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List of references supporting the assessment of *Carum carvi* L., fructus and *Carum carvi* L. aetheroleum

Draft

The European Medicines Agency acknowledges that copies of the underlying works used to produce this monograph were provided for research only with exclusion of any commercial purpose.

Al-Bataina BA, Maslat AO and Al-Kofahil MM. Element analysis and biological studies on ten oriental spices using XRF and Ames test. *J Trace Elem Med Biol* 2003, 17 (2):85-90

Al-Essa MK, Shafagoj YA, Mohammed FI and Afifi FU. Relaxant effect of ethanol extract of *Carum carvi* on dispersed intestinal smooth muscle cells of the guinea pig. *Pharm Biol* 2010, 48 (1):76-80

Alhaider AA, Al-Mofleh IA, Mossa JS, Al-Sohaibani MO, Rafatullah S and Qureshi MA. Effect on *Carum carvi* on Experimentally Induced Gastric Mucosal damage in Wistar Albino Rats. *International Journal of Pharmacology* 2006, 2 (3):309-315

Baananou S, Bagdonaite E, Marongiu B, Piras A, Porcedda S, Falconieri D *et al.* Extraction of the volatile oil from *Carum carvi* of Tunisia and Lithuania by supercritical carbon dioxide: chemical composition and antiulcerogenic activity. *Nat Prod Res* 2013, 27 (22):2132-2136

Blumenthal M, Busse WR, Goldberg A, Gruenwald J, editors. The Complete German Commission E Monographs. American Botanical Council, Austin Texas 1998, 102-103

British pharmaceutical codex 1979. The Council of the Pharmaceutical Society of Great Britain, London 1979, 134-135

Claus E. Pharmacognosy. 3rd ed. Lea & Febiger, Philadelphia, 1956: 310-311

CosIng [The European Commission database with information on cosmetic substances and ingredients (contained in the Cosmetics Regulation EC No 1223/2009, Cosmetics Directive 76/768/EEC and Inventory of Cosmetic Ingredients)]. Available at: <http://ec.europa.eu/consumers/cosmetics/cosing/>
Accessed 03/03/2014



Council of Europe, Natural sources of flavourings, Rep No 1, Council of Europe, Koelblin-Fortuna-Druck Germany, 2000, 105-106

de Sousa DP, de Farias Nobrega FF and de Almeida RN. Influence of the chirality of (R)-(-)- and (S)-(+)-carvone in the central nervous system: a comparative study. *Chirality* 2007, 19 (4):264-8

Eddouks M, Lemhadri A and Michel JB. Caraway and caper: potential anti-hyperglycaemic plants in diabetic rats. *J Ethnopharmacol* 2004, 94 (1):143-8

EMA/HMPC/107079/2007 HMPC Guideline on the assessment of genotoxic constituents in herbal substances/preparations

Engel W. *In vivo* studies on the metabolism of the monoterpenes S-(+)- and R-(-)-carvone in humans using the metabolism of ingestion-correlated amounts (MICA) approach. *J Agric Food Chem* 2001, 49 (8):4069-75

ESCOP Monographs 2nd ed. Carvi fructus – caraway fruit. European Scientific Cooperative on Phytotherapy, editor. Thieme, Stuttgart 2003, 64-69

EU regulation No 872/2012

European Food Safety Authority (EFSA). Scientific opinion on the safety assessment of carvone, considering all source of exposure. *EFSA Journal* 2014, 12 (7): 3806 74pp

European Pharmacopoeia Online 8.2. Caraway fruit – Carvi fructus. Council of Europe. 01/2008:1080

European Pharmacopoeia Online 8.2. Caraway oil – Carvi aetheroleum. Council of Europe. 01/2008:1817

Garcia-Gonzalez JJ, Bartolome-Zavala B, Fernandez-Melendez S, Barcelo-Munoz JM, Miranda Paez A, Carmona-Bueno MJ *et al.* Occupational rhinoconjunctivitis and food allergy because of aniseed sensitization. *Ann Allergy Asthma Immunol* 2002, 88 (5):518-22

