

SFRN 2019

Security in
food,
renewable
resources,
and
natural
medicines



PROCEEDING

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**3rd INTERNATIONAL CONFER-
ENCE ON SECURITY IN FOOD,
RENEWABLE RESOURCES, AND
NATURAL MEDICINES 2019
(SFRN 2019)**



hosted by,
Politeknik Pertanian
Negeri Payakumbuh



co-Hosted by,
Universitas Andalas
(UNAND)

Convention Hall Politeknik Pertanian Negeri Payakumbuh
INDONESIA

QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF SUSTAINABLE DE- VELOPMENTS GOALS (SDGS)

September 25-26, 2019



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Theme:
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SUSTAINABLE DEVELOPMENTS GOALS (SDGS)”**

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Welcome Message
**Executive Chairman of The 3rd International Conference on Security in Food,
Renewable resources, and Natural Medicines (SFRN) 2019**



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikum wr.wb

On behalf of the SFRN 2019 organizing committee, I am really honoured and delighted to welcome all of you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the State Polytechnic of Agriculture Payakumbuh, West Sumatra Indonesia

Our technical program is rich and varied with 8 keynote speeches and 4 invited talks and more than 170 technical papers split between 8 parallel oral sessions and 1 poster sessions. The speakers and participants came from 8 different countries, consist of Academicians, Scientists, Researchers, Practitioners, Professionals, and Government Officials in multidiscipline branch of knowledge, who gathered here today to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and HealthCare Free for All, in particular for those who in needs. As the chairman of conference 2019 SFRN, I know that the success of the conference depends ultimately on the how many people who have worked in planning and organizing both the technical program and supporting social arrangements. This year, the conference is jointly organized by the Payakumbuh State Agricultural Polytechnic and Andalas University. We also thank to the steering committee for their wise and brilliant advice on organizing the technical program; and also to the the Program Committee, both from the Payakumbuh State Agricultural Polytechnic and Andalas University, for their thorough and timely reviewing of the papers and to the Director of Payakumbuh State Agricultural Polytechnic and the rector of Andalas University, and the Head of the Institute for Research and Community Service of Andalas University, and Payakumbuh State Agricultural Polytechnic. Our recognition should go to the Organizing Committee members who have all worked really hard for the details of the important aspects of the conference programs and social activities, and then we extend our gratitude to our students who bore the arduous burden for preparing this event.

We hope this event is also a good step in gaining strengthened cooperation between our universities as we know that the State Agricultural Polytechnic of Payakumbuh is part of the Andalas University previously, of course the psychological relationship between the State Agricultural Polytechnic and the Andalas University is really close.

Finally on behalf of the committee, we apologize profusely for all the shortcomings and everything that is not properly in organizing this event and hopefully AES-Network contributes significantly to the research and technology for the good of humanity.

Thank you

Fithra Herdian, S.TP, MP

**Message from Afro-Eurasia Scientific (AES) Network
3rd International Conference on Security in Food, Renewable resources, and
Natural Medicines (SFRN) 2019**



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

On behalf of the AES Network, I am honored and delighted to welcome you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the Agricultural State Poly Technique of Payakumbuh, Indonesia. I believe we have chosen a venue that guarantees a successful technical conference amid the culture, delicacy and scenery of Payakumbuh, the city of "Rendang".

The AES-Network aims to Promote Livelihood Through Food Security, Promote Future Smart and Green Mobility by Using Renewable Energy, Promote Prosperity by Equally Managing and Distributing the Sustainable Resources and Promoting Enjoyable Long-Life by using Natural Medicines With Free Health Care For All. The AES-Network was established in 2018 and already have memberships from 12 countries. Our members consist of Academicians, Scientists, Researchers, practitioners, professionals, and government officials from multidiscipline branch of knowledge, who gathered and contributed their expertise to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In particular, the network aims to alleviate the condition of those who in dire needs. In the future, we also expect to provide technical demonstrations, and numerous opportunities for informal networking for Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In this opportunity, we invited you to become our members and join our efforts for a better life to all of mankind.

