Fact Versus Fiction Organic Health Benefits

The organic industry is booming worldwide. In 2014, it was reported that organic is an 80 billion dollar industry (Brantsæter, 2016). The sales of the organic industry are projected to continue to increase by 6% each year (UC Davis health, 2020).

Main message

While the organic movement began in Europe in the 1920s, the demand for healthier products has increased (Brantsæter, 2016). As a society we have begun to associate “organic” with healthy. The purpose of this research paper is in attempt to determine if the consumption of organic food is connected to health benefits. Is this fact or fiction?!

Literature Review/ MNT

Regulations have been set in place in an attempt to help regulate the organic industry. The regulatory organization, the International Federation of Organic Movements (IFOAM) which was founded in 1972 (Brantsæter, 2016). This organization develops a strict set of standards used in classifying products as organic. Products that are labeled “100% organic” must contain only organically produced ingredients Products labeled “organic” must contain at least 95% or organically processed ingredients (the remaining 5% of ingredients must be on the USDA's approved list) (Forman, 2012). There is also a fee involved with certifying products as organic. These guidelines and labeling procedures can help direct consumers to products that align with their beliefs, however it has also evolved to become a misleading tool in the case of foods that are processed. Processed foods that are labeled “made with organic ingredients” must contain at least 70% organic ingredients and may list up to three of those products on the front of their package (Forman, 2012). Processed food companies using organic ingredients are using these labels as marketing, which sways the consumers to believe they are making a more health-conscious choice. However, it is important to look at the big picture. The effects of pesticides on human health has drawn overwhelming public health interest.

Organic food has been shown to cost between 10-40% more than its conventional counterpart (HHP, 2015). This is primarily linked to the increased cost of organic animal feed, higher labor costs, and overall lower productivity (Forman, 2012). Due to its higher price point, consumers generally have higher income and education levels. Consumers that are white tend to purchase organic food at a higher rate than consumers who are African American (Brantsæter, 2016). Families with children and adolescents are more likely to buy organic food as well (Forman, 2012). Females tend to purchase organic food more often, as well as those who consume a higher ratio of plant to animal foods. There is a strong link to vegetarian and vegan consumers. These consumers tend to be more health-conscious overall, more physically active, and at a healthier weight than their counterparts at baseline (Vigar, 2019).

It is first critical to keep in mind that while epidemiologic studies can demonstrate statistically significant associations between exposures and health outcomes, this does not necessarily prove a causal relationship. There is a body of research to support that compositionally, organic foods differ a bit from conventional foods. However, few studies exist to confirm or deny the

effects of these compositional differences on human health. Macronutrient composition has little variation in almost all studies (Vigar, 2019). While some studies attempted to connect these compositional differences directly to disease states, none have been successful in finding both statistically and clinically significant differences (HHP, 2015). Below I will outline what the research is suggesting:

Considering animal products such as dairy and meats, the compositional variations primarily reflect differences in animal feed. In organic milk and dairy, a majority of the feed should be locally produced grass and clover, which is higher in omega-3 content. Conventional feed typically consists of soy, palm kernel cake, and cereals which have lower omega-3 content. As a result of this, one study demonstrated that organic milk consistently contained more omega-3 fatty acids and has a more beneficial ratio between omega 6 to omega 3 fatty acids than do conventional dairy products. On the other hand, organic milk was found to generally contains less iodine than conventional milk. These same compositional differences were seen in organic meat and eggs, and also linked to the feed of the animals as well (Brantsæter, 2016).

Many of the studies I reviewed found that organic fruits and vegetables had lower concentrations of nitrates and higher concentrations of iron, magnesium, phosphorous, zinc, vitamins C, as well as higher concentrations of other bioactive compounds such as carotenoids and tocopherols which have been shown to have positive effects on health. Organic produce has also been shown to have higher concentrations of secondary plant metabolites such as phenols and flavonoids, some of which are have been shown to provide benefits to human health. In one study, there was evidence to support 27% higher content of ascorbic acid in fruits and vegetables. This same study found evidence to support 21% higher iron levels, 29% higher magnesium levels, and 13.6% higher phosphorus levels in organic vs conventional fruits and vegetables. While these findings are attention grabbing, it is important to acknowledge that over the last 50 years, vitamin C, phosphorus, iron, calcium, and riboflavin content has been declining in conventional foodstuffs grown in this U.S overall. Perhaps due to decreasing biodiversity and soil quality of conventionally grown crops (Crinnion, 2010).

