REVIEW ARTICLE

RECORDS OF PHARMACEUTICAL AND BIOMEDICAL SCIENCES

Review article on chemical constituents and biological activity of *Thymelaea hirsuta*.

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Abstract

Thymelaea hirsuta a perennial, evergreen and dioecious shrub, which is native to North Africa. *T. hirsuta* is a widespread invasive weed and is commonly known as "Methnane". Along the history, *T. hirsuta*, family Thymelaeaceae, has been recognized as an important medicinal plant. Much research has been carried out on the medical applications of Methnane. The choice of the plant was based on the good previous biological study of *T. hirsuta* plant extract to use as anticancer, hepatoprotective and anti-diapetic. Several species of Thymelaeaceae have been the subject of numerous phytochemical studies. Initially, interest may have been due to the marked toxicity of these plants, but the widespread use of some species medicinally has certainly played a part in sustaining this interest.

Keywords: *Thymelaea hirsuta* **,** Chemical constituents, Biological activity

1.Introduction:

Thymelaea hirsuta a perennial, evergreen and dioecious shrub, which is native to North Africa. *T. hirsuta* is a widespread invasive weed and is commonly known as "Methnane".

Along the history, *T. hirsuta*, family Thymelaeaceae, has been recognized as an important medicinal plant. Much research has been carried out on the medical applications of Methnane. The current systematic classification of cannabis is listed in Table 1.

Species Profile Geography and Distribution

T. hirsuta grows in the Mediterranean coastal plains, the Sinai Peninsula and other Saharo-Arabian deserts. Regional: From Morocco to Egypt. Global: The Mediterranean: from Spain to Greece and Turkey; southern side from Morocco to Egypt. Near East: Lebanon and Palestine. The choice of the plant was based on the good previous biological study of *T. hirsuta* plant extract to use as anticancer, hepatoprotective and anti-diabetic. Several species of Thymelaeaceae have been the subject of numerous phytochemical studies. Initially, interest may have been due to the marked toxicity of these plants, but the widespread use of some species medicinally has certainly played a part in sustaining this interest (Beaumont et al., 2001). Several genera such as *Daphne*, *Thymelaea*, *Pimelea*, *Wikstroemia* and *Gnidia* have been researched upon extensively. The *Daphne* genus is of prime importance owing to its richness in a variety of different classes of natural products, especially, coumarins (Li et al., 2005, Ullah et al., 1999), flavones (Zhang et al., 2004, Baba et al., 1995, Liang et al., 2011), daphnane-type diterpene esters (Li et al., 2006), steroids and guianolides (Levyns, 1950).

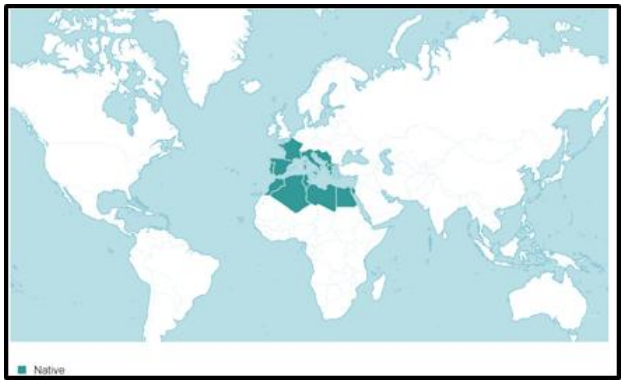


Fig. (1): A photo of *Thymelaea hirsuta* distribution.

Gnidia genus has similar chemical constitution as that *Daphne*. Chemical studies done on some *Gnidia* species indicated the presence of toxic diterpene esters of daphnane type, which are the main types of plant orthoesters known and have remarkable biological activities, such as the tradition use of *Gnidia* as antineoplastic and cytotoxic (Kupchan et al., 1976, Borris and Cordell, 1984, Badawi et al., 1983, Kupchan et al., 1975).

2. Chemical constituents reported from *T. hirsuta*:

2. 1. Terpenoidal and steroidal compounds

Miyamae isolated two new daphnane diterpenoids, hirsein A and hirsein B from the aerial parts of *T. hirsuta* (Miyamae et al., 2009) are listed in Table 2.

2. 2. Flavonoids

Yang isolated mono- and biflavonoids as genkwanin, genkwanin 5-O-β-D-glucopyranoside, genkwanin 5-O-β-D-primeveroside, tiliroside and neochamaejasmin B from *T. hirsuta* (Yang et al., 2014) are listed in Table 2.

2. 3. Coumarins

Yang isolated bi- and tricoumarins (daphnoretin and triumbelletin) from *T. hirsuta* (Yang et al., 2014) are listed in Table 2.

2. 4. Lignans

Yang isolated lignans (pinoresinol and syringaresinol) from *T. hirsuta* (Yang et al., 2014) are listed in Table 2.

3. Biological activities reported from T. hirsuta:

Division	Tracheophyta
Class	Magnoliopsida
Superorder	Rosanae
Order	Malvales
Family	Thymelaeaceae
Genus	*Thymelaea*
Species	*hirsuta.*

Table 1: The systematic classification of *Thymelaea hirsuta*

3.1 Anti-inflammatory activities

Azza and Oudghiri reported that the aqueous extract of T. hirsuta had an anti-inflammatory activity and inhibited the induction of adjuvant arthritis in male Wistar rats (Azza and Oudghiri, 2015).

3.2 Antioxidant activities

Amari conclouded that T. hirsuta extracts are rich sources of natural antioxidants which appears to be an alternative to synthetic antioxidants(Amari et al., 2014).

