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Extraction of total saponin from *Glycyrrhiza glabra* and comparison of its surface activity with saponin from *Quillaja saponaria* in presence of cholesterol

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Objectives: Saponins are high molecular weight glycosides, consisting of a sugar moiety linked to a triterpene or steroid aglycone. Many saponins have detergency properties and give stable foam in water. The recent researches have shown that oral administration of some saponins can prevent hypercholesterolemia, the phenomenon which is the result of complex formation with cholesterol. *Glycyrrhiza glabra* (Licorice) is a grassy plant which has a height of 50-100 cm or more. The medicinal organ of the plant is constituted of its roots, containing 3-15% triterpene saponins, that has many indications such as expectorant, anti-inflammatory, flavoring and foaming agent. Because of existing a high percentage of saponin in the roots of the plant, the aim of the present study was to determine some of its physicochemical properties, such as foaming, emulsifying and surface activity, and also the effect of complex formation between total saponin and cholesterol. **Methods:** For this reason, the collected roots of the plant were identified, dried, powdered and defatted with petroleum ether in a soxhlet apparatus. The air-dried powder was successively extracted with methanol, n-butanol and diethyl ether. Then Foaming power of the extracted *Glycyrrhiza glabra* total saponin (GTS) was measured using the Ross-Miles foam column method and the index of emulsification (E_{24}) of extracted saponin was also determined. The results were compared to data from *Quillaja saponaria* total saponin (QTS), and tween 80 as a potent synthetic surfactant. Using a Du-Nouy tensiometer, critical micelle concentrations (CMC) of the saponins and tween 80 were determined by measuring surface tension as a function of surfactant concentration. In the next step, the effect of complex formation with cholesterol was determined by measuring the changes in surface tension and critical micelle concentrations due to addition of cholesterol in saponin solutions. **Results:** The results showed that QTS had a good ability to produce stable foam. In the case of reduction of surface tension and emulsification, the extracted total saponin had less power than QTS and tween 80. The results also showed that the saponins have the ability to form complex with cholesterol. **Conclusion:** It can be concluded that oral administration of total saponins of *Glycyrrhiza glabra* and *Quillaja saponaria* may cause a reduction in cholesterol absorption by gastrointestinal system and finally a reduction in blood cholesterol. Also due to its excellent surface activity, it can be suggested that the total saponin from licorice roots is a suitable substitute for synthetic surfactants in food, drug and cosmetic industries.

Key words : Saponin, *Glycyrrhiza glabra*, *Quillaja saponaria*, Cholesterol.

Glycyrrhiza glabra

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Glycyrrhiza

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(QTS, Sigma, Swiss)

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(E₂₄)

GTS QTS

(CMC)

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(Merck, Germany)

E₂₄

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(CMC)

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General Linear Model - Univariate ANOVA

(Tukey test)

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HSD

(CMC)

(Du-Nouy Ring Tensiometer, White, Germany)

Kruskal- Wallis Test

Dwass - Steel - Chritchlow-Fligner

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(p < /) (p = /)

QTS .
GTS
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(CMC) (QTS) GTS QTS

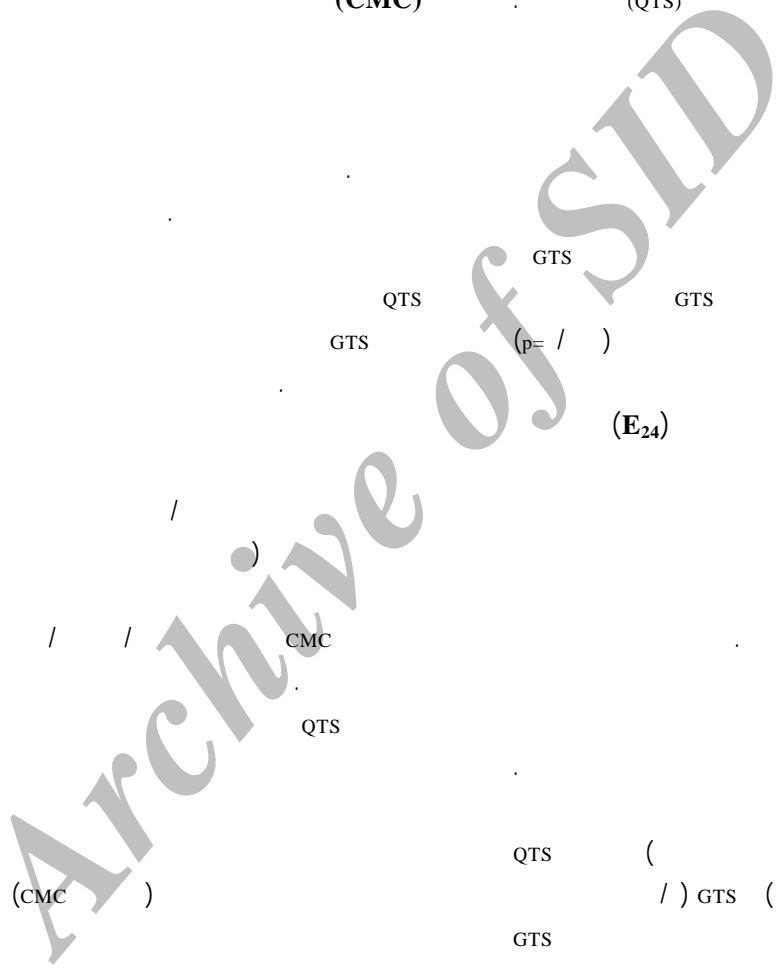
QTS
GTS
GTS (p= /) GTS (p < /) Tween 80
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($p < /$)

