BUKTI KORESPONDENSI ARTIKEL PADA JURNAL

INTERNASIONAL BEREPUTASI

PENGUSUL:

dr. Amallia Nuggetsiana Setyawati, M.Si.Med, Sp.A

JUDUL ARTIKEL:

THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE

Publikasi

Judul :	: The Effect of Giving Plantain Peel Extract (Musa paradisiaca) on
	Malondialdehyde Levels in Wistar Rats Exposed to Filter Cigarette
	Smoking
Penerbit:	: Wolters Klower Medknow Publication
Jurnal :	: Journal of Pharmaceutical Negative Results
ISSN	: ISSN: Print -0976-9234, Online - 2229-7723
Volume :	: 11(3): 1509-1514.
Nomer	: 3
Tahun	: 2022
Tanggal Publikasi	: 7 November 2022
SJR	: 0.13
Penulis	: Satria Damarjati, Lusiana Batubara, Puspita Kusuma Dewi,
	Amallia Nuggetsiana Setyawati
Corresponding	: Amallia Nuggetsiana Setyawati
author	

Kepada Yth. Tim Penilai Usulan PAK,

Bersama ini kami sertakan bukti korespondensi dan proses review artikel kami berjudul "THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE" dipublikasikan di Journal of Pharmaceutical Negative Results, 13(4), 1118–1123.

https://doi.org/10.47750/pnr.2022.13.04.155Wolters Klower Medknow Publication

No	Tanggal	Aktivitas
1.	26 Oktober 2022	Cover letter for submission pada email editor
2.	26 Oktober 2022	Original article submitted
3.	26 Oktober 2022	Submission confirmation
4.	26 Oktober 2022	Response to the editor
5.	30 Oktober 2022	reviewed and accepted for publication
6.	30 Oktober 2022	Acceptance letter
7.	1 November 2022	Bank transfer payment
8.	4 November 2022	ask about the progress of my accepted manuscript.
9.	5 November 2022	Response to accepted manuscript, pengiriman corrected proof
10.	7 November 2022	Published

Demikian atas perhatian Bapak/Ibu, saya mengucapkan terima

kasih Semarang, 17 Februari 2023

dr. Amallia Nuggetsiana Setyawati, M.Si.Med, Sp.A

Lampiran Rinci Kronologi dan Dokumen Email Korespondensi dengan Editor Jurnal terlampir sebagai berikut:



Amallia submission

Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> Kepada: editorpnrjournal@gmail.com 26 Oktober 2022 pukul 14.47

Dear Editor Journal of Pharmaceutical Negative Results

Free radicals from filter cigarettes can contribute to oxidative stress in the body. Malondialdehyde is a substance produced by the body in response to oxidative stress, and plantain peel extract contains antioxidants that can be used to combat oxidative damage.

This study aimed to see if a plantain peel extract could reduce MDA levels in Wistar rats exposed to filtered cigarette smoke.

The essay is especially suitable for the journal's section on the healthcare profession. It is mainly discussed on the plantain peel extract to reduce MDA levels in Wistar rats exposed to filter cigarette smoke.

According to the research described in the manuscript I'm submitting today, groups exposed to cigarette smoke and given beet juice had lower MDA levels than groups exposed to cigarette smoke alone, with the group given an 8 ml/kg BW dosage having lower MDA levels than the group given a 16 ml/kg BW dosage.

I appreciate your attention and ongoing interest.

My heartfelt thanks,

Amallia N. Setyawati Department of Medical Biology and Biochemistry Faculty of Medicine, Diponegoro University

send.THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca).Amallia.docx 56K

2	THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (<i>Musa paradisiaca</i>) ON MALONDIAL DEUXDE LEVELS IN WISTAR PATS EXPOSED TO EU TER
3 4	MALONDIALDEHYDE LEVELS IN WISTAK KATS EXPOSED TO FILTEK CIGARETTE SMOKE
5 6	Satria Damarjati ¹ , Lusiana Batubara ² , Puspita Kusuma Dewi ² , Amallia Nuggetsiana Setyawati ^{2,3}
7	¹ Faculty of Medicine Universitas Diponegoro, Semarang-50275
9	² Department of Medical Biology and Biochemistry, Faculty of Medicine Universitas
10 11	³ Department of Pediatrics, Diponegoro National Hospital, Semarang-50275
12 13 14 15 16	Corresponding author: Amallia Nuggetsiana Setyawati, Department of Medical Biology and Biochemistry, Faculty of Medicine Universitas Diponegoro, Semarang 50275 e-mail: @amallia.setyawati@fk.undip.ac.id
17 18 19	ABSTRACT
20	Background : Free radicals from filter cigarettes can contribute to the body's oxidative stress.
21	Malondialdehyde is a substance that the body produces in response to oxidative stress.
22	Antioxidants found in plantain peel extract can be used to counteract oxidative damage.
23	Aim: This study sought to determine whether Wistar rats exposed to filtered cigarette smoke
24	could have their MDA levels reduced by a plantain peel extract.
25	Methods: On Wistar rats, this study used an actual experimental design with a post-test-only
26	control group. Twenty-eight rats from the research sample were split into 4 separate groups.
.,,	
20	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and
27 28 20	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and
27 28 29 20	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbited playus usin was used to draw blood from the doad rate
27 28 29 30 31	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward MDA levels in the plasma were measured using the TPAPS technique.
28 29 30 31 32	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique.
28 29 30 31 32 33	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique. Results : The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm 1.791 ppm and 3.115 ppm respectively. The K and K + groups showed a
28 29 30 31 32 33 34	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique. Results : The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, respectively. The K- and K+ groups showed a significant difference in the Mann-Whitney test ($p=0.037$) as did the K+ and P1 group
28 29 30 31 32 33 34 35	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique. Results : The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, respectively. The K- and K+ groups showed a significant difference in the Mann-Whitney test (p=0.037), as did the K+ and P1 group (p=0.010). K+ and P2 group (p=0.025), and P1 and P2 group (p=0.004)
28 29 30 31 32 33 34 35 36	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique. Results : The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, respectively. The K- and K+ groups showed a significant difference in the Mann-Whitney test (p=0.037), as did the K+ and P1 group (p=0.010), K+ and P2 group (p=0.025), and P1 and P2 group (p=0.004). Conclusion : MDA levels in Wistar rats exposed to filter cigarette smoke could be decreased
27 28 29 30 31 32 33 34 35 36 37	K+ received exposure to cigarette smoke, P1 received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique. Results : The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, respectively. The K- and K+ groups showed a significant difference in the Mann-Whitney test (p=0.037), as did the K+ and P1 group (p=0.010), K+ and P2 group (p=0.025), and P1 and P2 group (p=0.004). Conclusion : MDA levels in Wistar rats exposed to filter cigarette smoke could be decreased by administering plantain peel extract.

39 INTRODUCTION

40 Tobacco use is widely recognized as a risk factor for early morbidity and mortality. 41 However, the relative mortality risk and the adverse effects of smoking differ between nations. 42 As one of the world's major markets for tobacco use, Indonesia is severely impacted by diseases 43 linked to tobacco use (Holipah et al., 2020). Indonesian clove cigarettes, also known as kretek, 44 are a blend of tobacco and cloves rolled into a cigarette and sprayed with oils, plant extracts, 45 and food flavorings in an unknown quantity and composition, which varies by brand and is 46 usually kept hidden(Picanço et al., 2022). Based on the 2018 Basic Health Research, 33.8% of 47 Indonesia's population aged 15 years and over are active smokers (Balitbangkes Kemenkes, 48 2019). Cancer and immune-mediated inflammatory illnesses are two conditions for which 49 smoking is a significant risk factor. Reactive oxygen and nitrogen species (ROS and RNS), 50 among other compounds, are present in tobacco smoke and be capable of causing harm to 51 lipids, proteins, and nucleic acids, which are cellular and sub-cellular targets (Caliri et al., 52 2021). Aldehydes, epoxides, peroxides, and other free radicals are among the numerous 53 oxidants in high concentrations in each cigarette puff (Caliri et al., 2021; Thimmulappa et al., 54 2020). Cigarette smoke can indirectly create more significant amounts of oxidants in the body 55 by activating anti-inflammatory cells to produce free radicals (Emma et al., 2022). Due to their 56 reactive nature, Reactive Oxygen Species (ROS) can arise due to an abundance of free radicals 57 in the body and harm tissue (Venditti & Di Meo, 2020).

58 Malondialdehyde (MDA) is a dialdehyde molecule produced as a by-product of the 59 body's processes for enzymatic and non-enzymatic lipid peroxidation. Because MDA readily 60 reacts with thiobarbituric acid, it is a biomarker for the peroxidation of omega-3 and omega-6 61 fatty acids (Fuloria et al., 2020). The Thiobarbituric Acid (TBA) test can determine MDA 62 levels. Because there are free radicals in the body, the appearance of MDA suggests an 63 oxidation process in cell membranes. An increase in ROS from cigarette smoke exposure 64 causes increased fat peroxidation in smokers (De Leon & Borges, 2020).

Antioxidant-rich substances can reduce the harm caused by free radical oxidation.
Southeast Asia is where the monocot plant, known as the banana, first appeared. Each year,
Indonesia produces more than 6 million tons of bananas. The plantain is a variety of bananas
that is quite popular in Indonesia (Ningsih, 2019). Most of the time, individuals consume the
fruit and discard the skin of the banana fruit without realizing its many health benefits. One of
them is the presence of antioxidants in the skin, such as flavonoids and phenolic compounds.

- 71 The plantain peel extract's flavonoids have the potential to serve as antioxidants to lower MDA
- real result of exposure to free radicals, which in this study was focused on
- filtered cigarette smoke (Adetuyi et al., 2022). This finding is evident from the reason given
- above. The findings of this study should shed light on the possibility of using plantain peels to

75 lower MDA levels.

76 METHODS

77 Sample

78 This study's sample consisted of Wistar (*Ratus norvegicus*) strain rats who met the following

inclusion, exclusion, and dropout criteria Wistar rat (*Rattus novergicus*) 6-8 weeks old Active
movement. 200-300 g, without anatomical flaws.

81 Exposure to Filter Cigarette Smoke

A smoking chamber was used to house animal samples. The smoking chamber has two holes: one for the outlet of filtered cigarette smoke exposure and the other for inserting lit filter cigarettes. Blowing cigarette filters is accomplished by using a smoking pump until the cigarette is extinguished. A cigarette smoke filter is administered twice daily, at 09.00 and 15.00, in the amount of two sticks, one at a time.

