



CODEN (USA): IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**Available online at: <http://www.iajps.com>**Research Article****HYPOGLYCEMIC EFFECT OF A PRODUCT EXTRACTED
FROM ARGANIA SPINOSA L.SKEELS LEAVES ON
DIABETIC RATS****EL Adib S¹, Bellalouna M¹, Slim S²**

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Abstract :

The action of the Argan tree extracts and the Argan oil study of 36 diabetic rats has helped to highlight the importance of Argan leaves in the reduction of the rate of glycemia after 30 minutes of the meal by comparing with the action of hypoglycemic medication. So, for the prize N1 compound of 12 rats, we noted that later 2hre of force-feeding of the extract of the leaves of the variety mutica that the rate of glycemia crossed 512-409,25 mg/ dl while the medicine did not exceed the 17% of reduction at the end of 3hr30. For the product in question and which is on the base of extracts of leaves of the variety apiculata, we noticed that it's very effective that of the medicinal solution with a reduction of 30 % of the rate of glycemia from 492 to 344 mg / dl. The argan oil (the prize N3) appeared the least effective in the reduction of the rate of glycemia by comparing him with the extracts of leaves and with the medicinal solution with a rate of reduction which did not exceed the 2 % after 2hre of force-feeding and the 15 % of reduction after 3hre30 of force-feeding. Thus the hypoglycemic product with extract of leaves of the variety apiculata is the most effective for the reduction of the rates of glycemia for diabetics rats.

Key words: *Argania spinosa- glycemia- Argan oil-leaves*

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Please cite this article in press as **EL Adib S et al, Hypoglycemic Effect of A Product Extracted From Argania Spinosa L.Skeels Leaves On Diabetic Rats, Indo Am. J. Pharm. Sci, 2015;2(9).**

INTRODUCTION

The diabetes is a metabolic disorder due to an insufficiency or a misuse of the insulin characterized by a superior fasting blood glucose in 1,26g / L verified twice [1]. This affection affects more and more people in the world and is a real problem of public health today. Indeed, the WHO underlines a progressive world incidence of the diabetes. Of 30 million diabetics listed in 1985, figures respectively passed in 135 millions in 1995, 177 millions in 2000 and 347 millions in 2011. We consider that by 2030, 438 million individuals will be reached [2]. Tunisia, recorded growth of certain non-communicable diseases are becoming a real public health problem. Parallel to the development of cardiovascular disease, retinopathy and renal failure, diabetes already affects a number of increasingly growing Tunisians. According to statistics from the Ministry of Public Health, the disease already affects nearly 10% of adults Tunisians (30 years), nearly 400,000 diabetics. Furthermore, insulin-dependent diabetics, who are under 20 years are estimated at 25,000. This brings the number of diabetics in Tunisia 425,000. Depending on its etiology, there are diabetes mellitus type 1 resulting from selective destruction and autoimmune β cells of the pancreas, diabetes mellitus type 2 characterized by insulin resistance or a lack of secretion this hormone. There are other specific types of diabetes as gestational diabetes whose frequency of occurrence is low [3]. The traditional pharmacology offers a solution accessible to all budgets. Thus extracts of some plants have been tested for their antidiabetic activity [4] [5] [6]. The Argan tree endemic tree Moroccan which belongs to the family of Sapotaceae is used by the local population as a medicinal plant and oils extracted from the amandons as a medicinal food. All parts of the plant are used to prepare remedies against various diseases [7]. Argan also operates in Tunisia in 1963 with two varieties: *Argania spinosa* var. *apiculata* that the thorny variety and more answered and *Argania spinosa* var. *mutica* which is the spineless variety and less answered [8]. Some studies have been conducted on the hypoglycemic effect of argan oil [9] [7] but no study was done on the effect of leaf extracts of argan on reducing blood glucose levels. In our study, we are going to highlight the effect of the extract of leaves of argan tree of two varieties and that of the Argan oil on the rate of glycemia to rats diabetics.

