Review Article

Organic Food: The importance from public health perspective

ABSTRACT:

Non organic food and chemical intake has been linked to a number of diseases and illnesses including cancer, digestive dysfunction, headaches, ADHD (attention deficit hyperactivity disorder), prenatal deformities, a compromised immune system and early mortality. Organic foods are pesticide-free and it is beneficial for overall health. Organic farming initiated 1000 years ago, once medieval farmers began cultivating along riverbeds based on natural resources. Organic food and food products are finest healthy food which can be consumed without causing harm to body, soil nutrients, environment, or biodiversity. This approach quickly is becoming well-known because of its significance and importance from public health perspective covering 20 to 30 % of India's entire agricultural area. Organic farming is an ideal type of agriculture when compared to chemical-based agriculture, since it reserves integrity of soil and environment while also providing high-quality agricultural products for a healthy lifestyle such as fruits, vegetables, grains, pulses, and other foods. Now a days, the people are more concern about the nutritional quality of food. There is a need to do more research and analysis to rationalise the importance of organic food and food products which are more nutritious and healthful than nonorganic foods. The comparative aspects of organic vs nonorganic farming along with biodiversity and environmental benefits of organic farming have been focused in this study. The present study also focused on the promotion of organic food consumption and its benefits from public health perspective in the current scenario. The scope of organic food can be converted into revenue generation for better and healthier tomorrow.

KEYWORDS: Organic food, organic farming, public health, nonorganic food

1. Introduction

Organic foods are grown using agricultural techniques which meet traditional farming criteria. Organic farming term was coined by Lord North Bourne in the year 1839. Organic farming is characterized by the activities which recycle resources creates natural equilibrium, and protects biodiversity. Certain pesticides and fertilisers can be prohibited in organic farming procedures according to the guidelines of regulatory bodies which controls and regulate the organic food products. The regulatory bodies recommends that radiation exposure, industrial solvents and artificial food supplements should not be used in the processing of organic food. Organic food producers should not use synthetic fertilizer and pesticides [1]. Organic farming is carried out at the grass-root level which conserves the soil's biological and restorative potential, with good growth nourishment. It helps to produce the nutrient-rich and disease-resistant food [2]. Organic production is a type of biological farming that supports and improves diversification, the life cycle, and soil microbial properties [3]. Nowadays, organic food is getting more demand because people are more cautious about their health and aware about harmful effects of nonorganic food on health.

2. Harmful effects of nonorganic food produced by using chemical fertilisers and pesticides:

Pesticide production started in India in 1852 with the development of a facility near the BHC plant near Calcutta. Today India is Asia's 2nd largest producer of pesticides after China, and ranks 12th globally. Pesticide poisoning kills about 1 million people per year and causes life-long illnesses around the world [4].

Nonorganic food which is produced by using chemical fertilisers impacted human health such as immunological suppression, reduced intellect and reproductive deformities are becoming more common as a result of minimal dosage exposures. It also creates digestive dysfunction, headaches, ADHD (Attention Deficit Hyperactivity Disorder), prenatal deformities, early mortality and cancer. [4] A very important observation is noted about Non-Hodgkin’s lymphoma

that there is reduction of Non-Hodgkin's lymphoma risk in the people those regularly consume organic food as compared to those never consume organic food [5].

Pesticides control pests grown with crops; however, it causes a variety of health problems. As it contains organophosphorus. Organophosphorus is related to several health complications such as developmental complications considering ADHD (Attention Deficit Hyperactivity Disorder), autism, and increase prevalence of Non-Hodgkin lymphoma, multiple myeloma and low birth weight [5]. Organic food promotes a healthier lifestyle and prevents the diseases particularly for the children who might be exposed to pesticide and toxins during their physical, mental and overall development period. The fertilizers like nitrites react with tertiary amines creating nitrosamines, it is carcinogenic and mutagenic also causes gastrointestinal disease and leukaemia [6].

What is non-organic food? [7,8,9]

Non-organic food includes fruits, vegetables, and meats that have been farmed using synthetic pesticides, insecticides, and synthetic fertilizers. It also covers meat products that have been genetically or molecularly changed by the manufacturers.

Non-organic foods are produced via non-organic cultivation, which allows farmers to cross-breed crops to create high-quality fruits and vegetables. They are, however, permitted to do so within the confines of the government's approved limits.

