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Abstract

Background : Diabetes Mellitus in Indonesia was ranked the 6th highest in the world in 2017. In NTB, the prevalence of DM increased to 1.5% per year and became top 10 most diseases in NTB Province. One of the non-pharmacological approaches that can be used by DM patients with high blood sugar and high cholesterol is herbal therapy of Fig Leaves (ficus carica) steeping water. Fig leaves are rich in flavonoids and pectin which are able to control blood sugar and cholesterol metabolism in the body, relax blood vessels and prevent the establishment of atherosclerosis. Pectin triggers bile secretion in digestive tract which binds cholesterol and excretes it out of the body with feces.
Purpose: Knowing the Effect of fig leaves (Ficus carica L.) on blood sugar and cholesterol levels in patients with diabetes mellitus
Method: A quasi-experimental study with descriptive analytic design and pre and post-test of non-equivalent control group design. Sampling used the purposive sampling technique and obtained 30 participants divided into 2 groups. 15 participants in the intervention group and 15 participants in the control group. The research instruments were questionnaires on characteristics, observation sheets. Data analysis used the Pairet t-test.
Results: In the intervention group, the statistical test results showed that there was a significant difference between blood sugar levels before and after intervention (p-value 0.000) and a significant difference between total cholesterol before and after intervention (p-value 0.000).
Conclusion : There is an effect of the fig leaves (Ficus carica L.) on blood sugar and cholesterol levels in patients with diabetes mellitus

Keywords: The fig leaves (Ficus carica L.); Blood sugar; Cholesterol levels; Patients; Diabetes mellitus

INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic diseases characterized by high levels of glucose in the blood (hyperglycemia) due to insulin secretion disorders, insulin action disorders, or both (Ozougwu et al., 2013; Guariguata et al., 2014; Koopman et al., 2017; Kumari et al., 2004).

DM became the main cause of 1.5 million deaths in 2012 (Nadrati et al., 2019). Indonesia is ranked 6th in the world with the highest DM sufferers in 2017 after China, India, America, Brazil, and Mexico (Guariguata et al., 2014). In NTB, the prevalence of DM increased to 1.5% in 2018 which was initially 0.9% in 2013 and spread

across all districts/cities, one of them is West Lombok district.

DM remains in the top 10 most diseases in Public Health Center in NTB Province at 2017 (Zhang et al., 2019; Isnaini & Ratnasari, 2018). Public Health Center Gunungsari is one of the health centers in West Lombok district with DM prevalence amount of 1.231, where DM occupies the third position after hypertension and gastritis (West Lombok District Health Office, 2018) (West Lombok District Health Office (2018). Profile of Public Health Center Gunungsari.

High blood sugar causes a decrease in HDL cholesterol (high-density lipoprotein / HDL) and an increase in LDL cholesterol (low-density lipoprotein / LDL) (Zega et al., 2016; Krug, 2016). Medical treatment of hyperglycemia and cholesterol is currently not effective because almost 70% of patients in Indonesia fail to achieve the target of blood sugar and cholesterol levels according to the treatment guidelines, besides the relatively expensive price of the medicine, frequently recurrences and give side effects (Yuliani et al., 2014). One approach that can be used to control high blood sugar and cholesterol levels is by consuming herbal ingredients, one of them is fig leaves (ficus carica) (Zaitseva et al., 2020). Fig leaves are believed to be rich in flavonoids and pectin which are able to control cholesterol metabolism in the body, relax blood vessels and prevent the establishment of atherosclerosis. Pectin triggers bile secretion in the digestive tract which binds cholesterol and excretes it out of the body with feces (Zaitseva et al., 2020)

The purpose of this study was to determine the effect of fresh fig leaves steeping water on blood sugar levels and total cholesterol levels in DM patients type 2 in the working area of Public Health Center Gunungsari.

RESEARCH METHOD

This research is a quasi-experimental research with descriptive analytic design and pre and post test nonequivalent control group design. This design was used to compare the results of the intervention of two groups, the intervention group and the control group, both of them were measured before and after being given the treatment. The form of the pre and post test approach scheme is nonequivalent control group design.

Sampling using purposive sampling technique to obtain subjects who fill the inclusion and exclusion criteria. In this study, there were 30 participants, 15 participants from the intervention group and 15 participants from the control group.

