Laura Wihanto

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THE EFFECT OF DRY RED JUJUBE FRUIT EXTRACT ON RATE ALKALINE PHOSPHATASE INDUCED WISTAR RATS ACETAMINOPHEN

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ABSTRACT

Introduction: Many things can cause hepatotoxicity, including the use of chemicals such as acetaminophen consumed in toxic doses. Acetaminophen destroyed can damage liver tissue, block the biliary tract and end the release of ALP into the blood. Jujube fruit has antioxidants like flavonoids and phenolic, which can ward off free radicals due to excessive consumption of acetaminophen.

Purpose: Knowing how giving dried red jujube fruit extract affects ALP levels of induced Wistar rats acetaminophen.

Method: The method used is Posttest-Only Control Group Design. The technique used in examining ALP levels is using a colorimetric test essay which refers to the International Federation of Clinical Chemistry and Laboratory Medicine. The experimental animals used were Wistar rats which were given dried red jujube fruit extract doses of 70, 140, and 280 mg/kg BW for ten days. On the 9th day, the rats have induced with an acetaminophen dose of 3 g/kg BW, and on the 11th day, termination was carried out to examine ALP levels in the blood.

Results: In this study, the normality test was generally distributed with a value of K(-) = 0.086, K(+) = 0.600, Kp1 = 0.156, Kp2 = 0.074, and Kp3 = 0.446. In the homogeneity test, the value of p = 0.0254 was obtained. On testone-way ANOVA, significant results were obtained with a p = 0.00. In the correlation test, a matter of 0.00 was obtained, which means a relationship exists between dried red jujube fruit extract and ALP levels.

Conclusion: Giving dried red jujube fruit extract has an effect on ALP levels in induced rats' acetaminophen toxic dose.

Keywords: Dried red jujube fruit, acetaminophen, alkaline phosphatase

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INTRODUCTION

The liver is the heaviest organ in the human body and a vital organ in the human body. Various factors can trigger damage to the liver. One of the factors that trigger damage to the liver is chemical factors such as acetaminophen in high doses and the anti-tuberculosis drug CCL4. Liver damage that lasts for a long time will trigger liver cirrhosis, characterized by fibrosis in the liver[1,2]. Acetaminophen metabolized in the liver in therapeutic doses is converted via glucuronidation and sulfation pathways. Liver damage due to acetaminophen primarily due to metabolic activity cytochrome P450, which will produce reactive metabolites such as NAPQI. NAPQI can be conjugated with glutathione and converts NAPQI to harmless metabolites. This causes a deficiency of glutathione and causes oxidative stress resulting in liver cell damage and necrosis in the liver. Cell damage can cause inflammation to fibrosis in the liver[3]. This process causes narrowing/blockage of the lumen of the biliary duct, and ALP will be released into the blood. Elevated ALP levels in the blood may indicate obstruction of the bile ducts and other diseases such as cholestasis, drug-induced liver damage, sclerosing cholangitis[6.] Fruit Ziziphus jujube, commonly referred to as Chinese dates or red dates, has many benefits for the body. One of the benefits of hepatoprotection is related to the bioactive components in jujube fruit, namely compounds phenolic and flavonoid. Compounds Phenolic and flavonoid jujube fruit have benefits as an antioxidant. Fresh jujube fruit in China has a relatively high flavonoid and phenolic content compared to dry ones[4,5]. Based on the description above, the researcher wants to research the effect of giving dried red jujube fruit extract on levels of alkaline phosphatase induced Wistar rats acetaminophen.

METHOD

This experimental study has five groups, two control, and three treatment groups. The research was conducted using the method Post-test Only Controlled Group Design with the sampling technique is random sampling. Each group of m ice consisted of 6 rats. The research population tested was Wistar strain male rats, aged 10-12 weeks, weighing 150-200 grams.Treatmentsinclude: K(+)is given acetaminophen 3 g/kg BW and 1% CMC Na, and K(-) is given 1% CMC Na. At Kp1, Kp2, Kp3, 70, 140, and 280 mg/kg BW of jujube fruit extract were given. The experimental animals in this study went through a 7-day adaptation period and were given dried red jujube fruit extract for ten days, and on the 9th day, they were given acetaminophen. On the 11th day, the rats were first anesthetized using ketamine, and then terminated to take blood samples through the heart, and ALP levels were examined. Determination of ALP levels using the test method colorimetric essay refers to the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) with units of IU/L using a measuring device Analyzer Automatic COBAS 400 Plus.

