



Comparison of Anticarcinogenic Action in Apple and Mango Peels Using Phenolic Compounds – A Review

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ABSTRACT

Cancer is a major obstruction to the growing world. The reason for this crisis is modification of lifestyle management and alteration in food intake. Fruits and vegetables are rich in phenolic and phytochemical compounds which provide chemoprotective properties. Utilization of fruits and vegetables reduces the risk of recurring diseases. Apple is an important part of food chain rich in source of phenolic compounds that provides chemoprotective activity. Apple and mango skin contains more nutritional value than any other fruit, which inhibits cancer cells. Apple and Mango peels are the key by-product during processing of apples and mangoes. This study is a literature based review defining the comparison of phenolic compounds in apple peel and mango peel.

Keywords: Polyphenols, apple peel, mango peel, anticancer.

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INTRODUCTION

Apples and mangoes are the major fruit diet that is included in day to day life. Apple and mango peels are rich in polyphenols which are proved to have anticancer activity and inhibition of cell in vitro (Scalbert, Johnson, & Saltmarsh, 2005)¹.

Apple, a pomaceous fruit (*Malus domestica*) belonging to the family of Rosaceae. Apples rich in nutritional value have been cultivated for thousand years all over the world. Apple peels are being wasted in manufacturing canned apple and sauces. These apple peels serve a significant role in vitamin C, phenolic content with high antioxidant activity that slow up the cancer cell proliferation.

Mango, a seasonal stone fruit (*Mangifera indica* L.) grown around tropical countries belonging to the family Anacardiaceae (H. Kim et al., 2010)². The mango fruit is also rich in polyphenols and phytochemicals that inhibit the cancer cell growth (Percival et al., 2006)³. Mango peels being the source of antioxidant as they are rich in vitamin E, polyphenols, phytochemicals and vitamin C but the peels are being wasted during the manufacture of canned products. These peels provide a basic foundation in inhibiting cancer cell (Ajila et al., 2007)⁴.

Comparison of Polyphenolic and Phytochemical compounds of two species:

The phenolic content in fruits and vegetables are proved to reveal antiproliferative activity.

The phenolic content in apple and mango has been revised in various literatures (H. Kim et al., 2010)² Though apple and mango peel being rich in polyphenol and phytochemical, the phenolic compound present in apple peel takes the lead when compared to phenolic compounds present in mango peel (Wolfe et al.,2003)⁵.

A special comparison was made among two separate species of apple and mango. In apple various varieties was being studied especially Idared, Rome beauty, Cortland and golden delicious (H. Kim et al., 2010)². In mango the study was being completed on unripe peel of *Mangifera indica* (Wolfe et al.,2003)⁵.

The phenolic contents though cannot be identified but can be measured through HPLC method (Ferreira et al., 2002)⁶. As shown in **table1** the study proceeded from a extraction process made by 80% acetone and ethanol extract 90 to 100 mg/g of mango (Wolfe et al., 2003)⁵, and apple peel (H.kim et al., 2010)².

Mechanism of cancer and antioxidant therapy:

Each tissue in human body is maintained by a balance between cell production and destruction. The part of mechanism involved in cancer cell is due to faulty placement of significant enzymes

in the cancer cells, which leads to alteration in the protein of cell surface. The cancer cell grows faster than any other cell in the body this explains the reason why cancer spreads rapidly than any other chronic disease. Antioxidants are rich in dietary supplements, presence of certain vitamins such as vitamin E, vitamin C, vitamin A and polyphenols these are molecules that inhibits oxidation of other molecules. Oxidation refers to a chemical reaction that transfers electrons from a substance to an oxidizing agent. Oxidation is a crude cause for the production of free radicals, these free radicals tend to begin chain reaction. When this chain reaction starts in a cell, it can cause damage or death of the cell. Antioxidant terminates this chain reaction and thereby inhibiting oxidation reaction.

Anticancer activity of the peels:

The mango and apple peel produces anticancer activity which was positively proved in various reports. The majority of phenolic compounds lies in the skin of apple as well as mango which is proved to exert its antioxidant activity (Seeram.2003)¹⁰. The inhibition of proliferation in HepG₂ liver cancer cell was found in both apples as well as mango peels which was previously being explored (H.kim et al., 2010)². Although various studies regarding the antioxidants as well as biochemical investigations already exists (Alia, Ramos, Mateos, Bravo, Goya, 2005)⁷. Mango peel inhibits cell proliferation by regulating apoptosis (Evan and Vousdan et al., 2001)⁸ whose inactivation is a major pathway for cancer tumor. The antiproliferative action of apple peel exhibits the same cell variability as in mango peel which was explained in various cases (Liu et al., 2000)⁹. Cell variability action of polyphenols explains the anticarcinogenic action.

Table1. Comparison of Polyphenolic compounds:

Sample fruits (species)	Total polyphenolic content (mg GAE/g)
Apple peel (Wolfe et al., 2003) ⁵ (In General)	203± 36.50
Mango peel (H.Kim et al.,2010) ² (unripe peel)	93 ±3.40

All data was presented in literature as Mean ± SD of the three replicates,(Wolfe et al.,2003) and (H. Kim et al., 2010)GAE represents Gallic acid equivalence per 100 grams.

CONCLUSION:

Apple and mango peel is a by-product during manufacture of canned product; this peel is proved to have polyphenols a major antioxidant responsible for anticancer activity (H.kim et al., 2010)² and (Wolfe et al., 2003)⁵. Along with polyphenols certain vitamin content are also seen in the

peels that boost up the antioxidant activity. The antioxidant activity of the mango peel is due to synergistic effect of bio-active compounds. Consumption of fruits and vegetables plays a key role in reducing certain chronic abnormalities and disease. Apple is being consumed by a million of population all over the world. Mango though consumed as equal as apple, they are seasonal and when compared to apple the protective action by phenolic compounds of mango is comparatively less. Further extensive studies are being made by the researcher to prove the antioxidant effect of fruits and vegetables in prevention of cancer and other chronic syndrome.

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