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Alpha-amylase inhibitory activity and phytochemical study of *Anabasis articulata*

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Abstract :
This work aims to contribute to the phytochemical study of the plant(***Anabasis articulata***) and to estimate the inhibitory efficacy of the alpha-amylase enzyme for its extracts. Through initial tests it was found that most ofthe products of secondary metabolism, especially flavonoids and alkaloids, wereextracted by four different polar solvents (distilled water, Methanol, hexane andacetone), where we obtained the highest yield in the aqueous extract (2.53%),and all the extracts were subjected to a quantitative analysis of phenolic,flavonoids and tannins, as we found that the largest amount of phenols in theaqueous phase (1251.77 mg equivalent for gallic acid / 100 g of dry matter(forflavonoids and tannins in methanol extract (44.38 mg equivalent to christin / 100g for dry matter and 755.17 mg equivalent for catechin / 100 g of dry matter) respectively.We also studied the inhibitory efficacy of the alpha-amylase enzyme forall extracts, so the aqueous extract efficacy was optimal, followed by themethanol extract (585.02 and 83.93 mg acarbose equivalent / 100 g of drymatter), respectively, because they contained the largest amount of total phenolsin addition to flavonoids, Which was responsible for inhibition, and this allowedthe plant to be used as an alternative treatment for diabetics.

Key words: Bagel plant, Anabasis Articulata, alpha-amylase, enzymeinhibition.

Introduction :

Plants were always healing andin his religious rituals.sometimes. The history of aromatic and medicinal plants is linked to the development of civilisations **[1]**. Medical care in developing countriesMedical care in developing countries, in the absence of a modern medical systemin the absence of a modern medical system.Source **[2].** The total number ofof natural products produced by plants is estimated to be more than 500000 and one hundred and sixty thousand products have been identified.natural products, with the value of 10000 productsincreasinannually[3].

In this context, with the aim of providing concrete solutions for the use of plants in traditional pharmacopoeia.biomolecular studies dedicated to the identification of active substances of medicinal plants have two main concerns: The first one the first concerns the discovery of new active ingredients for the development of the pharmaceutical industry, while the second is related to the validation ofthe validity of traditional medicines, which are used by 80% of the African population, despite the incredible advances thatThe first is about discovering new active ingredients for the development of the pharmaceutical industry.of modern medicine recently modern medicine has recently made [4]. However, alternative medicine is still widely used by the populationfor a number of reasons found in other countries. Basically, patients are dissatisfied with the treatments they receivelose faith in their doctors and prefer herbal remedies that seem more natural, have no side effects, are inevitable and inexpensive.unavoidable and inexpensive.Among the recognised biological potential of plants are, anti-diabetic activity, anti-inflammatory activitydiabetes, antimicrobial and anti-inflammatory activity [5]. In addition, theThe inhibitory or immunological potential of plant extracts on enzymes is increasingly being exploited in vitro and in Diabetes is one of the leading causes of death in most developed, developing and modern industrialised countries [6].Diabetes is the most common non-communicable disease, with an estimated 347 millionpeople were affected globally in 2011 and will double by 2030.is a metabolic disorder characterised by the presence of hyperglycaemia due to a defect in insulin secretion, insulin action or both. It is diagnosed with symptoms such as internal body heat leading to the emission of a large amount of urine, body weakness, weight loss... etc [7]. Algeria is not immune to this disease. In fact, in Algeria, studies related to this disease are still scarce.Despite being categorised among the most affected North African countries, the disease continues to increase rapidly and especially in some of the country's most deprived regions.The disease continues to increase at a particularly rapid rate, especially in some

