

A perfect Detoxifying Drink – Apple Cider Vinegar

Mumtahirul Kousar, Bushra Manzoor, Aasima Rafiq and Abida Jabeen

Division of Food Science and Technology,
Sher-e-Kashmir University of Agricultural Science and Technology-Kashmir

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Introduction

Apple cider vinegar, also known as cider vinegar or ACV, is a pale medium-colored vinegar prepared from cider or apple must. Mother of vinegar is present in unpasteurized or organic ACV. Apple cider vinegar is made from the juice of crushed apples that has been fermented. Pectin, vitamin B1, vitamin B2, and vitamin B6, biotin, folic acid, niacin, pantothenic acid, and vitamin c are likely to be present, as they are in apple juice. Ingestion of the acetic acid in vinegar provides a danger of probable harm to soft tissues of the mouth, throat, and stomach, according to preliminary studies. Poison advisories include cautions for uses such as topical therapy, cleaning solutions, and eye injuries. In order to prevent diabetes, dietary components such as apple cider vinegar, in addition to oral hypoglycemic drugs, appear to be promising for glycolic control in patients with Type 2 diabetes and for diabetes-related medical conditions (Khan et al., 2003, Anderson *et al.*, 1999, and Sultan *et al.*, 2012). Natural vinegar contains all Carbohydrate, organic acid (acetic, formic, lactic, malic, citric, succinic, and tartaric), alcohols, amino acids and peptides (Cocchia *et al.* 2006), vitamins and minerals salts, and polyphenolic substances (gallic acid, catechin, caffeic, ferulic acid) have all been found in natural vinegar. Different types of vinegar are made from regional foods in accordance with long-standing traditions. A variety of vinegars are available on the market. Traditional vinegar is made from regional cuisine in accordance with long-standing traditions. Modena balsamic vinegar is prepared from white Trebbiano grapes grown locally. Rice wine vinegar is made traditionally in Asia, coconut and cane vinegar is popular in India and the Philippines, and date vinegars are popular in the Middle East. Antimicrobial properties (Vijayakumar and Wolf Hall., 2002), prevention of inflammation and hypertension (Murooka and Yamshita, 2008), lower serum cholesterol (Fushimi et al., 2006), reduction in systolic blood pressure (Kondo *et al.*, 2000), enhanced calcium absorption and retention (Kishi *et al.*, 1999), and decrease the glycemic index of carbohydrate food for people with and

without diabetes. The antiglycemic properties of vinegar have been studied in both animal and human studies for more than a century (Salbe *et al.*, 2009). Apple cider vinegar (ACV) has been shown to reduce haemoglobin A1C (HbA1C), lower density lipoprotein (LDL), cholesterol, and triglycerides while increasing high density lipoprotein (HDL) cholesterol in patients with experimentally induced diabetes. Apple cider vinegar is created by fermenting apples. It includes acetic acid, pectin, potassium, and calcium, and is nutrient-dense, especially in unfiltered and organic varieties. Honey can be used to enhance the flavour of apple cider vinegar drinks without adding extra calories

Principle for the production of Apple Cider Vinegar:

Vinegar processing is based on fermentation. Yeasts use the sugar in apple juice to make ethanol during alcoholic fermentation, which is an anaerobic process that produces cider. An extra aerobic fermentation step is required for the creation of vinegar, in which acetic acid bacteria convert the ethanol in cider to acetic acid. The sensory properties of cider and vinegar are determined by microbial fermentation procedures and processing techniques.

Production of Apple Cider Vinegar:

The following steps complete the process of making apple cider vinegar:

- **Harvesting:** Between September and December, harvesting takes place. Sacks are used for hand collection, and larger orchards are harvested mechanically.
- **Selection of Apples:** Apples should be firm and ripe when purchased. Green apples have a bland flavor when they are not fully developed.
- **Sweating:** It is an optional mellowing stage during which the apples are held in a clean, odor-free environment and occasionally allowed to mellow and soften for a week to ten days before being ground.
- **Washing:** The apples must be washed after they have mellowed to remove leaves, twigs, insects, spray residues, and hazardous bacteria. They are dumped out of the bins into a scrubber on an automated basis. This machine cleanses and rinses each apple, removing the majority of chemical residues. They are then transported via a conveyor to a water-filled hopper. The apples are placed on a conveyor and moved to another worker from the hopper. Water jets assist in moving the apples for effective washing.

