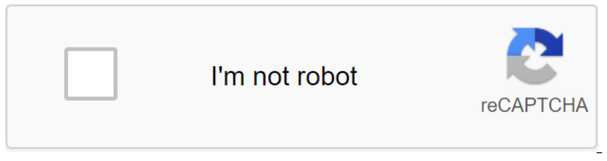

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J Food Sci Technol. 2011;48:412–22.PubMed Central CAS Article PubMed Google Scholar Page 2 Extractives TAC FRAC At 100 µg/mL At 150 µg/mL At 100 µg/mL At 150 µg/mL TPL 1.256 ± 0.026a 1.625 ± 0.010 2.199 ± 0.135 2.914 ± 0.100 TPRB 0.912 ± 0.097 1.150 ± 0.073 0.503 ± 0.002 0.741 ± 0.030 TPSB 0.685 ± 0.099 0.836 ± 0.063 0.289 ± 0.057 0.484 ± 0.028 TPF 0.525 ± 0.032 0.648 ± 0.030 0.454 ± 0.029 0.669 ± 0.094 CA 1.78 ± 0.083 2.267 ± 0.041 – – AA – – 3.108 ± 0.069 3.223 ± 0.087 TPL, TPRB, TPSB and TPF are representing as T. pallida leaf, root bark, stem bark and flower, respectively. AA and CA represent as ascorbic acid and catechin, respectively the value of aEach is the average of three tests - the standard deviation of oxidative stress plays an important role in diabetic physiopathology; hence, the interest of using natural antioxidants as therapeutic tools exists. The aim of this study was to assess the antioxidant activity of in vitro and the inhibitory potential of organic extracts from Aristolochia longa roots against key enzymes associated with hyperglycemia. Antioxidant activity was performed using 2.2-diphenyl-1-picrylhydrazyl (DPPH) and 2.2-amin-bis-3-ethylbenzoethiazoline-6-sulfonic acid (ABTS) radicals and ferrick reduction/antioxidant force (FRAP) methods. The in vitro model investigated the inhibitory effects of K-Glucosideza and Galactosidase. In addition, a phytochemical analysis of the extracts tested was carried out. The aquier fraction of this herb showed the highest antioxidant activity for both DPPH and ABTS methods, IC50-125.40'2.40 micrograms/ml and IC50-65.23'2.49 mcg/ml, respectively. However, the ethyl acetate faction had the strongest inhibitory effect in relation to glucoside (IC50-1.112'0.026 mg/ml). In addition, the result showed a high level of phenolic content. The results showed that this plant can be an important source of medically important natural compounds.1 IntroductionMedicide plants are one of the main therapeutic resources. Indeed, 80% of the world's population uses Recently, interest in the search for natural substances has increased significantly, as these substances are intended for use in food or drugs to replace synthetic compounds that are limited due to their side effects. There is a growing interest in the use of medicinal plants and their phytoconstentid as natural sources because of their well-known ability to collect free radicals. In fact, plants are sources of natural antioxidant compounds that have different pharmacological properties with little side effects or in the absence of and protect human health from many diseases. Prevention of oxidative stress associated with the disease by medicinal plant products delays the oxidation of lipids or other molecules by inhibiting the spread of oxidative chain reactions. Among Moroccan medicinal plants, Aristolochia longa (A. longa) is a medicinal plant belonging to the Aristolochiaceae family, which is widespread in tropical and temperate regions. Types of aristolohies contain secondary metabolites, which have well-known beneficial effects. A. longa locally known as Barrastam is a species widely used in Moroccan traditional medicine. Many traditional healers also use a small amount of its rhizome powder with honey or salt oil to treat abdominal pain and upper respiratory tract infections (8-10). Similarly, diabetes is the leading cause of death and the most common metabolic disorder characterized by hyperglycemia due to the lack of insulin production by the pancreas or the inability of insulin produced to control blood glucose. One interesting approach is to reduce post-pre-candid hyperglycemia by slowing glucose absorption by inhibiting carbohydrate-hydrolysing enzymes such as glucosidease and galactosidase. In this context, the purpose of this study was to assess antioxidant activity in vitro, A-Glucosidese and inhibitory potentials of A. longa root extracts.2. Materials and Methods2.1. Reagentsp-Nitrophenil-w-glucopiranoside, 