The instruments in this study were the respondent's characteristics questionnaire, observation sheets, SOPs for checking temporary blood sugar levels and total cholesterol, SOPs for giving fresh fig leaves steeping water, digital tools for temporary blood sugar parameters and total cholesterol easy touch blood glucose and cholesterol test strips. digital scales (grams), weight scales, measuring cups, hot water temperature thermometers.

In this study, the intervention group was treated with 7 grams of fresh fig leave steeped water 2 times a day with the distribution (3.5 g in the morning and 3.5 g in the evening) that was given for 7 days and metformin therapy, and the control group was only given metformin therapy. In the intervention group participants, before being given fresh fig leaves steeping water on day 1, Blood sugar levels 1–2 hours after the start of a meal and total cholesterol were checked first in the morning, running metformin therapy, then they were given fresh fig leaves steeped drinking water in the morning and evening.

Then the 2nd day to the 7th day they were given the same treatment as on the 1st day. On the 8th day, only Blood sugar levels 1–2 hours after the start of a meal and total cholesterol were checked. Meanwhile, the control group participants were given treatment that consist of checking Blood sugar levels 1–2 hours after the start of a meal and total cholesterol and running metformin therapy. Then on day 2 to day 7, control group participants were given the same treatment as on day 1. on the 8th day, only Blood sugar levels 1–2 hours after the start of a meal and total cholesterol were checked. Examination of Blood sugar levels 1–2 hours after the start of a meal and total

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cholesterol using digital parameters easy touch. This research has passed the ethical test of the Research Ethics Commission of the NTB Provincial Hospital Letter No. 070.1/11/KEP/2020.

RESULTS

Table 1. Distribution of Participants Characteristics (N= 30)

Characteristics	Group	
	Intervention (n=15)	Control (n=15)
Age (Mean±SD) (Range) (Year)	58.3±6.5 (45-65)	56.80±3.16 (52-64)
Weight (Mean±SD) (Range) (Kg)	75.93±4.06 (70-85)	75.20±5.91 (68-85)
Duration of Diabetes Mellitus (Mean±SD) (Range) (Year)	5.3±1.81 (2-8)	5.66±2.55 (2-9)
Gender (n/%)		
Male	6/40	5/30
Female	9/60	10/70
Education levels (n/%)		
Low	9/60	12/80
High	6/40	3/20
Smoking Status (n/%)		
≤ 1 pack/day	6/40	5/30
>1 pack/day	9/60	10/70
Diabetic Medical treatment (n/%)		
Regular	4/27	3/20
Irregular	11/73	12/80
Take Diabetes or Cholesterol Diet (n/%)		
Yes	3/20	1/7
No	12/80	14/93
Sport		
≥1 time/Week	1/7	-
Never/Week	14/93	15/100

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Table 2. Evaluation of the effectiveness of The fig leaves (Ficus carica L.)

	Intervention (n=15)	Control (n=15)
Blood sugar levels		
1–2 hours after the start of a meal		
(Mean$\pm$SD) (Range) (mg/dL)		
Before	(296.47$\pm$102.14)(106-531)	(306.13$\pm$92.41)(202-465)
After	(190.53$\pm$31.69)(128-242)	(193.27$\pm$12.05)(175-430)
Total Cholesterol levels		
(Mean$\pm$SD) (Range) (mg/dL).		
Before	(229.67$\pm$48.88)(120-318)	(220.80$\pm$12.83)(205-255)
After	(176.67$\pm$25.12)(132-220)	(193.27$\pm$12.05)(174-222)

Based on table 1, it was found that the average age of the intervention group was 58.33 years and the control group was 56.80 years, the gender was mostly female, 100% had low education, 60 participants in the intervention group smoked > 1 pack/day and the control group 70% smoked > 1 pack/day, 53.33% suffered from hypertension in the intervention group and 73.33% in the control group, 73.3% of participants had irregular treatment behavior in the intervention group and 80% in the control group, 73.33% of participants did not do diet. and 93.3% in the control group, 93.33% of participants in the intervention group never doing exercise and 100% in the control group.