87 Extraction of Plantain Peel

88 The maceration process produced plantain peel extract. The maceration method is used without 89 heating to ensure that the compounds in the plantain peel are adequately extracted and do not 90 decompose. The tools and materials prepared were knives, an oven, scales, a maceration vessel, 91 plantain, cotton, water, and 96% ethanol. The procedure was carried out based on previous 92 research. The following is the procedure for extracting plantain peels; Peel the plantain to 93 separate the skin from the fruit, plantain peel washed with water until clean, and plantain peel 94 cut into small pieces. The plantain skin was dried in an oven at 50°C until dry. The dried 95 plantain peels were sorted and weighed for the extraction process. The plantain peel was placed 96 in a maceration vessel, and 96% ethanol solvent was added until the entire sample was 97 completely submerged. The plantain peel and 96% ethanol solution were evenly stirred, and 98 the maceration vessel was tightly closed to produce maceration. Recurrent stirring is done 99 while the maceration process is kept at room temperature in a dark area. Filtration of the 100 macerate with a cotton swab results in a filtrate. A thick plantain peel extract was made by 101 evaporating the filtrate.

102 **Dosage of Plantain peel extract**

- 103 Another study stated that the most significant decrease in MDA levels occurred with the
- 104 administration of 200 mg/kg BW/day kepok banana peel extract. 45 The dose from the prior
- study was used, and a second dose was added by multiplying the initial dose by two. The second
- 106 dose is 400 mg/kg BW daily a result.

107 Animal Treatment

- 108 At our animal laboratory, all rats were housed in cages. Throughout the study, Wistar rats were
- 109 fed and given water. The adaptation treatment lasted seven days and consisted of ad libitum
- 110 traditional food and drink. The Wistar rats were randomly divided into four groups on the
- 111 eighth day following the adaptation treatment, namely:
- 112 Rats in Group K- received standard feed and water. For 28 days, rats in Group K+ were given
- standard feed and water and were exposed to filtered cigarette smoke. Group K1: After 28 days
- 114 of exposure to filtered cigarette smoke, rats were given standard feed and a sonde of plantain
- 115 peel extract at 200mg/kg BW/day. Group K2: After 28 days of exposure to filter cigarette
- smoke, rats were given standard feed treatment and 400mg/kg BW/day of plantain peel extract.
- 117 The treatment period for the animals lasted 28 days.

118 Analytical Statistics

- The information obtained is primary data. The information is entered into a computer andanalyzed using the Statistical Product and Service Solutions (SPSS) for Windows software.
- 121 The Shapiro-Wilk homogeneity test was used to determine the data distribution's normality.
- 122 Data is classified as generally distributed at a 95% confidence interval if the p-value is 0.05. If
- 123 the data is normally distributed, the one-way Anova test is used to determine whether there is
- a general difference in rats' average blood MDA levels across all groups. Then conduct the Post
- 125 Hoc Test to determine the various groups. A p-value of 0.05 indicates that the data is not
- 126 generally distributed at a 95% confidence level. If the data is not normally distributed, the
- 127 Kruskal-Wallis test can be used to compare the average blood MDA levels of rats across
- 128 groups. The Mann-Whitney test is then used to determine the various groups.
- 129
- 130
- 131

132 **RESULTS**

This study used a sample of 28 Wistar rats with a minimum age of 6 weeks before adaptation and a body weight of 200-300 grams. Each group had one rat drop out during the treatment, so six samples were collected. The MDA levels in blood from groups K-, K+, P1, and P2 were then determined using the TBARS method. The Shapiro-Wilk test was used to determine data normality and distribution.

Group	$\bar{X}\pm SD$	Normality test (p-value)
K-	$1{,}695\pm0{,}78$	0,113*
K+	$2,\!430 \pm 0,\!31$	0,248*
P1	$1{,}791 \pm 0{,}22$	0,282*
P2	$3,115 \pm 0,44$	0,960*

138 **Table 1:** Average and Normality Test of MDA Levels (ppm)

139 *Data are normally distributed (p>0.05).

140 Note Group K-: received standard feed and water. Group K+: exposed to filtered cigarette

141 smoke. Group K1: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg

142 BW/day dose. Group K2: exposed to filtered cigarette smoke and plantain peel extract at a

- 143 200mg/kg BW/day dose.
- 144

In the Shapiro-Wilk normality test, the data distribution was normal (p>0.05) in all groups, so the mean was used as the measure of data concentration, and the standard deviation was used as the size of the spread. Deviation.

148 The findings of this study did not meet the statistical test requirements—one-way

149 ANOVA. Unpaired numerical data and more than two groups, data with a normal distribution

150 and homogeneous data variants are all required for the one-way ANOVA test. The data

- 151 variance was not homogeneous in the Levene test, with p = 0.007 (p 0.05).
- As a result, the Kruskal-Wallis test was used to determine the significant differencesbetween each group.

Table 2:	Kruskal-	Wallis	Anal	lysis
----------	----------	--------	------	-------

	Plasma MDA Levels (ppm)
Kruskal-Wallis H	15,820
lf	3
o-value	0,001

155

156 Note Group K-: received standard feed and water. Group K+: exposed to filtered cigarette

157 smoke. Group K1: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg

158 BW/day dose. Group K2: exposed to filtered cigarette smoke and plantain peel extract at a

159 200mg/kg BW/day dose.

160

161 The table shows the results of the Kruskal-Wallis test with a p-value of 0.001 (p 0.05),

162 indicating significant differences between each group. To ascertain the differences between

163 each group, the Mann-Whitney non-parametric test was used.

164 **Table 3:** Pairwise Mann-Whitney Test Group Comparison

Group-Group	p-value
(K-)-(K+)	0,037*
(K+)-(P1)	0,010*
(K+)-(P2)	0,025*
(P1)-(P2)	0,004*
Description: *signif	ficant (p<0.05)

165

Note Group K-: received standard feed and water. Group K+: exposed to filtered cigarette
smoke. Group K1: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg
BW/day dose. Group K2: exposed to filtered cigarette smoke and plantain peel extract at a
200mg/kg BW/day dose.

170

According to the Mann-Whitney test results table above, there was a significant difference between the K- group (negative control) and the K+ group (positive control) with a p value = 0.037 (p<0.05), the K+ group and the P1 group (extract dose 200mg/kgBW) with a p value = 0.010 (p<0.05), group K+ and group P2 (extract dose 400mg/kgBW) with a p value = 0.025 (p<0.05) and between group P1 and group P2 with a value of p=0.004(p<0.05). According to the Mann-Whitney test results, the results of this study accepted the study's hypothesis, namely that there was an effect of giving plantain peel extract on the malondialdehyde levels of Wistar rats exposed to filter cigarette smoke. The findings supported the hypothesis that administering plantain peel extract at a dose of 200mg/kg BW could reduce MDA levels in Wistar rats exposed to filtered cigarette Kosmoke. However, the results of this study rejected the hypothesis that the administration of plantain peel extract at a dose of 400mg/kg BW could reduce MDA levels in Wistar rats exposed to filtered cigarette smoke.

183 **DISCUSSION**

184 MDA level measurements discovered that rats in the K-group had the lowest mean 185 MDA levels because they did not receive any treatment other than standard feed. The mean of the K- group (1.695 ppm) was lower than that of the K+ group (2.430 ppm). However, based 186 187 on the findings of the research data analysis, the difference between the two groups was 188 statistically significant (p>0.05). According to epidemiological research, fruits, vegetables, and 189 less processed staple foods provide the best defense against the emergence of oxidative stress-190 induced diseases (Igwe et al., 2021). Both banana peel and pulp contain antioxidant activity, 191 though the amount varies depending on the variety. Because of the presence of potassium, a 192 single banana meal can significantly reduce plasma oxidative stress in a healthy human (Qamar 193 & Shaikh, 2018).

Bananas are renowned for being the superior reservoir of potassium, which helps maintain
muscle functioning and prevent muscle spasms. In particular, the fruits include vitamin A and
vitamin B6, which, when ingested, will benefit., C and D enhance immunity and ensure
appropriate metabolic functions (Kumar et al., 2012). Not only are the fruits of *Musa spp*.
Edible and therapeutic, other parts of the plant, including the blooms, peels, roots, and seeds,
also possess these qualities (Kumar et al., 2012; Padam et al., 2014).

The nutritional content of plantain peel varies. According to previous research, plantain peel contains a variety of energy and mineral sources. Carbohydrates (59mg/g), fiber (31.7mg/g), fat (1.7mg/g), and protein (0.9mg/g) are the energy sources in question. Numerous banana peels can be used for a variety of purposes. There are 19.2mg/g calcium, 24.3mg/g sodium, 78.1mg/g potassium, 76.2mg/g manganese, 0.61mg/g iron, 0.21mg/g rubidium, bromine is 0.04mg/g, strontium is 0.03mg/g, zirconium is 0.02mg/g, and niobium is 0.02mg/g minerals in banana peels(Pyar & Peh, 2018). Banana peels can be utilized in a variety of ways.

207 Due to their capacity to donate hydrogen atoms to free radicals, phenolic compounds are208 bananas' main antioxidants (Afzal et al., 2022).

The average MDA levels of rats in the P1 group (1.791 ppm) were lower than those in the K+ group (2.430 ppm), while those in the P2 group (3.115 ppm) were higher than those in the K+ group (2.430 ppm) and P1 group (1.791 ppm) (1.791 ppm). According to the findings of statistical analysis of research data, the difference in MDA levels between the K+ and P1 groups was statistically significant (p>0.05), and the difference in MDA levels between the P2 group and the K+ and P1 groups was statistically significant (p0.05).

Antioxidants are free radical-neutralizing chemicals that can be gained through dieting(Showell et al., 2014). Compared to synthetic antioxidants, phenolic substances are more potent and safer (Zeb, 2020).

The antioxidant effect of flavonoids can be attributed to the uptake of free radicals by hydrogen proton donors from the flavonoid hydroxyl group. The antioxidant effect of flavonoids is strongly influenced by substituting hydroxy groups in the ortho and para positions to the OH and OR groups (Lopes et al., 2020).