Studies have shown lower concentrations of proteins and amino acids to be found in organic cereal crops. The explanation here was linked to lower nitrogen input and availability in organic crop production. While one major concern of organic cereal crops is contamination by mycotoxins and fungal metabolites that have adverse effects in humans, animals, and crops, most studies show no difference between organic and conventional cereals.

While other organic products on the market exist aside from food, The National Research Council reported in 1993 that the primary form of exposure to pesticides in children is through dietary intake (Forman, 2012). It has been generally accepted that dietary intake of pesticides is not considered to pose a health risk to consumers as long as individual pesticide concentrations in foods are below the Maximum Residue Level (MRL) (Vigar, 2019). However, few studies look at effects of chronic low level exposure. One study shows evidence from a cohort with long-term exposure to pesticides showing negative effects on health ranging from possible neurotoxicity to endocrine disruption (Vigar, 2019).

Organic foods have been proven to have lower levels of toxic metabolites such as organophosphates (OP), as well as lower levels of synthetic fertilizer and pesticide residues. One study attempted to look at pesticide metabolite excretion in subjects consuming organic food. They found up to a 90% decrease in metabolite excretion in the group fed the organic diet

in only a few days (Vigar, 2019).

One study reported higher occurrence of bacteria resistant to antibiotics in conventional as compared with organic chicken and pork (Brantsæter, 2016). If an animal is treated for disease with antibiotic agents, it cannot be sold as organic. This supports that idea that consumption of organic foods may reduce exposure to this antibiotic-resistant bacteria, and the threat of human diseases that go along with that (Forman, 2012).

Now I will outline what research has found about how consumption of organic foods related to disease states: Organic food has been studied under the context of allergies and eczema, reproductive anomalies in boys, preeclampsia, and cancer.

There are some studies to support the benefits of organic vs conventional food on the development of allergies or eczema in children. One study showed evidence that children fed only organic dairy products during infancy as well as children whose mothers consumed only organic dairy products during pregnancy had fewer allergies or fewer instances of eczema than did their respective controls (Brantsæter, 2016). In another study, consumption of organic dairy products resulted in a statistically significant advantage for lower eczema, those children consuming organic milk and milk products having a 36-per cent reduction in risk of having this allergic skin disorder (Crinnion, 2010).

There has been some conflicting research on reproductive anomalies in males as well. One study looked at infant boys with hypospadias. This study found evidence that mothers who consumed “any” organic food during pregnancy were less likely to give birth to a boy with hypospadias than were women who “never/seldom” consumed organic food. The evidence in this study was most strongly associated to organic vegetable and dairy products. The study further described the protective effect found in organic milk and butter (Brantsæter, 2016)

A few studies have been done on the consumption of organic food and the incidence of preeclampsia. Some studies showed that in pregnant women who reported frequent consumption of organic vegetables, there was a modest but significant reduction in the prevalence of preeclampsia, however, this association was not seen in other organic food groups (Vigar, 2019).

Researchers know that certain pesticides have carcinogenic properties at high levels (Newman, 2018).

Many studies have attempted to find a relationship between the consumption of organic foods and cancer, but few studies have shown promising evidence for reduced cancer risk. There has only been one study to find an association between consumption of organic food and decreased risk of developing non-Hodgkin lymphoma ($p = 0.049$), which was linked directly to the pesticides glyphosate, malathion, and diazinon (Newman, 2018). The highest degree of exposure to these pesticides was directly linked to the diet (UC Davis health, 2020). This study also linked consumption of organic food to lower risk of postmenopausal breast cancer (Brantsæter, 2016). However, it is important to look at the big picture.