Disadvantages of Non organic Food:

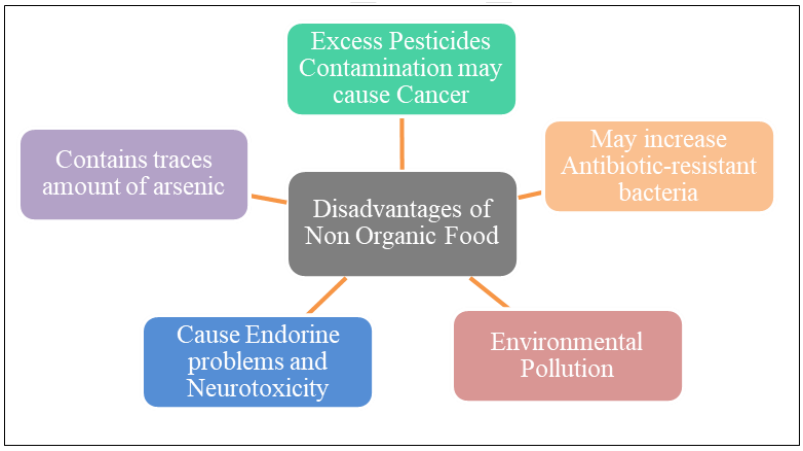

Fig 1: Disadvantages of Non organic Food

Non organic food may include hazardous chemicals such as preservatives which are used to extend shelf life of products cause's side effects. Pesticides in quite amount are used to grow the non-organic food. These pesticides can contribute to the high risk of certain types of cancer as an example leukaemia, prostate, lungs, breast, skin, etc. It may also increase the amount of bacteria resistant to antibiotics.

Pesticides from inorganic agriculture can contribute to increased contamination levels in the environment. Non-organic food intake over time can lead to endocrine dysfunction and neurotoxicity. Arsenic is naturally found in small amounts in soil. It's carcinogenic in some ways. Underground water contain arsenic can come in contact with non-organic substances; can cause serious harm to humans. Fig 1 shows the diagrammatic representation of disadvantages of non-organic food [7,8,9].

3. Impact of genetically modified crops and GMO food on health

GMOs are genetically modified organisms with changed genetic material which used to produce GMO food. GMO food causes poor brain growth, necrosis and digestive disorders. It is not good for health to eat over GMO foods. A genetically modified crop has negative impact on our body and affects our vital organs. It also affects soil, water ecosystem and environment [10].

4. Biodiversity loss due to modified farming practices

The biodiversity loss is alarming from the food security and human health point of view. Modifications in farming practices during the last century have had an adverse effect on agricultural ecosystems. Organically maintained farmland has 30 percent higher species richness than non-organically maintained farmland [11].

5. What is organic food?

Organic foods are cultivated and handled in a unique way from nonorganic food products. According to the USDA, organic foods promote the utilisation of sustainable energy supply and the conservation of soil and water in order to improve ecological sustainability for coming generations. Before a product can be marked as organic, it must be prepared without use of most standard pesticides, artificial intergradient fertilizers, or wastewater slurry. Companies that manage or prepare organic food must be validated by a Government-approved certifier before it reaches local supermarket or restaurant to ensure

that the farmer is obeying all of the essential requirements laid down by USDA for organic standards [12].

6. Nutritional value of organic food

Despite the lack of good medical evidence, organic food is assumed to have a higher nutritional content, the majority of study is observational, and clinical investigations on its health benefits are lacking. Antioxidants, phenolics, vitamins A, C, and E, potassium, phosphate, and nitrates, among other nutrients, are abundant in organic foods. Omega-3, fatty acids, and alpha linoleic acid (ALA) levels are reported to be higher in organic products. Vitamin C, iron, magnesium, phosphorus, and nitrate were all found to be in higher concentrations, according to Worthington. Organic foods are also claimed to include higher levels of omega-3 fatty acids and alpha linoleic acid (ALA).In organically cultivated veggies, Worthington found higher quantities of vitamin C, iron, magnesium, and phosphorus, as well as lower levels of protein, very little nitrate, and fewer heavy metals. Natural dairy items have higher concentrations of protein, ALA, total omega-3 fatty acid, cis-9, trans-11 conjugated linoleic acid, trans-11 vaccenic acid, eicosapentaenoic acid, and docosapentanoic acid, but lower concentrations of linked linolenic acid isomers (CLA) and trans- vaccenic acid (TVA) than standard dairy items, according to a recent meta CLA has been proven in animal models to have anti-carcinogenic, anti-atherosclerotic, anti-diabetic, and immunological properties that overlap. It's frequently assumed to alter the composition of bone mass. Rumenic acid, the most common isomer of CLA, and TVA levels were significantly higher in mothers who ate an organic lunch. In a recent systematic review, Vreek, et al discovered lower levels of protein, calcium, manganese, and iron in organically cultivated wheat flour. Protein digestibility improved dramatically when potassium, zinc, and molybdenum concentrations were increased. The chemical content of organic yellow plums was compared to that of commercial yellow plums by Lombardi-Boccia et al. The researchers identified only little variations in macronutrient levels, but significant variations in antioxidant vitamins such as vitamin C, vitamin E, carotene, and phenolic acid. Surprisingly, the levels varied depending on the type of organic farming; the antioxidant effect of organically farmed food is a considerable nutritional benefit. Consuming foods with high amounts of extra nitrates is harmful to one's health, whereas organic foods have fewer nitrates than processed goods [14]. Organic farming promotes environmental safety and helps to ensure the long-term stability of environmental risks such soil pollution. Despite the fact that this pesticide has been outlawed for several years, it has

been found in almost all waters, humans, and animals around the world. An organic food production system conserve fossil- fuel energy [10]. The vast majority of agricultural and animal goods are provided by a limited number of massive facilities and industrial sites which barely resembles farms, also more small rural farmers have been displaced because they are unable to support themselves financially [15].

