

THE RELATIONSHIP BETWEEN MACRONUTRIENT INTAKE AND PHYSICAL ACTIVITY WITH PLASMA SOD ACTIVITY : BASED ON PLASMA MDA LEVEL OF MINANGKABAU ETHNICITY MEN, IN WEST SUMATERA, INDONESIA

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Abstract. Reactive Oxygen Species (ROS) is the most dangerous radical in the body's biological system. Physical activity and an unbalanced diet can improve ROS. Malondialdehyde is a compound that can be used as an enhancer marker of ROS. **Objective:** The purpose of this research is to investigate the relationship between macronutrient intake and physical activity with plasma SOD activity based on plasma MDA level of Minangkabau ethnic men in West Sumatera, Indonesia. This cross-sectional study was conducted in Padang City in 2016, using a sample of 124 Minangkabau ethnic men, aged between 40-50 years. The macronutrient intake (carbohydrates, total fat, protein) were collected using a Food Frequency Questionnaire, physical activity by IPAQ Questionnaire and blood sample analysis to measure plasma SOD activity and MDA Plasma. Data is processed using a computer program, to see the relationship between variables conducted Chi-Square test. This research indicated an average carbohydrates was 57,77+ 9,14% , total fat intake was 27.01 + 6.68%, protein intake was 15,76+3,53 %. Average of plasma SOD activity was 6,18+ 3,94 U/mL and MDA plasma 70.22+18.06 nmol/mL. Respondents with mild physical activity were 58%. There is a relationship between severe physical activity and high fat intake with plasma SOD activity based on plasma MDA levels ($p < 0.05$). Severe physical activity and high fat intake were risk factors for decreased plasma SOD activity because they can increase plasma MDA levels.

Keywords: macronutrient intake, SOD Activity, Plasma MDA Level, RO



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ACTIVITY : BASED ON PLASMA MDA LEVEL OF
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Introduction

- Lifestyle changes are related to increasing the risk of non-communicable diseases (NCD), there are several risk factors that increase the incidence of NCD among others physical inactivity, unhealthy diets, smoking, alcohol, and obesity.
- Poor consumption of vegetables and fruits and Physical activity is an important risk factor for various diseases associated with NCD.
- The high intake of glucose and fat will disrupt the activity of the electron transport chain which has an impact on increasing the production of Reactive Oxygen Species (ROS).
- Malondialdehyde is used as a marker to measure the total radical load of the body.



Methode

- This study was an analytic observational study with a cross-sectional study design
- The aimed to determine the relationship between macronutrien intake and physical activity with plasma SOD activity : based on plasma MDA level of Mainangkabau ethnicity men in Padang City, West Sumatera
- This study was conducted in Padang City in 2016, using a sample of 124 Minangkabau ethnic men, aged between 40-50 years.
- The macronutrient intake (carbohydrates, total fat, protein) were collected using a Food Frequency Questionnaire, physical activity by IPAQ Questionnaire and blood sample analysis to measure plasma SOD activity and MDA Plasma.
- Data is processed using a computer program, to see the relationship between variables conducted Chi-Square test.

Table 1. Distribution of Respondent Based on Physical Activity, SOD Activity, Plasma MDA Level

Variable	n	%
SOD activity (U/ml)		
- low	67	54
- high	57	46
Plasma MDA Level (nmol/mL)		
- low	61	49.2
- high	63	50.8
Physical activity		
-Light	72	58.1
-While	35	28.2
-Weight	17	15.7

Table 2. Distribution of Respondent Frequency Based on Macronutrient Intake

Variable	n	%
Carbohydrates intake (%)		
- Less	23	18.5
- Enough	52	41.9
- More	49	39.5
Fat intake (%)		
- Less	25	20.2
- Enough	66	53.2
- More	33	26.6
Protein intake (%)		
- Less	58	46.8
- Enough	49	39.5
- More	17	13.7

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Table 3. The relationship between Physical Activity and SOD Activity based on MDA Pla Level

PA	MDA	SOD Activity				Total		P
		Low		High		n	%	Value
		n	%	n	%			
Less	Low	17	47.2	19	52.8	36	100	0.81
	High	18	50	18	50	36	100	
Medium	Low	35	48.6	37	51.4	72	100	0.07
	High	10	52.6	9	47.4	19	100	
Severe	Low	1	16.7	5	83.3	6	100	0.04*
	High	8	72.7	3	23.7	17	100	

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Table 4. Food Intake Relationship with SOD Activity based on Plasma MDA

Food Intake	MDA	SOD Activity				Total		P Value
		Low		High		n	%	
		n	%	n	%			
Total Fat								
Less	Low	9	75	3	25	12	100	0.67
	High	8	61.5	5	38.5	13	100	
Enough	Low	15	44.1	19	55.9	34	100	0.16
	High	19	59.4	13	40.6	32	100	
More	Low	4	26.7	11	73.3	15	100	0.03*
	High	12	66.7	6	33.3	18	100	