2-nitrophenyl-s-D-galactopiroside, z-Glucocidase from Saharomices cerevisiae, z-Galactoshidase from Aspergillus Oraizae, Acarbose, Reagent Folin-Chiocolteu, routine, catechin, 2.2-diphenyl-1-picrilgidrazil (DPPH), 2.2-azino-bis-3-ethylbenzoethiazoline-6-sulfon acid (ABTS), 6-hydroxy-2.5 (France) 8-tetramethylhroman-2-carboxicycilic acid (Trolox) and ascorbic acid were purchased from Sigma-Aldrich (France). All other reagents were analytical grade.2.2. Plant material2.2.1. The A. longa plant collection was collected in April 2016 in Al-Haus province, Morocco. The collected plant materials were tested in the Herbaria of the Botanical Rabat Science Institute, Morocco. The roots of the plant were washed, dried at room temperature from 48 to 92 hours, h, and then stored in glass bottles that have survived from light and moisture until used.2.2.2. Preparation of plant extracts For the preparation of extracts, the technique of continuous hot extraction by the extractor Soxhlet was carried out using solvents of different polarity. In short, 10 grams of root powder was extracted sequentially with 100 ml of each ethyl acetate, methanol and water until the extracts were colorless in the siphon tube. The extract was produced by adding 500 ml of distilled water to 50g of dry A. longa powder. After 24 hours of maceration at magnetic stirring at room temperature, the mixture was centrifuged. Then all the extracts already prepared are filtered through filter paper (Whatman) and evaporated to dry by a rotating vaporizer at 50 degrees Celsius. The resulting extracts were stored at 4 degrees Celsius until further use.2.3. Phytochemical analysis2.3.1. The definition of the total phenolic content of A. longa extracts was evaluated by the Fall-Chiocalteu method described by Spanos and Vrolstad. Gallic acid has been used as a standard for curve calibration and the results are expressed as mg gallic acid equivalent to g of dry weight extract (mg GAE/g edw).2.3.2. Determining the total flavonoid content The persistent content of flavonoid extracts A. longa was determined according to the method described by Dewanto et al. Ruthin was used to perform the standard curve, and the results were expressed as a routine equivalent per gram of dry weight extract (mg RE/g edw).2.3.3. The definition of proanthocyanidin ContentThe proanthocyanidin content of extracts A. longa has been determined, as reported by Julkunen-Tiitto. Catechin has been used as a standard for building a calibration curve and the results are expressed as a catechin equivalent per gram of dry weight extract (mg CE/g edw).2.4. Antioxidant activity2.4.1. DPPH Radical Cleansing Activity AssayRadical Cleaning Activity Extracts was measured using a stable radical DPPH, such as determined by Saya et al. In tubes were administered 2.5 ml of different concentrations of each extract and 0.5 ml of methanol solution DPPH (0.2 mM of DPPG dissolved in methanol) freshly prepared. The mixture was vigorously vortex and left in the dark at ambient temperature for 30 minutes. The antioxidant activity of our extracts is expressed as a percentage of radical inhibition of DPPH, and IC50 was calculated to compare the results.2.4.2. ABTS Radical Cleanup AssayThe TEAC test (Trolox Equivalent antioxidant potential) or DISCOmation test ABTS' was conducted according to the method described by Sayah et al. In short, the citoic radical (ABTS) was prepared by the reaction 10 ml ABTS (2 mM) in H2O and 100 ml of potassium persulfate (K2S2O8) (70 mM). The mixture was incubated in the dark for 16 hours at room temperature. The ABTS solution was then diluted with methanol to gain a absorption of 0.70 at 734 nm. Then 200 ml of each extract was mixed with 2 ml diluted ABTS solution and allowed to react within 1 minute. After that, the absorption of the radical ABTS is measured at 734 nm. All the samples were made in a triplikat. The results were presented as the equivalent of Trolox per gram of dry weight extract (mg TE/edw).2.4.3. Ferric Reduction/Antioxidant Power (FRAP) AssayThe FRAP test is carried out according to the method