RESULTS

Table 1 The average ALP levels of Wistar rats in the blood after being given treatment

	K (-) IU/L	K (+) IU/L	Kp1 IU/L	Kp2 IU/L	Kp3 IU/L
1.	394.2	401.2	337.3	249.1	255.8
2.	335.2	387	349	328.5	289.3
3.	352.7	546.3	292.1	251.9	209.2
4.	192.1	469.3	292	250.4	264.2
5.	384.2	475.6	332	297.2	271.1
Rerata ± SD	331.68 ± 81.553	455.58 ± 64.185	320.48 ± 26.671	275.42 ± 35.929	257.92 ± 29.8998

Based on the results of examining the ALP levels of the Wistar rats (table 1), the average K(-) was 331.68, K(+) was 455.58, Kp1 was 320.48, Kp2 was 275.42, Kp3 was 257.92.

Table 2 Test for normality of ALP levels in Wistar rats

Variable	Group	Significance
ALP	K (-)	.086
	K (+)	.600
	Kp1	.156
	Kp2	.074
	Kp3	.446

Based on the results of the normality test (table 2) it shows that K(-): 0.086, K(+): 0.600, Kp1: 0.156, Kp2: 0.074, and Kp3: 0.446, which means ALP levels are normally distributed.

Table 3 Test for homogeneity of ALP levels in Wistar rats

Variable	Significance
ALP	0.254

The results of the homogeneity test in this study (Table 3) obtained data with a homogeneous distribution with a value of 0.254 (p> 0.05).

Table 4 Test results One Way Anova, which was carried out on the ALP levels of Wistar rats

Variable	Test Analysis	Score p (< 0.05)	Significance
ALP	One Way Anova	0.00	Significant

The results of the ANOVA test (Table 4) in this study obtained a significant value with a value of 0.00 (p <0.05).

Test results after Theseus Least Significant Difference The groups that have significant differences in Table 5 are K(-): K(+), K(-): Kp3, K(+): K(-), K(+): Kp1, K(+): Kp2, K(+): Kp3, Kp1: K(+), Kp2: K(+), Kp3: K(-), Kp3: K(+).

Table 5 Test results Post Hoc (Least Significant Difference) on ALP levels of Wistar rats after treatment

Comparison Group	Groups being compared	Score p (< 0.05)	Significance
K (-)	K (+)	.001	Significant
	Kp1	.738	Not significant
	Kp2	.104	Not significant
	Kp3	.037	Significant
K (+)	K (-)	.001	Significant
	Kp 1	.001	Significant
	Kp 2	.000	Significant
	Kp 3	.000	Significant
Kp 1	K (-)	.738	Not significant
	K (+)	.001	Significant
	Kp 2	.188	Not significant
	Kp 3	.073	Not significant
Kp 2	K (-)	.104	Not significant
	K (+)	.000	Significant
	Kp 1	.188	Not significant
	Kp 3	.602	Not significant

Kp 3	K (-)	.037	Significant
	K (+)	.000	Significant
	Kp 1	.073	Not significant
	Kp 2	.602	Not significant

In the correlation test (table 6), a significant value was obtained (2-tailed) 0.00 with a
value p <0.05, which means there is a substantial relationship between the dose of dried red jujube fruit extract and the ALP levels of the Wistar rats. The correlation strength test (table 6) shows a value of -0.829. The negative correlation strength test value indicated that the relationship between the dose of dried red jujube fruit extract and the ALP levels of the Wistar rats was inversely proportional, meaning that the higher the dose of dried red jujube fruit extract, the lower the ALP level in the blood.