As a team, we acknowledge the existence of mutual interest among university and college educators, researchers, activists, business sector, entrepreneurs, policy

makers, and all society members. We must promote the need to strengthen cooperation for establishing Security in Food, Renewable Resources, and Natural Medicines in Africa, Europe, and Asia.

The AES-Network believe, a firm foundation for mutual collaboration with the spirit of equality and partnership and thereby contribute towards sustainable development in these three regions.

Therefore, through networking, friendships, and joint efforts, the capacity of our network can be enhanced to address major challenges in securing the Food, Renewable Resources, and Natural Medicines in Africa, Europa, and Asia. Our Network goals are to increase the awareness of educators, researchers, scientific community, business sector, entrepreneurs, and policy makers in Africa, Europa, and Asia, that the future of a better world, lies within their responsibilities, and to improve the networking, mobility and mutual collaboration of scientific community, business sector, entrepreneurs, and policy makers in Africa, Europe, and Asia to energize the delivery of Sustainable Development Goals.

Finally, I hope that, by registering our network, you will be provided a common platform and support the exchange of knowledge, while at the same time, we offer constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrived at the best solutions to our terminal goal, Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care based on scientific evidence in Africa, Europa, and Asian region.

Thank You for Joining us!

President

Assoc. Prof. Dr. Eng. Muhammad Makky

Welcome Message
Head of Institute for Research and Community Service
Universitas Andalas



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

It is with great pleasure that I welcome the participants of the SFRN 2019 in Payakumbuh, the city of “Rendang”, the prime of Indonesian delicacy.

In this esteem event, we share the knowledges, and imparted it to the people. The quest for knowledge has been from the beginning of time but knowledge only becomes valuable when it is disseminated and applied to benefit humankind. It is hoped that this conference will become a platform to gather and disseminate the latest knowledge which can be adopted for securing the food, resources, and health for mankind, in Asian, European and African region.

Academics, Scientists, Researchers and practitioners from multidiscipline branch of knowledge who gathered here today will be able to share and discuss new findings and applications of innovations for ensuring food security, in particular for those who reside in developing countries. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on environmental and sustainability. Therefore, we urge to all participants, to establish a scientific network that will voice the needs

Researchers in the multi sectoral aspects related to the benefit of mankind have been progressing worldwide. Food is a basic right, while energy drive the world. Human need a lot of resources so the civilization can be flourished. But human is not immune, and thus, ones need to take care of their health regularly. Modern Agri-food systems is the foundations of a decent life, a sound education and the achievement of

the Sustainable Development Goals. Over the past decade, we have witnessed a chain reaction that threatens the very foundations of life for millions of the world's people. Rising energy prices drove up the cost of food and ate away the savings that people otherwise would have spent on health care or education. Unsustainable plantation management induced forest fire and posed haze hazard to the whole Sumatra island and our neighboring countries.

The human cost of the food and energy crisis has been enormous. Millions of families have been pushed into poverty and hunger. Thousands more suffering from the collateral effects. Over the past year, food insecurity led to political unrest in some 30 countries. Yet because the underlying problems persist, we will continue to experience such crises, again and again -- unless we act now. That is why we are here today.

We must make significant changes to feed ourselves, and most especially, to safeguard the poorest and most vulnerable. We must ensure safety nets for those who cannot afford food, or energy, nor even a health service. We must transform agricultural development, markets and how resources is distributed. We must do so based on a thorough understanding of the issues. That is the only possible way we can meet the Goals of Sustainable Development.

Thank You,

Assoc. Prof. Dr.-Ing. Uyung Gatot S. Dinata,MT.

**Opening Ceremony
Rector of Andalas University**



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

I welcome the opportunity to address you at this important event.

