspectives drawn from facets of traditional culture, including cuisines (and culinary spices) and also indigenous medical practices, e.g., as found in China (Traditional Chinese Medicine) and India (including Ayurvedic, Siddha, and Unani practices) and among Native American tribal healers with their integral use of herbal products. Thus, an impact on self-efficacy can be drawn from these cultural beliefs within a community to enable individuals to increase control over their health. Interestingly, recent definitions of health include concepts of personal satisfaction as well as the ability to adapt and self-manage.[23-25] These notions are fully compatible with the definition of health by the WHO which includes mental and social well-being and suggest that botanical products can be incorporated as an integral component of self-efficacy regarding functions such as mood, cognition, and resilience. For example, current research efforts are employing dietary supplements and food-related behavioral change therapy to prevent depression in individuals who are overweight and have elevated depressive symptoms.[26]

In considering mental health and social well-being as part of health promotion, it is worth noting the tendency among some public health officials and governments to reduce health promotion to health education and social marketing focused on changing behavioral risk factors. However, among the early conceptions of health promotion was the overarching goals of empowering people to change their lifestyle to move toward a state of optimal health and working to inform, influence, and assist individuals to become more responsible and active in matters affecting their mental and physical health – not just to reduce the risk of one or more chronic diseases.[27] Thus, the opportunity to include self-efficacy toward a function like cognitive performance through the personal use of botanical nootropics, including Huperzine-A (*Huperzia serrata*), Lion's Mane (*Bacopa monnieri*), Ginkgo (*Ginkgo biloba*), and artichoke extract (*Cynara cardunculus*), should be recognized as part of health promotion.

Botanicals provide a variety of general and condition-specific benefits to health promotion with indications (and selected examples) such as alteratives (sometime called herbal blood purifiers) to support immune function (*Echinacea angustifolia*; Red Root, *Ceanothus americanus*); bitters to stimulate appetite and digestion (Dandelion, *Taraxacum officinale*; Gentian, *Gentiana lutea*); calming herbs and nervines to support the nervous system (Skullcap, *Scutellaria lateriflora*; Valerian, *Valeriana officinalis*); and demulcents for respiratory health (Chia seed, *Salvia hispanica*; Mullein, *Verbascum sinuatum*).

Adaptogens present a particularly relevant category of botanicals because resilience is an inherent component of health promotion and maintenance and can be augmented by botanical adaptogens (also called rasayanas in Ayurveda) that act to stabilize physiological processes and promote homeostasis, including a decreased cellular sensitivity to stress. Thus, within the notion of self-care, adaptogens may serve to reset adverse conditions to allow a more ready adoption of the behavioral aspects of self-efficacy. While clinical and regulatory definitions of adaptogens vary, among those botanicals where there is a broad acceptance of their classification in this category are American Ginseng (*Panax quinquefolius*), Ashwagandha (*Withania somifera*), Asian Ginseng (*Panax ginseng*), Cordyceps (*Cordyceps sinensis*), Dang Shen (*Codonopsis pilosula, C. tangshen*), Eleuthero (*Eleutherococcus senticosus*), Green Chirayta (*Andrographis paniculata*), Guduchi (*Tinospora cordifolia*), Holy Basil (*Ocimum sanctum, O. gratissium*), Jiaogulan (*Gynostemma pentaphyllum*), Reishi (*Ganoderma ludicum*), Rhaponticum (*Rhaponticum carthamoides*), Rhodiola (*Rhodiola rosea*), Schisandra (*Scisandra chinensis*), Siberian Ginseng (*Eleutherococcus senticosus*) root, Shialajit (*Asphaltum bitumen*), and Shiitake (*Lentinula edodes*). It is interesting to consider the role of botanical adaptogens in the context of classical principles of homeostasis and biological evolution where health be defined as the ability to adapt to internal and external stimuli. Maintaining a balance in homeostasis within biological processes can be reflected by clusters of functional biomarkers (e.g., blood lipids, inflammation, oxidative stress) that are kept within a certain range. In case of the pathogenesis of chronic disease, there is an adaptation within physiological functions such that the individual can survive for a prolonged time, even without medication – but this does not mean the individual would be considered as healthy. Indeed, monitoring adaptive states for homeostatic disturbance is used for indicators of suboptimal health before clinical sign of disease are apparent.

CONCLUSION

There are numerous and complex barriers and opportunities for health maintenance and promotion through nutrition beginning with the individual within sociocultural and community contexts and extending more broadly to the agricultural and food industries, all of which are influenced by government policies and global circumstance. Understanding these inter-relationships will provide some insight into the future of dietary/food supplements in health maintenance and promotion.

An oft-cited statistic in public health is the huge investment made in medical care compared to a very small one invested in health promotion and disease prevention. This is despite the fact that over 40 percent of deaths are caused by behavior patterns, including diet as well as physical activity and smoking status, which could be modified by preventive interventions while less than 20 percent could be avoided by better availability or quality of medical care.[28] Dietary/food supplements present an efficient and effective intervention that is readily available and can prevent inadequate intakes of essential nutrients known to result in long-term and profound adverse consequences. Together with botanical products which have centuries of established use as culinary spices and herbal remedies, supplements address a broad variety of functional and structural parameters of the human body to permit a better state of physical and mental well-being.

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