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Original Article

Preliminary Phytochemical Screening, Quantification of phenolic compounds, of Plant Extract from *Chenopodium quinoa*

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ABSTRACT

The aim of this study was to screening the phytogenic chemical compounds of the seeds of *Chenopodium quinoa*, obtained from Wilaya of El-Oued.
The chemical study showed that the plant contained a number of secondary metabolites, flavonoids, tannins, saponins, steroids and triterpenes, glycosids while the absence of alkaloids and coumarin in *Chenopodium quinoa*.
Folin-Ciocalteau colorimetric were used to determine the total phenolic con-tent (TPC), in the hydroalcoholic seeds extracts. The yield of the methanolic extract was estimated at 36.66%. As for the quantitative content of polyphenols, it is 11.647 ± 1.91µg AGE / mg extrait
From this, *Chenopodium quinoa* is considered a nutritional and therapeutic value because it contains secondary metabolites

1. Introduction

Coeliac disease is an immune-mediated enteropathy against dietary gluten present in wheat, rye and barley and is one of the most common lifelong food-related disorders worldwide [1]. in addition toin the world 925 to 1023 million people were suffering chronic hunger [2].One way of addressing solutions for this tremendous issue, is to look for crops that are nutritionally rich and can also grow under stressful environmental and research climatic conditions typical of the world hunger areas, such as Africa, among which species of the genus Amaranthus and Chenopodium [3]

Quinoa (*Chenopodium quinoa* Willd.) is a crop used by pre-Columbian cultures in South America for centuries. There is a long history of safe use of the grain in South America. Cultivated and collected Chenopodium species have been part of the Tiahuanacotan and Incan cultures. Quinoa has fulfilled various roles in these ancestral cultures, in addition to its role in human and animal nutrition, quinoa had a sacred importance [4].

Quinoa is usually referred to as a pseudo-cereal since it is not a member of the Gramineae family, but it produces seeds that can be milled in to flour and used as a cereal crop. it is considered to have a high nutritional value, mainly due to high in quantity and quality of protein relative to other protein sources [5]. Quinoa grains also have vitamins C, E (tocopherols), and B complex, and important minerals (Ca, K, Fe, Mg, Mn, P), isoflavons and even the saponins in the seed coats, previously considered as antinutrients [6].

2. Materials and Methods

2.1. Plant material

Quinoa *(Chenopodium quinoa*) was collected during Mars 2019, from Oum Thiour wilaya El M'Ghair is located within the Sahara Desert in northern-central of south Algeria.

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2.2. Preparation of extracts

Total methanol extract of *Chenopodium quinoa* was prepared by maceration technique, the dried and powder of seeds plant (5g) were macerated with (20 ml) of methanol (70%) at room temperature3 time (24 hours ×3). After filtration, the extract was concentrated using a rotary evaporator at a maximum temperature of 45°C, the residuals obtained were divided, a half part was stored in a freezer at – 4°C until further study [7].

2.3. extraction yield

The extraction yield is calculated by the formula given by [8]
R (%) = 100 M/ M'.
R: is the yield in%;
M: the mass of the extract after evaporation of the solvent in mg
M': is the dry mass of the plant sample in mg.

2.4. Phytochemical screening

The methanol extracts were subjected to phytochemical tests for secondary metabolites, tannins, saponins, steroid, alkaloids and glycosides in accordance with [9]and [10] with little modification.

Tests for Flavonoids

Pieces of magnesium ribbon and1ml HCl concentrated were mixed with 5 ml methanolic extract after few minutes and pink or orange color showed the presence of flavonoid. [11].

Test for Saponins

5 ml of distilled water was mixed with methanolic extract in a test tube and it was mixed vigorously. The frothing was mixed, the foam appearance showed the presence of saponins.

Test for reducing sugars (Fehling's test)

The methanol extract (2ml) was added to boiling Fehling's solution (A and B) in a test tube. Obtaining a brick-red precipitate indicates the presence of the reducing compounds [12].

Test for tannins

To 2ml of methanolic solution of each extract, 2 drops of ferric chloride ($FeCl_3$ solution diluted to 1%) were added [13]. The appearance of a dark green color indicates the presence of catechic tannins. The appearance of a blue-green color indicates the presence of gallic tannins

Test for Sterols and triterpenes

Sterols and terpenes were sought after by the Liebermann reaction. 5ml of the methanolic extract were evaporated. The residue is dissolved hot in 1 ml acetic anhydride and 1 ml of chloroform; we added 1 ml of concentrated sulfuric acid. The appearance, at the interphase, purple ring, turning blue then green, said a positive reaction.