Table 6 Correlation Test Results for ALP Levels in Wistar Rats

Variable	Correlation Test	Significance (2-tailed)	Pearson Correlation
Dosage of Dried red Jujube fruit and ALP Levels	Pearson	0.00	-0.829

DISCUSSION

Based on the results of the research conducted showed significant differences between the K(-) group and the K(+) group (table 5), which means acetaminophen, a dose of 3 g/kg BW can increase ALP levels in the blood of Wistar rats. The toxic dose given to the mice causes the glucuronide and sulfate pathways to become saturated and boosted acetaminophen metabolized in the oxidation pathway by CYP450 enzymes. CYP450 metabolism results in acetaminophen, a reactive metabolite in NAPQI. High NAPQI production in the body will deplete GSH, resulting in an inability to detoxify a large amount of NAPQI production. NAPQI can interact with target organs because it has electrophile (electron deficient) properties. NAPQI, which cannot be neutralized, will form covalent bonds with hepatic mitochondria and produce ROS, free radicals. ROS causes lipid peroxidase[10,11,12]. Lipid peroxidase occurs because ROS damage the fatty compounds in the cell membrane. After all, the cell membrane is rich in Polly Unsaturated Fatty Acid (PUFAs). Lipid peroxidase causes damage to the cell membrane structure, which ends in hepatic cell necrosis[13].

Oxidative stress that occurs in the body causes inflammation in the liver cells[16,17]. One of the acute responses of inflammation is edema caused by fluid and plasma protein exudation. Increased vascular permeability results in a high-protein fluid flow and blood cells migrating into extracellular tissues. This process can cause the osmotic pressure of the interstitial fluid to improve and cause more water to escape from the blood into the tissues[13]. The resulting edema blocks the lumen of the bile duct and causes ALP to be released into the blood.

In this study, ALP levels in treatment groups 1, 2, and 3 were lower than in the K(+) group (table 5), indicating that dried red jujube fruit extract could protect the liver from damage caused by toxic doses of acetaminophen. This is because the dried red jujube fruit extraxt has bioactive compounds, flavonoids, dan phenolic, as antioxidants. Flavonoid and phenolic function as anantioxidant because they can inhibit ROS formation. Antioxidants inhibit the formation of ROS by reacting by complementing the electron deficiency possessed by ROS so that ROS becomes relatively more stable and less reactive.[14,15].

Flavonoids and phenolics, which interact with free radicals, can inhibit the damage caused by free radicals. This process can

reduce the inflammatory reaction due to oxidative stress. The reduced inflammatory response will prevent the formation of swelling edema as a sign of inflammation. This process causes ALP levels in the blood not to increase.[12]

CONCLUSION

There is an effect of giving dried red jujube fruit extract doses of 70, 140, 280 mg on ALP levels of induced Wistar rats acetaminophen high dosage.

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REFERENCES

1. Paniagua, A. C., Amariles, P. Hepatotoxicity by Drugs. In: Malangu, N., editor. Pharmacokinetics and Adverse Effects of Drugs – Mechanisms and Risks Factors [Internet]. London: IntechOpen; 2017 [disitasi 2022 Mar 03]. Diunduh dari: https://www.intechopen.com/chapters/578 09
2. Sharma B, John S.Hepatic Cirrhosis in Treasure Island (FL); 2022. Stat Pearls Publ; 2021 Jan [Disitasi 2022 Mar 03]. Diunduh dari: https://www.ncbi.nlm.nih.gov/books.NBK482419/
3. Rotundo L, Pyrsopoulos N. Liver Injury Induced by Paracetamol and Challenges Associated with Intentional and Unintentional use ORCID Number. World J Hepatol [Internet]. 2020 Dec. Diunduh dari : https://doi.org/10.1038/s41598-022-06313-5
4. Wang C, Cao J, Jiang W. Effect of the Drying Method on Browning of Flesh, Antioxidant Compounds and Antioxidant Capacity of Chinese jujube (Zizyphus jujube Mill.) fruit. Curr Top Nutraceutical Res. 2016 [Disitasi 2022 Mar 06];14:161–9. Diunduh dari: https://xueshu.baidu.com/user center/paper/show?paperid=eb1a26 1a59f51c 71bb943a2d8fd66e91
5. Huang W, Wang Y, Jiang X, Sun Y, et. al. Protective Effect of *Flavonoid*s from Ziziphus jujuba cv. Jinsixiaozao against *Acetaminophen*-Induced Liver Injury by Inhibiting Oxidative Stress and Inflammation
6. Lowe D, Sanvictores T, John S. Alkaline Phosphatase. [Updated 2021 Aug 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan [Disitasi 2022 Mar 07]. Diunduh dari: https://www.ncbi.nlm.nih.gov/books/ NBK459201/
7. Lienardi AR, Suwasanti N, Dewi D AL. African Bitter Leaf Extract Effect on Epithelium Thickness of Seminiferous Tubules in Wistar Rats With Diabetes Mellitus. J Widya Med Jr. 2021;3(4):230–6.
8. Min Yan, Yan Wang, Ritesh Balaso Watharkar, et.al. Physicochemical and antioxidant activity of fruit harvested from eight jujube (*Ziziphus jujuba Mill.*) cultivars at different development stages. Scientific Reports.2022. diakses dari : https://www.nature.com/articles/s41598-022-06313-5#auth-Min-Yan