7. Health benefits of organic food

7.1. Antioxidant content

Antioxidant content has been shown to contain a beneficial impact in a number of scientific studies, particularly those found in organic foods, because organic foods are independent of foreign chemicals which usually react with vitamins, organic compounds, and minerals, reducing the necessary significant impact of antioxidants in food. Antioxidants produced from organic food have a good effect on heart disease, cancer, visual problems, premature ageing, and cognitive dysfunction. Organic crops have greater antioxidant activity, ranging from 18 to 69 percent higher concentrations of a variety of distinct antioxidants, is already related to a lower chance of illness including cardiovascular and neurogenerative disease, as well as specific malignancies [16].

7.2. Boost immune system

Organic food contains increased levels of vitamins and minerals, which aid in the strengthening of the human immune system [3].

7.3. Improved Heart condition

The amount of CLA (Conjugated linoleic acid) detected in animal products rises when they graze on natural grass. Natural grass absorbs solar energy through photosynthesis, which is then turned into organic CLA by herbivorous feed. CLA is a cardiac fatty acid that has the ability to protect the circulatory system and is present in greater amounts in animal meats and dairy products [17].

7.4. Sperm count and Fertility

The researchers studied the sperm health and organic farming in Danish. They compared organic food consumer with nonorganic food consumer and noticed that there was high sperm cell count in organic food consumer than nonorganic food consumer [13].

7.5. Safety aspects of organic food

As per a survey conducted, 70% of people preferred organic food in order to prevent harmful effects of pesticides. Pesticide residue levels in organic food tend to be lower than in commercial nonorganic food. Nitrate level in organic food is lower. Organic food consumer gets protection from exposure to organophosphorus which can create many health problems [5].

Most of the other hazardous fertilisers and pesticides that we started using years ago to protect our food and increase its shelf life were approved until enough research proved that they were harmful. The majority of these substances have been confirmed to cause cancer and other chronic health problems. Initially, concerns were focused on cancer-causing substances; however, these carcinogens were linked to other major health problems such as Alzheimer's disease and prenatal defects [13].

7.6. Organic food is delicious and tasty with characteristic fragrance

Organic food has delicious taste which makes sense because fertile soil and plants produce the best tasty food. In a series of experimental studies, consumers who tried organic food preferred it than the processed and synthetic food. Fruits and vegetables have a much more rich in vivid flavour [15].

8. Environmental benefits of organic farming and organic food

8.1. Organic farming prevents water pollution

Organic farmers never use toxic chemical fertilisers and pesticides to cultivate the crops and hence, there is no pollution of soil/land and water as well. It also assists in soil conservation. The use of toxic chemicals should be reduced to protect the sustainability of our overall ecosystem [15].

8.2. Environment protection

Organic food facts to be considered as these are more evident, when we think of the environment aspects. Current nonorganic farming techniques were previously assumed to be safe, however, turned out to be incredibly harmful to our health and make soil infertile. Organic food production do not use any synthetic chemicals, thus, it don't pollute the soil and water. It does not contaminate the soil and water as well, on the other hand a lot of chemical fertilizers and pesticides are used in the commercial nonorganic farming. Pesticides and artificial fertilisers have been clinically demonstrated to be extremely harmful to the human health as well as the environment. The chemical fertilisers and pesticides harm not

only pests but also useful mammals and birds as well as having a negative impact on the ecosystem [15].

9. Organic food as a good source of revenue generation

The global organic food market has grown in the last two decades, with the largest consumers belonging from the United States, Germany, France, and Australia. Some of India's most popular organic items include cereals, pulses, oil, seeds, spices, fruits, vegetables, nuts, dried fruits, sugar, honey, milk, and milk products. The top buyers are supermarkets, embassies, five-star hotels, and ayurvedic clinics.

Organic food products designed especially for new-borns and toddlers have a significant economic potential. Baby cereals, fruits smoothie, yoghurts, toddler meals, biscuits, nibbles, and cereal flakes are among the products that are carefully made, flavoured, and packaged to meet the demands of children of various ages. In India, several of such items are accessible largely via internet purchases. Organic farming creates greater employment, resulting in increased revenues [17].

