

ABSTRACT

Phenolic compounds attributed with unique properties such as metal chelation, free radical scavenging, modulating the enzymatic activity and changing of signal pathways during the voluntarily and non-voluntarily actions. Epidemiological research studies shows that adding polyphenol-rich food items in diet decreases the risk of diseases related to heart, cancer, and osteoporosis. For their diversity of uses and benefits, a great deal of research has been dedicated to the extraction, purification and quantification of phenolic compounds from plants leaves, roots, flowers or seeds. The present research work is divided in three parts; extraction of chlorogenic acid, synthesis of ionic liquids followed by immobilization on silica and third part; purification and enrichment of chlorogenic acid by using the ionic liquids immobilized silica as a stationary phase. In the first part, we applied simple solvent extraction technique for the extraction of chlorogenic acid a subclass of phenolic compounds from black apple. Two parameters were studied for the extraction; part of apple used for extraction and the technique for extraction. Flesh part, core part and skin part was used and three techniques such as centrifugation, hot plate followed by vortex shaker and vortex shaker were applied for the extraction. The spectrophotometric analysis showed that the extract which was extracted from core part used as a sample and extraction technique hot plate followed by vortex shaker has the highest concentration of total chlorogenic acid content. In the second part of research, three different types of ionic liquids such as triethyl ammonium sulphate (TEAS), benzalkonium chloride (BKC) and didecyl dimethyl ammonium chloride were separately synthesized and then immobilized on the silica surface. In the third step, the purification of chlorogenic acid by using a novel idea of using ionic liquids immobilized on silica as a stationary phase in simple column chromatography was applied and the extract with highest concentration of total chlorogenic acid content was used for purification. The comparison of total chlorogenic acid content for purified extract by the above mentioned stationary phases versus crude extract showed that there is significant increase in the concentration of the chlorogenic acid in the purified extract than the crude extract. Talking about the potential of ionic liquids immobilized stationary phase comparatively, triethyl ammonium sulphate (TEAS) based stationary phase showed more content of chlorogenic acid than

benzalkonium chloride (BKC) and didecyl dimethyl ammonium chloride (DDAC) based stationary phases. Furthermore, High Performance Liquid Chromatography analysis of crude extract and purified extracts reveals that the chromatogram of purified extract has more peak area and peak height than the crude extract values. It also confirmed that the ionic liquids based stationary phases has more retention potential for retaining the chlorogenic acid than the simple silica stationary phase. Likewise, antioxidant characterization indicated that the purified extract has good free radical scavenging capacity (80 %) and inhibition of peroxides in Linoleic acid (78 %). The idea of using ionic liquid based stationary phases for the purification and enrichment of phenolic compounds can further be explored for better results.