222 Cellular ROS are neutralized or eliminated by the antioxidant defense system. GSH is 223 mainly present in its reduced form, which functions as an important intracellular antioxidant. 224 In addition to halting DNA production and mending damaged DNA pieces, it helps to protect 225 cells from oxidative damage, harmful substances, and radiation. Malondialdehyde is one of 226 these by-products and a widely recognized sign of oxidative stress (Denk et al., 2022). The 227 flavonoids extracted from *Musa paradisiaca* in rats were found to stimulate the activities of 228 superoxide dismutase (SOD) and catalase, which may be to blame for the decreased levels of 229 peroxidation products like hydroperoxides (Galani, 2019). Consuming flavonoids have a 230 favorable influence on oxidative, glucose, and lipid metabolisms (Neri-Numa et al., 2020). The 231 phenolic components in banana peel range from 0.90 to 3.0 g/100 g in dry weight(Singh et al., 232 2016). Flavonoids inhibit the action of the Nicotinamide Adenine Dinucleotide Phosphate 233 (NADPH) oxidase and xanthine oxidase, as well as binding to metals (Cu2+ and Fe2+), which 234 have a preventive effect on redox reactions that can generate free radicals. In vivo, flavonoids 235 can be present sufficiently high quantities to exhibit pharmacological activity at receptors, 236 enzymes, and transcription factors (Azzi, 2022). Flavonoids can preserve redox tone alterations 237 and enhance oxidative stress markers (Oteiza et al., 2021).

Our result is in line with research on the results of administering rat exercise-induced plantain peel extract. In this experiment, rats' MDA levels were considerably lowered by administering banana peel extract following high and low-intensity exercise (Kinanti et al., 2021). In addition, research on diabetic rabbits with hyperlipidemia demonstrates that kepok banana peel extract can lower MDA levels. This study found that giving banana peel extract to rabbits resulted in considerably decreased MDA levels (Samiasih et al., 2019).

In high fat fed/low dose streptozotocin-induced diabetic rats, diets supplemented with boiled unripe plantain (20%-40%) prevented lipid peroxidation compared to acarbose administration. When unripe plantains are boiled, they can provide the necessary natural therapeutic measures to be considered a potential economic means of managing diabetes in underdeveloped countries (Ajiboye & Shodehinde, 2022).

249 In this study, rats exposed to cigarette smoke and given a dose of 200 mg/kg BW plantain 250 peel extract had significantly lower MDA levels than rats exposed to cigarette smoke alone. 251 However, rats exposed to cigarette smoke and given plantain peel extract at a dose of 400mg/kg 252 BW had significantly higher MDA levels than rats exposed to cigarette smoke and given 253 plantain peel extract at a dose of 200mg/kg BW and rats exposed to cigarette smoke only. This 254 result is because plantain peel extract at 200mg/kg BW does not exceed the maximum dose in 255 Wistar rats, allowing the administration of plantain peel extract to reduce MDA levels. In 256 contrast, plantain peel extract at 400mg/kg BW exceeds the maximum dose, causing a toxic 257 effect on the body. MDA levels in rats rise as a result of thisWhen there is an imbalance 258 between antioxidant and oxidant compounds in the body, or when antioxidant levels are high 259 while oxidant levels are low, the body will form oxidant compounds to balance the levels, 260 resulting in an increase in peroxidation and an increase in MDA levels. According to another study, the ethanol extract Musa paradisiaca L. contains secondary metabolites and can 261 262 potentially be a weak antioxidant. Several restrictions apply to this study, including 263 determining antioxidant active ingredient concentrations. This study did not include any 264 histopathological analysis (Nurmazela et al., 2022).

265 Conclusion

266 Plantain peel extract was found to lower MDA levels in Wistar rats exposed to filter cigarette

smoke. The plausible mechanism is that the presence of phenolic compounds in banana peel

268 reduces lipid peroxidation

activity.

270 Ethical clearance

271 KEPK has granted ethical clearance with the number 05/EC/H/FK-UNDIP/1/2022.

272 Acknowledgment

- 273 There was no financial support for this study. We want to express our appreciation for the
- technical assistance provided during this study course.

275 **Contribution of Author**

- 276 Formal analysis, ANS; investigation, PKD, and ANS; data curation, ANS; writing-original
- draft preparation, ANS; writing-review and editing, ANS; and funding acquisition, ABS.
- 278 Conceptualization, SD, ANS, and PKD; methodology, PKD, and ANS validation, PKD, LB,
- and ANS; formal analysis, ANS; and investigation, PKD, and ANS. All authors have read and
- approved the final text.
- 281

282 **References**

- Adetuyi, B. O., Ogundipe, A. E., Ogunlana, O. O., Egbuna, C., Estella, O. U., Mishra, A. P.,
 Akram, M., & Achar, R. R. (2022). Banana peel is a source of nutraceuticals. *Food and agricultural by-products are essential sources of valuable nutraceuticals* (pp. 243250). Springer.
- 287 Afzal, M. F., Khalid, W., Akram, S., Khalid, M. A., Zubair, M., Kauser, S., Abdelsamea 288 Mohamedahmed, K., Aziz, A., & Anusha Siddiqui, S. (2022). Bioactive profile and 289 functional food applications of banana in food sectors and health: a review. 290 International Journal Properties, 25(1), 2286-2300. ofFood https://doi.org/10.1080/10942912.2022.2130940 291
- Ajiboye, A. O., & Shodehinde, S. A. (2022). Diet supplemented with boiled unripe plantain
 (Musa paradisiaca) exhibited antidiabetic potentials in streptozotocin-induced Wistar
 rats. Journal of Food Biochemistry, e14431.
 https://doi.org/https://doi.org/10.1111/jfbc.14431
- Azzi, A. (2022). Oxidative Stress: What Is It? Can It Be Measured? Where Is It Located? Can It Be Good or Bad? Can It Be Prevented? Can It Be Cured? *Antioxidants*, *11*(8), 1431.
 <u>https://www.mdpi.com/2076-3921/11/8/1431</u>
- Balitbangkes Kemenkes, R. (2019). Laporan Nasional Riskesdas 2018. Lembaga Penerbit
 Badan Penelitian dan Pengembangan Kesehatan. Jakarta, 1-674.
- 301Caliri, A. W., Tommasi, S., & Besaratinia, A. (2021). Relationships among smoking, oxidative302stress, inflammation, macromolecular damage, and cancer. Mutation Research/Reviews303inMutation304https://doi.org/https://doi.org/10.1016/j.mrrev.2021.108365
- 305 De Leon, J. A. D., & Borges, C. R. (2020). Evaluation of oxidative stress in biological samples
 306 using the thiobarbituric acid reactive substances assay. *JoVE (Journal of Visualized* 307 *Experiments)*(159), e61122.

- Denk, B., Avcı, G., Aydoğan, B., Fidan, A. F., & Aslan, R. (2022). Redox-changing effects of
 popular tobacco products in rats. *Turkish Journal of Biochemistry*, 47(3), 341-347.
 https://doi.org/doi:10.1515/tjb-2021-0113
- Emma, R., Caruso, M., Campagna, D., Pulvirenti, R., & Li Volti, G. (2022). The Impact of
 Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative
 Stress. *Antioxidants*, 11(9), 1829.
- Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U.,
 Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review
 on source, types, effects, nanotechnology, detection, and therapeutic management of
 reactive carbonyl species associated with various chronic diseases. *Antioxidants*, 9(11),
 1075.
- Galani, V. (2019). Musa paradisiaca Linn.-A Comprehensive Review. Scholars International
 Journal of Traditional and Complementary Medicine, 45-56.
- Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause
 mortality in Indonesia. *PloS one*, *15*(12), e0242558.
- Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A.
 (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants:
 doi. org/10.26538/tjnpr/v5i11. 24. *Tropical Journal of Natural Product Research*(*TJNPR*), 5(11), 2037-2042.
- Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari,
 L. P., Abdurrahman, A., & Rukayadi, Y. (2021). The preventive role of Raja banana
 peel (Mussa paradisiaca sapientum) extract as exogenous antioxidant in reducing
 atherosclerosis risk after exercise intervention. *Journal of Physical Education and Sport*, 21, 2447-2452.
- Kumar, K. S., Bhowmik, D., Duraivel, S., & Umadevi, M. (2012). Traditional and medicinal
 uses of banana. *Journal of Pharmacognosy and Phytochemistry*, 1(3), 51-63.
- Lopes, S., Borges, C. V., de Sousa Cardoso, S. M., de Almeida Pereira da Rocha, M. F., &
 Maraschin, M. (2020). Banana (Musa spp.) as a source of bioactive compounds for
 health promotion. *Handbook of Banana Production, Postharvest Science, Processing Technology, and Nutrition*, 227-244.
- Neri-Numa, I. A., Cazarin, C. B. B., Ruiz, A. L. T. G., Paulino, B. N., Molina, G., & Pastore,
 G. M. (2020). Targeting flavonoids on modulation of metabolic syndrome. *Journal of Functional Foods*, *73*, 104132.
 https://doi.org/https://doi.org/10.1016/j.jff.2020.104132
- Ningsih, R. M., Rita. (2019). Folic acid content and fruit characteristics of five Indonesian dessert banana cultivars. *Biodiversitas Journal of Biological Diversity*, 20(1), 144-151.
 Nurmazela, V., Ridwanto, R., & Rani, Z. (2022). Antioxidant Activity Test of Barangan Banana Hump's Ethanol Extract (Musa Paradisiaca (L.)) with DPPH (1, 1 Diphenyl-2-Picrylhydrazyl) Method. *International Journal of Science, Technology & Management*, 3(5), 1478-1483.
- Oteiza, P. I., Fraga, C. G., & Galleano, M. (2021). Linking biomarkers of oxidative stress and disease with flavonoid consumption: From experimental models to humans. *Redox Biology*, 42, 101914. https://doi.org/https://doi.org/10.1016/j.redox.2021.101914
- Padam, B. S., Tin, H. S., Chye, F. Y., & Abdullah, M. I. (2014). Banana by-products: an underutilized renewable food biomass with great potential. *Journal of food science and technology*, *51*(12), 3527-3545.
- Picanço, J. M. A., Limberger, R. P., & Apel, M. A. (2022). Where should I start? A scoping
 review about the publications on clove cigarettes. *Critical Reviews in Toxicology*,
 52(4), 259-293.

