

# The Supremacy of Synergism: A Comparison of Anticancer Activity of Rhizome Extract of *Bistorta Amplexicaulis* and Gallic Acid in Cancer Cell Lines and Primary Cells

Salma Batool<sup>1,3,4</sup>, M. Javaid Asad<sup>1</sup>, Muhammad Arshad<sup>2</sup>, Rahman Shah Zaib Saleem<sup>4,\*</sup>, Muhammad Sheeraz Ahmad<sup>1,\*</sup>

<sup>1</sup> University Institute of Biochemistry and Biotechnology (UIBB), Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, 46300, Pakistan;

<sup>2</sup> Department of Botany, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, 46300, Pakistan;

<sup>3</sup> Department of Biochemistry, Faculty of Life Sciences, University of Central Punjab, Lahore 54000, Pakistan;

<sup>4</sup> Department of Chemistry and Chemical Engineering, SBA School of Science and Engineering (SBASSE), Lahore University of Management Sciences (LUMS), Lahore, 54792, Pakistan

## Article Information

### Identifiers and Pagination:

**Year:** 2021

**Volume:** 2

**Issue:** 1

**First Page:** 21

**Last Page:** 26

**Publisher ID:** [CNT-2-21](#)

**DOI:** [10.2174/2665978601666200218090845](#)

### Article History:

**Received Date:** 16/10/2019

**Revision Received Date:** 18/01/2020

**Acceptance Date:** 28/01/2020

**Electronic publication date:** 2021

Copyright: 2021 Bentham Science Publishers

\* Address correspondence to these authors at the University Institute of Biochemistry and Biotechnology (UIBB), Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, 46300, Pakistan; Tel: +92519062 742; Fax: +9251 9062; E-mail: [dr.sheeraz@uaar.edu.pk](mailto:dr.sheeraz@uaar.edu.pk); Department of Chemistry and Chemical Engineering, SBA School of Science and Engineering (SBASSE), Lahore University of Management Sciences (LUMS), Lahore, 54792, Pakistan; Tel: +9242 3560 8215; Fax: +92 42 3572 5048; E-mail: [Rahman.Saleem@lums.edu.pk](mailto:Rahman.Saleem@lums.edu.pk)

**Background:** *Bistorta amplexicaulis* is a seasonal herb with several folkloric uses. The plant extract has been shown to possess various activities including antioxidant, anticancer, anti-bacterial, anti-fungal, cardio-protective, and anti-atherosclerosis activities.

**Objective:** The aim of the study was to quantify the activity of the plant extract and relate it to the activity of the isolated compound, gallic acid.

**Methods:** Initially, the plant was extracted, then, the activity of the extract was compared with its constituent, gallic acid. After this, the cytotoxic potential of the two against human liver cancer cell line (HepG2), breast cancer cell line (MCF-7) and human umbilical vein endothelial cells (HUVEC) was evaluated through MTS assay.

**Results:** The extract had better activity against HepG2 as compared to gallic acid (IC<sub>50</sub> 29µg/mL vs 37µg/mL). It also provided a better therapeutic window by having lower toxicity for HUVEC cells than gallic acid (IC<sub>50</sub> 63µg/mL vs 47µg/mL), suggesting the use of the extract over the purified gallic acid for these cells. We also performed the fluorescence study of the rhizome extract in ethanol (REE), methanol (REM), 80% ethanol (80RE), 80% methanol, (80RM) and acetone (RAC). The highest intensity of fluorescence was found in REE with excitation at 394 nm and emission at 421nm.

**Conclusion:** The comparison of gallic acid with ethanolic rhizome extract of *B. amplexicaulis* reveals important insights about utilizing the plant extract over purified gallic acid. The ethanolic extract also has the potential to be used as an autofluorescent drug during *in vitro* and *in vivo* studies.

**Keywords:** *Bistorta amplexicaulis*, anticancer activity, HepG2, MCF-7, gallic acid, HUVEC.