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Bio-active compounds of bitter melon genotypes (*Momordica charantia* L.) in relation to their physiological functions

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Abstract

Background: Bitter Melon (*Momordica charantia* L) is one of the most popular cooked vegetables in many Asian countries. Its experimental use in mice has indicated improvement in glucose tolerance against Type II diabetes and reduction in blood cholesterol. However, it has not been proven which alkaloids, polypeptides, or their combinations in the Bitter Melon extract are responsible for the medicinal effects. Green and white varieties of Bitter Melon differ strikingly in their bitter tastes, green being much more bitter than white. It is not yet known whether they are different in their special nutritional and hypoglycemic properties. Nutritional qualities of Bitter Melons such as protein, amino acids, minerals, and polyphenolics contents were determined using four selected varieties such as Indian Green [IG], Indian White [IW], Chinese Green [CG], and Chinese White [CW] grown at the University of Arkansas at Pine Bluff [UAPB] Agricultural Research Center. Results indicated that protein levels of IW were significantly higher than IG in both flesh and seed.

Methods: Four Bitter Melon varieties, Indian Green [IG], Indian White [IW], Chinese Green [CG] and Chinese White [CW] were used for phytochemical analyses to determine protein contents, protein hydrolysis, amino acids contents, and their antioxidant and antimutagenic

activities. All analyses were conducted following standard methods. Statistical analyses were conducted using JMP 5 software package [SAS]. The Tukey's HSD procedure was used for the significance of differences at the 5% level.

Results: Moisture contents across the four varieties of Bitter Melon flesh ranged between 92.4 and 93.5%, and that of seed ranged between 53.3 and 75.9%. Protein contents of the flesh were highest in IW [9.8%] and lowest in CG [8.4%]. Seed protein contents were the highest in IW [31.3%] and lowest in IG [27.0%]. Overall, white varieties had higher protein contents than the green varieties. Compared with soy protein, most of the essential amino acid contents of Bitter Melon were similar as in soy proteins. Some amino acids such as Alanine, Glycine, and Valanine were relatively higher in Bitter Melon flesh than in soy protein. Phenolics contents of the flesh, seed, and seed coat tissue [SCT] were significantly different [$p<0.05$] among the four varieties. The four varieties were similar in their antioxidant activities of the flesh tissues; however, they were significantly different in their antioxidant activities in the seed and seed coat tissues [SCT]. Bitter melon varieties IW and CG, tested for antimutagenic effects, both flesh and seed had considerably high activities against benzo[a]pyrene with *Salmonella* TA98 [92-100% inhibition] and S*almonella* TA100 [79-86% inhibition].

Conclusion: Based on these studies, Bitter Melon is a good source of phenolic compounds. All four varieties tested showed considerably high antioxidant and antimutagenic activities. Therefore, these natural plant phenolics can be a good source of biologically active compounds that may be applied in many food systems to enhance food values and special nutritional qualities. Further studies will be needed using more genetically diverse varieties to pin point the bioactive and functional compounds and their physiological properties.

Key words: *Momordica charantia*, protein, polyphenolics, antioxidant, antimutagenicity