Supercritical fluid extraction (SEE) of the volatile oil from Thymus vulgaris L. aerial flowering parts was performed under different conditions of pressure, temperature, mean particle size and CO₂ flow rate and the correspondent yield and composition were compared with those of the essential oil isolated by hydrodistillation (HD). Both the oils were analyzed by GC and GC-MS and 52 components were identified. The main volatile components obtained were p-cymene (10.0-42.6% for SFE and 28.9-34.8% for HD), gamma-terpinene (0.8-6.9% for SFE and 5.1-7.0% for HD), linalool (2.3-5.3% for SFE and 2.8-3.1% for HD), thymol (19.5-40.8% for SFE and 35.4-41.6% for HD), and carvacrol (1.4-3.1% for SFE and 2.6-3.1% for HD). The main difference was found to be the relative percentage of thymoquinone (not found in the essential oil) and carvacryl methyl ether (1.0-1.2% for HD versus 0.4 for SFE) which can explain the higher antioxidant activity, assessed by Rancimat test, of the SFE volatiles when compared with HD. Thymoquinone is considered a strong antioxidant compound.