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Discussion



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- In this study, it was found that, there is a significant relationship between severe physical activity and SOD activity based on plasma MDA levels.
- The effect of physical activity on the occurrence of oxidative stress is divided into acute responses and chronic responses.
- Several theories explain that the chronic response to physical activity can reduce oxidative stress by increasing enzymatic antioxidant activity in liver cells such as superoxide dismutase (SOD).
- Exercise that is carried out continuously and regularly can reduce plasma MDA levels and increase SOD activity

Discussion



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- In this study, a significant relationship was found between high fat intake and SOD activity based on plasma MDA levels.
- Intake of foods containing high SAFA can increase the release of ROS and proinflammatory cytokines so as to increase oxidative stress levels in the body so that the plasma MDA will be high.
- Eating habits by consuming saturated fatty acids that exceed standard requirements, in the long run, can increase the formation of ROS in various tissues.
- Cytokine-induced NADPH oxidase in inflammatory processes or disorders of the mitochondrial electron transport chain that causes an increase in oxidative stress

(Eszyet al., 2014).

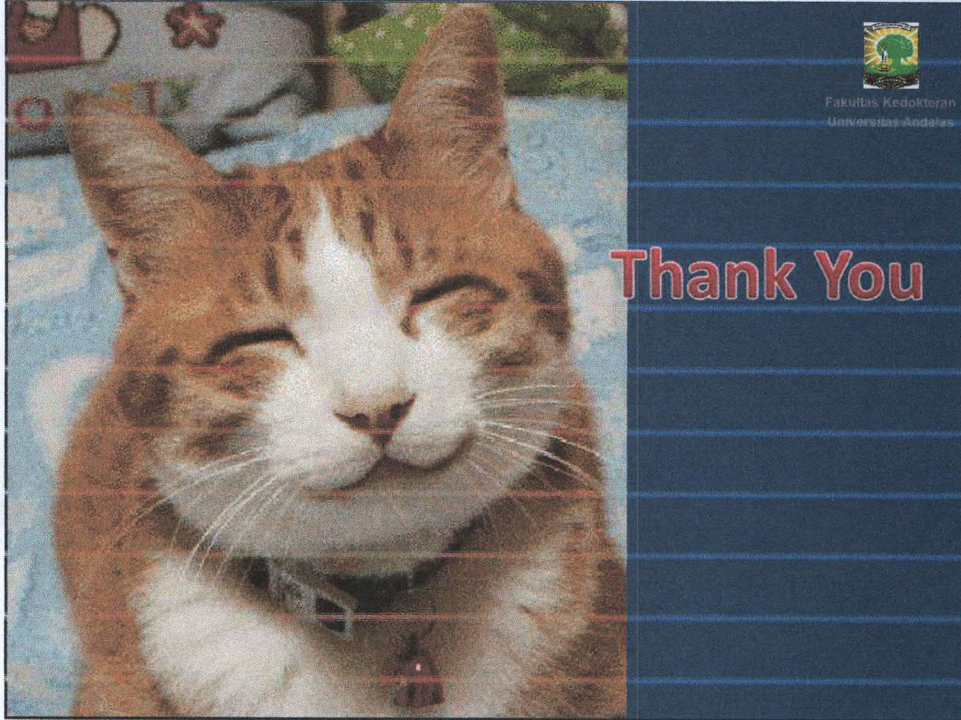
Conclusion



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- There is a relationship between severe physical activity with SOD activity based on plasma MDA levels
- There is a relationship between high fat intake with SOD activity based on plasma MDA levels

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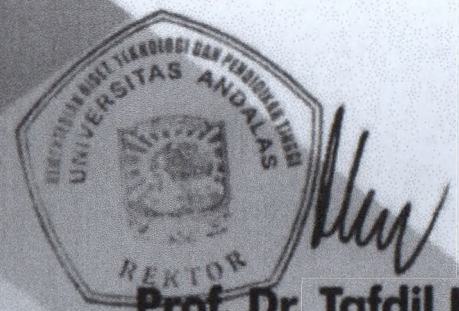
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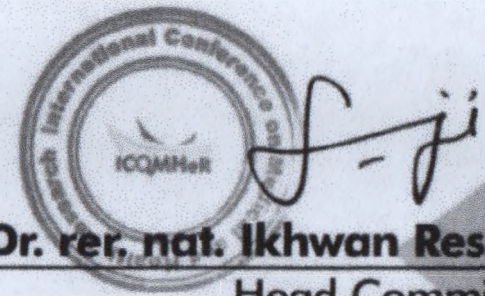
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