EXPERIMENTAL PROCEDURES

Product Preparation Hypoglycemic

From the variety *apiculata*, 2 g of leaves were reduced powder and mixed with 20 ml of ethanol plant (70%). The mixture is then stirred for 36 hours. After centrifugation (3000 rpm, 10 minutes at 25 ° C), the supernatant was recovered.

Subsequently other natural elements with minimal doses are added to a well-defined volume of the floating. This mixture has been a totally natural hypoglycemic patented dietary supplement in Tunisia and having the ARGAMYLASE trade name.

To compare the difference in the efficiency of the plant material of both varieties, especially for this protocol, we prepared two identical hypoglycemic products from the leaves of both varieties *apiculata* and *mutica* collected at the same time.

Oil Extraction

The extraction is inspired by traditional Moroccan Berber method. To do it, 75 g of dry amandons were ground until a brownish paste. This leg is mixed with warm water and the mixture was centrifuged for 25min at 5000 rpm at 27 ° C. The emulsion thus recovered is centrifuged for 15 min at 3000 rpm at room temperature to separate oil from water.

The extraction was done on the amandons of a single variety that is *apiculata* view we demonstrated in previous work [10] that the oils extracted from both varieties have almost the same degree of inhibition of the α -amylase.

Induction of Diabetes and the Effect of the Extracts on Blood Glucose

A set of 36 Wistar rats 4 months old weighing between 200 and 350 g were divided into three prizes of 12 rats each prize is divided into three groups of 04 rats as witnesses two groups: positive control with force-feeding of medication on chemical base and a negative control with a water solution. Animals were accommodated in standard cages and maintained under standard laboratory conditions (one cycle: 12 h light / darkness, temperature of 22 ° C, humidity 55-60%).

They were fed a granular diet of rat (mixed compound feed corn, alfalfa and CMV (vitamique mineral supplement) and had access to water. In order to induce diabetes, rats were treated with alloxan (a toxic substance for the β cells and whose toxicity is due to the production of free oxygen radicals). This substance is injected by the intraperitoneal way at the rate of 150 mg / kg of body weight (solution dissolved in physiological saline sterile) that is 30 mg / rat (200g). At the beginning of tests, the rats were weighed with the aim to verify the calculations of alloxan. After injection and to verify the effect of this substance, the animals were allowed to stand for 24 hours. A sugar solution (5% glucose) was available to them not to create a hyperglycemic shock. After 24 hours, the rats of glycemia levels is determined and this in to maintain the diabetic rats.

Results of the Action of Alloxan in Rats

Before alloxan injection, the mean blood glucose of rats of the different groups was between 116.6 and 126.4 mg / dl (Table II). This value increased

after the induction of diabetes up to 353 mg / dl reflecting the positive effect of this substance.

RESULTS AND DISCUSSION

The force-feeding of diabetic rats by extracts of both varieties and argan oil it possible to distinguish different effects on the rate of blood glycemia after 2 hours and 3 hours and a half. Depending on the nature of the extract and by reference to two controls for each test, the results vary from prize to the other one.

Demonstration of the Effect of the Extract of the Variety *Mutica*

The examination of the results presented in Figure 1 shows the hypoglycemic effect of the extract of the leaves of the variety *mutica* compared to the medicinal solution and to the sterile water solution. In stage 2 hours, the effect of the extract of the leaves was more effective than the medicinal solution with a 20% reduction of the rate of glycemia from 512 to 409.25 mg / dl while the medication did not exceed the 10% reduction from 302 to 271.5 mg / dl. In stage 3heure and a half, the extract is still the most effective than the medicinal solution that does not exceed the 17% of reduction.

Demonstration of the effect of the Extract of the Variety *Apiculata*

The study of the results presented at Figure 2 shows the hypoglycemic effect of the extract of the leaves of the variety *apiculata* compared to the medicinal solution and sterile water solution. In stage 2 hours, the effect of the extract of the leaves was very effective as that of the medicinal solution with a 30% reduction of the rate of glycemia from 492 to 344 mg / dl while the medicine did not reached 10 % of reduction from 323 to 292 mg / dl. In stage 3heure and a half, the extract is still more effective than the medicinal solution which that does not exceed the 16 % reduction.