It gives me great pleasure in welcoming you to this 3rd Conference on "Security in Food, Renewable resources, and Natural Medicines (SFRN)" 2019. I am delighted that so many have accepted our invitation. I am particularly happy that we have in this room, dedicated individuals from so many stakeholder groups — including our most respected and distinguished guest “The ministry of Agriculture of the Republic of Indonesia”. We also welcome the mayor of Payakumbuh and the Regent of Lima Puluh Kota. We extend our welcome to the civil society, the private sector, international organizations; the science community; and others dedicated to help create an environment in which people can escape food insecurity. Imagine what we can do together if we make the security for all as an our top priority, and pull in the same direction. We can make a difference in the lives of millions.

Food is a basic right. Food security are the foundations of a decent life, a sound education and the achievement of the Sustainable Development Goals Access to medicines - a fundamental element of the right to health. Health is a fundamental human right, indispensable for the exercise of many other rights in particular the right to development, and necessary for living a life in dignity. Moreover, human rights principles and language are being used to support resource access claims as rights-based approaches empower individuals and groups to gain or maintain access to natural resources

Much progress has been made during the last decades but much more needs to be done. Millions of people are Insecure worldwide, meaning that they either starve or they do not know from where their next meal, health care or resources will come.

Much of the progress on security has occurred at the expense of our environment. With business as usual, we foresee that the production improvements during the next decade will be less than the last one, while the environmental degradation will continue, and health will deteriorate significantly. Without available resources to seek, mankind will become endanger species in a very short time.

Solutions to the security problems need to be designed and implemented within a new and rapidly changing environment. Globalization and sweeping technological changes offer new opportunities for solving these problems. A number driving forces or trends must be taken into account in developing appropriate action. Some of the action needed, such as appropriate technology for small farms, is not new but it must be cast in the new and changing global and national environment, taking into account new opportunities and risks. I hope that by providing a forum for knowledge exchange, this conference will help identify the action to be taken. Furthermore, this conference will help to provide constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrive at the best solutions.

In conclusion, even if those responsible give high priority to achieving sustainable security for all and back it up with action, the world may not achieve the goal by 2030. But we will be much closer than with business as usual. I urge all of us to provide the strongest support for this event, to enable securing the food for all in the closest time possible. It is my sincere optimism that through the accomplishment of the objectives of this event, we will come to an important step nearer to secure the food for all.

Finally, I would like to thank the organizing committee who have spent their utmost efforts to prepare and manage this event successfully. Let me conclude my remarks by wishing our guests happiness, good luck and great success in the conference.

May I announce now the opening of the “3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019” in Payakumbuh.

Thank you.

Rector,
Prof. Tafdil Husni, SE, MBA, PhD

Welcome Message
Director of Politeknik Pertanian Negeri Payakumbuh



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikumwr.wb

I congratulate to all participants on the invitation and participate at our beloved campus Payakumbuh State Agricultural Polytechnic. I feel really honoured to welcome all of you at our event, the 3rd International Conference on Security in Food, Renewable Resources, and Natural Medicines (SFRN) 2019 at the Payakumbuh State Agricultural Polytechnic, Indonesia.

Food security is a very important aspect in a country's sovereignty. Food also determines the future direction of a nation. Many social and political fluctuation can also occur if food security is disrupted. Food availability that is smaller than its needs can create economic instability. This critical food condition can even endanger economic and national stability. In the current situation, there are many challenges in exteriorize food security, such as climate change, population, limited natural resources and other challenges both locally, regionally and globally.

Renewable resources are also our starting point to start sustainable development. Research on renewable resources is also very important as the solution in meeting the principles of sustainable development. As we know that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is the foundation for today's leading global framework for international cooperation - the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)

The discovery of treatment based on local culture also contributes greatly to the good of humanity. Unfortunately, there are still many treatments that have not been carried out by scientific research. So, through this conference we hope it can be a trigger to increase in traditional plant-based treatments that not go through complex

chemical processes, so that the effectiveness of the pillars can be further suppressed and also contribute to the community's economy.

Finally, I would like to express my gratitude to all people who involved in organizing this event and to all of stakeholders who have helped to make this event go on successfully. Please accept my apologize for any shortage, Assalamu'alaikumwr.wb.