10. Barriers in organic food production

10.1. High standards to get certified as an organic food

There are stringent guidelines of regulatory agencies to get certification as an organic food and organic food products. The farmers are reluctant to get certification and follow the process. That's why, most foods aren't organic. The organic food producer industries also do not desire to go with the rigorous procedures necessary to be certified as an organic. The qualification procedures that food must go through are designed to ensure that the customer understands that the food should be properly cultivated, prepared and maintained according to the certification criteria. Organic food manufacturing considerably lowers the chances of health concerns for the common people [1].

10.2. Lack of support from the farming public

Some farmers are reluctant to organic farming as they are happy with routeing practice of nonorganic farming and instant results of chemical fertilisers and pesticides.

10.3. Unawareness of organic farming

Farmers are unaware about benefits of organic farming and organic food. The farmers have confusion about organic farming due to lack of knowledge and proper guidelines. There should be proper guidelines and training on organic farming.

10.4. Cost of organic food

Organic foods are substantially more expensive than commercial nonorganic food due to the extensive methods involved for organic upbringing and production. Farmers' training, postharvest management, pesticide-free storage, a segmented marketing strategy, and large vendor margins lead to increase manufacturing costs. The high expense of organic food is seen as a one of the barrier.

11. Future of organic food

11.1. Innovation in Organic Food Production

Organic farmers are on the leading forefront of research, as they strive to achieve high quality crops without using chemicals that are hazardous to our health and the environment. These farmers have applied innovative approaches to replace and eliminate potentially harmful pesticides, as it needs lot patience to do trial and error study on organic farming from public health perspective.

11.2. Strengthening of rare species of food

One of the main issue in ecological studies is that we've been steadily losing genuine food species of good quality, although most people are trying to come out for the same with organic farming. In the agricultural sector, it is a major issue to maintain rare species of crops and vegetables of good quality. Organic farmers are undertaken to solve this issue with great pleasure in order to explore organic food for better public health perspective. These farmers are classifying each species and preserving seeds of rare species for further use and trying to resolve the issue of rare species getting endangered [15].

11.3. Variety in organic food products

Organic food grains, wheat, cereals etc. can be processed into variety of food products to make it available for the people in order to get its vital health benefits for better future endeavours. More education, awareness and financial support are needed to promote the varieties of organic food products and ultimately organic farming from health and environmental perspective. It will assist the farmers to incorporate new innovative ideas to process food products at reduced prices, as everyone should get anything in organic form [15].

11.4. Exploration of traditional knowledge and skills

The ancient Indian *vedic* literature such as *Rig-Veda, Ramayana, Mahabharata* and *Ana Kautilya arthashastra,* guides about important knowledge and skills necessary to do organic farming

practically feasible and produce organic food for healthy public [18,19]. There numerous organic inputs are mentioned in aforesaid *vedic* literature which promote organic farming and organic food since ancient time. The ancient literature also address about implementation of innovative idea in the farming. There is need of hour to go through these literatures to explore knowledge and skills to produce organic food for healthier tomorrow [20,21].

12. Conclusion

Organic food has numerous benefits and nutritional worth from public health perspective. According to several research, organic foods include more valuable nutrients, like antioxidants, than their commercially cultivated equivalents. Pesticides include fungicides, herbicides and insecticides etc. which are often utilized in commercial farming, thus the remnants can be found in our food. The remnants may create health problems including allergic reaction. So, the organic food is better option to the people having allergies to nonorganic food, chemical and pesticides remnants or additives.

There are health and environmental issues with biodiversity loss due to modified farming practices. It was found that genetically modified crops and GMO food creates health problems.

Organic farming is more eco-friendly and helps to maintain biodiversity. It decreases soil and water pollution along with increases water holding capacity of soil, improve soil fertility. Chemical fertiliser and pesticide free farming saves life of creatures and farm mammals along with people residing near farms and farm labour working in the field. Organic crops are cultivated and handled in a unique way from nonorganic crops which help to solve health and environmental issues. According to the USDA, organic foods promote the utilisation of sustainable energy supply and the conservation of soil and water in order to improve ecological sustainability for upcoming generations.

Organic food is rich in antioxidant content and it boosts immune system as well. Tasty and delicious organic food improves functions of cardiovascular system, increases sperm count and results fertility. Organic food is safe for health and is a good source of employment and revenue generation. There are some barriers to organic farming and production of organic food such as high standards to get certified as an organic food, lack of support from the farming public, lacking of substantial organic farming guidelines, unawareness of organic farming etc. The innovative techniques and smart efforts are required to preserve and strengthen the rare species of organic food for better healthy future. The organic food products can be prepared in lots of

variety to make it available from public health perspective. There is a need to review ancient *vedic* scriptures and to explore the traditional knowledge and skills of organic farming to resolve the major health issues like cancer, Alzheimer's disease etc. and to save our environment from public health perspective for better tomorrow.

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