- **Grinding:** Because apples are a hard fruit, slicing is required to obtain juice. This is accomplished by using high-speed rotary blades to reduce the fruit to a pulp, or by grinding the apples to a fine pulp with an applesauce consistency in a big mill. It is done in order to extract the maximum amount of juice from the apples.
- **Pressing:** In the commercial manufacturing of apple juice, three types of presses are utilised to separate the juice from the mash: the hydraulic press, the screw press, and the belt press. The screw press, unlike the hydraulic press, runs constantly and has a large operating capacity. The bladder press and the basket press are two other types of presses. They're mostly used in small and medium-scale manufacturing.
- **Pasteurization:** It is done for 10-15 seconds at 92°C. It is carried out in order to eliminate all harmful germs.
- **Cooling and Filling:** The juice extracted from the pomace is piped to a cooling tank via plastic tubing. The cider is run through a screen mesh when it is moved to the cooling tanks to remove any pulp fragments. After that, it's refrigerated and kept at 33° F (0.6° C). This aids in the prevention of infection by harmful germs. Potassium sorbate and other preservatives are added before the juice is transferred to the fermenting tank.
- **Fermentation:** The apple juice ferments in two phases for eight weeks. This contains yeast strains performing traditional alcoholic fermentation of carbohydrates into ethanol, followed by acetobacter fermentation to make vinegar.
- **Racking off:** The cider is dumped into the second fermenting tank or directly into bottles using a clean plastic tube.
- **Filtering:** A cider becomes crystal clear as a result of this step. It can be accomplished by:
 1. To avoid exposing the cider to air, a closed filter system is used.
 2. To clear undesirable yeast, add gelatin, bentonite, and a pectic enzyme to the cider.
- **Aging and Bottling:** To enhance the flavour, the wine is aged in oak barrels. For cider, use sterilised bottles. A tiny number of sugars can be added to each bottle for "in-bottle fermentation." To prevent additional fermentation, close or cork the bottle



and pasteurise the cider. The addition of sulphur is most commonly used to avoid killing the yeast by pasteurisation after adding sugar.

Medicinal and Nutritional properties of Apple Cider Vinegar

Pectin, vitamin B1, vitamin B2, and vitamin B6, biotin, folic acid, niacin, pantothenic acid, and vitamin c are all nutrients found in ACV. Apple cider vinegar may also help to heal acid reflux, regulate blood pressure, improve diabetes, and boost weight loss, according to new medical studies. The potent heading chemicals in apple cider vinegar, such as acetic acid, potassium, magnesium, probiotics, and enzyme, provide the benefits. Acetic acid has the capacity to eliminate harmful bad bacteria while simultaneously encouraging the growth of useful good bacteria. Acetic acid functions as a natural antibiotic because it eliminates undesired bacteria when it comes into touch with it. Apple cider vinegar has several health benefits for the skin, digestion, and immunity without any negative side effects. In addition, polyphenols are abundant in apple cider vinegar. Polyphenols have been linked to the prevention of cardiovascular disease, cancer, and neurological illnesses such as Alzheimer's, osteoporosis, and diabetes, according to research. According to a study published in the Journal of Diabetes Care, drinking apple cider vinegar can help lose weight. ACV helps fat reduction for a variety of reasons, one of which is that it reduces sugar cravings and enhances detoxification. Supplementing with the acetic acid present in apple cider vinegar reduced body fat in mice by 10%, according to another study. A modest amount of apple cider vinegar taken just before a meal stimulates the production of digestive juices. To restore alkaline acid balance, some alternative practitioners advocate apple cider vinegar. Our blood is somewhat alkaline (with a normal pH level of between 7.35 and 7.45) and our diet should mirror this pH level, according to the alkaline diet. Proponents of the alkaline-acid hypothesis think that a diet high in acid-producing foods causes fatigue, infections, anxiety, irritability, headache, sore throat, nasal and sinus congestion, allergic reactions, and an increased risk of illnesses like arthritis and gout.