- 357 Pyar, H., & Peh, K. (2018). Chemical Compositions of Banana Peels (Musa sapientum) Fruits 358 cultivated in Malaysia using proximate analysis. Res. J. Chem. Environ, 22, 108-113. 359 Qamar, S., & Shaikh, A. (2018). Therapeutic potentials and compositional changes of valuable 360 compounds from banana- A review. Trends in Food Science & Technology, 79, 1-9. 361 https://doi.org/https://doi.org/10.1016/j.tifs.2018.06.016 Samiasih, A., Subagio, W., Susanto, H., Sadhana, U., Sunoko, H., & Santosa, B. (2019). 362 363 Banana peels extract (Musa Paradisiaca Var Kepok) Decreased MDA in New Zealand White Rabbit With DM Hyperlipidemia. IOP Conference Series: Earth and 364 365 Environmental Science, 366 Showell, M. G., Mackenzie-Proctor, R., Brown, J., Yazdani, A., Stankiewicz, M. T., & Hart, R. J. (2014). Antioxidants for male subfertility. Cochrane Database of Systematic 367 Reviews(12). 368 369 Singh, B., Singh, J. P., Kaur, A., & Singh, N. (2016). Bioactive compounds in banana and their associated health benefits - A review. Food chemistry, 206, 1-11. 370 371 https://doi.org/https://doi.org/10.1016/j.foodchem.2016.03.033 Thimmulappa, R. K., Chattopadhyay, I., & Rajasekaran, S. (2020). Oxidative stress 372 373 mechanisms in the pathogenesis of environmental lung diseases. In Oxidative Stress in 374 Lung Diseases (pp. 103-137). Springer. Venditti, P., & Di Meo, S. (2020). The role of reactive oxygen species in the life cycle of the 375
- weinditti, P., & Di Meo, S. (2020). The fole of feactive oxygen species in the fife cycle of the
 mitochondrion. *International Journal of Molecular Sciences*, 21(6), 2173.
- Zeb, A. (2020). Concept, mechanism, and applications of phenolic antioxidants in foods.
 Journal of Food Biochemistry, 44(9), e13394.
- 379
- 380 ORCID ID
- 381 Satria Damarjati 0000-0001-5456-4301
- 382 Puspita Kusuma Dewi 0000-0002-5733-7857
- 383 Amallia Nuggetsiana Setyawati 0000-0002-1322-1369
- 384
- 385



Amallia submission

PNR Editorial Board <editorpnrjournal@gmail.com> Kepada: Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> 26 Oktober 2022 pukul 15.18

Dear Author Your article is under review process. We will update you soon.

On 26-Oct-2022, at 1:17 PM, Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> wrote:

[Kutipan teks disembunyikan]





Amallia submission

Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> Kepada: PNR Editorial Board <editorpnrjournal@gmail.com> 26 Oktober 2022 pukul 15.41

Dear Editor,

Thank you for your prompt respons.

Sincerely Amallia [Kutipan teks disembunyikan]



PNR Editorial Board <editorpnrjournal@gmail.com> Kepada: Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> 30 Oktober 2022 pukul 19.34

Dear Author,

It's our great pleasure to inform you that your manuscript entitled "THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE" has been reviewed and accepted for publication in the "Journal of Pharmaceutical Negative Results" with ISSN 2229-7723. This letter of acceptance is considered as an official acceptance of your manuscript with no further amendments required.

To proceed for publication, kindly pay the APC of 290 USD (for regular issue) or APC of 230 USD (for special issue) in the account given below and send the final copy of the article along with payment receipt in reply email.

Account Details:

Name: Intellitech Research Solutions Bank: HDFC BANK Acc number : 50200055415023 IFSC Code: HDFC0009034 Branch: Chandigarh Swift Code: HDFCINBBCGH

Please find the attached acceptance letter with this mail.

With warm regards,

Editorial Board Journal of Pharmaceutical Negative Results https://www.pnrjournal.com/index.php/home





30-10-2022

Journal Name: Journal of Pharmaceutical Negative Results

ISSN: 2229-7723

Manuscript Title: THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE

OUR DECISION

ACCEPTED

With Warm Regards,

Editorial Manager Journal of Pharmaceutical Negative Results

RESEARCHTRENTZ ACAD PUBL EDUCATION SERVICES, 240 Elm Street, 2nd & 3rd Floors, Somerville, United States, MA, 02144



Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> Kepada: PNR Editorial Board <editorpnrjournal@gmail.com> 30 Oktober 2022 pukul 19.46

Dear Editor of PNR,

Thank you for your acceptance email. May I know what is the difference between the regular and special issue?

Sincerely yours,

Amallia [Kutipan teks disembunyikan]



Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> Kepada: PNR Editorial Board <editorpnrjournal@gmail.com> 1 November 2022 pukul 14.27

Dear Editor of PNR,

Herewith I attach my payment proof (290 USD) I want my article to be published in regular issue.

Sincerely, Amallia

Pada tanggal Min, 30 Okt 2022 19.35, PNR Editorial Board <<u>editorpnrjournal@gmail.com</u>> menulis: [Kutipan teks disembunyikan]



IMG20221101140150.jpg 4270K



Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> Kepada: PNR Editorial Board <editorpnrjournal@gmail.com> 4 November 2022 pukul 11.19

Dear Editorial Board of PNR,

I would like to ask about the progress of my accepted manuscript.

Is there any more procedure that I should follow? I have already paid 290 USD for the regular publication fee.

Thank you Sincerely Amallia [Kutipan teks disembunyikan]



PNR Editorial Board <editorpnrjournal@gmail.com> Kepada: Amallia Nuggetsiana Setyawati <amallia.setyawati@fk.undip.ac.id> 5 November 2022 pukul 21.29

Dear Author

Thank you for the attachment; your receipt is currently being verified. Also, as previously stated, please include the final copy of the article with this email.

With warm regards,

Editorial Board Journal of Pharmaceutical Negative Results https://www.pnrjournal.com/index.php/home

[Kutipan teks disembunyikan]

	Ori	iginal Article
1		
2 3 4 5	THE EFFECT OF GIVING paradisiaca) ON MALON RATS EXPOSED TO F	PLANTAIN PEEL EXTRACT (Musa IDIALDEHYDE LEVELS IN WISTAR ILTER CIGARETTE SMOKE
6 7 8 9 10 11	Satria Damarjati ¹ , Lusiana Batubara ² , Pus ¹ Faculty of Medicine Uni ² Department of Medical Biology and Biochemistry ³ Department of Pediatrics, Dip	spita Kusuma Dewi ² , Amallia Nuggetsiana Setyawati ^{2, 3*} iversitas Diponegoro, Semarang-50275 r, Faculty of Medicine Universitas Diponegoro, Semarang-50275 nonegoro National Hospital, Semarang-50275
12 13	Background: Free radicals from filter cigarettes can contribute t produces in response to oxidative stress. Antioxidants found in	o the body's oxidative stress. Malondialdehyde is a substance that the body plantain peel extract can be used to counteract oxidative damage.
14 15	Aim: This study sought to determine whether Wistar rats expose plantain peel extract.	ed to filtered cigarette smoke could have their MDA levels reduced by a
16 17 18 19 20	Methods: This study used an experimental design with a post-te sample were split into 4 separate groups. K+ received exposure at a dose of 200mg/kg BW, and P2 received exposure to cigarette su control. K+ received exposure to cigarette smoke. The retroorbital p levels in the plasma were measured using the TBARS technique	st-only control group of Wistar rats. Twenty-eight rats from the research to cigarette smoke, P1 received exposure to cigarette smoke and extracted moke and extracted at a dose of 400mg/kg BW. K- serves as the negative blexus vein was used to draw blood from the dead rats afterwards. MDA
21 22 23	Results: The average output of MDA levels in the K1, K2, P1, a respectively. The K- and K+ groups showed a significant differe (p=0.010), K+ and P2 group (p=0.025), and P1 and P2 group (p	and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, ence in the Mann-Whitney test (p=0.037), as did the K+ and P1 group =0.004).
24 25 26	Conclusion: MDA levels in Wistar rats exposed to filter cigarette Keywords: Malondialdehyde, filter cigarettes, plantain peel.	te smoke could be decreased by administering plantain peel extract.
27 28 29 30 31 32 33 34 35 36	Image: Display the i	 39 40 Indonesian clove cigarettes, also known as kretek, are a 41 blend of tobacco and cloves rolled into a cigarette and 42 sprayed with oils, plant extracts, and food flavourings in an 43 unknown quantity and composition, which varies by brand 44 and is usually kept hidden (Picanço et al., 2022). 45 Address for correspondence: Amallia Nuggetsiana Setyawati Department of Medical Biology and Biochemistry, Faculty of Medicine Universitas Diponegoro, Semarang Email: amallia.setyawati@fk.undip.ac.id This is an open-access journal, and articles are distributed under the terms of the Creative the new creations are licensed under the identical terms. For reprints contact: pnrjournal@gmail.com
37		How to cite this article: Satria Damarjati, Lusiana Batubara, Puspita Kusuma Dewi, Amallia Nuggetsiana Setyawati, THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIAL DEHYDE LEVELS IN
38	Journal of Pharmaceutical Negative Results / Volume 13 / Issue 4 / 2022	WISTAR RATS EXPOSED TO FILTED CICADETTE SMOKE I DUADM

WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE, J PHARM NEGATIVE RESULTS 2022;13: 1118-1123.

