Total polyphenols and flavonoids contents of aqueous extracts of watermelon red flesh and peels (*Citrullus lanatus*, Thunb)

Serigne Ibra Mbacce DIENG, Amadou Jarouga Diallo, Alioune Dior FALL, Kady Diatta-Badji, William Diatta, Abdou Sarr and Emmanuel Bassene

**Abstract**

Watermelon, fruit of *Citrullus lanatus* (Cucurbitaceae), is well consumed in Senegal. The purpose of this study is to evaluate the total polyphenols and flavonoids contents of the red flesh and the white part of watermelon peels. The total polyphenols contents are estimated by the Folin-Denis and flavonoids by a method using AlCl₃. Polyphenol contents were 63.33±1.455 mg TAE/g and 47.3±0.888 mg TAE/g dry extract respectively for the white part of the peels and red flesh. For flavonoids, there are respectively, 1.105±0.142 mg RE/g and 2.028±0.061 mg RE/g. The results show that flavonoids are more concentrated in the red flesh whereas the peels are more riche in total polyphenols. Several studies show that consuming foods rich in polyphenols reduces the development of many pathologies. Man could thus consume, in the same way that the flesh, the white part of the peels.

**Key words:** *citrullus lanatus*, cucurbitaceae, red flesh, peels

**Introduction**

Fruits play an important role in nutrition and human health. Their consumption is a source of vitamin C, vitamin A, folates and potassium [1]. It also helps prevent some cardiovascular diseases and some cancers and nearly 3 million deaths a year worldwide [2-3]. Furthermore, according to Hooper [4], there is an improvement in some cardiovascular risk factors after consuming foods or drinks containing a high content of polyphenol. It is in this context that we are interested to evaluate the content of polyphenols and flavonoids of the fruit of *Citrullus lanatus* called watermelon of the family Cucurbitaceae. It is a seasonal fruit very rich in water and well consumed in Senegal. Studies on watermelon seeds show antioxidant, anti-inflammatory, analgesic activity [5]. The fruit is used as a refreshing, aphrodisiac, diuretic, expectorant, digestive stimulant and the seed are tonic for the brain [6]. The watermelon juice has an antioxidant activity and inhibits the formation of peroxide [7]. In Senegal, only red flesh is consumed, the rest is reserved for domestic animals or thrown away. This study aims to compare the red flesh and the mesocarp (White flesh) of watermelon in order to evaluate the most beneficial part by comparing their contents of total polyphenols and flavonoids.

**Material and Methods**

**Plant material**

Watermelons are bought at the market known as Sandika of Pikine. They are washed and divided into several slices. Get rid of from their seeds, the red flesh is separated from the white part.

**Reagents and equipment**

Folin and Denis Reagents, AlCl₃ and Rutin are supplied by the Sigma Aldrich laboratory. Tannic acid comes from the Panreac laboratory. The absorbances are measured using a BioSystem BTS / 340 UV / Vis spectrophotometer and extraction using a Kenwood Chef Classic brand blender.

**Extraction**

**Red flesh**

1894 g of red flesh are first pressed for 10 min and the juice obtained is separated from the
marc by filtration. The latter is subjected to a second extraction by aqueous decoction for 30 minutes. Decocted and juice are combined and concentrated in vacuo, the residue is then dried in a drying oven for 48 hours at 45 °C.

**Mesocarp or White Flesh**

A quantity of 1111 g is dried first in an oven for 1 week at 45 ° and then reduced to powder. The latter is subjected to an aqueous decoction for 30 minutes. The decoctate obtained is concentrated under vacuum and then dried in an oven for 48 h at 45 ° to obtain a dry extract.

**Phytochemical screening**

The presence of the main chemical groups in the extracts was investigated using the tests described by Bassene [8]: Flavonoids (Shibata test), tannins (Stiasny reaction followed by FeCl₃), anthracenoids (Borntraeger test), alkaloids (Dragendorf's reagents), cardiotonic heterosides (Baljet, Kedde and Raymond-Marthoud reagents) and saponosides (moss index).

**Total polyphenol contents**

The total polyphenol content is determined according to the described method [9]. For it, the stock solutions (3 g in 100 ml of water) are first diluted to 1/100 and then to 2 ml of this solution are added 2 ml of the Folin-Denis reagent. Shake and let stand for 3 minutes before adding 2 ml of the 25% sodium carbonate solution. After 2 hours incubation without light, the samples are centrifuged at 4000 rpm for 4 minutes. The absorbances are then measured at 670 nm. The tests were repeated three times for each sample. A calibration range (0.005 - 0.05 mg / ml) is carried out with tannic acid and is treated in the same manner as the extracts. The results are expressed in mg tannic acid equivalent per gram of dry extract (mg TAE / g).

**Flavonoid contents**

The flavonoid dosage is carried according to the method of Gloria [9]. The stock solutions are diluted 1/10. Then 2 ml of 2% AlCl₃ in ethanol are added to 2 ml of this solution. After 1 hour incubation at ambient temperature, the absorbances are measured at 405 nm. A calibration range (0.0125-0.4 mg/ml) made with Rutin is treated in the same way as the extracts. The results are expressed in mg Rutin equivalent per gram of dry extract (mg RE/g).

**Results**

**Phytochemical screening**

The yield obtained after extraction of the red flesh is 6.8% while that of the white part is 0.8%.

The screening shows the presence of polyphenols and flavonoids both in the flesh and in the white part. On the other hand, the saponosides are found in the red flesh, whereas in the mesocarp they are in a trace state. Cardiotonic, tannins, alkaloids and anthracenics are absent.

**Total polyphenols and flavonoids**

The total polyphenols contents, obtained from the tannic acid calibration curve (y = 26.73x-0.158, R² = 0.991), are 63.33 ± 1.45 mg TAE / g dry extract and 47.3 ± 0.88 mg TAE / g dry extract respectively for the mesocarp and the red flesh (figure 1).
References