Apple Cider Vinegar Reduces Fat Formation and Improves Lipid Profiles.

High dietary cholesterol causes large increases in liver cholesterol and triacylglyceride levels (Fushmi *et. al.*, 2005), which can contribute to health problems such as atherosclerosis and hypertension. Surprisingly, vinegar supplementation has been proposed to inhibit the synthesis of triacylglycerides in the liver (Fushmi *et.al.*, 2006) by increasing

hepatic glutathione (GSH) and trolox equivalent antioxidant capacity (TEAC), as well as catalase (CAT) and glutathione peroxidase (GPx) activities (Chou *et.al.*, 2015). The presence of acetic acid in vinegar inhibits sterol regulatory element-binding protein (SREBP) gene expression at the mRNA level, as well as ATP citrate lyase activity (ATP-CL). This procedure may lower the number of crucial substrates (acetyl-CoA and HMGCoA) needed for cholesterol and fatty acid production. Acetic acid boosts fatty acid oxidation via increasing the expression of the alternative oxidase (AOX) gene. Acetic acid decreases cholesterol and fatty acid production in the liver while simultaneously enhancing lipolysis, according to a study [22]. Consumption of persimmon vinegar improves blood lipid profiles by increasing body carnitine levels, which may enhance fat oxidation (Kim *et.al.*, 2013). Acetic acid supplementation was found to lower blood triacylglycerides in both human and animal investigations (Kondo *et.al.*, 2007).

Apple Cider Vinegar lowers blood sugar levels and enhances insulin secretion.

Apple cider vinegar (Hlebowicz *et.al.*, 2007) is a kind of vinegar that can lower postprandial blood glucose (Kohn *et.al.*, 2015), alleviate insulin resistance (Russell *et.al.*, 2013), and enhance insulin production. Streptozotocin, a chemical substance that damages insulin-producing beta-cells and is used to induce diabetes in rats, could be neutralised by vinegar.

Several pathways for vinegar and acetic acid's participation in glycemia have been proposed. Vinegar may hinder the breakdown of disaccharides into absorbable monosaccharides (Johnston *et.al.*, 2013) and interfere with carbohydrate digestion (Hlebowicz *et.al.*, 2007). Acetic acid also boosts glucose absorption and raises glucose-6phosphate levels in the liver and skeletal muscle, promoting glycogen replenishment (Kohn *et.al.*, 2015). As a result, vinegar may be as effective as acarbose and metformin (Johnston *et.al.*, 2013). According to Johnston *et al.* 2013, consuming one tablespoon of vinegar twice day at lunchtime reduced fasting blood glucose levels.

According to Ostman *et.al.*, 2005 postprandial blood glucose levels may be reduced in proportion to vinegar dose therapy. In contrast, Liatis *et al.* 2010 found that vinegar can reduce postprandial hyperglycemia in high GI meals but not in low GI meals. Mitrou *et al.* 2015 confirmed the contradiction, reporting a decrease in postprandial blood glucose levels; yet, vinegar administration with high and even low GI meals improved insulin sensitivity by



increasing glucose absorption. In certain circumstances, 10 g vinegar was more effective than 2 g or 20 g vinegar at lowering postprandial blood glucose. The amount of vinegar consumed before to a meal had an effect on postprandial blood glucose levels, with 2 hours showing greater results than 5 hours (Johnston *et.al.*, 2013).

Conclusion

Apple cider vinegar and honey treatment are used to treat arthritis thus relieving arthritic pain, as well as sore joints externally. Apple cider vinegar aids in the regulation of blood sugar levels. Which rise substantially shortly after a meal is finished. Furthermore, it aids in weight loss, which is critical given the role of obesity as a diabetes risk factor. This concoction also known to relieve stomach ache. When it is used medicinally it helps the body rid itself to harmful toxins has wonderful disinfecting properties as a natural bad germ fighter, and is a very biodegradable substance that does not pollute the environment. This amazing liquid, when used on a regular basis, helps to restore and balance the body's pH, bringing it from acidic to neutral in a short period of time.