There have been some studies looking at some explanations of compositional differences. These studies suggested composition varies among the geographic location of the farm, local soil characteristics, climactic conditions that can vary by season, maturity at time of harvest,

storage and time to testing after harvest (Forman, 2012). One study also determined that the length of time a plot has been using organic methods of farming also makes a difference in the composition of yield. This study argues that it takes years to build soil quality, which is another consideration of many of these studies (Crinnion, 2010). As mentioned earlier, composition of dairy and meat is strongly associated to what the animal eats. This too can vary based on time of year, and whether the farms are high input, which tend to supplement diets with vitamins and minerals, or low input, which tend to use low level mineral fertilizers (Forman, 2012). One study showed a higher level of heavy metals in crops grown in an open field compared to crops grown in a greenhouse due to possible atmospheric contamination suggesting a negative compositional effect of geographic location (Crinnion, 2010).

While we know from research that organic food may vary in composition a bit, and that consuming more organic foods decreases dietary exposure to pesticides, we do not know how it directly effects health. None of these studies have been well- designed, long term, or well controlled. In dietary research, it is incredibly difficult to homogenize the population. There are wide varieties in metabolic makeup, dietary preferences, and other environmental factors that need to be looked at in order to create a more well-designed study that convincingly connects organic food consumption to health status. In order to link consumption of organic foods, significant money and time needs to be put into research. Future studies need to be long term, controlled, and well monitored. In targeting specific disease states it is vital to consider ethics when designing future studies, and to try and focus on specific foods/food groups as much as possible to avoid any skewed results or uncertainty. Overall, while there are some intriguing leads available in current research, more large scale studies need to be conducted in order to draw any statistically and clinically significant results.

Where the research does show compelling research, however, is the effect of organic food on the environment. Organic farming has been shown to have less of an environmental impact when compared to conventional approaches (Forman, 2012). The basic principles of organic farming include rotation of crops, biodiversity in both plants as well as animals, freedom of animals to graze, a strong emphasis on soil quality using manures as well as compost to nourish the soil, as well as pest management without the use of synthetic pesticides (Brantsæter, 2016). Organic farms tend to produce less waste and use less energy overall. Because organic farms do not use or release pesticides into the environment, these farms have less (Forman, 2012) of an effect on soil, water, and wildlife as well.

Many believe that the use of pesticides to regulate crop yield is a strategy to ensure enough food production to feed the world’s growing population. One study found a 20% smaller yield from organic farms (Forman, 2012). However, this point was challenged. The largest prospective farming study to date is a comparative trial of more than 20 years’ duration conducted at Cornell University. Over these 20 years of observation, the organic fields had a productivity that was generally comparable to the conventional fields, while also avoiding environmental pollution with herbicides and pesticides and reducing fossil fuel consumption by around 30%. Although costs were higher due to the maintenance of these crops, the return for the organic plots was actually higher overall due to the higher prices put in place at the marketplace (Forman, 2012).

Conclusion

With the higher cost point of organic food, one potential concern is that the higher price of organically produced fruits and vegetables might lead consumers to eat less of these foods, despite the well-established literature documenting the health benefits of eating fruits and vegetables, including lower rates of obesity, cardiovascular disease, and certain types of cancer.

Another point of concern is that 55% of children born in the U.S. are eligible for supplemental nutrition assistance, which on average gives families around 10$ to spend each month on fruits and vegetables. For these families, allotted funds must used wisely to maximize fruit and vegetable consumption each month (Forman, 2012).

It is important for consumers to understand how to decode messages related to their health. The Environmental Working Group publishes a yearly guide to the fruits and vegetables with the highest and lowest concentrations of pesticides (EVG, 2020). An example can be viewed in tables 2 and 3. Knowing this information allows the consumer make more informed choices in the store, however it is also important to be aware of the potential this has on marketing as well.

Increasing consumption of organic foods can have positive implications towards the environment and may have certain health implications based on differences in composition, but those health implications need further research to be confirmed. As such it can be concluded that based on current research it is fictional to connect organic food to health benefits. As future RDs we should not focus on promoting or demoting organic foods, but rather on an increasing variety of the diet with a focus on whole foods rather than processed foods. Our job is to educate on overall diet quality! If asked about organic food, we should be able to provide science-based evidence about current research without leasing our clients one way or the other.