

Supplementation of Red Fruit (*Pandanus Conoideus*) Extract Improved Lipid Profile, Decreased Concentration of F2 Isoprostane and Bodyweight in Male Wistar Strain (*Rattus Norvegicus*) Rats Given High-Fat Diet

Kadek Anggun Dewi Laksmi¹, I Wayan Weta^{1,2}, AAG. Budhiarta^{1,3}

¹Biomedical Masters Study Program, Faculty of Medicine, Udayana University, Denpasar, Bali, 80114, Indonesia

²Department of Clinical Nutritional, Faculty of Medicine, Udayana University, Denpasar, Bali, 80114, Indonesia

³Department of Internal Medicine, Faculty of Medicine, Udayana University, Denpasar, Bali, 80114, Indonesia

Corresponding Author: I Wayan Weta

DOI: <https://doi.org/10.52403/ijrr.20220875>

ABSTRACT

Backgrounds: Red fruit plant (*Pandanus conoideus*) that grows in eastern Indonesia, has the strong antioxidant properties, such as flavonoids, tannins, beta-carotene, vitamin C, and vitamin E. Study objectives to prove the antioxidant effect of red fruit extract inhibit dyslipidemia, the F2 Isoprostane concentration, the weight gain in animal with high lipid diet.

Methods: The pre and posttest control group design experiment study was conducted on male Wistar rats. The subject was divided randomly into two groups. Both groups were administrated with high fat diet. The control group was blinded with 1 mL aquadestylates, and the treatment group, which was treated with 168 mg red fruit extract in 1 mL for 30 days. Dependent variables; lipid profile, levels of F2 isoprostane, and bodyweight were measured before and after intervention.

Results: We found the improvement of lipid profile in the treatment group; decreased of LDL cholesterol ($p<0.001$), triglycerides ($p<0.001$), total cholesterol ($p<0.001$), and increased HDL cholesterol ($p<0.001$). Other wised there was no change of lipid profile in the control group. F2 Isoprostane was also decreased ($p<0.001$) in the treatment group, but not in the control group. The bodyweight was decreased in the treatment group

($p<0.001$), but in contrary increased in the control group ($p<0.001$).

Conclusion: Supplementation of red fruit extract (*Pandanus conoideus*) significantly improved the lipid profile, decreased levels of F2 isoprostane, as well as bodyweight on male Wistar strain (*Rattus norvegicus*) rats that was administrated with a high-fat diet

Keywords: antioxidant, red fruit extract, lipid profile, F2 Isoprostane, body weight

INTRODUCTION

Now a days people tend to consume a high fat and high cholesterol diets, it usually comes from fast-food, junk food or street food. Unhealthy fat accumulation in adipose tissue release some mediator adipokines to induce the oxidative process in the body. These unhealthy food lead many serious diseases like obese, dyslipidemia, hypertension, stroke, and CHD.

According to The Ministry of Health (2014), in Indonesia, stroke is the highest cause of death for all ages, followed by CHD.[1] Healthy diet is the key to prevents and control those diseases. WHO has recommended to limits daily the total fat

consumption less than 30% and saturated fat to less than 10% of total energy.[2]

An existing of red fruit (*Pandanus conoideus*) a herbal plant grows in eastern Indonesia is often used as traditional healer. This fruit is exclusively found in province Papua and West Papua. People who mainly live in Wamena call this fruit as *kuanus* [3].The fruit is 68-110 cm long, with 10-15 cm in diameter, red colour, and contains oil. The juice from red fruit is generally taken from the fruit's flesh, and people usually use as a source of nutrition and alternative medicine for various types of diseases, for example, diabetis, dyslipidemia, deworming medicine, malaria medicine, and even cancer cell inhibitors [4].

This fruit is known because there are high levels of antioxidants such as flavonoids, tannins, vitamin C, and beta-carotene. Sriwiyanti (2021) reported regarding the effect of red fruit extract on male (*Rattus norvegicus*) rats with dyslipidemia, has been shown improved the blood lipid profile.[3] Based on the red fruit was reported as a good source of antioxidants, our study's objectives to prove supplementation of red fruit extract in control the lipid profile, oxidative process using F2 isoprostane parameter, and body weight of male Wistar strain (*Rattus norvegicus*) rats, which be administrated with a high-fat diet.

METHOD

An experimental pre and post-test control group design, conducted on 30 male Wistar strain (*Rattus norvegicus*) age 2-3 months, bodyweight 200-250 grams and healthy. The research was held at the Integrated Biomedical Laboratory, Faculty of Medicine, Udayana University, Denpasar, Bali, for 17 weeks.