46		99 100
47		100
48	Based on the 2018 Basic Health Research, 33.8% of	101
49	Indonesia's population aged 15 years and over are active	102
50	smokers (Balitbangkes Kemenkes, 2019). Cancer and	103
51	immune-mediated inflammatory illnesses are two10	4
52	conditions for which smoking is a significant risk factor1	05.
53	Reactive oxygen and nitrogen species (ROS and RNS),	106
54	among other compounds, are present in tobacco smoke and	107
55	be capable of causing harm to lipids, proteins, and nucleic	108
56 57	acids, which are cellular and sub-cellular targets (Caliri I)	09et
58	radicals are among the numerous ovidents in	110 hich
50 59	concentrations in each cigarette puff (Caliri et al	111
60	concentrations in caen eigarette puir (cann et al.,	112
61	Thimmulappa et al., 2020). Cigarette smoke can indirectly	113
62	create more significant amounts of oxidants in the body by	114
63	activanti anti-intraminatory cetis to produce tree naticals	115
64	(unimers in , comp due to une manuer, execute) Ovvers Stocciss (ROS) can anise due to an abundance of free	116
65	radicals in the body and harm tissue (Venditti & Di Meo,	117
66	2020).	118
67	Malondialdehvde (MDA) is a dialdehvde mol	119 ecule
68	produced by the body's processes for enzymatic and non-	120
69	enzymatic lipid peroxidation. Because MDA readily reacts	121
70	with thiobarbituric acid, it is a biomarker for	the
71	peroxidation of omega-3 and omega-6 fatty acids (Fuloria et	123
72	al., 2020). The Thiobarbituric Acid (TBA) tes	t can
73	determine MDA levels. Because there are free radicals in the	125
74	body, the appearance of MDA suggests an oxidation process	127
15 76	in cell membranes. An increase in ROS from cig	arette
/0	smoke exposure causes increased fat peroxidation	in 129
//	smokers (De Leon & Borges, 2020).	130
78	Antioxidant-rich substances can reduce the harm caused by	131
/9	free radical oxidation. Southeast Asia is where the monoc	20t 132
80 91	plant, known as the banana, first appeared. Each	year, 133
82	Indensia produces more than 6 million tons of bananas. The plantain is a variety of bananas that is quite popular.	134
83	plantani is a variety of bahanas that is quite popular	135
84	Indonesia (Ningsih, 2019). Most of the time, individuals	136
85	consume the fruit and discurd the skin of the banana fruit	137
86	the presence of antioxidants in the skin, such as flavonoid	ls
87	and phenolic compounds. The plantain peel extra	act's
88	flavonoids have the potential to serve as antioxidants	139 to
89	lower MDA levels that increase as a result of exposure to	140
90	free radicals, which in this study was focused on filtered	141
91	cigarette smoke (Adetuyiet al., 2022). This finding	is 143
92	evident from the reason given above. The findings of this	144
93	study should shed light on the possibility of using plantain	1.4.7
94	peels to lower MDA levels.	145
95		140 147
06	METHODS	14/ 1/9
70	METHOD3	140 1 <u>/</u> 0
97	Sample	150
20		130

98 This study's sample consisted of Wistar (Ratus norvegicus)151

strain rats who met the following inclusion, exclusion, and dropout criteria Wistar rat (Rattus novergicus) 6-8 weeks old Active movement. 200-300 g, without anatomical flaws.

Exposure to Filter Cigarette Smoke

A smoking chamber was used to house animal samples. The smoking chamber has two holes: one for the outlet of filtered cigarette smoke exposure and the other for inserting lit filter cigarettes. Blowing cigarette filters is accomplished by using a smoking pump until the cigarette is extinguished. A cigarette smoke filter is administered twice daily, at 09.00 and 15.00, in the amount of two sticks, one at a time.

Extraction of Plantain Peel

The maceration process produced plantain peel extract. The maceration method is used without heating to ensure that the compounds in the plantain peel are adequately extracted and do not decompose. The tools and materials prepared were knives, an oven, scales, a maceration vessel, plantain, cotton, water, and 96% ethanol. The procedure was carried out based on previous research. The following is the procedure for extracting plantain peels; Peel the plantain to separate the skin from the fruit, plantain peel washed with water until clean, and plantain peel cut into small pieces. The plantain skin was dried in an oven at 50°C until dry. The dried plantain peels were sorted and weighed for the extraction process. The plantain peel was placed in a maceration vessel, and 96% ethanol solvent was added until the entire sample was completely submerged. The plantain peel and 96% ethanol solution were evenly stirred, and the maceration vessel was tightly closed to produce maceration. Recurrent stirring is done while the maceration process is kept at room temperature in a dark area. Filtration of the macerate with a cotton swab results in a filtrate. A thick plantain peel extract was made by evaporating the filtrate.

Dosage of Plantain peel extract

Another study stated that the most significant MDA level decreased with 200 mg/kg BW/day of kapok banana peel extract. 45 The dose from the prior study was used, and a second dose was added by multiplying the initial dose by two. The second dose is 400 mg/kg BW daily as result.

Animal Treatment

At our animal laboratory, all rats were housed in cages. Throughout the study, Wistar rats were fed and given water. The adaptation treatment lasted seven days and consisted of ad libitum traditional food and drink. The Wistar rats were randomly divided into four groups on the eighth day following the adaptation treatment, namely:

Rats in Group K- received standard feed and water. For 28 days, rats in Group K+ were given standard feed and water and were exposed to filtered cigarette smoke. Group K1: After 28 days of exposure to filtered cigarette smoke, rats were given standard feed and a sonde of plantain peel extract at 200mg/kg BW/day. Group K2: After 28 days of exposure to filter cigarette smoke, rats were given standard feed

212

213

214

228

229

152	treatment and 400mg/kg BW/day of plantain peel extract19	2.	
153	The treatment period for the animals lasted 28 days.	193	
154	Analytical Statistics	194	
155	The information obtained is primary data. The information	195	
156	is entered into a computer and analyzed using the Statistical	196	
157	Product and Service Solutions (SPSS) for Windows	197	
158	software.	198	
159	The Shapiro-Wilk homogeneity test was used to determine	ne	
160	the data distribution's normality. Data is classified as	200	
161	generally distributed at a 95% confidence interval if the p-	201	
162	value is 0.05. If the data is normally distributed, the one-way	202	
163	Anova test is used to determine whether there is a general20	03	
164	difference in rats' average blood MDA levels across all		
165	groups. Then conduct the Post Hoc Test to determine the	;	
166	various groups. A p-value of 0.05 indicates that the data is		
167	not generally distributed at a 95% confidence level. If the		
168	data is not normally distributed, the Kruskal-Wallis test of	can	
169	be used to compare the average blood MDA levels of rat	S	
170	across groups. The Mann-Whitney test is then used	to	
171	determine the various groups.	204	
172		205	
172	Proute	206	
1/3	INESUL15	207	
174	This study used a sample of 28 Wistar rats with a minimum	208	
175	age of 6 weeks before adaptation and a body weight of 2002	209-	
176	300 grams. Each group had one rat drop out during the2	10	
177	reament, so six samples were concreted. The MDA levels	211	
1/8	ID DECKI FORD FORD N. N. P. FL and F. WOR HED		

181 Table 1: Average and Normality Test of MDA Levels 215 182 (nnm)

L	o	4	

(ppm	

Group	$\bar{x} \pm SD$	Normality test (p-value)	r
K-	$1,695 \pm 0,78$	0,113*	
K+	$2,430 \pm 0,31$	0,248*	216
P1	$1,791 \pm 0,22$	0,282*	217
P2	$3,115 \pm 0,44$	0,960*	218 219
*Data are norr	nally distributed (p>0.05).		- 220 221

184 Note Group K-: received standard feed and water. Group

- 185 K+: exposed to filtered cigarette smoke. Group K1: exposed223
- 186 to filtered cigarette smoke and plantain peel extract at 224a
- 187 200mg/kg BW/day dose. Group K2: exposed to filtered225
- 188 cigarette smoke and plantain peel extract at a 200mg/kg226

```
189 BW/day dose.227
```

190

183

191 In the Shapiro-Wilk normality test, the data distribution was 230

normal (p>0.05) in all groups, so the mean was used as the measure of data concentration, and the standard deviation was used as the size of the spread. Deviation.

The findings of this study did not meet the statistical test requirements—one-way ANOVA. Unpaired numerical data and more than two groups, data with a normal distribution and homogeneous data variants are all required for the one-way ANOVA test. The data variance was not homogeneous in the Levene test, with p = 0.007 (p 0.05).

As a result, the Kruskal-Wallis test was used to determine the significant differences between each group.

Table 2: Krus	kal-Wallis Analysis
	Discuss MDA Lough
	(ppm)
Kruskal-Wallis H	15,820
Df	3
p-value	0,001

Description: *significant (p<0.05)

Note Group K-: received standard feed and water. Group K+: exposed to filtered cigarette smoke. Group K1: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg BW/day dose. Group K2: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg BW/day dose.

The table shows the results of the Kruskal-Wallis test with a pvalue of 0.001 (p 0.05), indicating significant differences between each group. To identify the differences between each group, the Mann-Whitney non-parametric test was used.

Table 3: Pairwise Mann-Whitney Test Group Comparison

Group-Group	p-value
(K-)-(K+)	0,037*
(K+)-(P1)	0,010*
(K+)-(P2)	0,025*
(P1)-(P2)	0,004*

Description: *significant (p<0.05)

Note Group K-: received standard feed and water. Group K+: exposed to filtered cigarette smoke. Group K1: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg BW/day dose. Group K2: exposed to filtered cigarette smoke and plantain peel extract at a 200mg/kg BW/day dose.

According to the Mann-Whitney test results table above, there was a significant difference between the K- group (negative control) and the K+ group (positive control) with a p value = 0.037 (p<0.05), the K+ group and the P1 group (extract dose 200mg/kg BW) with a p value = 0.010 (p<0.05), group K+ and group P2 (extract dose 400mg/kg BW) with a

p value = 0.025 (p<0.05) and between-group P1 and group P2 with a value of p= 0.004(p<0.05).

231 According to the Mann-Whitney test results, the results 284of 232 this study accepted the study's hypothesis, namely that there 285 233 was an effect of giving plantain peel extract on the 286 234 malondialdehyde levels of Wistar rats exposed to filter287 235 cigarette smoke. The findings supported the hypothesis that 288 236 administering plantain peel extract at a dose of 200mg/kg289 237 BW could reduce MDA levels in Wistar rats exposed 290to 238 filtered cigarette Kosmoke. However, the results of this 291 239 study rejected the hypothesis that the administration 292of 240 plantain peel extract at a dose of 400mg/kg BW could reduce 293 241 MDA levels in Wistar rats exposed to filtered cigarette 294

242 smoke.295

283

antioxidants (Afzal et al., 2022).

