UNIVERSITI PUTRA MALAYSIA

ANTIULCEROGENIC ACTIVITY OF VIRGIN COCONUT OIL ON ULCER INDUCED RATS

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Abstract of thesis presented to the senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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By

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Peptic ulcer disease (PUD) is a lesion of the gastric or duodenal mucosa occurring at a site where the mucosal epithelium is exposed to acid and pepsin. Factors such as stress, smoking, nutritional deficiencies and ingestion of non-steroidal anti-inflammatory drugs (NSAIDs) contribute to the incidence of gastric ulcerations. Currently available medicinal treatments generally based on the inhibition of gastric acid secretion and work as acid-independent therapy have a high rate of ulcer recurrence and cause various side effects. Therefore, it is mandatory to search for new anti-ulcer agents. Recently, Virgin Coconut Oil (VCO) is gaining wide popularity in the global market. It is extracted via fermentation and/ or through wet processes compared to coconut oil (CO) which are extracted through Refined–Bleached-Deodarized (RBD) process and undergoes high heating treatments. As VCOs are produced under a controlled temperature, therefore it may have more beneficial effects than the commercial oil since it retains most of the unsaponifiable components. Two different types of VCOs labeled as VCO A and VCO B were

donated by MARDI, while CO is produced through the conventional method. Their total phenolic content and antioxidant activity were studied followed by fatty acid analysis and other chemical properties. The antiulcer activity of VCOs over CO was evaluated by using in-vivo models of acute gastric lesions induced by HCl / ethanol and diclofenac in rats. Moreover, the effect of the oils on gastric content, volume, pH and total acidity, using pylorus ligated model were also evaluated. Chemical composition analysis revealed that all three oils had lauric acid (C12:0) as the major fatty acid constituent. Other chemical parameters were also presented. VCO B showed highest antioxidant property followed by VCO A and CO the least with high phenolic content. Oils were administered orally for 7 days as the last dose one hour prior to ulcerogenic procedure. Ulcer index scoring, ulcer length and cure ratio (%) were determined, followed by microscopic assessment of inflammation scoring and damage scoring. VCO B (100%) significantly prevented gastric ulcer formation induced by HCl/ ethanol and diclofenac ($P<0.001$) followed by VCO A (100%) compared negative control group. Similarly, CO also significantly ($P<0.00$) prevented gastric ulcer formation as compared to negative control group. In the pylorus ligated model, it was observed that VCO B (100%) displayed a significant antisecretory activity ($P<0.001$) which lead to the reduction in the gastric juice, volume, total acidity and pH. This is followed by VCO A and CO which also significantly ($P<0.01$) reduces the gastric juice volume, total acidit, pH and increase in mucus content. These findings indicate that VCO B, followed by VCO A and CO displays a good anti-ulcer activity as compared to negative control group.

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KESAN ANTIULSER MINYAK KELAPA DARA KE ATAS TIKUS.

oleh

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Ulser gastrik merupakan sejenis keadaan di mana berlaku kerosakan pada lapisan mukosa perut atau duodenum apabila diselaputi asid dan pepsin. Faktor-faktor seperti stres, merokok, kekurangan nutrisi dan pengambilan ubat anti-inflamasi (NSAIDs) memberikan sumbangan terhadap kejadian ulser gastric. Kawalan yang ada pada masa ini hanya berasaskan perencatan sekresi asid gastrik yang berfungsi sebagai terapi asid bebas. Namun, rawatan tersebut mempunyai kesan sampingan dan kejadian ulser yang mungkin berulang. Oleh kerana itu, adalah perlu untuk mencari agen baru berasaskan herba yang boleh mengatasi dilema di atas. Minyak kelapa dara (VCO) semakin terkenal di dalam pasaran global. Ia diekstrak daripada proses fermentasi sama ada melalui proses basah berbanding dengan minyak kelapa (CO) yang diekstrak melalui pemanasan pada suhu tinggi. VCO yang dihasilkan di bawah suhu terkawal, bermungkinan mempunyai kesan yang lebih baik daripada minyak komersil kerana ianya dapat mengekalkan sebahagian besar komponen yang membantu dalam aktiviti farmakologi. Dua jenis VCO dilabel sebagai VCO A dan

VCO B hasil sumbangan MARDI, manakala CO dihasilkan melalui kaedah konvensional. Jumlah kandungan fenol dan aktiviti antioksidan ditentukan diikuti dengan analisis asid lemak dan sifat – sifat kimia yang lain. Kegiatan antiulser oleh VCO dan CO dinilai dengan menggunakan model HCl / etanol dan diclofenak. Selain itu, kesan minyak kelapa dara terhadap kandungan perut, isipadu, pH dan jumlah keasidan juga diukur dengan menggunakan model di ligasi pilorus. Analisis komposisi kimia menunjukkan bahawa ketiga-tiga minyak tersebut mempunyai asid laurik (C12:0) sebagai konstituen lemak tertinggi. Parameter lain juga direkodkan. VCO B telah menunujukkan aktiviti antioksidan yang paling tinggi diikuti dengan VCO A dan CO berserta dengan kandungan fenol yang tinggi. Minyak diberikan dalam dos 10mg/Kg (100%) selama 7 hari dan satu jam sebelum ulser diaruhkan. Skor indeks, panjang ulser dan purata penyembuhan (%) ditentukan diikuti dengan penilaian mikroskopik iaitu menilai skor keradangan dan skor kerosakan. Nyata, VCO B ($P< 0.001$) mencegah pembentukan ulser yang diaruh oleh HCl / etanol dan diclofenac diikuti dengan VCO A (100%) berbanding dengan kumpulan negative. Ini diikuti oleh kumpulan CO ($P<0.001$) yang juga mencegah ulser diaruh oleh kedua-dua ejen. Untuk model yang diligat pilorus pula, VCO B (100%) menunjukkan ia mempunyai keupayaan antiulser yang menyebabkan penurunan dalam jus perut, isipadu, jumlah keasidan dan juga pH. Ini juga diikuti dengan VCO A (100%) dan CO (100%) yang juga menyebabkan penurunan jus perut, isipadu jumlah keasidan, pH dan peningkatan mucus perut. Penemuan ini menunjukkan VCO B, diikuti dengan VCO A dan CO berkemungkinan mempunyai aktiviti anti-aruh-ulser yang baik.

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