The subjects were divided randomly into two groups, namely the control and the treatment group. Both groups were exposed with a high-fat diet. The control group was administrated with placebo (1 mL aquabidestylates), other wised the treatment group treated with red fruit extract 168 mg(1mL) per day using a gastric probe.

Intervention have conducted for 30 days. The dependent variables namely body weight, concentration of blood lipid parameter dan F2 isoprostan were measured.

The study protocol was approved by Research Ethics Committee from the Faculty of Veterinary Medicine, Udayana University, with ethical clearance Number: B//14/UN14.2.9/PT.01.04/2022.

RESULT

The study was conducted on 30 subjects, but one subject of the treatment group has passed away in the intervention period. So, the total 29 subject, with the control group had 15 rats, while the treatment group had 14 rats, those were eligible analyzed.

Table 1. The Comparison of the lipid profile, concentration of F2 isoprostane, and bodyweight in rats before and after administration of a high-fat diet and red fruit extract in the control and treatment groups

Variable	Control (n=15)	Treatment (n=14)	P ^b
	(mean ±SD)	(mean ±SD)	
Total cholesterol (mg/dL)			
Before	223±10.6	223±6.21	0.336
After	226±7.16	196±7.26	<0.001
p^a	0.965	<0.001	
LDL cholesterol (mg/dL)			
Before	140±8.29	140±6.06	0.996
After	140±8.97	111±2.02	<0.001
p^a	0.972	<0.001	
HDL cholesterol (mg/dL)			
Before	48.8±2.00	48.3±0.74	0.337
After	47.3±1.88	53.1±1.58	<0.001
p^a	0.077	<0.001	
Triglycerides (mg/dL)			
Before	175±9.82	176±4.25	0.925
After	193±3.86	162±3.13	<0.001
p^a	<0.001	<0.001	
F2 Isoprostane (mg/dL)			
Before	10.7±0.39	10.6±0.51	0.753
After	10.6±0.37	4.50±0.34	<0.001
p^a	0.560	<0.001	
Bodyweight (grams)			
Before	224±22	225±12.5	0.916
After	254±37	192±16.8	<0.001
p^a	<0.001	<0.001	

^a using Paired t-test; ^b using independent t-test

There were no different of lipid profile (total cholesterol (p=0.336), LDL cholesterol (p=0.996), HDL cholesterol (p=0.337), triglyceride (p=0.925), F2 isoprostan (p=0.753), and body weight between the control and the treatment group before the intervention.

The study results show in the treatment group there were significant decreased of blood

total cholesterol ($p < 0.001$), LDL cholesterol ($p < 0.001$), triglyceride ($p < 0.001$), and increased HDL cholesterol ($p < 0.001$), as well as decreased of F2 isoprostane ($p < 0.001$), after exposed with high fat diet and treated with red fruit extract. Other wise, did not change of those parameter in the control group after 30 days exposed with high fat diet. Body weight of the treatment group was decreased ($p < 0.001$) after red fruit extract supplementation, but in contrary body weight of the control group was increased ($p < 0.001$), significantly.

After intervention in the treatment group the concentration of blood total cholesterol, LDL cholesterol and triglyceride were lower than the control group. The blood HDL cholesterol was also significant higher in the treatment group compared to the control group. The F2 isoprostane concentration were also lower in the treatment group compared to the control group. Body weight post intervention also significant lower in the treatment group than the control group

DISCUSSION

The red fruit extract is effective to improve the lipid profile, control the oxidative stress, and reduce body weight in rats feeding with high fat diet. This fact mean that the extract has a high potential and benefit in prevent and treatment obesity and its clinical implication, due to the high fat diet.

Some studies reported the in line with our results. The effectiveness of supplementation between studies are still various seemly according to the doses of red fruit extract administrated, animal model and its precondition, and duration of intervention. Sanchez et al (2022), reported intervention 14 days of the enzymatical extract of red fruit oil with the optimum dose (1199,25mg/kg body weight rat) effective in decreasing total cholesterol, triglyceride, LDL cholesterol, as well as increasing HDL cholesterol.[5] Those facts impact to decreased atherogenic index, coronary risk index. Wijayanti (2008), reported supplementation for 24 days of 30 mL red fruit extract not significant decreased total cholesterol in white rats (strain Sprague

dawley) without alloxan induced, however the dose 45 mL decreased this lipid in diabetic induced alloxan rats, effectively.[6] Rohmawati and Wuryaningsih (2015), reported supplementation 0.12 mL/dy red fruit oil (*Pandanus conoideus* oil) reduced of total cholesterol content of rat (*Rattus norvegicus* strain wistar) with atherogenic diet.[7] Agnesa et al (2017) published supplementing 0.12 mL red fruit extract for 21 days effective decreasing LDL cholesterol in male white rats (*rattus norvegicus* L).[8] This evidence is also supported by the Indonesian basic health research [9], reported that the morbidity of several disease such as obesity (25,8%), dyslipidemias (17%), hypertension (22%), and CHD (24%) in West Papua province with peoples usually consume red fruit as their daily food, were relatively lower than the national average. The people in Papua often use the red fruit as a pasta, the food colouring, a fresh fruit or consume with rice.

