

**DETERMINATION OF BIOACTIVE
COMPOUNDS FROM MALAYSIAN SEAHORSES
(*Hippocampus kuda*, *Hippocampus trimaculatus*,
Hippocampus spinosissimus)**

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Institute : Institute of Marine Biotechnology

Three species of seahorses *Hippocampus kuda*, *Hippocampus trimaculatus* and *Hippocampus spinosissimus* was subdivided according to its gender (male and female) and screened for its antioxidant activities (DPPH free radical scavenging assay, xanthine oxidase assay and superoxide dismutase assay), antibacterial activities (well diffusion technique and disk diffusion technique), antiviral activities (cytotoxicity assay) and finally evaluated for its biochemical properties which comprised of total protein content, ash content, moisture content, total fat content, trace metal content and fatty acid composition. On the whole, the biological effects of antioxidant activities exhibited by the 3 species of seahorses can be summarized as follow; *H. kuda* showed the highest antioxidant activities for all three assays conducted. *H. kuda* distinctively showed activities close to the activities of the positive controls for both xanthine oxidase and superoxide dismutase assay. Seahorse crude extract showed adverse bacterial inhibitory

effects against most of the test strains. Results revealed that the well diffusion technique showed better antimicrobial activities compared to the well diffusion technique. Apart from that, male seahorses showed better bacterial inhibitory effects than female seahorses. On the whole, seahorse crude showed good bacteria inhibition against 5 out of the 8 bacteria test strains, which comprised of *S. aureus*, *S. agalactia*, *A. hydrophilla*, *B. subtilis* and *B. cereus*. The antiviral activity of seahorse on the whole exceeded 50% at the high concentration in the subtoxic range, with EC_{50} against HSV-1 of ranging from 31.8 $\mu\text{g/ml}$ to 277.4 $\mu\text{g/ml}$ and CC_{50} ranging from 31.8% to 48 % of toxicity at 1000 $\mu\text{g/ml}$. If activities were to be compared according to species, the highest anti HSV-1 activities were exhibited by *Hippocampus trimaculatus*, *Hippocampus spinosissimus* and *Hippocampus kuda*. All three species of seahorses exhibited almost a similar fatty acid profile where the highest fatty acid content was C16:0 (Palmitic acid), followed by C18:1 (Stearic acid) and C22:6 (hexaenoic acid). The highest content of Palmitic acid content among the three species was seen in *Hippocampus spinosissimus*, 31.29% in males and 28.89% in females, followed by *Hippocampus kuda*, 29.43% in males, 28.43% in females, followed by *Hippocampus trimaculatus*, 27.78% in males, 26.27% in females. Highest PUFA content was seen in *Hippocampus trimaculatus* followed by *Hippocampus spinosissimus* and *Hippocampus kuda*. EPA content was much higher in *Hippocampus spinosissimus* compared to the other 2 species exhibiting 9.98% in males and 9.14% females. Whereas DHA content was seen higher in *Hippocampus trimaculatus* compared to the other 2 species exhibiting 19.65% in

males and 19.12% in females. The trace metals concentrations were relatively low for all the three species. Cadmium concentrations ranging from 0.11 ± 0.01 to 0.85 ± 0.08 $\mu\text{g/g}$, copper concentrations ranging from 2.07 ± 0.17 to 5.12 ± 0.75 and lead concentrations ranging from 2.18 ± 0.26 to 6.16 ± 0.82 $\mu\text{g/g}$. Mg (Magnesium) concentration was the highest among the six tested metals with *Hippocampus trimaculatus* in the lead exhibiting 1230 ± 15.54 $\mu\text{g/g}$ in males and 1123 ± 16.64 $\mu\text{g/g}$ in females followed by *Hippocampus spinosissimus* exhibiting 759 ± 3.45 $\mu\text{g/g}$ in males and 729 ± 5.45 $\mu\text{g/g}$ in females and *Hippocampus kuda* exhibiting 734 ± 5.08 $\mu\text{g/g}$ in males and 702 ± 7.18 $\mu\text{g/g}$ in females.