Goerg KJ and Spilker T. Effect of peppermint oil and caraway oil on gastrointestinal motility in healthy volunteers: a pharmacodynamic study using simultaneous determination of gastric and gall-bladder emptying and oro-caecal transit time. *Aliment Pharmacol Ther* 2003, 17 (3):445-51

Hawrelak JA, Cattley T and Myers SP. Essential oils in the treatment of intestinal dysbiosis: A preliminary *in vitro* study. *Altern Med Rev* 2009, 14 (4):380-4

Heinle H, Hagelauer D, Pascht U, Kelber O and Weiser D. Intestinal spasmolytic effects of STW 5 (Iberogast) and its components. *Phytomedicine* 2006, 13 (Suppl 5):75-9

Higashimoto M, Purintrapiban J, Kataoka K, Kinouchi T, Vinitketkumnun U, Akimoto S *et al.* Mutagenicity and antimutagenicity of extracts of three spices and a medicinal plant in Thailand. *Mutat Res* 1993, 303 (3):135-42

Hänsel R, Keller K, Rimpler H, Schneider G. editors. Hagers Handbuch der Pharmazeutischen Praxis. 4th ed. Vol 5. Drogen A-D. Springer-Verlag, Berlin 1992, 693-700

Johri RK. *Cuminum cyminum* and *Carum carvi*: An update. *Pharmacogn Rev* 2011, 5 (9):63-72

Kazemipoor M, Radzi CW, Hajifaraji M and Cordell GA. Preliminary Safety Evaluation and Biochemical Efficacy of a *Carum carvi* Extract: Results from a Randomized, Triple-Blind, and Placebo-Controlled Clinical Trial. *Phytother Res* 2014, (Mar 17):Epub ahead of print

- Kazemipoor M, Radzi CW, Hajifaraji M, Haerian BS, Mosaddegh MH and Cordell GA. Antiobesity effect of caraway extract on overweight and obese women: a randomized, triple-blind, placebo-controlled clinical trial. *Evid Based Complement Alternat Med* 2013, 2013 1-8
- Keshavarz A, Minaiyan M, Ghannadi A and Mahzouni P. Effects of *Carum carvi* L. (Caraway) extract and essential oil on TNBS-induced colitis in rats. *Res Pharm Sci* 2013, 8 (1):1-8
- Khayyal MT, el-Ghazaly MA, Kenawy SA, Seif-el-Nasr M, Mahran LG, Kafafi YA *et al.* Antiulcerogenic effect of some gastrointestinally acting plant extracts and their combination. *Arzneimittelforschung* 2001, 51 (7):545-53
- Khayyal MT, Seif-El-Nasr M, El-Ghazaly MA, Okpanyi SN, Kelber O and Weiser D. Mechanisms involved in the gastro-protective effect of STW 5 (Iberogast) and its components against ulcers and rebound acidity. *Phytomedicine* 2006, 13 (Suppl 5):56-66
- Lahlou S, Tahraoui A, Israili Z and Lyoussi B. Diuretic activity of the aqueous extracts of *Carum carvi* and *Tanacetum vulgare* in normal rats. *J Ethnopharmacol* 2007, 110 (3):458-63
- Lemhadri A, Hajji L, Michel JB and Eddouks M. Cholesterol and triglycerides lowering activities of caraway fruits in normal and streptozotocin diabetic rats. *J Ethnopharmacol* 2006, 106 (3):321-6
- List PH, Hörhammer L. editors. Hagers Handbuch der Pharmazeutischen Praxis. Chemikalien und drogen AM-CH. Springer-Verlag, Berlin 1972, 727-733
- Ljungdahls M. Recepthandbok. 4th ed Nova förlag, Malmö 1981 (reprint of Ljungdahls M. Recepthandbok. 3rd ed 1953), 253
- Mahmoud I, Alkofahi A and Abdelaziz A. Mutagenic and Toxic Activities of Several Spices and Some Jordanian Medicinal Plants. *International Journal of Pharmacognosy* 1992, 30 (2):81-85
- Madaus G. Lehrbuch der biologischen Heilmittel. Vol 2. Georg Olms Verlag. Hildesheim-New York 1976 (reprint of Madaus G. Lehrbuch der biologischen Heilmittel. Georg Thieme Verlag, Leipzig, 1938), 848-852
- Martindale. The Extra Pharmacopoeia. 26th ed, The Pharmaceutical Press, London 1972, 1236
- Martindale. The Extra Pharmacopoeia. 28th ed, The Pharmaceutical Press, London 1993, 1349-1350
- Mascher H, Kikuta C and Schiel H. [Pharmacokinetics of carvone and menthol after administration of peppermint oil and caraway oil containing enteric formulation]. *Wien Med Wochenschr* 2002, 152 (15-16):432-6
- Micklefield G, Jung O, Greving I and May B. Effects of intraduodenal application of peppermint oil (WS(R) 1340) and caraway oil (WS(R) 1520) on gastroduodenal motility in healthy volunteers. *Phytother Res* 2003, 17 (2):135-40
- Niinimäki A, Hannuksela M and Mäkinen-Kiljunen S. Skin prick tests and in vitro immunoassays with native spices and spice extracts. *Ann Allergy Asthma Immunol* 1995, 75 (3):280-6
- NTP Toxicology and Carcinogenesis Studies of d-Carvone (CAS No. 2244-16-8) in B6C3F1 Mice (Gavage Studies). *Natl Toxicol Program Tech Rep Ser* 1990, 381 1-113
- Rockwell P and Raw I. A Mutagenic Screening of Various Herbs, Spices, and Food Additives. *Nutr Cancer* 1979, 1 (4):10-15