9. Ayad R, Akkal S. Chapter 12-Phytochemistry and Biological Activites of Algerian Centaurea and Related Genera. Elsevier; 2019. P357-414. Diunduh dari : https://www.sciencedirect.com/science/article/pji/B9780128179017000125
10. Miguel-Chávez,R.Phenolic Antioxidant Capacity: A Review of the State of the Art. In: Soto-Hernandez, M., Palma-Tenango, M., Garcia-Mateos, M.d.R., editors. Phenolic Compounds – Biological Activity [Internet]. London: IntechOpen; 2017 [disitasi 2022 Mei 02].Diunduh dari: https://www.intechopen.com/chapters/53658 doi:10.5772/668 97
11. National Center for Biotechnology Information. PubChem Compound Summary for CID 12205925, Paracetamol-d4. (2022). [disitasi 2022 April 25] Diunduh dari: https://pubchem.ncbi.nlm.nih.gov/com pound/Paraceta mol-d4
12. Katzung B.G.(Ed.). *Basic & Clinical Pharmacology*, 14e. McGraw Hill.;2018.64- 65p.
13. Brunton L.L., Hilal-Dandan R, & Knollmann B.C.*Goodman & Gilman's: The Pharmacological Basis of Therapeutics*, 13e. McGraw Hill; 2017. 69, 696 p.
14. Kumar, Abbas., Abul K, Aster, Jon C, et al. Buku ajar pathology Robbins. 2019. 43-44 p.
15. Robert J Nijveldt, Els van Nood, Danny EC van Hoorn, et al., *Flavonoid*s: A Review of Probable Mechanisms of Action and Potential Applications, The American Journal of Clinical Nutrition. 2001 October. [Disitasi 2022 November 02]. Volume 74, Issue 4, Pages 418–425. Diunduh dari: https://doi.org/10.1093/ajcn/74.4.418
16. Mutha, R.E., Tatiya, A.U. & Surana, S.J. *Flavonoid*s as Natural Phenolic Compounds and Their Role in Therapeutics: an Overview. 2021. [Disitasi 2022 November 02]. Diunduh dari: https://doi.org/10.1186/s43094-020-00161-8
17. Hussain T, Tan B, Yin Y, et al. Oxidative Stress and Inflammation: What Polyphenols Can Do for Us? Rupasinghe V, editor. Oxid Med Cell Longev [Internet]. 2016 [Disitasi 2022 November 24]: 2016:7432797. Diunduh dari: https://doi.org/10.1155/2016/7432797
18. Parsian, H., Nouri, M., Rahimipour, A., et al., Comparison of Five Liver Fibrosis Indexes with Serum Levels of Laminin and N Terminal Peptide of Procollagen Type III in Chronic Hepatitis Patients. In: Takahashi, H., editor.LiverBiopsy[Internet]. London: IntechOpen; 2011 [Disitasi 2022 November 24]. Diunduh dari: https://www.intechopen.com/chapters/18785 doi: 10.5772/21784