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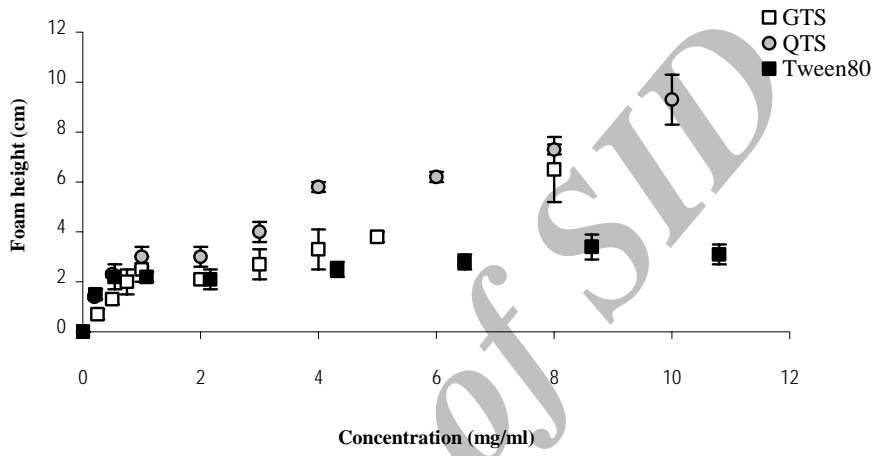
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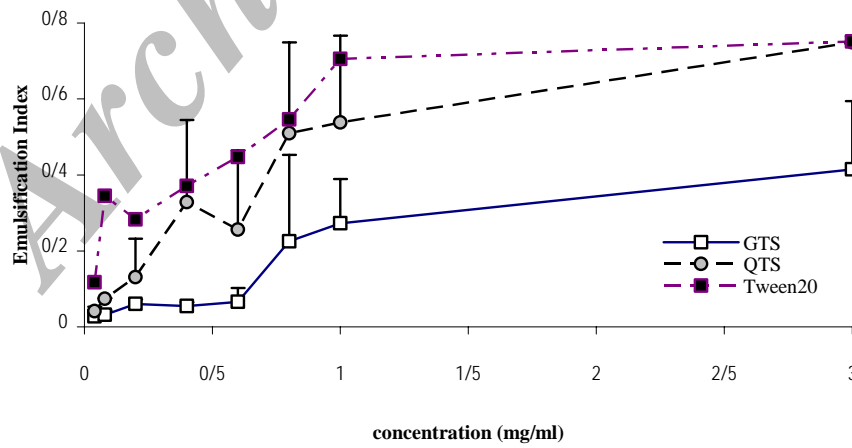
GTS