Sachin BS, Monica P, Sharma SC, Satti NK, Tikoo MK, Tikoo AK *et al.* Pharmacokinetic interaction of some antitubercular drugs with caraway: implications in the enhancement of drug bioavailability. *Hum Exp Toxicol* 2009, 28 (4):175-84

Saghir MR, Sadiq S, Nayak S and Tahir MU. Hypolipidemic effect of aqueous extract of *Carum carvi* (black Zeera) seeds in diet induced hyperlipidemic rats. *Pak J Pharm Sci* 2012, 25 (2): 333-7

Samojlik I, Lakic N, Mimica-Dukic N, Dakovic-Svajcer K and Bozin B. Antioxidant and hepatoprotective potential of essential oils of coriander (*Coriandrum sativum* L.) and caraway (*Carum carvi* L.) (Apiaceae). *J Agric Food Chem* 2010, 58 (15):8848-53

Schemann M, Michel K, Zeller F, Hohenester B and Ruhl A. Region-specific effects of STW 5 (Iberogast) and its components in gastric fundus, corpus and antrum. *Phytomedicine* 2006, 13 (Suppl 5):90-9

Schempp H, Weiser D, Kelber O and Elstner EF. Radical scavenging and anti-inflammatory properties of STW 5 (Iberogast) and its components. *Phytomedicine* 2006, 13 (Suppl 5):36-44

Sibaev A, Yuce B, Kelber O, Weiser D, Schirra J, Goke B *et al.* STW 5 (Iberogast) and its individual herbal components modulate intestinal electrophysiology of mice. *Phytomedicine* 2006, 13 (Suppl 5):80-9

Simmen U, Kelber O, Okpanyi SN, Jaeggi R, Bueter B and Weiser D. Binding of STW 5 (Iberogast) and its components to intestinal 5-HT, muscarinic M3, and opioid receptors. *Phytomedicine* 2006, 13 (Suppl 5):51-5

Steinegger E, Hänsel R. Lehrbuch der Pharmakognosie. Springer Verlag Berlin-Heidelberg-New York 1972,422-423

Thakur S, Bawara B, Dubey A, Nandini D, Chauhan NS and Saraf DK. Effect of *Carum carvi* and *Curcuma longa* on hormonal and reproductive parameters of female rats. *International Journal of Phytomedicine* 2009, 1 31-38

The International Plant Names Index. Available at <http://www.ipni.org/index.html>. Accessed 03/03/2014

Trease GE, Evans WE. Pharmacognosy 11th ed. Baillière Tindall London 1978, 417

Wuthrich B and Hofer T. [Food allergy: the celery-mugwort-spice syndrome. Association with mango allergy?]. *Dtsch Med Wochenschr* 1984, 109 (25):981-6