

## BIOLOGICAL ACTIVITY OF FEIJOA PEEL EXTRACTS

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### Abstract

Fractions of Feijoa peel extracts were studied for anti-tumor activity, 50% cell cytotoxicity ( $CC_{50}$ ), anti-human immunodeficiency virus activity and anti-bacterial activity. Two active fractions [A3] of acetone extract and [M2] of MeOH extract had potent inhibitory activity against Gram-positive and Gram-negative bacteria as well as fungi tested. These results indicate the therapeutic value of Feijoa peel extracts as potential anti-tumor and anti-microbial organism agents.

Key words: anti-bacterial, anti-HIV, anti-tumor, Feijoa extracts

### Introduction

*Feijoa sellowiana* Berg (Myrtaceae) is mainly cultured in tropical and subtropical countries such as southern Brazil, Uruguay, Paraguay and northern Argentina. Feijoa has a pleasant flavor,



Fig. 1. Pictures of Feijoa. A; Feijoa leaves, B; Feijoa fruit in the tree, C; Feijoa flower, D; Feijoa fruit.

it is also eaten as stew, jam, jelly or juice. Feijoa contains many medicinally bioactive compounds (Figure 1).

The predominant aroma of Feijoa fruits is ascribed to methylbenzoate and ethylbenzoate (HARDY & MICHAEL 1970; HERRMANN 1994). Other volatile components have also been identified (PINO 1997; BINDER & FLATH 1989; Di CESARE et al. 1998; STARODUBTSEVA & KHAREBAVA 1978; STARODUBTSEVA & KHAREBAVA 1986). Feijoa is known to contain high amounts of vitamin P (P)-active polyphenols, such as catechin, leucoanthocyanins, flavonols, proanthocyanidins, and naphthoquinones (BABA-ZADE 1972; KRIVENTSOV & KARAKHANOVA 1972b; GERSHTEIN & GABISONIYA 1972; VANIDZE 1991). Leaves of Feijoa also contain catechins, such as (+)-catechin, (-)-epicatechin, (+)-gallocatechin and (-)-epigallocatechin (VANIDZE et al. 1991). Further, tannins in Feijoa fruits and leaves have been identified (FOO & PORTER 1981). The flower part of Feijoa contains anthocyanin-3-glucoside of polyphenols (LOWRY 1976). Moreover, Feijoa fruits are rich in vitamin C (KRIVENTSOV & KARAKHANOVA 1972a; MGALOBILISHVILI & LOLOSIDI 1971; BABA-ZADE 1972; GERSHTEIN & GABISONIYA 1972; SALVO et al. 1987). Vitamine C in concentrated Feijoa juice can be up to three times higher than that in fresh juice (Di CESARE et al. 1998). Provitamin A, such as  $\alpha$ -carotene,  $\beta$ -carotene and  $\beta$ -cryptoxanthin, has also been determined (HOMNAVA et al. 1990). Both water-soluble and water-insoluble fibers are found in Feijoa (SALVO et al. 1987; LINTAS & CAPPELLONI 1992). Amino acids such as tryptophan, lysine, methionine and asparagine with nutritional value are also found in Feijoa extracts (TSIKORIDZE et al. 1986; SALVO et al. 1987).

Feijoa peel contains more than twice as much vitamin C and catechin's vitamin P (P)-active polyphenols, such as leucoanthocyanins, flavonols and naphthoquinones (KRIVENTSOV & KARAKHANOVA 1972a). Although the chemical constituents of Feijoa fruit have been reported, pharmaceutical studies of constituents of the peel have barely been carried out. Feijoa fruit peel is generally wasted. However, the peel is rich in biologically and nutritiously interesting compounds. With this consideration in mind, we have screened for new biologically active agents various fruits and vegetables that are consumed by many people, including Feijoa. The purpose of this study is to investigate anti-tumor activity, 50% cell cytotoxicity (CC<sub>50</sub>), anti-human immunodeficiency virus (HIV) activity and anti-bacterial activity of fractions of Feijoa peel extracts.

## Materials and Methods

### *Preparation of Feijoa peel extracts.*

Feijoa peel (330 g) was cut into small pieces and successively extracted with hexane, acetone, MeOH and 70% MeOH at room temperature. The solvent was concentrated *in vacuo*, and the hexane extract [H 0](0.44 g), acetone extract [A 0](5.9 g), MeOH extract [M 0](16.7 g) and 70% MeOH extract [70M 0](6.1 g) were obtained, respectively. First, the aliquot of hexane extract [H 0](0.4 g) was subjected to silica gel column chromatography, which was then eluted with a hexane-acetone gradient. The hexane fraction [H 1](32 mg), hexane-acetone (9:1) fraction [H 2](157 mg), hexane-acetone (4:1) fraction [H 3](47 mg) and [H 4](45 mg) were eluted stepwise. Second, the acetone extract [A 0](5.5 g) was subjected to silica gel column chromatography, which was then eluted with a benzene-EtOAc gradient. The benzene fraction [A 1](92 mg), benzene-AcOEt (10:1) fraction [A 2] (103 mg), [A 3](145 mg), benzene-AcOEt (1:1) fraction [A 4](170 mg), AcOEt fraction [A 5](582 mg), AcOEt-EtOH (5:1) fraction [A 6](836 mg) and [A 7](854 mg) were eluted stepwise. Third, the MeOH extract [E 0](16.7 g) was subjected to