Demonstration of the Effect of the Extract of Argan Oil

The detection of hypoglycemic effect of argan oil compared with the medicinal solution and to the sterile water solution is illustrated in Figure 3. At the stage 2 hours , the medicinal solution was more effective the oil with a reduction of 10.8 % reduction from 287 to 256 mg / dl , while the oil has not exceeded 2 % of reduction of 520-509 mg / dl. In stage 3heure and a half, the medicine is still the most effective that reaches the 17 % , while the oil does not exceed 15 % of reduction.

Hypoglycemic Effect of Extracts and Oil

The comparative study of the rates of reduction of glycemia of extracts for both varieties and oil in rats tested in comparison with the two witnesses has allowed us to demonstrate the effectiveness of dietary supplement extracted from the leaves of the variety *apiculata* (Figure 4) . So, we notice a considerable decrease of the rate of glycemia compared to oil. On the other hand , it was noted

that the extract variety *apiculata* is endowed with the most high activity after 2 hours and a half and 3heurs of force-feeding (30 and 31%). The influence of the oil on the rate of blood glycemia is low after 2 hours and increases in a considerable way at the 3 hours and a half.

Discussion

In our protocol, the first remarkable result is the importance of alloxan in the induction of diabetes to 36 rats of three prizes studied. So, this substance showed effective action on beta cells of the rats tested after 24hre. Moreover, it was observed that the medicine used as a positive control is moderately effective against the hyperglycemia compared to the tested extracts. His mode of action appeared stable after 2 hours and 3 hours and a half independently of the weight of the tested rats. These results remind us that Ndomou *and al*, 2014 [11] during the evaluation of the antidiabetic activity of the extracts of leaves of *Gnetum africanum* and *Gnetum bulchozzianum* with trials on diabetic rats. For rats gavaged with the extract from the leaves of the variety *mutica*, we noticed that the efficiency is greater than the medical solution and reached the 20% of reduction in the rate of blood glycemia at the end of the force-feeding. The rates are almost identical after 3 hours and a half (21%) and the differences are not significant between both gips of the blood analyzed. The rats force-fed by the solution of the food supplement based on extracts of leaves of the variety *apiculata* have presented the best blood glycemia reduction going to 30% of reduction after 2 hours. Similarly for the rats in this prize, the rates of glycemia blood were slightly lowered after 3 hours and a half and the differences are not significant. The Argan oil proved less effective compared to extracts of the leaves of both varieties and do not exceed 2% of reduction after 2 hours while it reaches the 15% of reduction after 3 hours and half. Despite its remarkable hypoglycemic action, it's considered ineffective in front of the medicinal solution used as a positive control in this study but remains as a hypoglycemic agent [12]. Some phenolic compounds were identified in argan oil such as carotenoids [13]. Furthermore the unsaponifiable fraction of this oil is rich in antioxidants such as tocopherols [14] which may explain the mode of action of hypoglycemic argan oil. These results confirm our previous works when we tested the power of these extracts on inhibition of the action of α -amylase enzyme on the scale of laborator [10]. Thus, we noticed that extracts of the leaves are generally more effective than the oil from the amandons. The efficiency of the extracts of the *apiculata* variety can be explained by the richness of its leaves in polyphenols and flavonoids [10] compared to the variety *mutica*. According Yao et al, 2013 [15], hypoglycemia caused by extracts from *Cichorium glandulosum* can be

explained by the rich in phenolic compounds, mainly flavonoids which are inhibitors of α -glucosidase and the α -amylase enzymes involved in the catabolism of carbohydrates long chain. These results confirm those of Wang et al, 2010 [16] by extracts from the leaves of guava.

