Abstract

From the moment we are conceived until the time of our death, we maintain an ongoing relationship with food as it plays a major part in our lives. In America, we spend incredible amounts of money on healthcare, yet we continue to have one of the unhealthiest populations in the world. There seems to be disconnect amongst providers and the healthcare system about the effects food can have as a treatment. The aim of this analysis is to explore the essence of the concept *food as medication* using Walker & Avant's method and arrive at an operational definition of the concept. *Food as medication* is defined; attributes, antecedents, consequences, cases, and empirical referents are also included.

Food as Medication: A Concept Analysis

From the moment we are conceived until the time of our death, we maintain an ongoing relationship with food as it plays a major part in our lives. Because we are so familiar with food we often have a lack of appreciation for food's therapeutic benefits, simply seeing it purely as "fuel" for our bodies (McCracken, 2012). In America, we spend incredible amounts of money on healthcare, yet we continue to have one of the unhealthiest populations in the world. Chronic illnesses in America are taking their toll, and the World Health Organization (WHO) has reported that the major risk factors influencing our mortality are our patterns of living and our consumption ("Food as medicine," n.d.). Despite knowing the negative effects food can have on our health, most physicians are not required to receive training in school related to food and nutrition. In contrast, for thousands of years ancient Chinese, Greco-Islamic, and Ayurvedic medicine have addressed the consumption of food and spices to purify, tone, and heal the body or extend life (Chen, 2009).

One growing epidemic in America is obesity, which can lead to a number of other chronic illnesses. Many patients who deal with obesity are told by their provider to "eat less, exercise more," but food is much more than a mechanism for conveying calories. Food is a source of phytonutrients, plant chemicals that are molecules that interact with your biology. Research in the field of nutrigenomics is showing that food programs your body with message of health or illness, having an effect on your DNA (Hyman, 2011). Dr. Dean Ornish has shown through research that lifestyle changes, mainly our specific food intake, can change our genes. This includes turning on protective genes and turning off genes that promote inflammation, oxidative stress, and oncogenes that promote prostate cancer, breast cancer, and colon cancer.

Western doctors turn to medication too quickly and dealing with stress and changing the diet can be far more powerful. Yet, there seems to be disconnect amongst providers and the healthcare system about the effects food can have as a treatment (Weil, 2016). For those healthcare providers that do realize the medicinal effects of food, many different terms are used: food pharmacology, food as medicine, functional medicine, culinary medicine, etc. While researching these terms, none were found to have an adequate definition. Thus, the aim of this concept analysis is to explore the essence of the term *food as medication* and arrive at an operational definition of the concept. Initially this analysis contained three case presentations to assist in explaining the concept: model case, borderline case, and contrary case. These were removed from this summary to save space.

Definitions and uses of the concept

In order to identify an operational definition of the concept *food as medication*, a basic online analysis of the definitions of each individual term was performed. Perhaps the simplest definition of medication found was: "administration of remedies" (Medication, 2005). The more specific definition found was: "a drug or other substance used to treat disease or injury; a medicine" (Medication, 2007). Dictionary.com defines food as: "any nourishing substance that is eaten, drunk, or otherwise taken into the body to sustain life, provide energy, promote growth, etc." While these are adequate definitions to describe the entire realm of food, they will not be specific enough on their own to effectively describe the concept. These definitions provide a foundation to define the concept: that food is a material people eat (with specific nutritional qualities) required by our bodies for growth, repair, and energy, used as a medication to treat disease or injury.

Defining Attributes

After reviewing literature, some common themes were presented that allude to the essence of this concept. While the idea that foods provide therapeutic benefits has been embraced for over 2500 years, this philosophy fell into relative obscurity in the 19th century when modern drug therapy was introduced. When the importance of diet in disease prevention and health promotion resurfaced, the focus of the early 20th century was on identification of essential elements (vitamins) related to nutrient deficiencies. The emphasis on deficiencies shifted in the 1970s over concern related to diseases linked to over-nutrition (Hasler, 2002). Using food to treat nutritional deficiencies and/or over-nutrition is still a common theme related to *food as medicine/medication* as a concept. Adjusting intake in relation to calories, fats, carbs, sugar, etc. can be used to treat a person experiencing effects from being under weight, the effects from being obese, effects of diabetes, coronary artery disease, and many other altered physiological states. Therefore this theme is relevant to the concept, which should include the importance of nutrient regulation in its definition.

Another main theme addresses physiological effects some foods have on the body that may treat or prevent disease (not related to nutrient content). Several examples are present in literature describing unique compounds in certain foods that can elicit physiological responses: For example, tomatidine (in green tomatoes) is a powerful stimulator of skeletal muscle growth and may treat age related muscle atrophy (Dyle et al., 2014). Polyphenols have been found to neutralize free radicals that can damage our cells and DNA (Scalbert, Johnson, and Saltmarsh, 2005).

While searching for themes related to the concept in question, another term was discovered in the literature that was similar in nature to *food as medication*. The term *functional foods* (also called nutraceuticals) was found to be very similar to the concept of *food as medication*. *Functional food* originated in Japan in the 1980s to describe foods that had advantageous physiological effects. A recent definition from The Functional Food Center defines *functional food* as "natural or processed foods that contains known or unknown biologically-active compounds; the foods, in defined, effective, and non-toxic amounts, provide a clinically proven and documented health benefit for the prevention, management, or treatment of chronic

disease" (Martirosyan & Singh, 2015). At first glance, this definition appears to incorporate all of the qualities of the concept *food as medication* and, if that were true, would eliminate the need for an additional concept. However, upon further research, the term functional food is also used interchangeably today with the term nutraceutical. Nutraceuticals are supplements that do have health benefits, however many are synthesized in a lab to resemble a naturally occurring substance. Therefore, they are not a purely chemical compound as a pharmaceutical is, but many are not the same as the natural compound either. While these supplements may be of benefit, the aim of this analysis is to describe the effects from foods in their natural form. Similarly, the definition for functional foods includes the term "processed." Studies have shown that chronic illnesses are often times a direct result of eating too many unnatural, processed foods in place of natural foods ("Food as medicine," n.d.). The definition for functional foods will be very similar, but not identical to the definition of *food as medication*.