243	29	6
244	Discussion 29	7
245 246 247 248	MDA level measurements discovered that rats in the K- group had the lowest mean MDA levels because they did no receive any treatment other than standard feed. The mean of the K- group (1.695 ppm) was lower than that of the K+	299 t 300 301 302
249	group (2.430 ppm). However, based on the findings of the	03
250 251	research data analysis, the difference between the two of two of the two of two	04
251 252 253	groups was statistically significant (p>0.05). According to epidemiological research, fruits, vegetables, and ³³ les	05 06
253	processed staple foods provide the best defence against the 31)7
255	2021). Both banana peel and pulp contain antioxida	08 11
256	activity, though the amount varies depending on the variety.	10
257	Because of the presence of potassium, a single banana meal	10
258	can significantly reduce plasma oxidative stress in a healthy	יי י
259	human (Qamar & Shaikh, 2018).	3
260	Bananas are renowned for being the superior reservoir 314of	
261	potassium, which helps maintain muscle functioning and 315	
262	prevent muscle spasms. In particular, the fruits include316	
263	vitamin A and vitamin B6, which, when ingested, will317	
264	benefit., C and D enhance immunity and ensure appropriate318	
265	metabolic functions (Kumar et al., 2012). Not only are the 319	
266	fruits of Musa spp. Edible and therapeutic, other parts of the 320	
267	plant, including the blooms, peels, roots, and seeds, also321	
268	possess these qualities (Kumar et al., 2012; Padam et al322.,	_
269	2014).	3
270	The matrixed counter of hand and a structures. A constant	.4
271	proise ment, plana pel canaco sular y deneg	5
272	and mineral sources.	
273	(31.7mg/g), fat (1.7mg/g), and protein (0.9mg/g) are the	.1
274	energy sources in question. Numerous banana peels can be328	
275	used for a variety of purposes. There are 19.2mg/g calcium, 329	
276	24.3mg/g sodium, 78.1mg/g potassium, 76.2mg/g330	
277	manganese, 0.61mg/g iron, 0.21mg/g rubidium, bromine331	
278	0.04mg/g, strontium is 0.03mg/g, zirconium is 0.02mg/g,332	
279	and niobium is 0.02mg/g minerals in banana peels(Pyar 333&	
280	Peh, 2018). Banana peels can be utilized in a variety of ways334.	
²⁸¹ 282	Due to their capacity to donate hydrogen atoms to free 335 radicals, phenolic compounds are bananas' main	

The average MDA levels of rats in the P1 group (1.791 ppm) were lower than those in the K+ group (2.430 ppm), while those in the P2 group (3.115 ppm) were higher than those in the K+ group (2.430 ppm) and P1 group (1.791 ppm) (1.791 ppm). According to the findings of statistical analysis of research data, the difference in MDA levels between the K+ and P1 groups was statistically significant (p>0.05), and the difference in MDA levels between the P2 group and the K+ and P1 groups was statistically significant (p0.05).

Antioxidants are free radical-neutralizing chemicals that can be gained through dieting (Showell et al., 2014). Compared to synthetic antioxidants, phenolic substances are more potent and safer (Zeb, 2020).

The antioxidant effect of flavonoids can be attributed to the uptake of free radicals by hydrogen proton donors from the flavonoid hydroxyl group. The antioxidant effect of flavonoids is strongly influenced by substituting hydroxy groups in the ortho and para positions to the OH and OR groups (Lopes et al., 2020).

Cellular ROS are neutralized or eliminated by the antioxidant defence system. GSH is mainly present in its reduced form, which functions as an important intracellular antioxidant. In addition to halting DNA production and mending damaged DNA pieces, it helps to protect cells from oxidative damage, harmful substances, and radiation. Malondialdehyde is one of these by-products and a widely recognized sign of oxidative stress (Denk et al., 2022). The flavonoids extracted from Musa paradisiaca in rats were found to stimulate the activities of superoxide dismutase (SOD) and catalase, which may be to blame for the decreased levels of peroxidation products like hydroperoxides (Galani, 2019). Consuming flavonoids have a favourable influence on oxidative, glucose, and lipid metabolisms (Neri-Numa et al., 2020). The phenolic components in banana peel range from 0.90 to 3.0 g/100 g in dry weight(Singh et al., 2016). Flavonoids inhibit the action of the Nicotinamide Adenine Dinucleotide Phosphate (NADPH) oxidase and xanthine oxidase, as well as binding to metals (Cu2+ and Fe2+), which have a preventive effect on

redox reactions that can generate free radicals. In vivo, flavonoids can be present sufficiently high quantities to exhibit pharmacological activity at receptors, enzymes, and transcription factors (Azzi, 2022). Flavonoids can preserve redox tone alterations and enhance oxidative stress markers (Oteiza et al., 2021).

Our result is in line with research on the results of administering rat exercise-induced plantain peel extract. In this experiment, rats' MDA levels were considerably lowered by administering banana peel extract following high and lowintensity exercise (Kinanti et al., 2021). In addition, research on diabetic rabbits with hyperlipidemia demonstrates that kapok banana peel extract can lower MDA levels. This study found that giving banana peel extract to rabbits resulted in considerably decreased MDA levels (Samiasih et al., 2019).

In high fat fed/low dose streptozotocin-induced diabetic rats,

336

338 diets supplemented with boiled unripe plantain (20%-40%)391 339 prevented lipid peroxidation compared to acarbose392 340 administration. When unripe plantains are boiled, they can 393 341 provide the necessary natural therapeutic measures to be managing 395 342 considered a potential economic means of 343 diabetes in underdeveloped countries (Ajiboye 3[°]96 344 Shodehinde, 2022). 39 39 345 39 dose of 200 mg/kg BW plantain peel extract 346 400 to 347 significantly lower MDA levels than rats exposed 348 cigarette smoke alone. However, rats exposed to cigarette40 349 4(40 350 BW had significantly higher MDA levels than rats exposed 405 351 to cigarette smoke and given plantain peel extract at a dose 352 of 200mg/kg BW and rats exposed to cigarette smoke only 407353 40 354 does not exceed the maximum dose in Wistar rats, allowing 410 355 the administration of plantain peel extract to reduce MDA 356 levels. In contrast, plantain peel extract at 400mg/kg BW41 4 357 41 358 body. MDA levels in rats rise as a result of this. When there 41: 359 is an imbalance between antioxidant and oxidant compounds 360 in the body, or when antioxidant levelsare high while4 361 4 oxidant levels are low, the body will 41 362 compounds to balance the levels, increasing peroxidation 420 363 and an increase in MDA levels. According to another study, the ethanol extract Musa paradisiaca L. contains secondary $4\ddot{2}$ 364 42 365 metabolites and can potentially be a weak 4^{2} 366 Several restrictions apply to this study, includ 42 367 determining antioxidant active ingredient concentration 368 This study did not include any histopathological analysis42 369 (Nurmazela et al., 2022). 4 42 370 4 4 371 Conclusion 4 4 372 Plantain peel extract was found to lower MDA levels 43 4_{ii} 373 4 43 374 mechanism is that the presence of phenolic compounds in 43 4 375 banana peel reduces lipid peroxidation activity. 4 376 Ethical clearance 4 4 377 The Ethics Committee of the Faculty of 44 378 Universitas Diponegoro, has granted ethical clearance with 44 **4**4 379 number 05/EC/H/FK-UNDIP/1/2022. 4 380 Acknowledgement 4 381 4 4 382 express our appreciation for the technical ussist 44 383 provided during this study course. The publication fee of this 384 study is supported by the Faculty of Medicine, Universitas 385 Diponegoro. 4 4 386 Contribution of Author 4 4 387 Formal analysis, ANS; investigation, PKD, and ANS; data 456 388 curation, ANS; writing-original draft preparation, ANS; writing-review and editing, ANS; and funding acquisition, 45 389 459 390 ABS. Conceptualization, SD, ANS, and PKD; methodology,

PKD, and ANS validation, PKD, LB, and ANS; formal analysis, ANS; and investigation, PKD, and ANS. All authors have read and approved the final text.