CONCLUSION

After the test of two extracts of both varieties and oil on diabetic rats it was found that the food complement based on extracts of leaves of the variety *apiculata* is most effective in reducing of the rate of blood glycemia after 30 minutes of their meals after 2 and a half and 3h. By against the extract from the leaves of the variety *mutica* was less effective but action is greater than that of the medicinal solution in the same time axis. The Argan oil has a minimal share especially after the first two hours of feeding and action remains below that of the medicine. In later studies, is to determine the mode of action of the same extracts after two successive weeks while keeping the same rats.

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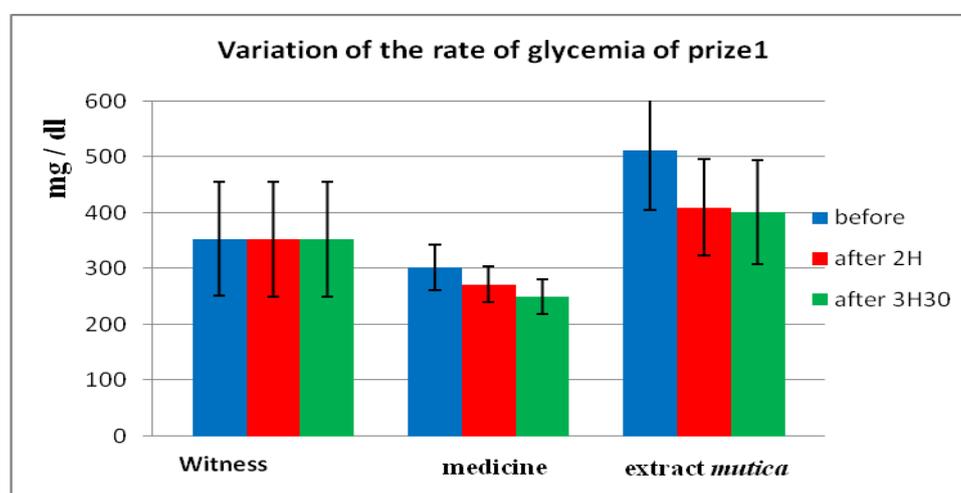
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Table 1: Force-Feeding of Different Groups

Prize 1 (Based Product Leaves <i>Mutica</i>)		
Groupe 1 (4rats)	Croupe 2 (4rats)	Groupe 3(4rats)
10ml/Kg of steril water	10ml/Kg of the extract to be tested	10ml/Kg of antidiabetic drug solution
Prize 2 (Based Product Leaves <i>Apiculata</i>)		
Groupe 1(4rats)	Croupe 2(4rats)	Groupe 3(4rats)
10ml/Kg of steril water	10ml/Kg of the extract to be tested	10ml/Kg of antidiabetic drug solution
Prize 3 (Extract Argan Oil)		
Groupe 1(4rats)	Croupe 2(4rats)	Groupe 3(4rats)
10ml/Kg of sterile water	10ml/Kg of the extract to be tested	10ml/Kg of antidiabetic drug solution

Table 2: Animal Blood Glycemia Rates Before and After Induction of Diabetes in mg / dl

	Before Induction	After Induction
Groupe 1	126,4 ± 2,33	353 ± 76,35
Groupe 2	116,6 ± 4,82	338 ± 101,78
Groupe 3	120 ± 0,91	295 ± 76,17

Fig 1: Detection of the Hypoglycemic Action of the Extract of the Variety *Mutica* on Prize1