3.3 Antimicrobialactivities

Felhi revealed that the essential oil isolated by the hydro-distillation of aerial parts of T. hirsuta exhibited a moderate-to-potent anti-microbial activity against all the microorganisms tested. Gram-positive bacteria were noted to be more sensitive to the oil than gram-negative bacteria and yeasts (Felhi et al., 2017).

3.4 Antidiabetic activities

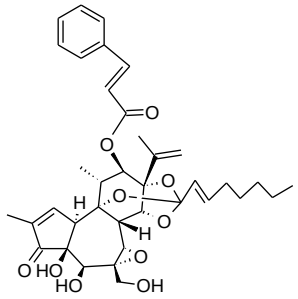
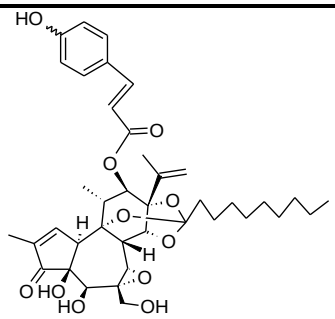
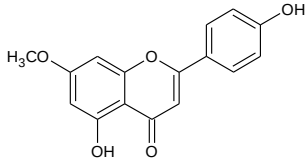
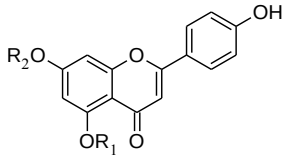
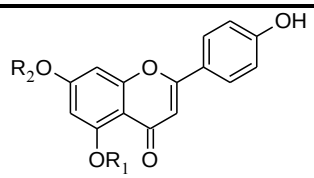
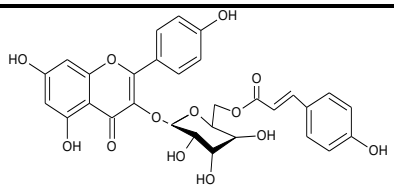
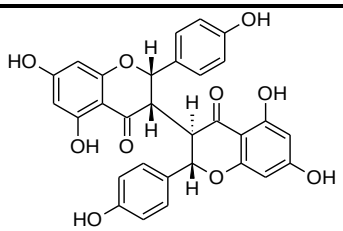
El Amrani founded that *T. hirsuta* possesses both hypoglycaemic and antidiabetic activities in normoglycaemic and STZ diabetic rats(El Amrani et al., 2009).

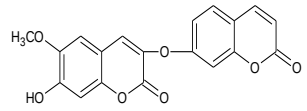
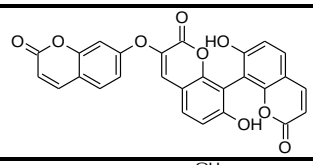
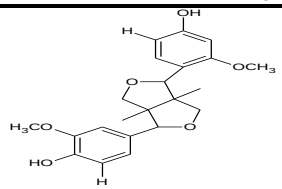
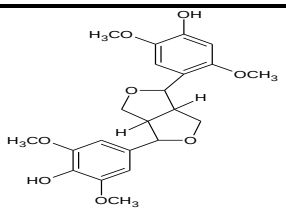
Dahamna concluded that a single administration of aqueous extract of *T. hirsute* at a dose of 250 mg/kg bodyweight caused a very significant decrease in blood glucose level in rat (Dahamna et al., 2015).

3.5 Antimelanogenesis activities

Miyamae concoluded that *T. hirsuta* has antimelanogenesis effect (without cytotoxicity) on B16 murine melanoma cells by downregulating the expressions of the Mitf gene

Table (2): Examples of some compounds isolated from *T. hirsuta* of family Thymelaeaceae.

Structure	Name	Plant	Reference
	Hirsein A	*T. hirsuta*	**(Miyamae et al., 2009)**
	Hirsein B	*T. hirsuta*	**(Miyamae et al., 2009)**
	Genkwanin	*T. hirsuta*	**(Yang et al., 2014)**
	Genkwanin-5-O-primeveroside R_1= glc-xyl R_2=CH_3	*T. hirsuta*	**(Yang et al., 2014)**
	Genkwanin 5-O-βDglucopyranoside R_1=glc R_2=CH_3	*T. hirsuta*	**(Yang et al., 2014)**
	Trans-Tiliroside	*T. hirsuta*	**(Yang et al., 2014)**
	Neochamaejasmin B	*T. hirsuta*	**(Yang et al., 2014)**

	Daphnoretin	*T. hirsuta*	**(Yang et al., 2014)**
	triumbelletin	*T. hirsuta*	**(Yang et al., 2014)**
	Pinoresinol	*T. hirsuta*	**(Yang et al., 2014)**
	Syringaresinol	*T. hirsuta*	**(Yang et al., 2014)**

and the melanogenic enzymes' genes(Miyamae et al., 2009).

3.6 Antifugalactivities

Dahamna indicated that extracts of *T. hirsuta* possesses antifugal activity on both fungi *Microsporum audouinii* and *Microsporum gypseum* (Dahamna et al., 2015).

3.7 Hepatoprotective activities

The biochemical observations and the histopathological examination of liver sections indicated that *T. hirsute* possesses no toxicity effects but hepatoprotective properties against CCl_4-induced hepatic injury in rats(Azza et al., 2012).

3.8 Cytotoxicity activities

Akrout found that all the extracts of *T. hirsuta* tested (hexane and ethanol–water), except the infusion extract, exhibited antitumor activity against human colon cancer HT-29 cells using MTT test activities (Akrout et al., 2011).

4. Conclusion

Thymelae hirsuta are growing all over the world as it used for medicinal purposes. Here we just report a brief review for the chemical constituent and biological activity from the plant.

5. Conflict of interest

The authors report no declaration of conflict of interest.

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