described by Sayah et al. In short, 1 ml of each extract (1 mg/ml) was mixed with 2.5 ml of phosphate buffer solution (0.2 m, pH 6.6) and 2.5 ml 1% ferricide solution. After incubation at 50 degrees Celsius for 20 minutes, 2.5 ml 10 ml of trichloroactic acid was added to the mixture and then the mixture was centrifuged at 3000 rpm for 10 minutes. At the end of 2.5 ml of supernatant mixed with 2.5 ml of distilled water and 0.5 ml of FeCl3 akwe chloride solution (0.1%, w/in). The absorber was measured at 700 nm. The results are expressed as the equivalent of ascorbic acid per gram of dry weight extract (mg AAE/g edw).2.5. In vitro antidiabetic effects2.5.1. The inhibitory activity of the Glucosidase Inhibitory AssayThe-Glucosidase inhibitory activity has been tested using the p-Nitrophenyl-d-glucopyranoside (pNPG) substrate, which is hydrolyzed by glucoside to release p-Nitrophenyl (a color agent that can be controlled at 405 nm), according to the method described by Maruz. The results were expressed as percentage inhibition, while the concentrations of the inhibitor needed to inhibit 50% of enzyme activity (IC50) were determined to compare the results. Inhibitor inhibitor inhibitor Galactosidasey AssayThe-Galactosidase was evaluated in accordance with the Bouabid et al. method using 2-nitrophenyl-D-Galactopyranoside as a substrate that is hydrolyzed by z-Galactosidase to release 2-nitrophenyl (color agent; In short, a mixture of 150 litre samples at different concentrations (0.5-5 mg/ml) and 100 litres of sodium phosphate buffer 0.1 m (pH 7.6) containing the enzyme solution z-Galactosidase (0.1U/mL) was incubated at 37 degrees Celsius for 10 minutes. After the pre-insuagaia, 200 MKL gala solution 1 m was added to the sodium phosphate buffer 0.1 M (pH-7.6). After incubation, 1 ml 0.1 M Na2CO3 were added to stop the reaction and absorption was recorded at 405 nm using a spectrophotometer. formula as a test na-Glucosideza and values IC50 have been determined. The overcetin was used as a positive control, and the experiment was conducted three times.2.6. Statistical analysisResults are expressed as average and standard error of average value. Differences between the means were determined by one of the ways of analyzing variance (single-11 ANOVA). The difference in the average of 0.05 euros was considered statistically significant. All analyses were conducted using GraphPad Prism 6. In addition, IC50 values were determined by non-linear regression curves with the same program.3 Results and discussion3.1. Total phenolic, flavonoid, and Proanthocyanidin Content Total phenolic, flavonoid, and proanthocyanidin content are represented in Table 1. Phenol content in ethyl acetate faction (EAF) A. Longa were found to have been 32.55'0.43 mg of GAE/g edw, which are significantly (p' 0.05) larger than methanol fraction and aqueous extract (24.48'1.63 mg GAE/g edw and 13.13'0.48 mg GAE/gedw) respectively. There is no significant difference between EAF and aqueous fraction (AF) (28.90 x 1.36 mg GAE/g edw). Results of flavonoid and proanthocyanidine content show that the faction of ethyl acetate also led to a significant (rz 0.05) higher values of these compounds (116.86-4.12 mg RE/g edw and 77.64-1.93 mg AD/g edw, respectively), followed by aquatic fractions, which were 7.60 x 0.11 mg RE/g edw and 10.79 x 0.49 mg CE/g edw, respectively. The interesting phenolic content of this herb indicates important activities that promote health. Indeed, Djeridane et al. worked on the roots of A. longa, and they rated the total content of phenols and flavonoids as 1.47-0.02 mg OF GAE/g edw and 0.81-0.02 mg of RE/g edw, respectively. These compounds are secondary plant metabolites with a wide range of pharmacological activities such as anti-cancer, antiviral, anti-inflammatory and capillary fragility (24-26). Previous studies that have been interested in other species of Aristolochia, such as A. bracteolata and A. indica, have shown that methanol extract from each plant contains large amounts of phenols and flavonoids. Phenol compounds are an important