Table 3. Therapeutic Effectiveness The Fig Leaves (Ficus Carica L.) On Blood Sugar And Cholesterol

Variabel	n	SE	Mean Difference	S.D	p-value
Blood sugar levels					
1–2 hours after the start of a meal					
Intervention Group	15	22.239	105.933	86.132	0.000
Control	15	4.766	40.933	18.460	
Total Cholesterol levels					
Intervention Group	15	8.718	53	33.762	0.000
Control Group	15	16.76	27.533	6.490	

Based on tables, the average Blood sugar levels 1–2 hours after the start of a meal lat the first measurement in the intervention group was 296.47 mg/dl with a standard deviation of 102.148. In measuring Blood sugar levels 1–2 hours after the start of a meal after 7 days of treatment with fresh fig leaves steeping water, the average Blood sugar levels 1–2 hours after the start of a meal level was 190.53 mg/dl with a standard deviation of 31.697. While the average Blood sugar levels 1–2 hours after the start of a meal level in the first measurement in the control group was 306.13 mg/dl with a standard deviation of 92,417 and after 7 days the Blood sugar levels 1–2 hours after the start of a meal measurement obtained an average Blood sugar levels 1–2 hours after the start of a meal level of 265.20 mg/dl with a standard deviation of 81,431.

The average total of Cholesterol levels obtained in the first measurement in the intervention group

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was 229.67 mg/dl with a standard deviation of 48,880. In the measurement of total cholesterol after 7 days of treatment with fresh fig leaves steeping water, the average total cholesterol level was 176.67 mg/dl with a standard deviation of 25.124. While the average total cholesterol level in the first measurement in the control group was 220.80 mg/dl with a standard deviation of 12.830 and total cholesterol levels after 7 days obtained an average total cholesterol level of 193.27 mg/dl with a standard deviation of 12.056.

DISCUSSION

The results showed that the youngest age was 45 years and the oldest age was 65 years. Diabetes mellitus type 2 is generally aged 45-74 years. This is because the older a person is, the less the work of his organs, so the risk of disease increases. This is due to IDF data in 2013 which states that most people with diabetes are in the age range of 40-59 years old and 80% of diabetes mellitus patients in this age group are in developing countries such as Indonesia. However, it is possible that people who are less than 45 years old can get diabetes. Based on gender, both control and intervention groups were mostly women, there are 19 participants (63.3%) which was also in line with a research conducted by Nadrati, Hajri & Suharti (2019) stated that female tends to be more at risk of developing diabetes mellitus its relate to body mass index and menstrual cycle syndrome as well as menopause that cause fat accumulation easily which effecting the inhibition of glucose transport into cells (Isnaini & Ratnasari, 2018; Irudayaraj et al., 2017).

The female have hormone estrogen which plays a role in increasing levels of High Density Lipoprotein (HDL), along with increasing age, estrogen production decreases, therefore women are more susceptible to hypertension after being over 45 years old and after experiencing menopause (Wendling & Beadle, 2015). ; Barth et al., 1991; Adnan et al., 2013; Yilmaz et al., 2010).

The results of the analysis in the study showed that both groups experienced a decrease in temporary blood sugar levels and total cholesterol

with a p value of 0.000 but when viewed from the average blood sugar level in the intervention group, that was 296.47 mg/dl to 190.53 mg/dl which which decreased by 105.94 mg/dl after 7 days of treatment with fresh fig leaves steeping water and metformin while in the control group the average of temporary blood sugar level was 306.13 mg/dl to 265.20 mg/dl which was only given metformin itself. only decreased by 40.93 mg/dl.

While the average of total cholesterol in the intervention group was 229.67 mg/dl to 176.67 mg/dl which decreased by 53 mg/dl, after 7 days of treatment with fresh fig leaves steeping water and metformin while in the control group the average of temporary Blood sugar levels were 220.80 mg/dl to 193.27 mg/dl, while the group that was only given metformin only decreased by 27.53 mg/dl.

Based on the results of this analysis, it was shown that there was a difference in the average before being given the treatment in the intervention group or the group that was given the intervention of a combination of fig leaves and metformin with the control group or the group that was only given metformin. The intervention group experienced a decrease in blood sugar levels as much as 65.01 mg/dl from the control group and a decrease in total cholesterol as much as 25.47 mg/dl from the control group.

