

**PHYSICOCHEMICAL PROPERTIES OF PRE-
TREATED CUTTLBONE POWDER AND ITS
POTENTIAL AS AN ALTERNATIVE CALCIUM
SOURCE**

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PHYSICOCHEMICAL PROPERTIES OF PRE-TREATED CUTTLBONE POWDER AND ITS POTENTIAL AS AN ALTERNATIVE CALCIUM SOURCE

By

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A dissertation submitted in partial fulfilment of the requirements for the degree of
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DECLARATION BY AUTHOR

This dissertation is composed of my original work and contains no material previously published or written by another person except where due reference has been made in the text. The content of my dissertation is the result of work I have carried out since the commencement of my research project and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution.



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LIST OF ABBREVIATIONS

CBP	Cuttlebone powder
CBP1	Cuttlebone powder pre-treated with distilled water
CBP2	Cuttlebone powder pre-treated with 1% acetic acid solution
CBP3	Cuttlebone powder pre-treated with 2% sodium hydroxide solution
Ca	Calcium
DPPH	1,1-diphenyl-2-picrylhydrazylradicals
Fe	Iron
FAO	Food and Agricultural Organization
K	Potassium
Mg	Magnesium
MOH	Ministry of Health Malaysia
Na	Sodium
NaOH	Sodium hydroxide
WHC	Water Holding Capacity
WHO	World Health Organization
OHC	Oil Holding Capacity

SIFAT FIZIKO KIMIA SERBUK TULANG SOTONG KATAK YANG DIRAWAT DAN POTENSINYA SEBAGAI SUMBER KALSIMUM ALTERNATIF

ABSTRAK

Kajian ini bertujuan untuk mengkaji potensi serbuk tulang sotong katak yang dirawat sebagai sumber kalsium alternatif dengan menilai sifat-sifat fizikokimia serbuk tulang sotong katak yang dirawat terlebih dahulu dengan air suling (CBP1), 1% asid asetik (CBP2) dan larutan natrium hidroksida 2% (CBP3). Pra-rawatan digunakan untuk mengekstrak abu dengan membuang bahan organik seperti protein dan lemak. Sifat-sifat kimia seperti komposisi proksimat, kandungan mineral dan sebatian bioaktif, juga sifat-sifat fizikal, seperti warna, ketumpatan pukal, sifat aliran, kapasiti penahan air dan minyak dan kelarutan air, juga ditentukan. Analisis proksimat menunjukkan abu adalah komponen utama yang terdapat dalam kesemua sampel. Analisis kualitatif sebatian bioaktif yang dijalankan ke atas ekstrak polisakarida tulang sotong katak, dan kehadiran fenol, flavonoid, alkaloid dan glikosida dikesan. Tiada kehadiran tanin dalam tulang sotong katak. Analisis mineral menunjukkan serbuk tulang sotong katak yang dirawat kaya dengan kalsium, dan berpotensi dianggap sebagai sumber kalsium dalam produk makanan atau suplemen kalsium. Kandungan mineral semua sampel meningkat mengikut urutan besi <kalium <magnesium <natrium <kalsium. Didapati tiada perbezaan yang signifikan ($p > 0.05$) pada keputihan dan kemerahan semua sampel, tetapi kekuningan CBP1 jauh lebih tinggi berbanding CBP2 dan CBP3. Ketumpatan pukal CBP2 lebih rendah secara signifikan ($p < 0.05$) berbanding CBP1 dan CBP3, sementara daya tahan air CBP1 lebih tinggi secara signifikan ($p < 0.05$) berbanding CBP2 dan CBP3. Didapati tiada perbezaan yang signifikan ($p > 0.05$) pada daya tahan minyak dan kelarutan air kesemua sampel. Ketumpatan pukal yang relatif tinggi dan daya tahan air dan minyak serbuk tulang sotong katak yang dirawat menunjukkan potensinya sebagai bahan makanan berfungsi.

PHYSICOCHEMICAL PROPERTIES OF PRE-TREATED CUTTLEBONE POWDER AND ITS POTENTIAL AS AN ALTERNATIVE CALCIUM SOURCE

ABSTRACT

This study was aimed to investigate the potential use of pre-treated cuttlebone powder (CBP) as an alternative calcium source by evaluating the physicochemical properties of CBP pre-treated with distilled water (CBP1), 1% acetic acid (CBP2) and 2% sodium hydroxide (NaOH) solutions (CBP3). Pre-treatments were used to extract ash and degrade the organic matters such as proteins and fats. The chemical properties including proximate composition, mineral contents and bioactive compounds as well as physical properties, including colour, bulk density, flowability, water and oil holding capacities and water solubility, of the samples were then determined. Proximate analysis revealed ash as the major component of all samples. Qualitative analysis of bioactive compounds was conducted on polysaccharides extracted from cuttlebone, and the presence of phenols, flavonoids, alkaloids and glycosides were detected. Tannins appeared to be absent in cuttlebones. Mineral analysis indicated that pre-treated CBP was rich in calcium, which means the material may be considered as a potential calcium source for food products or calcium supplements. The mineral contents of all samples increased in the order of iron < potassium < magnesium < sodium < calcium. No significant difference ($p>0.05$) in the whiteness and redness of all samples was observed, but the yellowness of CBP1 was significantly greater than those of CBP2 and CBP3. The bulk density of CBP2 was significantly lower ($p<0.05$) than those of CBP1 and CBP3, and the water holding capacity (WHC) of CBP1 was significantly higher ($p<0.05$) than those of CBP2 and CBP3. No significant differences ($p>0.05$) in oil holding capacity (OHC) and water solubility were observed amongst the samples. The high bulk density, water and oil holding capacities of pre-treated CBP demonstrated its potential use as a functional food ingredient.