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Antioxidant activity of doum fruit extract (*hyphaene thebaica*) as an alternative to antidiabetic drinks

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Abstract---*Diabetes* Mellitus (DM) is a public health problem that occurs not only in Indonesia but throughout the world. The use of insulin and oral antidiabetic drugs is often burdensome to patients because of the high cost and side effects. The balance of free radicals in the body is formed because there are antioxidants. Antioxidants function as the body's defense mechanism against free radicals. Doum fruit or Doum fruit is an alternative fruit that is rarely known to have various kinds of active compounds such as polyphenolic flavonoids. There has not been much research on Doum fruit or doum fruit, it is deemed necessary to do research on the antioxidant test of Doum fruit extract (Hyphaene thebaica) as an alternative to antidiabetic drinks. The analysis was carried out by testing the water content and the antioxidant activity test (% inhibition) using the DPPH method. The results showed that the IC50 value in boiled water was 74,098 ppm, and Doum immersion water was 78,654 including strong antioxidant activity.
Keywords---*antidiabetic, antioxidant, hyphaene thebaica.*

Introduction

Public health problems that occur not only in Indonesia but throughout the world, one of which is Diabetes Mellitus (DM). This can be seen by the increasing number of DM cases in Indonesia, which ranks 4th after India, China, and America with 8.4 million sufferers and is expected to continue to increase to 21.3 million in 2030. There are two types of antihyperglycemic drugs, namely in the form of insulin injections and oral antidiabetic drugs which include the sulfonylurea group and alphaglucosidase inhibitors such as glibenclamide (Guillausseau, 2003; Edmont et al., 2000; Oh et al., 2005). However, the use of insulin and oral antidiabetic drugs is often burdensome for patients because of the high cost and side effects (Abdou et al., 2011).

Free radicals in living systems are part of the process to produce energy which plays an important role in the body's physiological processes but in uncontrolled amounts will disrupt the flow of energy so that it changes the dynamic order and balance that is formed in a healthy body. Free radicals are atoms or groups of atoms that have one or more unpaired electrons in their outermost orbital (Pala & Tabakcioglu, 2007) so they are unstable and reactive. In an effort to make up for the electron deficiency, free radicals easily bind to electrons from atoms or molecules of other compounds nearby in a short time (Sisein, 2014). Compounds that lose electrons will become radicals and trigger a chain reaction to form new free radicals. The balance of free radicals in the body is formed because there are antioxidants. Antioxidants function as the body's defense mechanism against the nature of free radicals (Valko et al., 2009) where in uncontrolled amounts free radicals will form oxidative stress. Free radicals in the body are

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endogenous and exogenous. One source of exogenous free radicals in the body comes from cigarette smoke which is complex (Chari & Colagar, 2011).

Doum fruit or Doum fruit is a plant native to Egypt, this fruit has a variety of active compounds. Some of the polyphenolic flavonoid compounds from Doum are myricetin, kaemppherol, quercetin, and myricitrin. Phenol compounds in the form of ellagic acid, gallic acid, caffeic acid, and ferulic acid (Abdel-moniem et al., 2015). Doum fruit also contains protein, carbohydrates, fats, amino acids, and various minerals such as Mg, Fe, Na, K, S, and Cu. There are not many studies on Doum fruit or doum fruit, it is necessary to do research on the Antioxidant Test of Doum Fruit Extract (Hyphaene thebaica) as an alternative to antidiabetic drinks (Forkink et al., 2010).

Method

This research will be carried out for 3 months in June - September 2021. This type of research is pure experimental (true experimental). The research implementation includes: preparation of raw materials, then chemical analysis of water content and antioxidant activity test (% inhibition) DPPH method is carried out.

Results and Discussion

Based on the results of the study it is known the antioxidant activity of Doum fruit was tested using the DPPH method with UV-V is spectrophotometry at a maximum wavelength of 517 nm. The amount of antioxidant activity is indicated by the IC50 value, which is the concentration of sample solution required to inhibit 50% of DPPH free radicals.

Table 1
IC50 value of Doum water decoction and Doum water immersion

Material Type	IC_{50} (ppm)
Stew	74.098
Marinade	78,654

From the results of Table 1. shows the IC50 value in boiled water of 74,098 ppm, and Doum immersion water of 78,654 including strong antioxidant activity. Antioxidant activity can be divided into very strong, strong, moderate, weak, and very weak categories (Blois, 1985 in Molyneux, 2004). Antioxidants are said to be very strong if their IC50 values are less than 50 ppm, strong antioxidants have IC50 values in the range of 50 ppm to 100 ppm, moderate antioxidants have IC50 values ranging from 100 ppm to 150 ppm, weak antioxidants have a range of 150 ppm to 200 ppm and IC50 values more than 200 ppm are very weak antioxidants.

The results showed that Doum fruit had a strong antioxidant activity test, both from boiled water and soaked water (Arnao, 2000; Braca et al., 2002; Maillard et al., 1996). Doum fruit is classified as a fruit that has high antioxidants and is good for warding off free radicals and reducing oxidative stress that can cause diabetes. Oxidative stress and oxidative damage to tissues usually end in chronic diseases such as atherosclerosis, diabetes, rheumatoid arthritis (Yen & Chen, 1995). Increased glycosidation and liposidation results in plasma and protein tissue due to increased oxidative stress in diabetes mellitus. Complications of diabetes are related to oxidative stress, especially the formation of superoxide free radicals (Gülçin, 2012).

The highest source of stress in diabetic patients comes from thoughts, and poor diet, foods that contain lots of carbohydrates and lipids will increase the formation of ROS from glycation reactions and lipid oxidation, thereby reducing the antioxidant defense system including GSH. Oxidative stress in diabetics will increase the formation of ROS in the mitochondria which will cause various oxidative damage in the form of diabetes complications and will worsen the condition of diabetics, it is necessary to normalize ROS levels in the mitochondria to prevent oxidative damage (Khaydarova et al., 2022).

High antioxidant activity, making Doum fruit can be used for antidiabetic drinks, according to El-Beltagi et al., (2018), Biological Activities of the Doum Palm (Hyphaene thebaica L.) Extract and Its bioactive components stated that the phenol content of Doum fruit water extract can reduce hyperlipidemia in nephrotic syndrome and lead to a reduced risk of glomerulosclerosis and atherosclerosis. Doum fruit contains compounds such as flavonoids and polyphenols that function as natural antioxidants in the body (Hsu et al., 2006; Sone et al., 2021; Mohamed et al., 2020). The content of flavonoids and polyphenols in Doum fruit can counteract peroxy radicals that cause the breakdown of fat bonds in cell membranes, flavonoid compounds are compounds that have the potential to bind free radicals by cutting the chain oxidation reaction of free radicals, so that free radicals are unable to react with secondary components (Kassim, 2015). Flavonoid group compounds are in the form of glycosides having sugar

groups. In this study, it is suspected that the flavonoid glycosides contained in Doum fruit act as hydroxyl radical scavengers, so that they can prevent diabetagonic action (Studiawan & Santosa, 2005).

Conclusion

Doum fruit shows the IC50 value in boiled water of 74,098 ppm, and Doum immersion water of 78,654 is included in strong antioxidant activity, and has the potential as an antidiabetic drink.

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