Potential of Analog Meat from Rubber Seeds through Tissue Culture as a Solution for Unsaturated Fatty Acid Rich Meat: A Literature Review
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Abstract
Non-communicable diseases (NCD) in Indonesia are a chronic disease caused by many factors, such as genetical, physiological, environmental, behavioral and lifestyle. According to Basic Health Research survey (RISKESDAS) in 2013 and 2018, the prevalence of NCD showed increasing number within the last 5 years. The cause of this phenomena was proofed due half of Indonesians people had been consuming high fat or cholesterol or fried food, 1 – 6 timer per week. This mini narrative review study aims to exploring and discovering the potency of meat analog (in-vitro meat) and tissue culture of rubber seed as a solution for high unsaturated fat meat diet. Literature study related to NCD was found in National Library of Medicine (PubMed). We found that rubber seed contains 9 out of 10 essential amino acid and some unsaturated fatty acids in which when combined with tempeh made by pillar nut (Vina unguiculata) will potentially become an analog meat (in vitro meat) by tissue culture. This idea should be implemented with experimental study hence clinical potency of aforementioned meat analog will be well known.
1. Introduction

Non-communicable disease (NCD) is a chronic disease caused by many factors, which are genetical, physiological, environmental, behavioral and lifestyle (Bull et al., 2020). However, according to the survey of Basic Health Research (RISKESDAS) 2013 and 2018, almost all NCD were increased in number within the last 5 years (Pengembangan & 2013, n.d.). The large budget was spent by government as one of the strategies to increase quality of life In Indonesia and makes the largest portion in National Health Insurance budget.

The cause of this phenomena was proofed, almost half of Indonesians had been consuming high fat diet or cholesterol or fried food, 1 – 6 timer per week. This habit increased fat deposit within the body that eventually increasing obesity prevalence, and it was proved according to survey of Basic Health Research within the last 10 years. In 2018, the prevalence of overweight in Indonesia was 13.6%, in which on previous surveys were 8.6% and 11.5%. Moreover, the prevalence of obesity in 2018 was 21.8% and it was increased from the previous surveys, which was 10.5% and 14.8%.

World Food Programme on 2017 stated that there was a middle-up frequency of plant based food consumption (including legumes). But, Indonesians tend to eat it in lesser amount (WFP Year in Review 2017 | World Food Programme, n.d.). Some of reasons behind this phenomena are bitter taste and weird texture. Whereas this plant based food contains high fiber that can decrease risk for obesity.

Hence, Indonesia put obesity prevention in 9 indicators that need more attention for Sustainable Development Goals (SDGs) goal-3: Ensure healthy lives and promote well-being for all at all ages. On the point 3.4 and 3.5 target, unhealthy diet was a big challenge (Morton et al., 2017; Ramirez-Rubio et al., 2019). The work of food system improvement was done by the government, such as transforming policy regarding food system in collaboration with Bappenas, Food agriculture Organization (FAO) and Institute of Agriculture Bogor (IPB). This framework will be disseminated in Food System Summit in September 2021. The goal is to balance Indonesians food intake, where currently a high fiber food is not consumed by 95% people. Furthermore, the food system already became a part in SDGs for supporting many aspects, not only SDG-3. Hence, the Food System was proposed by the United Nation for being implemented in many countries.

Based on global recommendation, dietary shift of protein intake from meat-based to be plant-based is a strategy for decreasing obesity in Indonesia. Recently, there are many industries making mead analog in Indonesia eventhough not yet being well known; because this meats are mostly known in Vegetarian population. However, the production of meat analog in Indonesia has some obstacles, such as scarcity of the ingredients.

In America and European countries have promoted meat analog or in-vitro meat to minimize many effects of the real meat and production process, in which contributes for NCD and methane gas polution up to 65% due to livestocks (Zhang et al., 2009). This in-vitro meat is an artificial meat from a biotechnology process from plant-based food that preferred by vegetarians or by people who are aware of decreasing real meat consumption, especially beef (Warner, 2019).

This analog meat was made atrificially by biotechnology process resulting in similar nutrient and taste to the real meat. The most common basic ingredients used by the researcher came from legumes that high of plant-based protein and good amino acids (Kumar et al., 2017). Actually, meat analog can be made by many natural resources from Indonesia, that has Carbon, Hydrogen, Oxygen and Nitrogen (C, H, O, N) as its compound (Kumar et al., 2017).

One of the resources that easily be found in Indonesia is rubber seed (Hevea brasiliensis). This seeds was not being utilized effectively. A study by Karima (2014) showed that rubber seed contains high unsaturated fatty acid and essential amino acids (Hutan & 2014, n.d.). Moreover, 9 out of 10 essential amino acids that is important for the body can be found in rubber seed, including isoleucin, leucin, lysin, phenylalanine, methionine,
threonine, valine, arginine and histidine (Gea, 2018; Syamsunarno et al., n.d.). Rubber seed also contains 85.9% unsaturated fatty acids 11. Unsaturated Fatty Acid was clinically proven for its benefit for NCD patients (e.g. heart disease, hypertension and diabetes) (Billingsley et al., 2018; Chilton et al., 2017; Gil et al., 2015; Torres et al., 2015).

However, rubber seed contains cyanide acid (HCN), in raw rubber seed contains 111.19 mg/kg of cyanide acids (Mushollaeni et al., n.d.). This is the reason of low utilization of rubber seed. However, some process has been found for optimization such as boiling that can decrease cyanide up to 98.26%, to be 1.93 mg/kg (Mushollaeni et al., n.d.). This value is within safety consumption of HCN, approximately 0.5 – 3.5 mg HCN/kg and it was found by Keraten (2005) (Hutan & 2014, n.d.).

Therefore, rubber seed is very potential to be one of meat analog ingredients. In the process, tempeh flour (from soybean) was made for tissue culture process rich in antioxidant and probiotic. This process is needed to tighten fibers and make a meat-like texture. Anyway, soy for tempeh is imported from America, hence we can replaced it use pillar nut (Vigna Unguiculata) as an alternative. This alternative can support local food diversity.

This process is a potential answer for problems mentioned. After a literature study and tracing Intelectual Property Database, meat-analog with rubber seed as its basic ingredients with pillar nut tempeh flour addition for tissue culture process has not yet been found. Therefore, we are interested to bring up this idea. We predict that the implementation of this idea will bring benefit for many sectors, such as health, environment and economy.

Conflict of Interest
The authors declare no conflict of interest.

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