and complex group of chemical components present in plants and are classic protective compounds to protect plants from herbivores, pathogenic and parasitic infections. ExtractsPolisfile content (mg GAE/g extract)Flavonoid content (mg RE/g extract)Proantocyanidinin (mg CE/g extract)MF24.48-1.6 3b 7.00.0.61b05.78'0.28aEAF32.55'0.43c116.86'4.12c7 7.64'1.93cAF28.90'1.36b,c07.60'0.11b10.79'0.49bAE13.13'0.48a03.80'0.32a06.87'0.32a,bThe values are the average of three definitions and the standard error. Values in one column without sharing the total letter (a to c), 0.05.MF: methanol fraction; Eaf: Eaf: acetate faction; AF: aqueous faction; AE: aqueous extract; GAE: the equivalent of gallyan acid; RE: routine equivalent; CE: catechin equivalent.3.2. Antioxidant activityUkemia, many scientific studies have shown that free radicals play an important role in the development of cancer, heart disease, aging, cataracts and damage to the immune system. These unstable free radicals can be eliminated by antioxidants that suppress the rate of oxidation and protect cells from damage. Antioxidant drugs are used to prevent and treat stress-related oxidative diseases such as diabetes, Alzheimer's disease, atherosclerosis, stroke and cancer. However, its side effects and high prices cause many people to take herbal medications that have fewer side effects. Numerous methods of analyzing antioxidant activity in vitro and in vivo have been developed, but there are only a few quick and reliable methods for a large number of plant extract samples. In addition, the ability to clean up the stable free radicals of DPPH and ABTS and their ferrice, which reduces antioxidant strength (FRAP) has been evaluated to study the antioxidant activity of our plant extracts. DPPH is one of the stable free radicals, commercially available, nitrogen at the center, and is heavily used to evaluate the cleanup of antioxidant standards and plant extracts with a characteristic absorption of 517 nm, which is reduced in the presence of free radical scavengers. Taking hydrogen from the appropriate donor, the SOLUTION DPPH loses its characteristic dark purple color and becomes yellow diphenylpicril hydrazine (36-39). This clean-up activity has been widely used as a quick and reliable parameter to assess the overall antioxidant activity of in vitro extracts (40, 41). Recently, numerous studies have reported the antioxidant properties of medicinal plant products using DPPH analysis (42-44). Of these analyses, several molecules from medicinal plants have been developed as antioxidant agents. Figure 1 illustrates the radical work of DPPH in cleaning up various A. longa extracts in different concentrations. All A. longa extracts have shown a cleaning effect that increases with the concentration of samples. At concentrations of 416 micrograms/ml, A. longa and methanol fraction showed an increased radical activity of THE PDG by 77.17% and 74.66%, respectively. In addition, aqueous extract has shown less activity at all concentrations. These results showed that the roots of A. longa contained a large number of radical cleansing compounds with proton-sacrificed ability. A similar result was noted in one previous study, Benmehdi et al., which showed a dose-dependent clean-up DPPH using the roots of A. clematitis. Radical cation 2.2-azino-bis-3-ethylbenzoethiazoline-6-sulfon acid (ABTS) is stable in free form. The concentration of this radical radical to be identified by measuring absorption at 734 nm. Adding antioxidant to the solution of this radical leads to its reduction and reduced absorption. This decrease depends not only on the antioxidant activity of the test compound, but also on time and concentration. The experiments were conducted using an improved analysis of ABTS decolorization. The ability of extracts to clean ABTS cation was expressed in Figure 2. The aqueous faction exhibited the powerful ABTS sweeping the cation cleaning up in a concentration-dependent manner. At a concentration of 181 micrograms/ml, A. longa and methanol fraction had 90.89% and 82.58% cleaning activity