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**PENYARINGAN SEBATIAN BIOAKTIF DARI KUDA LAUT
MALAYSIA (*Hippocampus kuda*, *Hippocampus trimaculatus*,
Hippocampus spinosissimus)**

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Sebatian bioaktif dari tiga spesis kuda laut iaitu *Hippocampus kuda*, *Hippocampus trimaculatus* dan *Hippocampus spinosissimus*, yang dibahagikan mengikut jantannya (jantan dan betina) telah disaring untuk aktiviti antioksidan (pemerangkapan radikal bebas oleh DPPH, ujian xanthine oksidase dan ujian superoxide dismutase), aktiviti antibakteria (teknik pembauran telaga dan teknik pembauran cakera), aktiviti antiviral (ujian ketoksikan) dan juga profil kandungan biokimianya yang terdiri daripada kandungan protin, kandungan abu, kandungan air, kandungan lemak, kandungan logam serta komposisi asid lemak. Secara keseluruhannya, kesan biologi aktiviti antioksidan bagi ketiga-tiga spesis boleh dirumuskan seperti berikut; *H. kuda* menunjukkan aktiviti antioksidan yang tertinggi bagi ketiga-tiga ujian yang dijalankan. *H. kuda* juga menunjukkan aktiviti yang menghampiri kawalan positif bagi ujian xanthine oksidase dan juga

superoxide dismutase. Sebatian kuda laut menunjukkan kesan antibakteria terhadap 5 dari 8 test strain yang terdiri dari *Staphylococcus aureus*, *Streptococcus agalactiae*, *Aeromonas hydrophilla*, *Bacillus subtilis* dan *Bacillus cereus*. Kesan aktiviti antiviral pula menunjukkan aktiviti yang melebihi 50% pada kepekatan yang tinggi yang terletak dalam lingkungan toksik-separa, dengan nilai EC₅₀ yang terletak dalam lingkungan 31.8 µg/ml ke 277.4 µg/ml dan nilai CC₅₀ terletak dalam lingkungan 31.8% ke 48 % pada kepekatan toksisiti 1000 µg/ml. Jika aktiviti dibandingkan mengikut spesies kuda laut, aktiviti tertinggi dikesan pada *H. trimaculatus* diikuti pada *H. spinosissimus* dan *H. kuda*. Ketiga-tiga spesies kuda laut menunjukkan profil asid lemak yang hampir serupa di mana kandungan asid lemak tertinggi adalah C 16:0 (asid palmitik) diikuti oleh C18:1 (asid stearik) dan C22:6 (asid heksanoik). Kandungan asid palmitik yang tertinggi dikesan pada spesies kuda laut *H. spinosissimus* iaitu 31.29% untuk jantan dan 28.89% untuk betina, diikuti dengan *H. kuda*, 29.43% untuk jantan, 28.43% untuk betina dan *H. trimaculatus*, 27.78% untuk jantan, 26.27% untuk betina. Kandungan asid lemak poli-tak tepu dikesan pada *H. trimaculatus*, *H. spinosissimus* dan *H. kuda*. Kandungan asid lemak Eiko-pentanoik dikesan lebih tinggi pada *H. spinosissimus* jika dibandingkan dengan 2 spesies kuda laut yang lain, dimana 9.98% dikesan pada jantan dan 9.14% dikesan pada betina. Manakala kandungan asid lemak doko-heksanoik dikesan lebih tinggi pada *H. trimaculatus* dengan jumlah komposisi 19.65% pada jantan dan 19.12% pada betina. Kandungan logam pula dikesan pada tahap yang rendah bagi ketiga-tiga spesies dimana kandungan cadmium (Cd) terletak dalam lingkungan 0.11±0.01 ke

0.85±0.08 µg/g, kepekatan kuprum (Cu) dalam lingkungan 2.07±0.17 ke 5.12±0.75 dan plumbum (Pb) dalam lingkungan 2.18±0.26 ke 6.16±0.82 µg/g. Kandungan magnesium (Mg) pula dikesan sebagai kandungan logam yang tertinggi dari 6 jenis logam yang diuji bagi ketiga-tiga spesis, di mana *H. trimaculatus* merupakan spesis yang mencatatkan kandungan yang tertinggi pada kepekatan 1230±15.54 µg/g dalam jantan dan 123±16.64 µg/g dalam betina diikuti dengan *H. spinosissimus* mencatatkan 759±3.45 µg/g dalam jantan dan 729±5.45 µg/g dalam betina manakala *H. kuda* menunjukkan 734±5.08 µg/g dalam jantan dan 702±7.18 µg/g dalam betina.