deprived areas of the country, andThe number of people with diabetes has risen from one million Year 1993 To more than2.5, year 2007with a penetration rate of 7.3 ٪ To more than 3 million people Year 2011 or 7.4% of Algeria's population. With projections that are expected to reach to 8.9% In the year 2025 and more than 9.3% in a year2030. Knowing that 10% of the populationof the population do not know that they have diabetes [8]. The current treatment of diabetes is aimed at treating the disease and not trapping it in the traditional pharmaceutical treatments.traditional pharmaceutical therapies, in particular. As a result, despite in the case of chronic diseasesthe amazing development of modern medicine, medicinal plants still find their therapeutic indications in the treatment of manyDiseases and ailments in different societies and cultures, in 81% of cases, the traditional indications of anti-diabetic plants have been confirmed.traditional anti-diabetic indications of plants have been experimentally confirmed [9]. Controls blood glucose levels below normalof blood glucose levelsCurrently available anti-diabetic medicationsby supplementing insulin, improving insulin sensitivity, increasing insulin secretion from the pancreas and reducing glucose absorption at the gastrointestinal levelpancreas and reducing glucose absorption at the intestinal level [10].anti-diabetic treatment is to reach a blood glucose level that does not exceed1.6 to1.8 Magg/ Litre. For type 1 diabetes, treatment is strictly through the administration of insulin. While thefor type 2 diabetes is mainly due to the strict application of a diet combined with physical exercise.Mainly to restore normal weight. If it is not sufficient to restore glycaemic control. One of thestrategies include reducing or slowing down the digestion and absorption of dietary carbohydrates by inhibitingThe main enzymes that break down ingested carbohydrates are amylase-α and glucosidase-α in the organs. In this context and to enrich the database of anti-diabetic plants, the current work is dedicated to the study ofThe current work is dedicated to the study of Bacillus subtilis. The aim is to evaluate the inhibitory activity of extracts of this plant on -αamylase, a potential source of natural antidiabetic agents.

I-Material and methods:

I-1-Extraction and dosing :

A quantity of 5 g of plant Powder is macérâtes in four solvents: hexane, acetone, methanol and water for 48 h at room temperature in the dark.After filtration and evaporation under reduced pressure at a temperature oftemperature of 55°C, the residue was stored at +4°C, giving the crude phenolic extract.giving the crude phenolic extract.The determination of total polyphenols in the extracts wasusing the method adapted by Singleton and Rossi[11] and

flavonoids were determined using the method ofLamaison and Carnat [12], while for the determination of total tanninswe adopted the vanillin method in an acid mediumacid medium [13].

I-2-Assessment of anti-diabetic activity:

We are interested in the in vitro evaluation of the capacities offour extracts (hexanolic, acetonic, methanolic andaqueous) to inhibit porcine pancreatic α-amylase (EC3.2.1.1) using the method of Dygert et al [14].The enzymatic activity of this enzyme is assayed onstarch as substrate. It catalyses the hydrolysis of thissubstrate, releasing maltose and other products. Themaltose is measured spectrophotometrically thanks to itsits reducing power. It reacts with a basicbasic glycine-copper solution, developing a yellow-orangeyellow-orange coloration in the presence of neocuproin.This coloration is measurable at 455 nm and its intensityis proportional to the amount of product released.

II-Results and discussion :

Fig. 1. ***Anabasis articulata*** **(original, taken February, 2019 in Becher)**

The results obtained (Table 1) show that the total phenol content varies between 7.27±2.07 and 1251.77±20.74 mg EAG/100g DM. The aqueous extract represents the highest levels ofphenols and for flavonoids the highest contents were found in the methanoic extract(44.38±1.09 mg EQ/100 g DM) and tannins (755.17±8.57 mg ECat/100 g M).

Table 1: Total phenol**, flavonoid and tannin content of extracts.**

Extracts	**Total phenol content (mg/100g EAG)**	**Flavonoid content (mg /100g EQ)**	**Tannin content(mg/100g ECat)**
Methanolic	**152,24±5,91**	**44,38±1,09**	**755,17±8,57**
Hexanic	**7,27±2,07**	**4,7±7,69**	**382,20±0,12**
Acetone	**50,68±0,74**	**16,08±1,96**	**734,48±0,44**
Aqueous	**1251,77±20,74**	**27,31±0,20**	**662,02±0,40**

The results of in vitro antidiabetic activity (Table 2) are expressed by the AEIC(Acarbose Equivalent Inhibition Capacity) parameter, which is defined as the concentration of the acarbosethe concentration of the standard acarbose solution with an inhibition capacity equivalent to a solution of 1 g/l dry matter (DM).dry matter (DM). All the results obtained from this test indicate that all the samples testedshowed significant inhibition with AEIC values greater than unity (Table 2).

Table 2: VCEAC values of the different extracts with respect to α-amylase.

Extracts	AEIC (mg /100g Ms)
Methanolic	83,9324±6,91
Hexanic	16,25±1,07
Acetone	19,46±2,74
Aqueous	585.,02±22,74

Conclusion:

This study shows that these plants are rich in phenolic compounds and have a high antioxidant activity. Their use lowers plasma glucose levelsglucose levels by inhibiting a-amylase and could be important in the management of diabetes mellitus. However, more work is neededto

isolate and characterise the bioactive compounds and further evaluate their biological properties.

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