Thank you

Ir. Elvin Hasman, MP

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The Effect of Kawa Daun Gambir (*Uncaria gambir* Roxb.) on the Malondialdehyde (MDA) Level of Heart Alloxan Induced Hyperglycemia Mice

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² Undergraduate Program of Medical Faculty Andalas University; ³ Physics Department of Medical Faculty Andalas University

Abstract. Kawa Daun Gambir is steeping gambir leaves containing catechins, antioxidant compounds that can reduce free radical activity and reduce the progressivity of complications caused by oxidative stress. The objective of this study was to determine the effect of Kawa Daun Gambir on levels of malondialdehyde (MDA) in the heart of hyperglycemic mice induced by alloxan. This research was experimental laboratory research with a post-test only control group design. The study was conducted on 30 mice divided into five groups. The first group was considered as a negative control group. The third, fourth and fifth groups were considered as the treated groups 1, 2 and which were induced by alloxan and given Kawa Daun Gambir with different doses for 14 days. The heart malondialdehyde (MDA) levels were examined by using a spectrophotometer. Data analysis was performed using by One Way Anova and Least Significant Differences (LSD). The results of the study showed that there were differences between heart malondialdehyde levels, the positive control group, and the treatment group. There were differences in the mean levels of malondialdehyde (MDA) between groups ($p < 0,05$). Mice heart malondialdehyde levels in the treatment group (mean \pm SD) were 7.29 ± 0.91 nmol/ml, 6.75 ± 0.96 nmol/ml, and 7.06 ± 0.15 nmol/ml lower than positive control group (K+) 8.51 ± 0.63 nmol/ml. The study concludes that Kawa Daun Gambir can reduce the levels of malondialdehyde (MDA) in the heart of hyperglycemic mice induced by alloxan.

Keywords: Alloxan, Heart, Kawa Daun Gambir, Malondialdehyde

INTRODUCTION

The most common complication that causes morbidity and mortality in people with diabetes mellitus is Atherosclerotic Cardiovascular Disease (ASCVD). This syndrome includes myocardial infarction, stable angina, unstable angina, Coronary Heart Disease (CHD) and stroke. (American Diabetes Assosiation. 2017) CHD can occur due to the accumulation of fat tissue in the walls of blood vessels (atherosclerosis) that narrowing of blood vessels, thereby causing blood supply to the heart muscle reduced (Leon B.M et al. 2015). Another factor that can cause fat accumulation in blood vessel walls is high plasma levels of cholesterol and triglycerides that exceed normal limits. (Beckman JA et al. 2013) Increased cholesterol and blood glucose in people with diabetes mellitus can cause increased levels of free radicals in the body (Tangvarasittichai S. 2015). The increase in free radicals can oxidize unsaturated fatty acids that can damage cell membranes, then

form the final lipid peroxidation product malondialdehyde (MDA). MDA can be used as a biological marker of oxidative stress, increased free radical levels, and unsaturated fat will be followed by an increase in MDA in the body (Isabella DD et al. 2006). MDA levels in the body can be reduced by administering antioxidants (Winarsi H. 2007). The control of blood glucose levels is important to prevent various kinds of complications. Treatment to regulate blood glucose levels can be done non-pharmacologically such as lifestyle modification by improving daily eating patterns, increasing physical activity, exercising, and stopping smoking (American Diabetes Association. Lifestyle management. 2017). Non-pharmacological can be done by consuming antioxidants such as Gambir Leaf (*Uncaria gambier* Roxb.).

Catechins in gambir leaves can be an alternative antidiabetic by antioxidant mechanisms that can reduce oxidative stress (Umeno A et al. 2016). Kawa Daun is a typical Minangkabau beverage made with steeping leaves (Zulfitra. 2017). Kawa Daun Gambir is a steeping drink containing catechins as an antidiabetic compound. Giving Kawa Daun Gambir with a dose of 2 grams/100 ml can effectively reduce blood glucose levels as 68 %, while giving Kawa Daun Gambir with a dose of 4 grams/100 ml can reduce blood glucose levels as 64 % through an antioxidant mechanism in mice that induced by alloxan (A'raaf M et al 2017). Based on the background above, so the objective of this study was to determine the effect of kawa daun gambir on levels of malondialdehyde (MDA) in the heart of hyperglycemic mice induced by alloxan.