This study is in line with the research of Zakaria et. al, (2019) with the results that there is an effect of giving fig leaves tea on blood sugar levels in DM patients. And it is also in line with the research by Laksono and Jamil (2018) with results showing there is a significant difference between pretest and posttest data in the first week (p=0.011) where flavonoids and pectin in fig leaves tea (Ficus Carica) play an important function in cholesterol regulation, flavonoids are able to increase the expression of HDL-C (good cholesterol) while pectin increases the sterols secretion in the metabolism of Cecal so it can be ascertained that consuming fig leaves tea 2 times a day is proven able to reduce blood cholesterol levels in participants (Zakaria et al, 2019; Zaitseva et al., 2020).

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The content of fig leaves can affect blood sugar levels, one of them is flavonoids which are useful for the treatment of DM by giving fig leaves tea for 3 weeks or 21 days, the results show that fig leaves extract has good hypoglycemic activity (Zakaria et al, 2019; Zega , 2016; Ivanov et al., 2018; Roberts et al., 2009; Nadrati et al., 2019).

Trifunschi, et al., (2015), Flavonoids in fig leaves tea are useful for people with diabetes as a controller of blood sugar levels in the body, as well as antioxidants protecting tissues against oxidative damage due to free radicals, which come from internal or external body processes. Flavonoids have a function as antioxidants that are able to restrain the rate of absorption of blood glucose from the gastrointestinal tract to the blood vessels so that it can hold blood glucose levels increasing. By preventing an increase in blood glucose levels because it is expected to prevent an increase in free radicals. Triterpenoids function as suppliers of insulin levels in the body and help the pancreas to increase insulin intake then it can increase the amount of insulin needed by the body to bind sugar levels in the blood and reduce blood sugar levels and the amount of insulin needed.

To prevent or treat DM, health experts generally use medicine that cause hypoglycemic effects and insulin-boosting effects, these types of medicines are usually the first medicines given to treat DM. In fig leaves tea which contains flavonoids and triterpenoids which have hypoglycemic activity, it can reduce blood sugar levels so that it can reduce blood sugar levels in DM (Zakaria et al, 2019; Zega, 2016).

Research by Irudayaraj et al., (2017) showed that Ficus carica contained in fig leaves has a significant effect on carbohydrate metabolism enzymes with promising hypoglycemic and hypolipidemic activities in type 2 diabetic rats. significantly ($p < 0.005$) restrained the increase in blood glucose levels at 60 and 120 minutes and at ITT, Ficus carica significantly increased glucose utilization.

The result of The research by Zhang's *et al.*, (2019) extract from Ficus carica inhibits gluconeogenesis through the activation of AMP-activated protein kinase. AMP-activated protein kinase that used in the treatment of diabetes can increase insulin sensitivity and control blood sugar levels.

In this research the researcher use AMP-activated protein kinase with natural product or herbal because it showed considerable success in decreasing blood glucose levels. According to Zhang et al., (2019), ficus carica is a good extracts for decreasing blood glucose. The ethanol extract activity of Ficus carica fruit is higher than all extracts and other plant parts in terms of antioxidant, antidiabetic, and anti-obesogenic effects. The IC50 value of fruit etanol extract in terms of antioxidant (134,44 ± 18,43 μg / mL), and inhibition of α-glucosidase (255,57 ± 36,46 μg / mL), α-amylase (315,89 ± 3,83 μg / mL), and pancreatic lipase activity (230.475 ± 9.65 μg / mL) indicated that the activity of the ethanol fruit extract was better than all other extract plant. Gas chromatography-mass spectroscopic analysis of fruit ethanol extract showed that the presence of a number of bioactive compounds. This result showed that extract fruits of Ficus carica has potential as an antidiabetic and anti-obesogenic agent. Zakaria et al,, (2019) quoted from A Brief Review. ARPN Journal of Science and Technology said that the stems, leaves, and fruits of Ficus Carica have been used as traditional medicine since long time ago for gastrointestinal disorders, respiration, DM, skin diseases, wounds, dysentery, and hemorrhoids as well as many alkaline active substances, fatty acids, alcohol, Phytosterols, and triterpenoids that are beneficial to the human body. The fatty acid substance works as an antioxidant. Phytosterols are able to actively inhibit the absorption of cholesterol in the digestive tract (Ivanov et al., 2018).