Based on some animals' studies, it is needed forward prove in human research, to meet an appropriate formulation of red fruit, to improve lipid profile, to control oxidative stress and maintain healthy weight. We hope for the next future there will a herbal or food functional come from this natural resource, to improve human health and wellbeing. Now day red fruit still grows in wild forest, next we also hope could be agriculture with modern plantation.

CONCLUSION

The supplementation of red fruit extract (*Pandanus conoideus*) significantly improved the lipid profile, decreased the concentration of F2 isoprostane as well as bodyweight of male Wistar strain (*Rattus norvegicus*) rats feeding with a high-fat diet

Competing interests: No competing interests were disclosed.

Acknowledgments: declared none.

Conflict of interest: The authors declare no conflict of interest, financial or otherwise.

Source of Funding: None

REFERENCES

1. The Ministry of Health. Epidemiology stroke in Indonesia. 2014. [Online] available from: <https://kemkes.go.id/index.php?lg=ln02>. [Accessed on 11 Mey, 2022]
2. Grundy, S. M., Stone, N. J., Bailey, A. L., Beam, C., Birtcher, K. K., Blumenthal, R. S., Braun, L. T., De Ferranti, S., Faiella-Tommasino, J., Forman, D. E., dan Goldberg. Guideline on the management of blood cholesterol: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of The American College of Cardiology*. 2018. 73(24), pp.3168-3209.
3. Sriwiyanti. "Ekstrak Buah Merah (*Pandanus conoideus lam*) Memperbaiki Profil Lipid Tikus (*Rattus norvegicus*) Wistar Jantan Dislipidemia" (tesis). Denpasar: Universitas Udayana. 2018.
4. Heryani, R. Pengaruh Ekstrak Buah Naga Merah terhadap Profil Lipid Darah Tikus Putih Hiperlipidemia. *Jurnal IPTEKS Terapan*. 2016. 16(2): 68-77.
5. Sanchezy I, Martono Y. Soetjipto H. Ekstrak Enzimatis Minyak Buah Merah (*Pandanus conoideus LAM.*) Sebagai Antikolestrol Terhadap Mencit Putih Jantan Galur Wistar. *Tugas Akhir*. Fakultas Sains Dan Matematika Uneversitas Kristen Staya Wacana, Salatiga. 2022.
6. Wijayanti M. 2008. Pengaruh Ekstrak Buah Merah (*Pandanus Conoidus Lam*) Terhadap Kadar Kolesterol Total Darah. *Tugas Akhir*. Fakultas Kedokteran Universitas Yogyakarta. [Online] available from: <https://etd.umy.ac.id/id/eprint/31008/> [Accessed on 11 Mey, 2022]
7. Rohmawati, N., dan Wuryaningsih, E. M. Pengaruh Pemberian Minyak Buah Merah (*Pandanus conoideus oil*) Terhadap Kadar Kolesterol Total Tikus (*Rattus norvegicus*) Dengan Diet Aterogenik. *Jurnal Ikesma*. 2009. Vol 5 no. 2: 93-106.
8. Agnesa, O.S., Waluyo, J., Prihatin, J., dan Lestari, S.R. 2017. Potensi Buah Merah (*Pandanus conoideus lam.*) Dalam Menurunkan Kadar LDL Darah Tikus Putih. *Jurnal Biokspersimen*. 3(1): 48-56.
9. Riskedas. 2018. *Laporan nasional riset kesehatan dasar*. [Online] available from: <https://www.kemkes.go.id/article/view/19051700002/hipertensi-penyakit-paling-banyak-diidap-masyarakat.html> [Accessed on 11 Mey, 2022]

How to cite this article: Kadek Anggun Dewi Laksmi, I Wayan Weta, AAG. Budhiarta. Supplementation of red fruit (*Pandanus Conoideus*) extract improved lipid profile, decreased concentration of F2 Isoprostane and bodyweight in male Wistar strain (*Rattus Norvegicus*) rats given high-fat diet. *International Journal of Research and Review*. 2022; 9(8): 868-871. DOI: <https://doi.org/10.52403/ijrr.20220875>