METHODS

This is an experimental laboratory study on animals with randomized post-test only group design. This research group consisted of a negative control group, a positive control group, a treatment group 1, a treatment group 2 and a treatment group 3.

The study population was white mice (*Mus musculus*) aged 2-3 months, with bodyweight ranging from 25 to 35 grams. The sample size for each treatment group was six mice, so the total number of samples needed was 30 mice.

The first group was a negative control group (K-), which was only given standard feed and drink. The second group was a positive control group (K +) induced by a single dose of alloxan 210 mg/kg BW intraperitoneal (Khoiroh NL. 2017). Groups three, four and five were the treatment group (P1, P2, and P3) induced by alloxan and given kawa daun gambir with a dose of P1 = 1 gram/ 100 ml, P2 = 2 gram/100 ml, P3 = 4 gram/100 ml for 14 days. The calculation of the dose of kawa daun gambir came from the conversion of human doses to mice doses. Doses of kawa daun gambir that have potential is 2 grams per day.⁸ Gambir leaf was taken from Kebun Tanaman Obat (KTO) Andalas University.

The next five days after alloxan induction, all groups were measured blood glucose levels by Accu-check glucometer. The blood was taken from the veins of the mice's tail. Blood glucose levels in normal mice in the range of 62-175 mg/dl (Malole MBM, Pramono CS. 2015). Treatment of gambier leaf extract given for 14

days. On the 15th day, mice were dissected for heart organ then continued with measurement of cardiac MDA levels by the TBARS method.

Data analysis was performed using by One Way Anova and Least Significant Differences (LSD) at a 95% confidence interval. This research was conducted after obtaining approval from the Ethics Commission of the Faculty of Medicine at Andalas University Padang with The Number Ethical Clearance 642/KEP/FK/2018.

RESULTS

The results of blood glucose levels on the fifth day after administration of a single dose of alloxan 210 mg/kgBW intraperitoneally one-time induction were presented in Table 1.

Table 1. The blood glucose levels on mice at the 5th day after alloxan-induced

Group	Treatment	The blood glucose levels (mg/dl) [mean ± SD]
K-	Negative control group	84.40 ± 7.02
K+	Positive control group	384.00 ± 104.66
P1	Treatment of steeping gambir 1 mg/100ml/d	287.40 ± 93.22
P2	Treatment of steeping gambir 2 mg/100 ml/d	431.40 ± 140.68
P3	Treatment of steeping gambir 4 mg/100 ml/d	419.80 ± 171.93

Kruskal-Wallis: $p = 0,009$ ($p < 0,05$)

Table 2. The heart MDA levels in groups after 14 days

Group	Treatment	The heart MDA levels (nmol/ml) [mean ± SD]
K-	Negative control group	6.39 ± 0.70
K+	Positive control group	8.51 ± 0,63
P1	Treatment of steeping gambir 1 mg/100ml/d	7.29 ± 0.91
P2	Treatment of steeping gambir 2 mg/100 ml/d	6.75 ± 0.96
P3	Treatment of steeping gambir 4 mg/100 ml/d	7.06 ± 0,15

One-Way Anova: $p = 0.002$ ($p < 0.05$)

The highest average blood glucose level was found in P2 at 431.40 ± 140.68 mg/dl, and the lowest blood glucose level was found in K- at 84.40 ± 7.02 mg/dl. These data indicate that alloxan could induce mice in the positive control group and treatment groups (P1, P2, and P3) become hyperglycemia, as the Kruskal-Wallis test indicated $p = 0.009$ ($p < 0.05$).