CONCLUSION

The research result showed that there are 15 respondent experienced temporary blood sugar levels and total cholesterol with different scores. After the implementation of giving fresh leaves steeping water, the result of statistic tests showed there are significant difference between blood

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sugar levels before and after giving fresh fig leaves steeping water. (p *value* 0,000) and there are difference significant between cholesterol total before and after giving fresh fig leaves steeping water (p *value* 0,000). So we can concluded that there was an effect of giving fresh fig leaves steeping water on blood sugar and total cholesterol of diabetes mellitus patients.

REFERENCES

Adnan, M., Mulyati, T., & Isworo, J. T. (2013). The Relationship Body Mass Index (IMT) with Blood Sugar Levels in Patiencts with Diabetes Mellitus (DM) Type 2 Outpatient at Tugurejo Semarang Hospital. Journal of Nutrition, 2(1). DOI:https://doi.org/10.26714/jg.2.1.2013.%25p.

Awad N, Langi AY, Pandelaki K. (2013). Result of Risk Factors for Diabetes Mellitus Type II Patients at the Endocrine Polyclinic Section/SMF FK-UNSRAT RSU Prof. Dr. R.D Kandou Manado Period May 2011 – October 2011. E-biomedic. 2013: Vol. 1 (1) : 45 – 49. DOI:https://doi.org/10.35790/ebm.1.1.2013.1160.

Baptiste-Roberts, K., Barone, B. B., Gary, T. L., Golden, S. H., Wilson, L. M., Bass, E. B., & Nicholson, W. K. (2009). Risk factors for diabetes type 2 among women with gestational diabetes: a systematic review. The American journal of medicine, 122(3), 207-214. https://doi.org/10.1016/j.amjmed.2008.09.034.

Barth, R., Campbell, L. V., Allen, S., Jupp, J. J., & Chisholm, D. J. (1991). Intensive Education Improves Knowledge, Compliance, and Foot Problems in Type 2 Diabetes. Diabetic Medicine, 8(2), 111-117. https://doi.org/10.1111/j.1464-5491.1991.tb01555.x.

Fonseca, V., Rosenstock, J., Patwardhan, R., & Salzman, A. (2000). Effect of metformin and rosiglitazone combination therapy in patients with diabetes mellitus type 2: a randomized controlled trial. Jama, 283(13), 1695-1702. doi:10.1001/jama.283.13.1695.

Guariguata, L., Whiting, D. R., Hambleton, I., Beagley, J., Linnenkamp, U., & Shaw, J. E. (2014). Global estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes research and clinical practice, 103(2), 137-149. https://doi.org/10.1016/j.diabres.2013.11.002

International Diabetes Federation (IDF), 2017. IDF Diabetes Atlas Eighth edition 2017. https://doi.org/10.1016/j.diabres.2019.107843.

Canadian Task Force on Preventive Health Care (CANRISK). (2012). Recommendations on screening for diabetes type 2 in adults. Canadian Medical Association Journal, 184(15), 1687-1696; 2012. DOI:https://doi.org/10.1503/cmaj.120732.

Irudayaraj, S. S. et al. (2017) 'Protective effects of Ficus carica leaves on glucose and lipids levels , carbohydrate metabolism enzymes and β - cells in type 2 diabetic rats', Pharmaceutical Biology. Informa Healthcare USA, Inc, 0(0), p. 000. doi: 10.1080/13880209.2017.1279671.

Isnaini, N., & Ratnasari, R. (2018). Risk Factors Affect The Incidence of Diabetes Mellitus Type 2. Journal of Midwifery and Nursing Aisyiyah, 14(1), 59-68. DOI: https://doi.org/10.31101/jkk.550.

Ivanov, Dincheva, Badjakov, Petkova, Denev and Pavlov.(2018). GC-MS Analysis of Unpolar Fraction from Ficus Carica l.(fig) Leaves. International Food Research Journal 25(1): 282-286.