REFERENCES

97	1.	Adetuvi, B. O., Ogundipe, A. E., Ogunlana, O. O., Egbuna, C., Estella,
98		O II Mishra A P Akram M & Achar R R (2022) Banana neel
99		is a source of putrocouticels. Food and agricultural by products are
had		is a source of nutraceuticals. Food and agricultural by-products are
)		essential sources of valuable nutraceuticals (pp. 243–250). Springer.
$\mathbf{\hat{n}}$	2.	Afzal, M. F., Khalid, W., Akram, S., Khalid, M. A., Zubair, M., Kauser,
12		S., Abdelsamea Mohamedahmed, K., Aziz, A., & Anusha Siddiqui, S.
03		(2022). Bioactive profile and functional food applications of banana in
)4		food sectors and health: a review. International Journal of
5		Food Properties 25(1) 2286-2300
-		https://doi.org/10.1080/109/2912.2022.21309/0
7	2	https://doi.org/10.1080/10942912.2022.2150940
/. No	3.	Ajiboye, A. O., & Shodehinde, S. A. (2022). Diet supplemented with
00		boiled unripe plantain (Musa paradisiaca) exhibited antidiabetic
)9		potentials in streptozotocin-induced Wistar rats. Journal of Food
D		Biochemistry, e14431.
		https://doi.org/https://doi.org/10.1111/jfbc.14431
12	4	Azzi A (2022) Oxidative Stress: What Is It? Can It Be Measured?
13		Where Is It Located? Can It Be Good or Bad? Can It Be Prevented?
4		C I D C 10 A ()1 (11(0) 1421
		Can It Be Cured? Antioxidants, $11(8)$, 1431 .
5		https://www.mdpi.com/2076-3921/11/8/1431
17	5.	Balitbangkes Kemenkes, R. (2019). Laporan Nasional Riskesdas
1/		2018. Lembaga Penerbit Badan Penelitian dan Pengembangan
18		Kesehatan. Jakarta, 1-674.
9	6.	Caliri, A. W., Tommasi, S., & Besaratinia, A. (2021), Relationships
n 🧳	~	among smoking oxidative stress inflammation macromolecular
		damage and cancer Mutation Pesearch/Peviews in Mutation
2		D 1 707 100265
วัว		Research, 787, 108305.
		https://doi.org/https://doi.org/10.1016/j.mrrev.2021.108365
24 ling	7.	De Leon, J. A. D., & Borges, C. R. (2020). Evaluation of oxidative
5		stress in biological samples using the thiobarbituric acid reactive
ns.		substances assay. JoVE (Journal of Visualized Experiments)(159),
27	1	e61122.
28	8.	Denk, B., Avcı, G., Avdoğan, B., Fidan, A. F., & Aslan, R. (2022).
29		Redox-changing effects of popular tobacco products in rats. Turkish
30		Journal of Piochemistry 47(2) 241 247
31		$\frac{1}{10000000000000000000000000000000000$
20		https://doi.org/doi:10.1515/tjb-2021-0115
52	9.	Emma, R., Caruso, M., Campagna, D., Pulvirenti, R., & Li Volti, G.
33		
		(2022). The Impact of Tobacco Cigarettes, Vaping Products and
n		(2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9),
n 35		(2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829.
n 35 36	10.	(2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramanivan, V., Karupiah, S., Kumari, U., Sathasiyam,
n 35 36	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria,
n 35 36 38	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source types effects.
n 35 36 7 38 39	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, protostabulogu, dotaction and therapoution measurement of reacting.
n 35 36 7 38 39 40	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive concentration of the products of the product of the
n 35 36 7 38 39 40 41	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidante, 10(1), 1075
n 35 36 7 38 39 40 41	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075.
n 35 36 7 38 39 40 41 42	10.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive
n 35 36 7 38 39 40 41 42 3	10. 11.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and
$ \frac{1}{35} $ $ \frac{7}{38} $ $ \frac{7}{38} $ $ \frac{39}{40} $ $ \frac{41}{42} $ $ \frac{3}{44} $	10. 11.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56.
n 35 36 7 38 39 40 41 42 3 44 45	10. 11. 12.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco
n 35 36 7 38 39 40 41 42 3 44 45 46	 10. 11. 12. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one.
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 40 \\ 41 \\ 4\overline{2} \\ 344 \\ 45 \\ 445 \\ 445 \\ 445 \\ 447 \end{array}$	 10. 11. 12. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558.
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 40 \\ 41 \\ 42 \\ 344 \\ 45 \\ 46 \\ 47 \\ 18 \end{array}$	 10. 11. 12. 13 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558.
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 40 \\ 41 \\ 42 \\ 344 \\ 45 \\ 445 \\ 445 \\ 445 \\ 447 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 38 \\ 48 \\ 4$	 10. 11. 12. 13. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. L., & Comprise V. A. (2021). Disarding parties and by Nitre
n 35 36 7 38 39 40 41 42 3 44 45 46 47 48 9	 10. 11. 12. 13. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro
n 35 36 7 38 39 40 41 42 3 44 45 46 47 48 9	 10. 11. 12. 13. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi.
$ \frac{n}{35} $ $ \frac{3}{36} $ $ \frac{3}{38} $ $ \frac{3}{39} $ $ \frac{41}{42} $ $ \frac{41}{42} $ $ \frac{3}{44} $ $ \frac{44}{45} $ $ \frac{46}{47} $ $ \frac{48}{9} $	10.11.12.13.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product
n 35 36 7 38 39 40 41 42 3 44 45 46 47 48 9° 52	10.11.12.13.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042.
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 40 \\ 41 \\ 42 \\ 34 \\ 445 \\ 446 \\ 447 \\ 48 \\ 9 \\ 52 \\ 53 \end{array}$	10.11.12.13.14.	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042.
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 389 \\ 40 \\ 41 \\ 42 \\ 344 \\ 45 \\ 445 \\ 445 \\ 445 \\ 445 \\ 447 \\ 48 \\ 9 \\ 52 \\ 53 \\ 54 \end{array}$	 10. 11. 12. 13. 14. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042. Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari, L. P., Abdurrahman, A., & Rukavadi, Y
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 389 \\ 340 \\ 41 \\ 42 \\ 344 \\ 45 \\ 447 \\ 48 \\ 55 \\ 55 \\ 55 \\ 55 \\ 55 \end{array}$	 10. 11. 12. 13. 14. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjpnr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042. Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari, L. P., Abdurrahman, A., & Rukayadi, Y. (2021). The preventive role of Raia banana peel (Mussa paradisios)
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 41 \\ 42 \\ 34 \\ 45 \\ 445 \\ 447 \\ 48 \\ 9 \\ 53 \\ 546 \\ 55 \\ 55 \\ 55 \\ 55 \\ 55 \\ 55 \\ 5$	 10. 11. 12. 13. 14. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042. Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari, L. P., Abdurrahman, A., & Rukayadi, Y. (2021). The preventive role of Raja banana peel (Mussa paradisiaca carbioxidant in production and plants).
$\begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 41 \\ 42 \\ 344 \\ 45 \\ 445 \\ 447 \\ 48 \\ 9 \\ 53 \\ 54 \\ 55 \\ 55 \\ 55 \\ 55 \\ 55 \\ 55$	 10. 11. 12. 13. 14. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042. Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari, L. P., Abdurrahman, A., & Rukayadi, Y. (2021). The preventive role of Raja banana peel (Mussa paradisiaca sapientum) extract as exogenous antioxidant in reducing a sparadisiaca as exogenous antioxidant in reducing a santoxidant in reduci
$ \begin{array}{c} n \\ 35 \\ 36 \\ 7 \\ 38 \\ 39 \\ 40 \\ 41 \\ 42 \\ 34 \\ 45 \\ 46 \\ 47 \\ 48 \\ 9^{5} \\ 52 \\ 53 \\ 54 \\ 55 \\ 58$	 10. 11. 12. 13. 14. 	 (2022). The Impact of Tobacco Cigarettes, Vaping Products and Tobacco Heating Products on Oxidative Stress. Antioxidants, 11(9), 1829. Fuloria, S., Subramaniyan, V., Karupiah, S., Kumari, U., Sathasivam, K., Meenakshi, D. U., Wu, Y. S., Guad, R. M., Udupa, K., & Fuloria, N. K. (2020). A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. Antioxidants, 9(11), 1075. Galani, V. (2019). Musa paradisiaca LinnA Comprehensive Review. Scholars International Journal of Traditional and Complementary Medicine, 45-56. Holipah, H., Sulistomo, H. W., & Maharani, A. (2020). Tobacco smoking and risk of all-cause mortality in Indonesia. PloS one, 15(12), e0242558. Igwe, C. U., Onyeagoro, E. E., Morah, A. C., Nwaogu, L. A., Iheme, C. I., & Onwuliri, V. A. (2021). Phenolic Profile and In Vitro Antioxidant Potential of Four Medicinal Plants: doi. org/10.26538/tjnpr/v5i11. 24. Tropical Journal of Natural Product Research (TJNPR), 5(11), 2037-2042. Kinanti, R. G., Pelana, R., Yunus, M., Abdullah, A., Andarianto, A., Kusuma, S. A. F., Sari, L. P., Abdurrahman, A., & Rukayadi, Y. (2021). The preventive role of Raja banana peel (Mussa paradisiaca sapientum) extract as exogenous antioxidant in reducing atherosclerosis risk after exercise intervention. Journal of Physical

15. Kumar, K. S., Bhowmik, D., Duraivel, S., & Umadevi, M. (2012).

460	Traditional and medicinal uses of banana. Journal of Pharmacognosy
461	and Phytochemistry, 1(3), 51–63.
462	16. Lopes, S., Borges, C. V., de Sousa Cardoso, S. M., de Almeida
463	Pereira da Rocha, M. F., & Maraschin, M. (2020). Banana (Musa
464	spp.) as a source of bioactive compounds for health promotion.
465	Handbook of Banana Production, Postharvest Science, Processing
466	Technology, and Nutrition, 227-244.
407	17. Neri-Numa, I. A., Cazarin, C. B. B., Ruiz, A. L. T. G., Paulino, B. N.,
408	molilia, G., & Pastore, G. M. (2020). Targeting flavonoids on modulation of metabolic syndrome. Journal of Functional Foods, 73
470	104132, https://doi.org/https://doi.org/10.1016/i.iff.2020.104132
471	18. Ningsih, R. M., Rita. (2019). Folic acid content and fruit
472	characteristics of five Indonesian dessert banana cultivars.
473	Biodiversitas Journal of Biological Diversity, 20(1), 144-151.
474	19. Nurmazela, V., Ridwanto, R., & Rani, Z. (2022). Antioxidant
475	Activity Test of Barangan Banana Hump's Ethanol Extract (Musa
4/6	Paradisiaca (L.)) with DPPH (1, 1 Diphenyl-2-Picrylhydrazyl)
477	Method. International Journal of Science, Technology & Management 3(5) 1478 1483
479	20 Oteiza P I Fraga C G & Galleano M (2021) Linking
480	biomarkers of oxidative stress and disease with flavonoid
481	consumption: From experimental models to humans. Redox Biology,
482	42, 101914.
483	https://doi.org/https://doi.org/10.1016/j.redox.2021.101914
484	21. Padam, B. S., Tin, H. S., Chye, F. Y., & Abdullah, M. I. (2014).
486	great notential Journal of food science and technology 51(12) 3527-
487	3545.
488	22. Picanço, J. M. A., Limberger, R. P., & Apel, M. A. (2022). Where
489	should I start? A scoping review about the publications on clove
490	cigarettes. Critical Reviews in Toxicology, 52(4), 259-293.
491	23. Pyar, H., & Peh, K. (2018). Chemical Compositions of Banana Peels
492	(Musa sapientum) Fruits cultivated in Malaysia using proximate
494	24 Oamar S & Shaikh A (2018) Therapeutic potentials and
495	compositional changes of valuable compounds from banana- A
496	review. Trends in Food Science & Technology, 79, 1-9.
497	https://doi.org/https://doi.org/10.1016/j.tifs.2018.06.016
498	25. Samiasih, A., Subagio, W., Susanto, H., Sadhana, U., Sunoko, H., &
499	Santosa, B. (2019). Banana peels extract (Musa Paradisiaca Var Kanak) Decreased MDA in New Zeeland White Dekkit With DM
501	Hyperlinidemia IOP Conference Series: Earth and Environmental
502	Science,
503	26. Showell, M. G., Mackenzie-Proctor, R., Brown, J., Yazdani, A.,
504	Stankiewicz, M. T., & Hart, R. J. (2014). Antioxidants for male
505	subfertility. Cochrane Database of Systematic Reviews(12).
500	27. Singh, B., Singh, J. P., Kaur, A., & Singh, N. (2016). Bioactive
508	Food Chemistry pp 206 1-11
509	https://doi.org/https://doi.org/10.1016/i.foodchem.2016.03.033
510	28. Thimmulappa, R. K., Chattopadhyay, I., & Rajasekaran, S. (2020).
511	Oxidative stress mechanisms in the pathogenesis of environmental
512	lung diseases. In Oxidative Stress in Lung Diseases (pp. 103-137).
513	Springer.
514 515	29. Venditti, P., & Di Meo, S. (2020). The role of reactive oxygen species
516	m me me cycle of the mitochondrion. International Journal of Molecular Sciences 21(6) 2173
517	30. Zeb, A. (2020). Concept, mechanism, and applications of phenolic
518	antioxidants in foods. Journal of Food Biochemistry 44(9) e13394
	= 10000, 000000, 0000000, 0000000, 000000

JOURNAL OF PHARMACEUTICAL NEGATIVE RESULTS

HOME / ARCHIVES / VOL. 13 NO. 4 (2022) / Articles

THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE

Satria Damarjati

Lusiana Batubara

Puspita Kusuma Dewi

Amallia Nuggetsiana Setyawati

DOI: https://doi.org/10.47750/pnr.2022.13.04.155

Keywords: Malondialdehyde, filter cigarettes, plantain peel.