The highest level of heart malondialdehyde was found in the positive control group, 8.51 ± 0.63 nmol/ml. The lowest heart malondialdehyde level was found in the negative control group, 6.39 ± 0.70 nmol/ml.

ANOVA test was carried out after the data distribution proved to be normal and homogeneity of variances ($p > 0.05$). One-Way Anova test showed that there were differences in levels of malondialdehyde after administration of kawa daun

gambir in various doses for 14 days in all treatment groups significantly $p = 0.002$ ($p < 0.05$). Data analysis was continued with the Least Significant Differences (LSD).

Table 3. The results of least significant differences (LSD) on MDA levels

Groups		Significance
Negative control (K-)	Positive control (K+)	0.000*
	Treatment 1 (P1)	0.064
	Treatment 2 (P2)	0.434
	Treatment 3 (P3)	0.158
Positive control (K+)	Negative control (K-)	0.000
	Treatment 1 (P1)	0.015*
	Treatment 2 (P2)	0.001*
	Treatment 3 (P3)	0.005*
Treatment 1 (P1)	Negative control (K-)	0.064
	Positive control (K+)	0.015
	Treatment 2 (P2)	0.259
	Treatment 3 (P3)	0.626
Treatment 2 (P2)	Negative control (K-)	0.434
	Positive control (K+)	0.001
	Treatment 1 (P1)	0.259
	Treatment 3 (P3)	0.512
Treatment 3 (P3)	Negative control (K-)	0.158
	Positive control (K+)	0.005
	Treatment 1 (P1)	0.626
	Treatment 2 (P2)	0.512

* = significant differences

Base on Table 3. there were significant differences between Positive Control on Treatment 1 ($p=0.015$), Treatment 2 ($p=0.001$), and Treatment 3 ($p=0.005$).

DISCUSSION

Table 1 showed that alloxan could increase blood glucose levels significantly. This means mice are in hyperglycemia. This is caused by alloxan damaged pancreatic β cells, thereby decreasing the secretion of the insulin hormone. Decreased levels of this hormone cause blood glucose levels increased (International Diabetes Federation, 2015).

Table 2 showed that the highest MDA level is in the K + group (8.51 ± 0.63 nmol/ml). Increased levels of MDA in the mice's heart because hyperglycemia has lipid profile disorders in the form of elevated triglyceride levels. High triglyceride levels will accumulate in tissues such as the heart.³ High triglyceride levels accumulated in the heart are very susceptible to oxidation by the Reactive Oxygen

Species (ROS). The result of the oxidation process was increased MDA (Matsuzaki S et al 2009).

Decreased levels of heart MDA occur in mice that were given kawa daun gambir in various doses. It is due to the antioxidant mechanism found in gambir leaf. This leaf has a catechin content of 7-33% (Magdalena NV and Kusnadi J. 2015). Catechins are natural polyphenol compounds that are included in the tannin group (Akiyama H et al. 2001). Gambir (*Uncaria gambir Roxb.*) is a member of Rubiaceae family. It mainly contains catechin, pyrocatechol wax, fixed oil, and florisin (Arman D). Windasari's research (2016) states that the provision of green tea which also contains tannins can reduce levels of MDA in blood in alloxan-induced hyperglycemia mice (Windasari. 2016).

The results of comparisons between treatment groups also showed that the most significant decrease in MDA levels was found in treatment group 2 (P2 = 2 grams/100 ml /day). $p = 0.001$ ($p < 0.05$). It is consistent with research conducted by Yunarto (2015). which states that administering high concentrations of catechins can reduce the antioxidant benefits of catechins (Yunarto N. 2015). Pane (2018) conducted a clinical trial on DM patient who consume gambir herbs in short time (14 days) showed a decrease in MDA levels.

CONCLUSION

There is a significant difference in the influence of giving Kawa Daun Gambir (*Uncaria gambier Roxb.*) on levels of heart malondialdehyde hyperglycemic mice induced alloxan with a dose of Kawa Daun Gambir 1 gram/100 ml, 2 gram/100 ml, 4 gram/100 ml.

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