Bahjatun Nadrati*, Elisa Oktaviana, Zuliardi, Lalu Dedy Supriatna, Zurriyatun Toyyibah, Raden Aahmad Dedi Mardani
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Koopman, A. D., Rauh, S. P., van 't Riet, E., Groeneveld, L., Van Der Heijden, A. A., Elders, P. J., & Rutters, F. (2017). The association. https://doi.org/10.1177/0748730417713572

Krug, E. G. (2016). Trends in diabetes: sounding the alarm. The Lancet, 387(10027), 1485-1486. DOI:https://doi.org/10.1016/S0140-6736(16)30163-5

Kumari, M., Head, J., & Marmot, M. (2004). Prospective study of social and other risk factors for incidence of type 2 diabetes in the Whitehall II study. Archives of internal medicine, 164(17), 1873-1880.doi:10.1001/archinte.164.17.1873

Nadrati, B., Hajri, Z., & Suharti, S. (2019). Description of the value of ankle brachial index (abi) in dm type 2 personnel at Public Health Center Gunungsari Lombok Barat. Journal of Holistic Health, 13(2), 128-135. DOI: https://doi.org/10.33024/hjk.v13i2.1392

Ozougwu, J. C., Obimba, K. C., Belonwu, C. D., & Unakalamba, C. B. (2013). The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. Journal of physiology and pathophysiology, 4(4), 46-57. DOI 10.5897/JPAP2013.0001

Snow, V., Aronson, M. D., Hornbake, E. R., Mottur-Pilson, C., & Weiss, K. B. (2004). Lipid control in the management of diabetes mellitus type 2: a clinical practice guideline from the American College of Physicians. Annals of internal medicine, 140(8), 644-649. https://doi.org/10.7326/0003-4819-140-8-200404200-00012.

Trifunschi, S. I., Munteanu, M. F. F., Ardelean, D. G., Orodan, M., Osser, G. M., & Gligor, R. I. (2015). Flavonoids and polyphenols content and antioxidant activity of Ficus carica L. extracts from Romania. Zbornik Matice srpske za prirodne nauke, (128), 57-65. https://doi.org/10.2298/ZMSPN1528057T.

Wendling, S., & Beadle, V. (2015). The relationship between self-efficacy and diabetic foot self-care. Journal of Clinical & Translational Endocrinology, 2(1), 37-41. https://doi.org/10.1016/j.jcte.2015.01.001.

Yilmaz, M. I., Carrero, J. J., Martín-Ventura, J. L., Sonmez, A., Saglam, M., Celik, T., & Egido, J. (2010). Combined therapy with renin-angiotensin system and calcium channel blockers in diabetic hypertensive patients type 2 with proteinuria: effects on soluble TWEAK, PTX3, and flow-mediated dilation. Clinical journal of the American Society of Nephrology, 5(7), 1174-1181. DOI:https://doi.org/10.2215/CJN.01110210.

Yuliani, F., Oenzil, F., & Iryani, D. (2014). The Relationship of Various Risk Factors to The Insidence of Coronary Heart Disease in Patience with Diabetes Mellitus type 2. Journal of Andalas Health, 3(1). DOI: https://doi.org/10.25077/jka.v3i1.22.

Zaitseva, O., Khudyakov, A., Sergushkina, M., Solomina, O., & Polezhaeva, T. (2020). Pectins as a universal medicine. Fitoterapia, 104676. https://doi.org/10.1016/j.fitote.2020.104676.

Zakaria, A., Yahya, Z., & Nurmayunita, H. (2019). Effect of Giving Fig Leaves Tea on Blood Sugar Levels in Patients with Diabetes Mellitus. Journal of Health Scientific, 7(2), 357-365. DOI:https://doi.org/10.32831/jik.v7i2.215

Zega, V. L., Wowor, P. M., & Mambo, C. (2016). Test of Several Doses of Noni Fruit Steeping Water (Morinda citrifolia l.) on Blood Glucose Levels in Alloxan-induced Wistar Mouse (Rattus norvegicus). E-Biomedic, 4(2). DOI: https://doi.org/10.35790/ebm.4.2.2016.14646.

Zhang, Y., Chen, J., Zeng, Y., Huang, D., & Xu, Q. (2019). Involvement of AMPK activation in the inhibition of hepatic gluconeogenesis by Ficus carica leaf extract in diabetic mice and HepG2 cells. Biomedicine & Pharmacotherapy, 109, 188-194.

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