

Chapter 12

Pomegranate Peel and Fruit Extracts: A Novel Approach to Avert Degenerative Disorders – Pomegranate and Degenerative Diseases

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ABSTRACT

Pomegranate (Punica granatum L.), the fruit and its peel have been shown to hold tremendous potential for the treatment of various ailments. Incorporation of pomegranate, peel and their extracts, as key functional ingredients in various ethnopharmacological formulations are widely accepted in almost all cultures of the World. In addition to their disease ameliorating features, pomegranate and the peel extracts have gained significant popularity in functional food market as ingredient of choice in foods designed to prevent onset of various non-communicable diseases. Health promoting features of the pomegranate peel and fruit extracts define the scope of this natural reserve in global nutraceutical and functional food industry. On account of their unique phytochemicals profile, plentiful pool of antioxidants, dietary fibers, minerals and natural colors, both the valuable reserves have been remained as highly explored plant material in last two decades. Building levels of interest in this fruit has created a deeper insight among researchers to understand actual potential and pathways of pomegranate biomolecules reactivity in human models. The chapter in hand meticulously deals with pomegranate and its extracts as source of innovative healthy components responsible for averting cardiovascular diseases, inflammatory and non-inflammatory disorders, type 2 diabetes, gastric ulcers, various types of cancers and neurodegenerative disorders.

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INTRODUCTION

Pomegranate (*Punica granatum* L.) from the plant family *Punicaceae* is a wonderful source of natural biomolecules implicated as ethnic or folk medicine for the treatment of various health ailments since centuries. Some very earlier studies on pharmacological properties of pomegranate, the bark, fruit and its various anatomical parts endeavor the entire plant and the fruiting body as convincing tools to treat microbiological infections, inflammatory and non-inflammatory diseases and several other degenerative disorders (Milin & Stanimirovic, 1950; Polunin & Stainton, 1985; Morton, 1987; Novarro et al., 1996). The fruit and the inedible fractions (peel and seeds) of pomegranate are biochemically composed of more than 124 different phytochemicals comprised of phenolics, flavonoids, anthocyanins, and a broad range of essential minerals and vitamins. Extensive review of literature in this highly explored domain correlate extraordinary phytochemical and microelemental profile of pomegranate all fractions to their strong antioxidant, anti-mutagenic, apoptotic and antimicrobial properties (Lansky et al. 2005; Li et al., 2006; Heber, 2011). Therapeutic properties of pomegranate are of broad prospects and are proposed to mitigate cardiovascular diseases (Shema-Didi et al., 2014), prostate cancer (Malik et al., 2005), colon cancer (Kasimsetty et al., 2010), breast cancer (Kim et al., 2002), skin melanoma (Pacheco-Palencia et al., 2008), neurodegenerative disorders (Subash et al., 2014), arthritis (Shukla et al., 2008), infertility (Atilgan et al., 2014), Oral and dental diseases (DiSilvestro et al., 2009), gastric damages (Moghaddam et al., 2013) and microbiological pathogenesis (Tanveer et al. 2015). The consumption patterns of the fruit and its various accessions vary in different cultures. The fruit or berry is conventionally manually peeled off to separate the juicy arils which are consumed with seeds or crushed to extract pleasant flavored juice rich in high molecular weight phytochemicals i.e. ellagitannins, flavonoids. Phytochemical composition that defines characteristic role of pomegranate as pharmacological preparation varies with the fruit fraction, cultivar, harvesting time, geographical and climatic condition of the fruit cultivation region (Fischer et al. 2011; Kumari et al., 2012; Zhao et al., 2013). Refer to the to-date explored phytochemistry of the pomegranate fruit and its peel fraction (Figures 1 and 2), a unique class of phenolics i.e. ellagitannins comprising of punicalagin, punicalin, pedunculagin, corilagin, ellagic acid, gallagic acid, tellimagrandin I, casuarinin, granatin A and granatin B. Among some other promising biomolecules, the fruit and its various fractions have also been reported to hold potential levels of caffeic acid, catechin, gallo catechin, luteolin, kaempferol, delphinidin, cyanidin, pelarogonidin, *p*-coumaric acid and gallic acid (Akhtar et al. 2015). Mechanistic role of pomegranate biomolecules and the reactive substances responsible for site-specific inhibitory reactions are still not evidently defined. Interpretations of research made on fate of pomegranate macro biomolecules i.e. ellagitannins in human body and their conversion to recoverable bioactive fractions reveal urolithins (A, B, C & D) as the major stakeholders in mediating various ailments (Gonzalez-Sarrias et al. 2010; Kasimsetty et al. 2010). Gross comparison of free radicals scavenging properties further enlighten urolithins as potential antioxidants than the parent compounds i.e. punicalagin and ellagic acid (Bialonska et al. 2009).

To its audience, this chapter comprehensively defines pomegranate - a traditional medicine of various cultures as tremendously explored potential therapeutic agent of the modern age. Highlighting evidence based ethnic uses of the fruit and its various fractions, the readers are provided with up to date information on pomegranate application trends in therapeutics specifically in mitigating degenerative disorders.

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