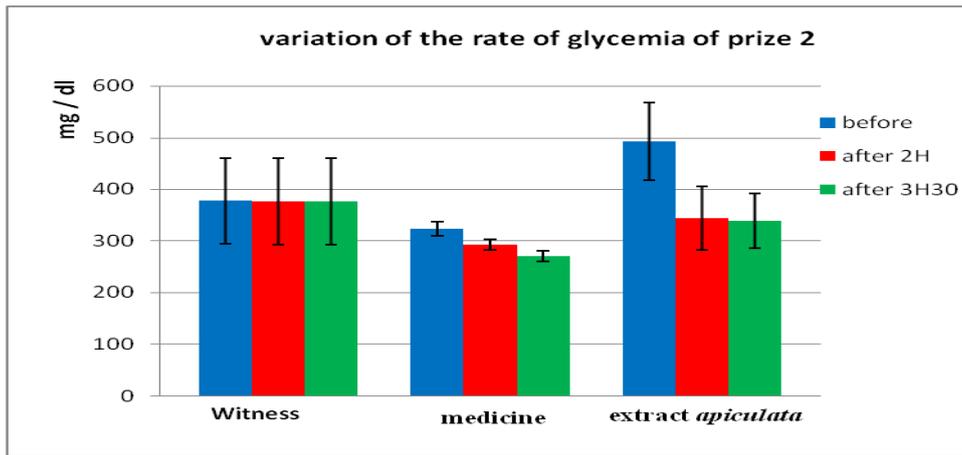


Fig 2: detection of the Hypoglycemic Action of the Extract of the Variety *Apiculata* on Prize 2

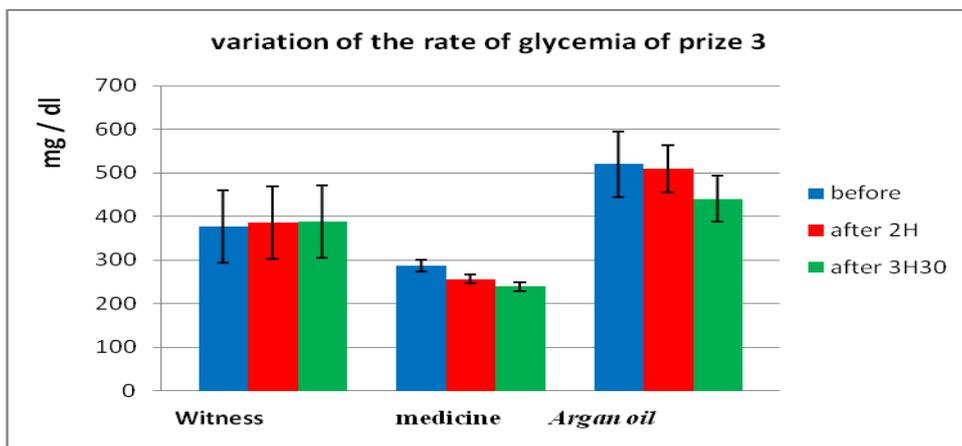


Fig 3: Demonstration of the Hypoglycemic Action of the Extract of Argan Oil on the Lot 3 Rats

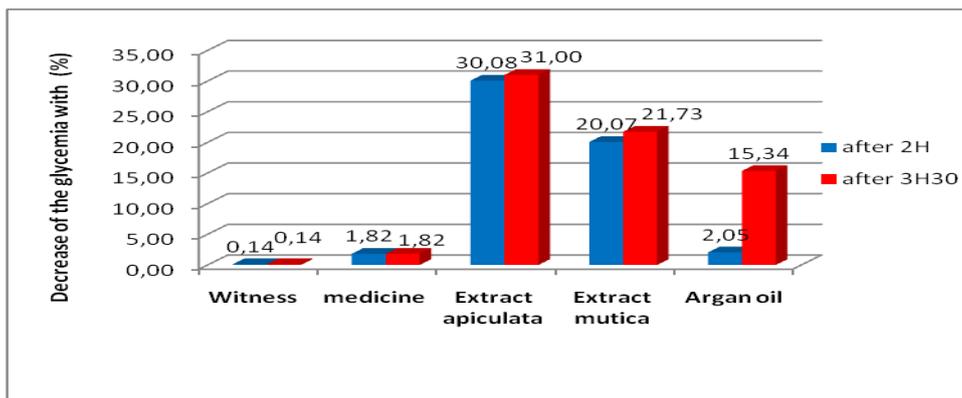


Fig 4: Comparison of the Hypoglycemic Action of Extracts of both Quality Selections and Oil on Rats for Two Different Times.