on ABTS. In the concentrations studied, this effect may indicate the herb's ability to minimize oxidative damage to some vital tissues in the body. These results, in accordance with the findings of Jegadeeswari and others, in the FRAP method, the antioxidants present in the sample reduced the Fe3/ferricyanide complex to a blue ferric form, which can serve as a measure of antioxidant ability interpreted as reduced power. Reducing the power of extracts is represented in Figure 3. Higher absorption indicates a higher reduced power. In 2000, the concentration of mcg/ml and among proven solvents, the aqueous fraction exhibited a higher decrease in activity of 80.73%. The results are consistent with studies conducted on A. longa (air part) and A. indica (air part) and (roots), which indicate that they have reduced power. To compare the results, IC50 is calculated, as shown in Table 2. A lower IC50 indicates greater antioxidant activity. Indeed, the aqueous faction showed the highest rate of inhibition of radicals DPPH (IC50-125.40'2.40 micrograms/ml), while the methanol fraction was most active against the radical catalysis of ABTS (IC50-61). 58 x2.15 micrograms/ml), and the troloc value for both tests was 1.79 x 0.35 micrograms/ml and 0.70 x 0.01 microgram/ml, respectively. Our results are similar to those of Ramalalingam et al. using a DPPH analysis on aqueous extract A. indica, which showed the value of IC50 182.31'0.31 microgram/ml, while the standard showed a value of 30.12'0'11 micrograms/ml. In another study also using DPPH analysis, the roots of A. longa had the weakest effect compared to Trolox, among all plants tested. In addition, our study showed similar findings with this work. In the ABTS method, we share the same results of a study of five A. bracteolate extracts that found that methanol extract has a powerful antioxidant activity. However, there is variability in the recorded activity of various extracts; this is certainly due to the difference in chemical composition of extracts, especially polyphenols and flavonoids phytochemical analysis in our study. These components have different degrees of antioxidant activity against different free radicals. The effectiveness of antioxidants can be due to a large number of essential components, as well as the presence of other components in small amounts or synergy between them. Indeed, previous studies have reported the presence of chemical compounds such as Aristolactam la (ALla), Limonen-6-ol, and Maaliol (56-58). Phenolics are antioxidants with redox properties; Hydroxyl group helps them work as shrinking agents, hydrogen donors and singlet oxygen queers (59, 60). Plant extracts, which have a large number of phenolic compounds, do not always lead to high antioxidant capacity; this may be due to the presence of various active compounds, the synergistic effects of these compounds, and the position and degree of hydroxylation and conjugation. In addition, our activity was significantly weaker compared to Trolox (p 0.05 euros); this result can be interpreted by the fact that extracts have multiple compounds, while the concentration of those who could perform this activity would be very low. It is also noted that the antioxidant effects vary depending on the test used. In fact, antioxidant activity depends on the interaction in media reactions between substrate (s) (radicals) and active molecules (s) that trap them. Other studies have shown that the roots of A. longa have antioxidant activity. In addition, there is another study that was interested in the air part of this plant, and we found almost the same results for the DPPH method; It was found that the values of IC50 extract of fruit acus and fruit methanol are 145.15-0.78 micrograms/ml and 186.21-6.24 micrograms/ml, respectively. used, harvest period, and studied part (root, leaf, stem ...) Products DPPH (mcg/ml)ABTS (mcg/ml)MF199.35'1.25b61.58'2.15bEAF220.80'2.40b103.62'8.8.8.2 62b,cAF125.40 2,40b65.23'2.49bAE354.60'5.20c144.40'2.07cloTrox1.79'0.35a0.70'0a Values are the average of three definitions of a standard