EVALUATING EFFICACY OF THE VERNONIA AMYGDALINA BY THE EXTRACTION CONDITIONS OF TAGUCHI EXPERIMENT DESIGN

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Abstract - Taguchi experimental method is a type of general fractional factorial design often applied in industrial process and effectively reduces the time and cost of product development, and its design concept is also called off-line quality design. Using the Taguchi's orthogonal arrays and the signal-to-noise ratio (S/N ratio) can accurately find the optimal conditions of influencing factors to control the quality of products. The Vernonia amygdalina (VA) is a traditional herbal medicine and food, which can reduce the occurrence of breast cancer for local residents in tropical Africa. Apart from this, the VA has not bad antibacterial and anti-oxidant effects in African folklore. In our study, Taguchi experimental design was used to find the best extraction conditions in the ultrasonic extracted processof the VA. There are 4 extracted factors (time, concentration of solvent, temperature and solid-liquid ratio) and 3 level in Taguchi'sorthogonal arrays [L9 (34)] to use. Under the optimal extraction conditions, the highest flavonoids and total phenol content were obtained to further evaluate the antioxidant capacity (reducing ability, chelating ferrous ion, DPPH free radical scavenging ability) and antibacterial property of the VA. The results showed that the VA has not only excellent anti-oxidation ability, but also has good inhibited effect on the Escherichia coli by the Agar disk-diffusion testing. Therefore, the VA has great potential for application in the natural health foods and cosmetics fields.

Keywords: Vernonia amygdalina, Taguchi experimental design, extraction, antioxidant, antibacterial