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Function and Health Benefits of Vinegar for Human Consumption

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ABSTRACT

A natural product called vinegar is produced through the fermentation process of foods high in carbohydrates first in an alcoholic state and then again in an acetic one. Vinegar is made with various raw ingredients and fermentation techniques to provide distinct aromas and sensations. Vinegar has many physiological uses, including regulating cholesterol, controlling blood sugar, promoting weight loss, and having anticancer properties. Acetic acid is primarily responsible for vinegar's ability to regulate lipid metabolism, control blood sugar levels, and aid in weight loss. Frequent consumption of foods high in vinegar is thought to be crucial for preventing and managing several lifestyle-related illnesses, including cancer, diabetes, and obesity. Therefore, the purpose of this review is to highlight the benefits of vinegar use for one's physical health.

Keywords : Vinegar, Obesity, Anti-tumor, Cholesterol

INTRODUCTION

A condiment called vinegar is made by fermenting alcohol and then acetifying glucose found in fruits and other high-carb foods (Budak *et al.*, 2014). In the first part of this two-stage bioprocess, the yeast turns sugar into ethanol. In the second phase, the ethanol is oxidized in an aerobic atmosphere to produce acetic acid (Hutchinson *et al.*, 2019). Different raw materials are utilized to ferment different varieties of vinegar. For instance, acetous fermentation of sugars generated from rice produces rice vinegar (Nanda *et al.*, 2001). Grain vinegar is prepared from wheat, sorghum, or other grains; while fruit vinegar is derived from fruits like grapes and apples. Other varieties of vinegar include wine, malt, apple cider, and balsamic vinegar (Chen *et al.*, 2016). Historically, vinegar has therapeutic significance, its manufacture is done for medical purposes. Vinegar has long been recognised for its antibacterial and health-promoting qualities, as well as its ability to avoid detrimental health effects (Petsiou *et al.*, 2014). Vinegar is used in a wide variety of products, including sauces, ketchup, and mayonnaise, and is used mostly as a spice in cooking. It is essential to the food manufacturing process (Ho *et al.,* 2017). Using low-cost raw resources such as food industry byproducts, fruit waste, inferior fruit, and agricultural surpluses results in generally lower production costs for vinegar (Solieri and Giudici, 2009).

Functional Properties and Health Benefits of Vinegar:

Numerous beneficial effects of vinegar have been reported and confirmed. The primary functional characteristics of vinegar- such as its ability to combat bacteria, infections, blood sugar, cholesterol, and obesity are discussed along with health benefits.

Obesity Effect:

Long-term energy intake imbalances are the source of obesity, which puts people at risk for a number of lifestyle-related illnesses. In recent years, obesity rates have sharply grown globally (Kopelman, 2000). By promoting fullness after a meal, vinegar consumption can lower the glycemic impact and hence lower the overall

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amount of food eaten (Mermel, 2004).

Numerous studies have demonstrated the potential benefits of vinegar in managing weight and combating obesity. Beheshti *et al.* (2012) demonstrated that oral vinegar use for a period of one to six months can reduce the risk of obesity-related type 2 diabetes.

Lee *et al.* (2013) looked at tomato vinegar's anti-visceral obesity properties in relation to high-fat diets in another investigation. Visceral obesity is connected to the buildup of intra-abdominal fat, which can cause diabetes, hyperlipidemia, and CVDs. Research has shown that regular consumption of vinegar can completely eliminate visceral fat. These findings so strongly imply that vinegar may function as a natural medication to combat obesity and open the door to a healthier lifestyle.

Long-term use of fruit vinegar has been shown in human trials to considerably reduce weight, body mass index, and levels of total cholesterol and triglycerides in healthy obese individuals (Kondo *et al.*, 2009) and those who are obese and have high blood pressure (Kadas *et al.,* 2014).

Anti-Diabetic Effect:

Consuming vinegar may have an impact on blood sugar levels. Cheng *et al.* (2020) assert that drinking vinegar can greatly enhance glycaemic management in those with type 2 diabetes. Consuming apple vinegar also increases insulin sensitivity in type 2 diabetics compared to healthy people (Ebihara and Nakajima, 1988) consuming apple vinegar before bed can help people with type 2 diabetes control their blood glucose levels during fasting and prevent the "diabetes mellitus dawn phenomenon" that occurs the next day (White and Johnston, 2007).

Although studies on the use of vinegar to reduce blood glucose levels have mostly focused on fruit vinegar, prolonged use of grain vinegar may also help lower blood glucose concentrations in humans given that acetic acid can reduce postprandial blood glucose concentrations (Ebihara and Nakajima, 1988; Ostman *et al.,* 2005).

The lowering of fasting blood glucose levels is facilitated by the acetate in vinegar, which helps to convert blood glucose into glycogen (Fushimi *et al.*, 2001). Furthermore, it has been demonstrated that consuming one tablespoon of vinegar twice a day at dinner will lower a person's fasting blood glucose level to an equivalent degree as frequent use of diabetic medications (Johnston *et al.*, 2013).