error. Values in the same column that do not divide the total letter (a to c) vary significantly at 0.05,3,3. K-Glucosides and K-Galactosidase Inhibitory ActivitiesDiabetes are characterized by high blood sugar levels, which can lead to serious complications, so the goal of treating patients with diabetes is to maintain almost normal levels of glycemic control. In modern medicine there is no treatment or medication to treat diabetes without side effects that are associated with the use of insulin and oral hypoglycemic agents. Medicinal plants with properties can be a useful source for finding safer, more cost-effective antidiabetic drugs. In B This study, various A. longa extracts are evaluated for their antidiabetic activity. Two different in vitro analyses were used to assess this activity: Glucosideza and -Galactosidase absorption. Its inhibitors can slow down the

intake of dietary carbohydrates in the small intestine and reduce post-prandiaal hyperglycemia, which can be a useful mechanism in the preparation of antidiabetic drugs. This is largely used as an effective pharmacological strategy to manage hyperglycemia associated with early stages of type 2 diabetes. On the other hand, catalysis catalysis of hydrolysis z-Galactosids is subtracted from simple carbohydrates in the gut. Subsequently, inhibition of this enzyme can lead to a decrease in intestinal hydrocarbons and ultimately reduce glucose levels. A. longa extracts showed inhibitory effects on both enzymes tested in Table 3. The result showed that the extracts tested inhibited the concentration of activity of glucosidese and galactosidase (0.5-5 mg/ml). Indeed, at a concentration of 1.5 mg/ml, the ethyl acetate fraction has the highest inhibitory activity against K-Glucosidese (76.56-2.54%) And K-Galactosidase (12.70-1.27%). и «Галактосидаза» (2,05–1,22%). Однако, aqueous экстракт ингибирует только энзиматической активности 3-Галактозидазы (2,20%). Эти результаты согласуются с результатами Джанани и Ревати, которые работали над другим видом аристохиацеев (A. indica). Их исследование показало, что метанольный экстракт всего растения показал ингибирующую активность глюкозидазы, которая увеличивалась с увеличением концентрации. Экстракт/Стандарт-Глюкозидаза ингибирование-Галактозидаза ингибирование% ингибирования при 1,5 мг/мл (мг/мл)% ингибирования при 1,5 мг/мл (мг/мл)Этил ацетат фракция76. 56'2.54b1.112'0.026b12.70'1.27b-5Метаноличная фракция21.94'1.34a2.378 0.037b2.05'1.22a-5Акционная дробная 5na-5Акеозная экстрактна 52,20'0.13a-5Акарбозе96.78 0,03c0.199'0.014a--------Кверцетин--------92.62'0.14c0.247'0.006na: неактивный; среднее - SD (n'3). Значения в одной колонке, не разделяющей общую букву (от a до c), значительно различаются при p3 0.05.То измеряют ингибирующую эффективность каждого экстракта, мы использовали IC50, который представляет собой концентрацию ингибитора, который необходим для 50% ингибирования его целевого фермента. Фракции этилового ацетата и метанола показали сильную ингибирующую способность против глюкозидазы со значениями IC50 1.112'0.026 и 2.378'0.037 мг/мл Accordingly. These inhibition values are greater than acarbose (0.199'0.014 mg/ml) used as a standard Similar effects were observed on A. indica. Similarly, the values of infection with glucosidease extract and aquial fraction above 5 mg/ml. For the inhibitory ability of K-Galactosidase, all extracts showed a value of IC50 more than 5 mg/ml. The fact that Glucosidesa and Galactosidase showed a difference due to structural differences associated with the origin of enzymes. The inhibitory effects of A. longa extracts against the enzyme No-Glucosidase demonstrate their potential ability to reduce post-prandial blood glucose levels in diabetic patients and their ability to prevent type 2 diabetes. Thus, it is assumed that the antihypergliemic mechanism may be associated with the antioxidant activity of this herb. Our finding corresponds to earlier reports that showed that in animal models two of its species, A. indica air parts and A. ringens root extracts, showed a decrease in elevated