Test for Alkaloids

2 ml of the methanolic extract, were treated separately with both reagents (Maeyer's, Hager's and Dragendorff's), after which it was observed whether the alkaloids were present or absent in the turbidity or precipitate formation. The appearance orange, brown or white precipitate indicates the presence of Alkaloids Respectively.

Test for coumarins

NaOH test - 2ml of extract was treated with 3ml of 10% sodium hydroxide in a test tube. If the solution turns to yellow color, then it contains coumarins.

2.5. Determination of polyphenols using the Folin-Ciocalteu reagent

Principle: The reagent consists of a mixture of phosphotungstic acid (H3PW12O40) and phosphomolybdic acid (H3PMo12O40). It is reduced during oxidation phenols, in a mixture of blue oxides of tungsten and molybdenum [14]. The color produced, whose maximum absorption is between 725 and 760 nm is proportional to the number of polyphenols present in the plant extracts. [15]

Implementation of the dosage

The control polyphenol, in general gallic acid. To perform the assay, 125µL of Folin-Ciocalteu reagent are added to 125µL of diluted extract (1mg.mL-1) or point of range. After 3 min added to 1250 µL of Na2CO3 (75g.L-1) are then added and 1ml water. After 90mn in the dark, the absorbance reading at 760 nm is done using a spectrophotometer. Through the standard range, calculates the average concentration of polyphenols present in the extract's plants in µg gallic acid equivalent per mg of extracts (µg AG E/mg extracts) [16];[17].

Statistical analysis

Averages were calculated using Excel 2016

3. Results and Discussion

The preparation of extracts from the seeds of *Chenopodium quinoa* was carried out by maceration methods at room temperature, was obtained with a yield of 36,66% (w/w) (Table1)

Table 1. extract methanolic Yields of *Chenopodium quinoa*

Extract	Color	Aspect	Yield%
MES	**Brown**	**hygroscopic**	**33,66%**

MES : methanolic extract of seeds Quinoa

Phytochemical screening

Investigations on the phytochemical screening of *Chenopodium quinoa* seeds extracts revealed the presence of flavonoids, tannins, saponins, steroids and triterpenes, glycosids while the absence of alkaloids and comarin in *Chenopodium quinoa* (Table 2). These compounds are known to be biologically active. Our results are in close agreement with that reported by (18; 19; 20) .

Determination of polyphenols

In recent years, the consumption of polyphenols has been increasing, largely due to its beneficial effects on health.

Through the standard range, calculates the average concentration of polyphenols present in the extracts plants. see Fig. 1. We described here the presence of high polyphenol content. As for the quantitative content of polyphenols, it is 11.647 ± 1.91µg AGE / mg extrait

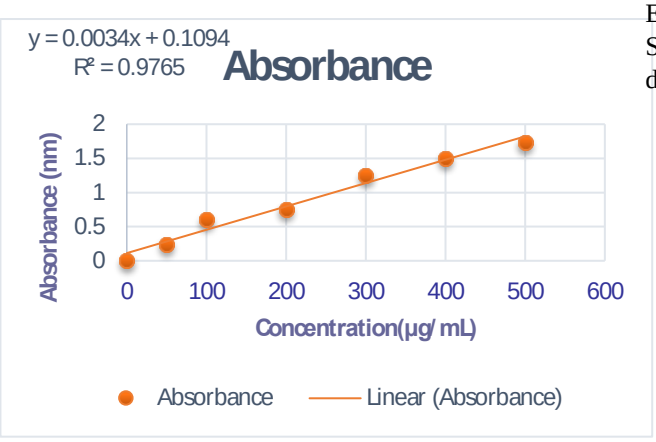

Fig 1. Calibration curve for total polyphenols.

Table 2. Phytochemicals found in methanolic extract of Chenopodium *quinoa*

Phytochemicals	Seeds
Flavonoids	+-
Saponin	+++
Steroids	+++
Reducing sugars	++
Tannins	++
Alkaloids-wagner's-reagents	-
Alkaloids-Draghandroff's-reagents	-
Alkaloids-Mayer's-reagents	-
Coumarins	-

+++: Strong intensity reaction, ++: Medium intensity reaction
+: Weak intensity reaction, −: Non detected
+-: trace

Conclusion

Quinoa is considered to be of nutritional and therapeutic value.There are several products derived from quinoa: puffed grains, flour, pasta, etc. However, more sophisticated products or those whose production requires the use of more advanced technologies are about to be exploited, such as the extraction of favonoid, saponin, starch and proteins, from quinoa milk, These products are considered as the economic potential of quinoa because they enhance not only nutritional, but also physicochemical characteristics, which go far beyond the food industry as they supply products to the chemical, pharmaceutical and cosmetic industries.

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