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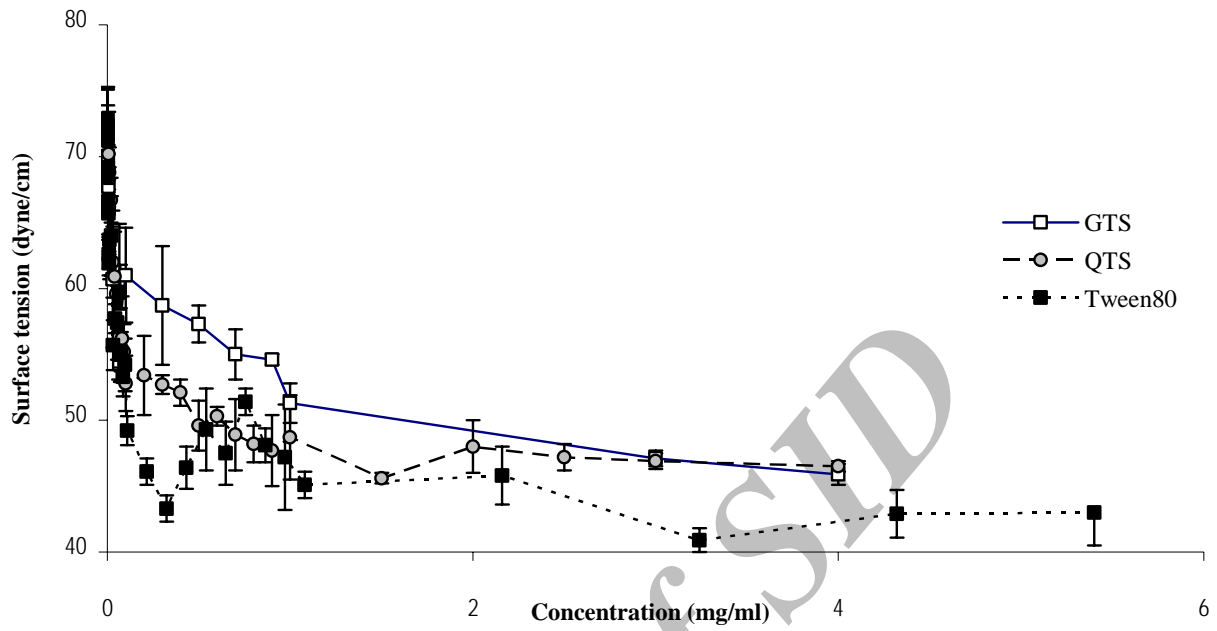
($n =$)

Tween80 QTS GTS



($n =$)

Tween 80 QTS GTS



(n=)

Tween 80 GTS QTS

GTS

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QTS

CMC

(p< /)

(p= /)

QTS

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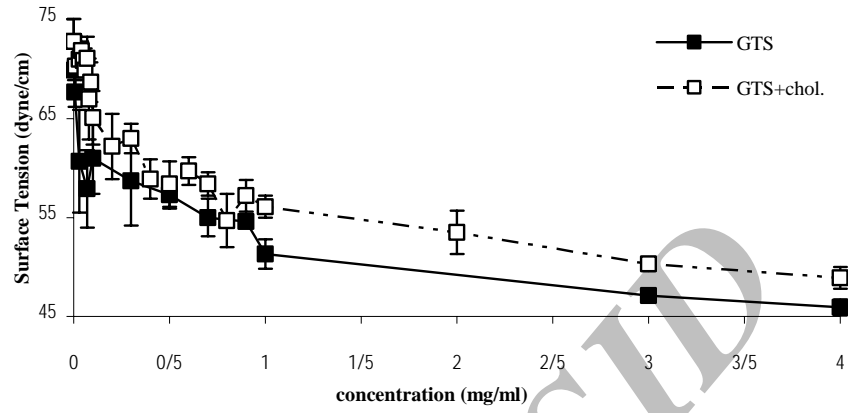
CMC

QTS

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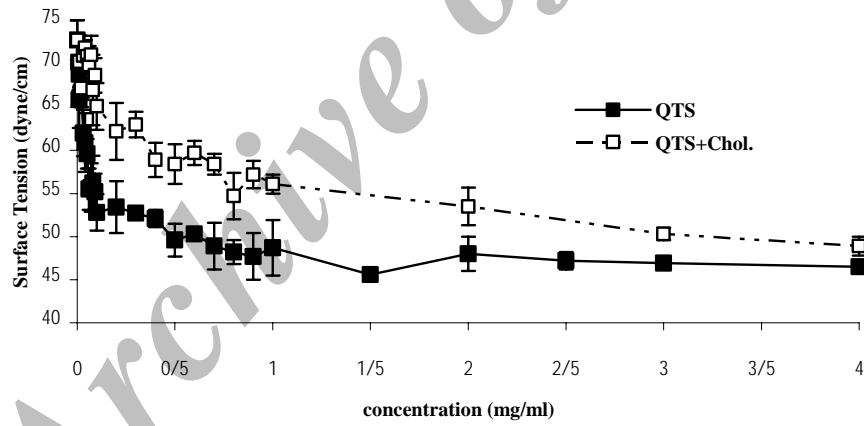
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(n=)

GTS&Chol /GTS

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(n=)

QTS&Chol QTS

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LDL

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