Letter to the Editor

Comment on "A Rare Cause of Neonatal Breast Abscess and Mastitis: *Foeniculum vulgare* and Powerfull Massage"

Dear Editor,

Kose and colleagues[1] attribute an intriguing case of breast abscess and enlargement in an exclusively breast-fed infant to infection, breast massage and maternal ingestion of fennel tea. Their inferences around the causal role of the tea rely heavily on the co-incidence of symptoms and tea ingestion as well as extrapolation based on the reputation of anethole as estrogenic. Anethole is a major component of essential oils from fennel (*Foeniculum vulgare* (Mill.), Apiaceae) and also a major component of fennel teas (FT).[2] Kose et al cite two papers to support the premise that anethole is estrogenic.[3,4] However, as described below, neither paper is convincing and belie the fact that the estrogenic activity of anethole is disputable.

The first citation[3] does not report original data regarding the estrogenic activity of fennel essential oils (FEO) or anethole, instead citing a review article[5] to assert that they are estrogenic. However, the review[5] contains no empirical evidence to confirm the estrogenic activity of anethole. Rather, the review[5] casts doubt on it by suggesting that polymers and oxidation products of anethole, instead of anethole itself, may be the estrogenic compounds in FEO.

The second citation[4] supporting the statement that anethole is estrogenic does contain original data consistent with this idea but is not definitive. Using the assay regarded as the "gold standard" there was a significant increase in uterine weights of juvenile rats after application of 80 mg/kg bw anethole for three days. However, no information about the provenance of the anethole or its purity is provided. As mentioned above, polymers and oxidation products of anethole have been implicated as the more likely estrogenic compounds present in FEO.[5] If the anethole tested contained these impurities, a false positive result may have occurred. So despite an apparently positive result from the gold standard method, uncertainty remains around the estrogenic activity of anethole. Since the first paper contains no relevant data, and the second contains questionable data, there are currently insufficient data to conclude that anethole is estrogenic and the idea should not be propagated as a certainty.

Another point to note is that ingestion of FT is not equivalent to ingestion of FEO. The two preparations have markedly different compositional profiles. FT are aqueous infusions containing a dilute mixture of volatile and non-volatile compounds.[2] FEO are lipophilic, non-aqueous mixtures of volatile compounds. While some of the volatile, relatively hydrophobic compounds occurring in FEO do also occur in the teas, FT contain additional compounds not found in the oils including the putative phytoestrogen quercetin glucuronide.[2]

It may be that FT do exert estrogenic effects when ingested. However, the identity of any active compounds is far from established. Unconditional statements that anethole has estrogenic activity do not reflect the mixed nature of the limited evidence available in the literature and neglect the possibility that other compounds from FT may contribute to any such effects. In light of the widespread use of FT, the question of their estrogenic activity, including that of anethole, should be clarified with further investigation.

References

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CF **Carson**
School of Medicine and Pharmacology (M503),
The University of Western Australia
35 Stirling Hwy, Crawley WA 6009, Australia
and
Translational Renal Research Group,
Harry Perkins Institute of Medical Research,
6 Verdun St, Nedlands WA 6009, Australia

Correspondence to: Dr. CF **Carson**
Email: christine.carson@uwa.edu.au