Arun Kumar, Suneel Prajapati, Mahima Sharma, Tejveer Singh, Neha Choudhary, Alok C. Bharti, Rohit Sharma and Pankaj Gupta*

# Quantitative assessment of antioxidant potential of selected homeopathic preparations in clinical practice

https://doi.org/10.1515/dmpt-2022-0169
Received September 22, 2022; accepted October 31, 2022; published online December 29, 2022

**Abstract**

**Objectives:** Antioxidant property like radical scavenging is a primary target to elucidate the efficacy mechanism of a drug against diseases linked to oxidative stress such as cancer, metabolic disorders, rheumatoid arthritis, etc. In alternative therapies, homeopathy is one of the preferred choices by patients and clinicians due to its potential to cure chronic and complex illnesses. However, the efficacy of homeopathic preparations at high diluted potencies attracts rational criticism due to insufficient scientific knowledge supporting the mechanism of action. Therefore, an attempt was made to estimate the total phenolic content (TPC) and radical scavenging activity of clinically prescribed homeopathic drugs.

**Methods:** With gallic acid as a reference control, mother tinctures (MTs) and different potencies of *Eucalyptus globulus* (EG), *Syzygium jambolanum* (SJ), *Ruta graveolens* (RG), and *Thuja occidentalis* (TO) were used to perform Folin–Ciocalteu test, 2,2′-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS), and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays.

**Results:** The results showed TPC of MTs equivalent to µg/mL of gallic acid viz; EG (4,872.5 ± 133.2), SJ (8,840.5 ± 14.8), RG (985.6 ± 39.1), and TO (341.5 ± 19.5) with significant ABTS and DPPH radical scavenging potential. Whereas 30C and 200C potencies of each homeopathic drug showed undetectable phenolic content and insignificant radical scavenging potential compared to vehicle control, i.e., alcohol 90% (2.0 ± 1.5).

**Conclusions:** The reported efficacy of 30C and 200C potencies of homeopathic medicines against oxidative stress-related illnesses might be due to mechanisms other than radical scavenging. Furthermore, the assays studied can be helpful in drug standardization and quality control of MTs that are used as starting material in homeopathic preparations.

**Keywords:** ABTS assay; DPPH; homeopathy; oxidative stress; radical scavenging; total phenolic content

***Corresponding author: Pankaj Gupta**, Molecular Biology Laboratory, Drug Standardization Unit, Dr. DP Rastogi Central Research Institute of Homeopathy, Ministry of AYUSH, Government of India, Noida 201301, Uttar Pradesh, India, E-mail: pankajgupta77@gmail.com
**Arun Kumar,** Molecular Biology Laboratory, Drug Standardization Unit, Dr. DP Rastogi Central Research Institute of Homeopathy, Ministry of AYUSH, Government of India, Noida 201301, Uttar Pradesh, India; and Department of Zoology, Kirori Mal College, University of Delhi, Delhi-110007, India. https://orcid.org/0000-0002-1540-3465
**Suneel Prajapati and Mahima Sharma,** Molecular Biology Laboratory, Drug Standardization Unit, Dr. DP Rastogi Central Research Institute of Homeopathy, Ministry of AYUSH, Government of India, Noida 201301, Uttar Pradesh, India
**Tejveer Singh,** Department of Zoology, Hansraj College, University of Delhi, Delhi-110007, India
**Neha Choudhary,** Centre for Computational Biology and Bioinformatics, Central University of Himachal Pradesh, Dharamshala, Himachal Pradesh, India
**Alok C. Bharti,** Department of Zoology, Molecular Oncology Laboratory, University of Delhi, Delhi 110007, India
**Rohit Sharma,** Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh 221005, India. https://orcid.org/0000-0002-3682-3573

## Introduction

The generation of reactive oxygen species (ROS) by extra- and intra-cellular processes plays a vital role in cellular signaling and normal functioning of the human body [1]. Further, environmental stressors (i.e. pollutants, ionizing radiation, UV rays, and heavy metals) and xenobiotics (i.e., anticlastic agents) also contribute to production of ROS [2, 3]. An imbalance of ROS between their production and accumulation inside the cells or tissues can lead to oxidative stress in conjugation with the malfunctioning of a biological system to detoxify these reactive products [4]. The cumulative oxidative stress with disrupted mitochondrial respiration and damage further relates to severe consequences, viz. cancer, rheumatoid arthritis, diabetes, asthma, cardiovascular disease, Parkinson's disease, Alzheimer's disease, and other neurodegenerative diseases [5, 6]. Despite several approaches [7, 8], factors like expensive cost, severe and chronic side effects of pure and synthesized molecules have shifted the interest towards natural therapeutics and