Using the definitions of the terms food and medication, in addition to the themes present in literature and terminology presented in the definition of *functional foods*, a theoretical definition of food as medicine can be provided. The concept *food as medicine* in this analysis is defined as: replacing poor, processed and/or damaging food choices with natural foods in one's diet (whether for nutrient regulation, known or unknown biologically-active compounds, or both) in defined, effective, and non-toxic amounts, that have proven and documented health benefits related to the prevention, management, or treatment of acute or chronic disease.

Antecedents

Antecedents "are those events or incidents that must occur prior to the occurrence of the concept" (Walker & Avant, 2005). There are a number of antecedents related to the concept of food as medication. Due to space constraints, antecedents will be listed and not further explained in this summary: the presence of an individual; motivation for using food as medicine (prevent disease, maintain wellness, or treat disease); proper education related to what to eat, how much to eat, when to eat, etc; a healthcare provider knowledgeable in using food as medication; locally grown (ideally fresh) fruits and vegetables that have traveled the least amount of distance to the table and supplement with frozen when needed (Hefferon, 2012); access to fresh foods (transportation, money, store or market); and finally, a means to wash (clean water), process (knives, cutting board, etc.), and cook (working stove/oven/microwave, knowledge on how to cook) the food. If food is being used as medication to treat a chronic disease, then an individual must have a way to monitor the effects the treatment has on the chronic disease (blood work, radiology studies, etc.).

Consequences

Consequences related to a concept are defined as "those events or incidents that occur as a result of the occurrence of the concept" (Walker & Avant, 2005). The consequences related to this concept are straightforward and simple relative to the number of antecedents and can be broken down into three categories. If the concept is being used as a means of preventing disease, then the outcome would be that the individual remains disease free. If it is being used as a means to maintain health, then an individual would feel, look, and act healthy (as well as remain free from any new diseases). If the concept is being used as a treatment for disease, then the

consequence would be some positive effect on disease treatment; slowing, stopping, or eliminating the disease. A secondary consequence would be a parent making the same dietary changes for their children and/or spouse, allowing them to prevent disease or maintain health as well.

Empirical Referents

Testing the effectiveness of the concept food as medication first depends on which aspect the concept is being used for: prevention, health maintenance, or treatment. Prevention and maintenance may be difficult to prove, as the main quantifiable outcome would be the absence of poor health and disease. Measuring treatment outcomes, however, is much easier to quantify and a number of published studies have tested the essence of the concept of using *food as medication*. For example, one study tested the effects of intensive nutrition and lifestyle intervention on men with prostate cancer. Researchers found through pathway analysis that significant modulation of biological processes occurred (that have critical roles in tumorigenesis), in addition to improvement in participant's weight, abdominal obesity, blood pressure, and lipid profiles (Ornish et al., 2008b). Another study evaluated the effect of diet and lifestyle changes on telomeres and telomerase activity. Telomeres are protective DNA-protein complexes at the end of linear chromosomes. Shortening of telomeres has been linked to disease risk, progression, and premature mortality in many types of cancer. While the sample was relatively small (30 participants), the study results suggested an association with these changes and an increase in telomerase activity and telomere maintenance (Ornish, 2008a). A third example of the effectiveness of using food as medication is from a study using pomegranate juice. Pomegranate juice contains many biologically active compounds that have been shown to have anti-atherosclerotic properties in mice and humans. Researchers in this study tested the effect of drinking 240ml per day of pomegranate juice on 45 participants with coronary heart disease. Stress induced ischemia was tested on each participant before and after 3 months of treatment. After three months, participants showed an average increase in myocardial profusion of 17% compared to the control group who showed an average worsening of profusion by 18% (Sumner et al., 2005).

Conclusion

Often called the "father of medicine," Hippocrates is frequently quoted as saying the following 2500 years ago: "let food be thy medicine, and medicine be thy food." Using food as medication is a unique concept in that its essence has been around for thousands of years, but is only recently becoming the focus of more in depth analysis by researchers, especially in America. There is no debate regarding the unhealthy nature of the Western diet, yet there is still lack of agreement on what a healthy diet should look like (Weil, 2016). Perhaps more concerning is the fact that there are a number of foods that have been shown to elicit advantageous physiological effects in the body, yet the majority of healthcare professionals lack training in food and nutrition. This analysis attempted to define the concept of *food as medication*, where a specific definition seemed to be lacking in the literature. This is important for Nurse Practitioners because if the profession intends to reduce the high healthcare costs that currently aren't leading to positive outcomes, they need to understand the relationship human beings have with food, and the effects certain foods have on our bodies. Unhealthy eating has been shown to be the cause of

many chronic illnesses present today, and synthesized medications aren't fixing the problem. Perhaps using food as medication, utilizing the healing properties of food, and the healing response our bodies exhibit when stimulated by certain foods, will tip the scales in healthcare from negative outcomes to positive ones.

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