

Alimatus Shofikhah 220341100091. Kajian Bioavailabilitas Zat Besi Pada Produk Garam Fortifikasi Ekstrak Kelor(*Moringa oleifera*) Terenkapsulasi. Pembimbing Wiwit Sri Werdi Pratiwi S.Si., M.Si., M.Sc

ABSTRAK

Daun kelor (*Moringa oleifera*) merupakan sumber zat besi potensial yang dapat berfungsi untuk bahan fortifikasi pangan. Penelitian ini bertujuan untuk mengetahui kadar zat besi daun kelor hasil metode *Microwave Assisted Extraction* (MAE), kadar zat besi pada garam setelah fortifikasi kelor enkapsulasi, serta tingkat bioavailabilitas zat besi pada produk garam fortifikasi kelor enkapsulasi. Ekstraksi zat besi daun kelor dilakukan menggunakan metode MAE dan *Deep Eutectic Solvent* (DES), kemudian ekstrak dienkapsulasi dengan dormulasi kitosan 0,15%(F0), 0,25%(F1), 0,35%(F3) dan difortifikasikan ke dalam garam. Kadar zat besi dianalisis secara kuantitatif dengan *Atomic Absorption Spectroscopy*(AAS), sedangkan uji bioavailabilitas dilakukan secara *in vitro* melalui simulasi pencernaan fase lambung dan usus. Hasil penelitian menunjukkan bahwa metode MAE mampu mengekstraksi zat besi dari daun kelor dengan baik rata-rata 8,18mg/L dan 10,34mg/L. Kadar zat besi garam fortifikasi menggunakan ekstrak kelor enkapsulasi yaitu Kontrol Garam 2,99mg/L, F1 3,00mg/L, F2 1,16mg/L, F3 0,53mg/L. Uji bioavailabilitas menunjukkan Total pelasan zat besi kontrol 0,91mg/L, F1 0,91mg/L, F2 0,61mg/L F3 0,4mg/L dan total pelepasan fraksional didalam lambung dan usus sampel kontrol 30%, F1 30,14%, F2 67,28%, F3 93,33%. Proses enkapsulasi berpengaruh nyata terhadap pola pelepasan zat besi ($p < 0,005$), di mana pelepasan Fe lebih optimal terjadi pada fase usus. Berdasarkan keseluruhan hasil, formulasi F2 dengan merupakan formulasi terbaik berdasarkan total total zat besi yang dilepaskan mendekati total zat besi awal dan berpotensi dikembangkan sebagai produk garam fortifikasi sumber zat besi.

Kata kunci : Bioavailabilitas, *Deep eutectic solvent*, *Enkapsulasi*, *Microwave Assisted extraction*, Fortifikasi garam

Alimatus Shofikhah 220341100091. A Study of the Bioavailability of Iron in Encapsulated Salt Fortified with Moringa (*Moringa oleifera*) Extract. Supervised : Wiwit Sri Werdi Pratiwi, S.Si., M.Si., M.Sc.

ABSTRAK

Moringa leaves (*Moringa oleifera*) are a potential source of iron that can be used for food fortification. This study aimed to determine the iron content of moringa leaves obtained using the Microwave-Assisted Extraction (MAE) method, the iron content in salt after fortification with encapsulated moringa, and the bioavailability of iron in the encapsulated moringa-fortified salt product. Iron extraction from moringa leaves was performed using the MAE and Deep Eutectic Solvent (DES) methods; the extracts were then encapsulated using chitosan formulations at 0.15% (F0), 0.25% (F1), and 0.35% (F3) and fortified into salt. Iron content was quantitatively analyzed using Atomic Absorption Spectroscopy (AAS), while bioavailability testing was conducted in vitro via gastric and intestinal phase digestion simulations. The results showed that the MAE method effectively extracted iron from moringa leaves, yielding average concentrations of 8.18 mg/L and 10.34 mg/L. The iron content of the fortified salt using encapsulated moringa extract was as follows: Control Salt 2.99 mg/L, F1 3.00 mg/L, F2 1.16 mg/L, F3 0.53 mg/L. Bioavailability tests showed total iron release for the control at 0.91 mg/L, F1 at 0.91 mg/L, F2 at 0.61 mg/L, and F3 at 0.4 mg/L, with total fractional release in the stomach and intestine for the control sample at 30%, F1 at 30.14%, F2 at 67.28%, F3 93.33%. The encapsulation process had a significant effect on the iron release profile ($p < 0.005$), with optimal Fe release occurring in the intestinal phase. Based on the overall results, formulation F2 was the best formulation, as the total iron released was close to the initial total iron content and has the potential to be developed as a fortified salt product serving as an iron source.

Keywords: Bioavailability, Deep eutectic solvent, Encapsulation, Microwave-assisted extraction, Salt fortification