ABSTRACT

Background: Free radicals from filter cigarettes can contribute to the body's oxidative stress. Malondialdehyde is a substance that the body produces in response to oxidative stress. Antioxidants found in plantain peel extract can be used to counteract oxidative damage.

Aim: This study sought to determine whether Wistar rats exposed to filtered cigarette smoke could have their MDA levels reduced by a plantain peel extract.

Methods: On Wistar rats, this study used an actual experimental design with a post-test-only control group. Twenty-eight rats from the research sample were split into 4 separate groups. K+ received exposure to cigarette smoke and extracted at a dose of 200mg/kg BW, and P2 received exposure to cigarette smoke and extracted at a dose of 400mg/kg BW. K- serves as the negative control. K+ received exposure to cigarette smoke. The retroorbital plexus vein was used to draw blood from the dead rats afterward. MDA levels in the plasma were measured using the TBARS technique.

Results: The average output of MDA levels in the K1, K2, P1, and P2 groups was 1.695 ppm, 2.430 ppm, 1.791 ppm, and 3.115 ppm, respectively. The K- and K+ groups showed a significant difference in the Mann-Whitney test (p=0.037), as did the K+ and P1 group (p=0.010), K+ and P2 group (p=0.025), and P1

3/1/23, 11:13 PM

THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR ... and P2 group (p=0.004).

Conclusion: MDA levels in Wistar rats exposed to filter cigarette smoke could be decreased by administering plantain peel extract.

🔎 PDF

PUBLISHED

2022-11-07

HOW TO CITE

Satria Damarjati, Lusiana Batubara, Puspita Kusuma Dewi, & Amallia Nuggetsiana Setyawati. (2022). THE EFFECT OF GIVING PLANTAIN PEEL EXTRACT (Musa paradisiaca) ON MALONDIALDEHYDE LEVELS IN WISTAR RATS EXPOSED TO FILTER CIGARETTE SMOKE. Journal of Pharmaceutical Negative Results, 13(4), 1118–1123. https://doi.org/10.47750/pnr.2022.13.04.155

More Citation Formats

ISSUE

Vol. 13 No. 4 (2022)

SECTION

Articles

COVER PAGE

•

3/1/23, 11:13 PM



INDEXING



3/1/23, 11:13 PM



MAKE A SUBMISSION

CURRENT ISSUE

ATOM 1.0

RSS 2.0

RSS 1.0

INFORMATION

For Readers

For Authors

For Librarians

Open Journal Systems Hosting and Support by: OpenJournalSystems.com



JOURNAL OF PHARMACEUTICAL NEGATIVE RESULTS

HOME / Editorial Team

Editorial Team

Editor-in-Chief

Dr. Dhiren Shah Professor, College of Pharmacy, India Editorial Board Members

Dr. Chakradhara Rao Satyanarayana Uppugundur, B.Pharm., M.Sc., PhD,

Pharmacology, Laboratoire de la fondation CANSEARCH, Department of Pediatrics (University Hospital of Geneva), BatiamentTulipe; 64, Avenue De La Roseraie1205, Geneve.

Dr. Nachiappa Ganesh Rajesh, M.B.B.S., MD,

Pathology, Department of Pathology, JIPMER, Pondicherry, India

Dr.V.Ravichandran,

Pharmaceutical Chemistry Unit, Faculty of Pharmacy, AIMST University, Bedong, Malaysia

Dr.Ramya S Kuna,

Postdoctoral Research Fellow, Salk Institute for Biological Studies, California

Dr. K. Krishnaraj, M Pharm., PhD

Pharmaceutical chemistry, Research Scientist Formulation & Development (Pharma), R&D,The Himalaya Drug Company, Makali, Bangalore, India

Dr. Nandha Kumar Subbiah, M.Sc., Ph.D.,

Medical Anatomy Medical University of the Americas, P.O. Box 701, Charlestown, Nevis, West Indies

Dr.Haidar K.A.Alsaedi

Department of Basic Science, Faculty of Dentistry, Al-Qadisyah University, Iraq

Dr. Venugopala KN, Ph.D

Pharm Chemistry Department of Biotechnology and Food Technology, Durban University of Technology, Durban-4001, South Africa.

K.S. Jaganathan Ph.D

General Manager, Manufacturing Technology, Shantha Biotechnics Ltd (A Sanofi company), Medchal, Hyderabad. India.

A.V. Jayapala Reddy,

Associate Vice President, & Global Head - Biologics, Business Development, Hetero Labs Ltd, Hyderabad,Telangana, India.

Dr. S. Rajasekaran, Ph.D

Professor, Al-Ameen College of Pharmacy, Bangalore, India

Dr. Sandra Barbalho,

Department of Biochemistry and Pharmacology, School of Medicine, University of Marília, Department of Biochemistry and Nutrition, Faculty of Food Technology of Marília, Marília - SP,Brazil

Dr. Syam Mohan, RPh, D.Pharm, B.Pharm, PhD (Pharmacology)

Director, Central Laboratory, MRC, Head, Bio-Medical Research Unit, Medical Research Center Jazan University, Jazan Kingdom of Saudi Arabia

Dr. Fatima Samad. M.D.,

Aurora Cardiovascular Services, Aurora Sinai/Aurora St. Luke's Medical Centers, University of Wisconsin School of Medicine and Public Health, Milwaukee, Wisconsin, USA.

Dr. Manik, M. Pharm., Ph.D., RPh.

Assistant Professor, Chief Editor - PHARMBIT (ISSN: 0973-6204) Department of Pharmaceutical Sciences & Technology, Birla Institute of Technology, Mesra, Ranchi (Jharkhand), India

Dr. Sudeep Gautam, Ph.D

Diabetes section, Laboratory of Clinical Investigation (LCI), IRP (Intramural Research Program) NIA (National Institute on Aging), BRC (Biomedical Research Center), NIH (National Institute of Health), 251 Bayview Blvd. Baltimore, MD

Dr. Raghava Naidu, Ph.D

Department of Human Oncology, University of Wisconsin, 1111, Highland Ave, Madison, Wisconsin 53705, USA

Dr. A.R. Suresh Babu, M.Pharm.Ph.D.,

Global Data and Safety Monitoring, Quintiles Research India Pvt Ltd, Bangalore, India

Dr. Maithili Karpaga Selvi. N, MS.c, Ph.D,

Assistant Professor, Department of Biochemistry, All India Institute Of Medical Science (AIIMS), Jodhpur, Rajasthan. INDIA

Dr. Yujie Zhu, MD & Ph.D

Exec. Editor-in-Chief, Journal of Cardiovascular Disease Research, Department of Medicine/Cardiology, University of Alabama at Birmingham, 1670 University Blvd Birmingham, AL 35294, USA

Dr. Madhavrao Chavan M.B.B.S, M.D.,

Associate Professor, Dept. of Pharmacology, Azeezia Institute of Medical Sciences & Research [AIMSR], Meeyannoor [Kollam District], Kerala - 691 537, India

Dr. Narmadha Balakrishnan,

Government Hospital, Tambaram, Chennai,India.

Dr. Vanaja K, M.Pharm, Ph.D

Formerly Asst Prof, Visveswarapura Institute of Pharmaceutical Sciences 22nd Main, 24th Cross, Opp to BDA Complex BSK 2nd Stage, Bangalore, Karnataka, India

Guest Editor Dr. Shubhrajit Mantry Professor, HOD, Sharadchandra Pawar College of pharmacy, (Savitribai Phule Pune University) Otur, Pune, Maharashtra, India

COVER PAGE



INDEXING





Editorial Team | Journal of Pharmaceutical Negative Results

MAKE A SUBMISSION

CURRENT ISSUE

ATOM 1.0

RSS 2.0

RSS 1.0

INFORMATION

For Readers

For Authors

For Librarians

Open Journal Systems Hosting and Support by: OpenJournalSystems.com



KOMISI ETIK PENELITIAN KESEHATAN HEALTH RESEARCH ETHICS COMMITTE UNIVERSITAS DIPONEGORO FAKULTAS KEDOKTERAN

Sekretariat : Kantor Dekanat Lama FK UNDIP LL 1 Jl. Dr. Soctomo 18 Semarang. Telp. 024-769280010; 769280011 pswt 7820, email : komisietikægmail.com

D

ETHICAL CLEARANCE No. 05/EC/H/FK-UNDIP/I/2022

Komisi Etik Penelitian Kesehatan Fakultas Kedokteran Universitas Diponegoro Semarang, setelah membaca dan menelaah Usulan Penelitian dengan judul :

Pengaruh Pemberian Ekstrak Kulit Pisang Raja (Musa Paradisiaca) terhadap Kadar Malondialdehid pada Tikus Wistar yang **Dipapar Asap Rokok Filter**

Nama Peneliti : Satria Damarjati

Pembimbing	:	1. dr. Amalia Nuggetsiana Setyawati, M.Si.Med.SpA 2. dr. Puspita Kusuma Dewi, M.Si.Med, Sp.M
Institusi	E.	Program Pendidikan Sarjana Kedokteran Fakultas Kedokteran Universitas Diponegoro Semarang
Penelitian	1	Dilaksanakan di Laboratorium Biomedik Terintegrasi Fakultas Kedokteran Universitas Sultan Agung Semarang

Setuju untuk dilaksanakan, dengan memperhatikan prinsip-prinsip yang dinyatakan dalam Deklarasi Helsinki 1975, yang diamandemen di Seoul 2008 dan Pedoman Nasional Etik Penelitian Kesehatan (PNEPK) Departemen Kesehatan RI 2011.

Pada laporan akhir peneliti harus melampirkan cara pemeliharaan & dekapitasi hewan coba dan melaporkan ke KEPK bahwa penelitian sudah selesai dilampiri Abstrak Penelitian.

Semarang, 18 Januari 2022

LIT Kom Si Etik Penelitian Kesehatan Fakblas Kedokteran Undip, Ketua; Ú, PK E U? FKONDIP RS Dr. Prof. Dr. dr. Banundari Rachmawati, Sp.PK(K) NIP.196006061988112002