References

- Andrea M. White *et al.* 2007. Vinegar Ingestion at Bedtime Moderates Waking Glucose Concentrations in Adults With Well-Controlled Type 2 Diabetes, *Diabetes Care* 2007 Nov; volume 30, issue (11),pp 2814-2815.
- Banna AA, Kawar NS. Behavior of parathion in apple juice processed into cider and vinegar. *J Environ Sci Health B* 1982;17:505-514.
- Carol S. Johnston *et al.* 2009. Preliminary evidence that regular vinegar ingestion favorably influences hemoglobin A1c values in individuals with type 2 diabetes mellitus. Volume 84, Issue 2, May 2009, Pages e15–e17 science direct.
- Carol, S. Johnston, Department of Nutrition, Arizona State University, Mesa, Arizona, Cindy A. Gaas, Department of Nutrition, Arizona State University, Mesa, Arizona. <http://lup-tup.com/apple-cider-vinegar>.
- Ebihara K, Nakajima A. 1988. Effect of acetic acid and vinegar on blood glucose and insulin responses to orally administered sucrose and starch. *AgricBiol Chem.* 52:1311–1312.
- Fushimi T, Sato Y: Effect of acetic acid feeding on the circadian changes in glycogen and metabolites of glucose and lipid in liver and skeletal muscle of rats. *Br J Nutr* 2005, 94:714.

- Fushimi T, Suruga K, Oshima Y, Fukiharu M, Tsukamoto Y, Goda T: Dietary acetic acid reduces serum cholesterol and triacylglycerols in rats fed a cholesterol-rich diet. *Br J Nutr* 2006, 95:916-924.
- Hlebowicz J, Darwiche G, Björkell O, Alme´ r L-O: Effect of apple cider vinegar on delayed gastric emptying in patients with type 1 diabetes mellitus: a pilot study. *BMC Gastroenterol* 2007, 7:46.
- Johnston C.S *et al.* 2010. Examination of the Antiglycemic Properties of Vinegar in Healthy Adults, Volume 56,74–79.
- Johnston CS, Kim CM, and Buller AJ. 2004. Vinegar improves insulin sensitivity to a high carbohydrate meal in subjects with insulin resistance or type 2 diabetes mellitus. *Diabetes Care*. 27: 281-282.
- Johnston CS, Quagliano S, White S: Vinegar ingestion at mealtime reduced fasting blood glucose concentrations in healthy adults at risk for type 2 diabetes. *J Funct Foods* 2013, 5:2007-2011.
- Kohn JB: Is vinegar an effective treatment for glycemic control or weight loss? *J Acad Nutr Diet* 2015, 115:1188.
- Kondo T, Kishi M, Fushimi T, Kaga T: Acetic acid upregulates the expression of genes for fatty acid oxidation enzymes in liver to suppress body fat accumulation. *J Agric Food Chem* 2009, 57:5982-5986.
- Maryam Iman *et al.* 2015. Effect of Apple Cider Vinegar on Blood Glucose Level in Diabetic Mice. *Original Research , pharmaceuticals science* 2015, volume 20, issues 4, pp 163-168.
- Mohammad shaabani *et al.* 2012. Influence of apple cider vinegar on blood lipids, *Life Science Journal*, 9(4)
- Roberts SB. 2000. High-glycemic index foods, hunger, and obesity Is there a connection? *Nutr Rev.*, 58:163–169.
- Russell WR, Baka A, Björck I, Delzenne N, Gao D, Griffiths HR, van Loon L: Impact of diet composition on blood glucose regulation. *Crit Rev Food Sci Nutr* 2013.
- Vinegars and Acetic Acid Bacteria. *International Symposium*; May, 2005; Available at:http://www.vinegars2005.com/images/Vin_2005_book.pdf. Accessed March 9, 2006.

Yamashita H: Biological function of acetic acid-improvement of obesity and glucose tolerance by acetic acid in type 2 diabetic rats. Crit Rev Food SciNutr 2015, 8398.