Cholesterol-Lowering Effect:

Over half of all deaths are caused by cardiovascular disease, making it the major cause of mortality (Lee *et al.,* 2007; Lloyd-Jones *et al.,* 2010). Human (8-week) experiments have shown that taking 30 mL of apple vinegar twice a day will considerably lower hyperlipidemia patients' levels of total cholesterol, triglycerides, and LDL while non-significantly raising HDL content (Beheshti *et al.,* 2012). Moreover, foods high in acetic acid, like vinegar, support the maintenance of LDL cholesterol levels, but they also help to maintain levels of total cholesterol, triglycerides, and high-density lipoproteins (HDL). According to Fushimi *et al.* (2006), in animal studies, consuming acetic acid in meals over an extended period of time has been linked to a considerable decrease in TC, TG, and LDL cholesterol as well as an increase in HDL cholesterol.

Anti-Tumor Effect:

Kuro-su, a traditional Japanese rice vinegar, is reputed to be one of the most important sources of phenolic compounds to reduce the risk of cancer (Shimoji *et al.,* 2004). Consuming vinegar has been linked to a preventive impact and a lower incidence of esophageal cancer (Xibib *et al.,* 2003). The neutral medium-sized alpha-glycan content of fermentation products of acetic acid and alcohol produced during apple vinegar was examined for its ability to inhibit experimental mice tumors. It was found that the fermentation of acetic acid led to the formation of neutral medium-sized alpha-glycan, whereas alcohol fermentation did not (Abe *et al.*, 2007). Studies by Mimura *et al.* (2004) found that vinegar encourages human leukemia cells to die, thereby lowering the incidence of leukemia. Leukaemia is a blood cancer that causes an abnormal surge in white blood cells in the human body.

Antibacterial And Anti-Infection Effect:

The primary cause of vinegar's antibacterial and anti-infective properties is its organic acid content, specifically polyphenols and melanoidins (Ozturk *et al.,* 2015). Before the 19th century, when Pasteur and Koch studied bacteria, vinegars were widely utilizedin applications relating to antimicrobials and infections. About 400 BC, Hippocrates, the Greek physician, utilized fruit vinegar to heal wounds, infections, coughs, and swelling (Budak *et al.*, 2014).

Using vinegar with an acetic acid concentration of

0.1%, Entani *et al.* (1998) found that all 17 bacterial strains were significantly bacteriostatically affected. Bacteriological food poisoning induced by Salmonella spp. and Escherichia coli was significantly reduced by the bactericidal action. Vinegar additionally demonstrated antimicrobial effects against mycobacteria. TB and leprosy are just two of the several diseases caused by the well-known, disinfectant-resistant microbes known as mycobacteria (Esteban *et al.*, 2012).

According to research by Cortesia *et al.* (2014), vinegar's bactericidal action is caused by the carboxylic acid activity of acetic acid, making it useful for treating a variety of illnesses, including ear infections, warts, head lice, and nail fungi (Johnston, 2009).However,Grain vinegar can successfully eradicate respiratory pathogens such as *Micrococcus catarrhalis, Staphylococcus albus, Diplococcus pneumonia* and *Alpha streptococcus*, while apple vinegar dramatically reduces the growth of pathogenic bacteria such as *Pseudomonas aeruginosa, Proteus mirabilis, Staphylococcus epidermidis* and *Klebsiella pneumoniae* (Hindi, 2013).

Other Health Benefits of Vinegar:

There are numerous more health benefits linked to vinegar's bioactive components, but few studies have thoroughly examined these advantages. Because vinegar heals burns, throughout ancient times, it has been utilized as medicine. The therapeutic benefits of vinegar are mostly thought to stem from its antibacterial characteristics (Sindhu *et al.*, 2014). Vinegar is excellent for a variety of digestive tract issues (Song *et al.*, 2020). By relieving a variety of digestive health issues, it also reduces inflammation. Vinegar helps with constipation-related issues. According to Hjorth *et al.* (2020) clinical investigation, vinegar is a recognized medication that effectively relieves constipation in people who are fat.

According to certain research, taking acetate orally can lessen the damage that physical activity causes to the muscles (Sugiyama *et al.*, 2010). Furthermore, it has been suggested that consuming vinegar can improve people's cognitive abilities (Ali *et al.*, 2017).

Conclusion:

When consumption of vinegar is taken in moderation, it offers a number of possible health advantages. The presence of acetic acid helps with better digestion and glycaemic control and possibly even aids in weight loss. In controlling blood glucose levels and many other diseases fruit vinegar shows tremendous positive effects on human health. Furthermore, its antibacterial qualities emphasize how valuable it is as a dietary supplement. Overall, if consumed moderately and in an appropriate amount, vinegar can be an advantageous component of a healthy lifestyle.

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