blood glucose levels. In addition, the results are consistent with a study performed on 71 herbal plants to test their antidiabetic effects, which showed that 36 herbs were inhibiting glucosidease including the species Aristolochiaceae (Asarum hetropteroroides). The differences observed for the inhibitory activity of the enzyme can be explained by changes in the percentage of inhibition relative to the phytochemical composition of plant species, as well as the sensitivity of enzymes. Consequently, as mentioned above, phytochemical studies on A. longa have demonstrated its ability to produce large amounts of phenolic compounds and several flavonoids, including alkaloids, saponins and tannins. Phenol compounds are known for their ability to suppress the activity of carbohydrate-hydrolysing enzymes due to their ability to bind to proteins. In addition, the presence of flavonoids, especially in the ethyl acetate faction, may explain the observed inhibitory activity. In fact, flavonoids are known to have high inhibitory potential for glucosidease in both in vitro and in vivo studies (74) and can prevent malfunction of pancreatic beta cells due to oxidative stress and thus can reduce the onset of type 2 diabetes. It is important to note that some researchers have indicated that there is a positive link between the overall content of flavonoids and polyphenols and the ability to inhibit glucosidease. The inhibitory effect observed in the Methanol fraction A. longa may be associated with the presence of other phytoconstifists such as alkaloids, tannins and saponins (76, 77). These latter were responsible for suppressing the absorption of fluid and glucose on the edges of the brush. These compounds, which can also inhibit glucosidease, have fewer side effects and are cheaper compared to synthetic pharmacotherapists like Acarbose. they perform perform other biological activities such as antibacterial, antioxidant and anti-cancer drugs. Typically, herbal medicine is based on the therapeutic effect of a mixture of different compounds acting often in synergy to have all their beneficial effects. This suggests that the biologically active compounds present in the extracts studied may have a synergistic way of exercising their carbohydrate-hydrolysing enzymes of activity inhibition and antioxidant effect. Observed changes in the chemical composition of Aristolochia sp from different parts of the world are due not only to the type of species, but also to different agroclimatic conditions, extraction method, harvest period and characteristics (81, 82), as well as selected part of plant and polarity of extraction solvents. As for plant extracts, other studies have shown that some may increase the secretion of insulin and insulin signaling in fat and skeletal muscles. In this study, we investigated the antidiabetic potential of A. longa, which is used in traditional medicine to treat a number of diseases. This herb has not previously been studied for its antidiabetic in vitro activity. The results of this work should be relevant to the human body4. The finding of A. longa roots had the best antioxidant effects against the radicals of DPPH and ABTS and the strong force of ferret reduction. This suggests that A. longa can be used to prevent and control oxidative stress caused by free radicals. Antidiabetic activity was also investigated, focusing on inhibitory effects on glucosidease and galactosidase. Our study is the first to report on the potential mode of action of A. longa and suggests that the effect of this plant is due to inhibition of digestive enzymes. On the other hand, the presence of flavonoids and phenols concludes that this herb has several biological properties. Other studies should be conducted to isolate the active ingredients of this plant, identify them, and examine their bioactivity. The availability of data Personal data used to support the results of this study is included in the article. Conflicts of interest Authors have no conflict of interest to declare. Brought. in vitro antioxidant activity of plant extracts pdf