Benefits of Fibre-Rich Snacks to Prevent the Risk of Cardiovascular Disease by Reducing Waist Circumference and Atherogenic Index of Plasma in Obese

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Background

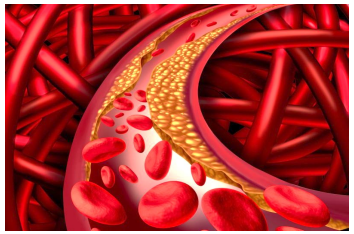
Obesity carrying the heavy burden of multiple and serious co-morbidities including cardiovascular disease which is characterized by an increase in the waist circumference and the atherogenic index of plasma. Adipose tissue dysfunction in obesity can contribute to atherosclerotic dyslipidemia. Many observational studies have shown that dietary fibre is associated with decreased risk of cardiovascular disease. Dietary fibre reduces food intake by decreasing the speed of gastric emptying which maintains satiety and decreases appetite through the secretion of the hormones *Glucagon-like-peptide-1* (GLP-1) and *Peptide tyrosine tyrosine* (PYY) by the production of *short-chain fatty acids* (SCFA), which are the dependent product of dietary fibre fermentation by specific microbes in the intestinal colon. These effects are believed can reduce the fat accumulation.

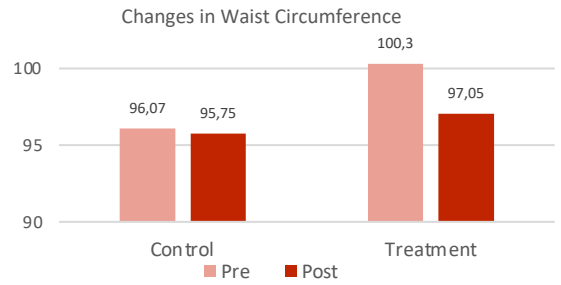
Objectives

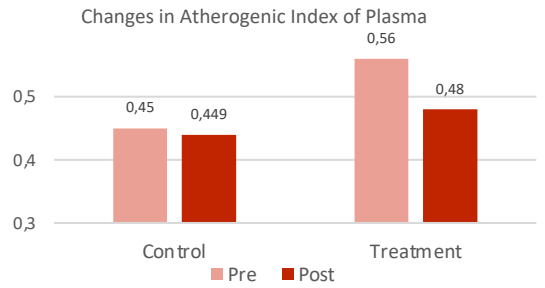
The objectives of this study was to evaluate the effects of fibre-rich snacks on waist circumference and atherogenic index of plasma in obese

Keywords

Fibre, Waist Circumference, Atherogenic Index Of Plasma, Cardiovascular Disease, Obese.







Material and Methods

This study uses a quasi-experimental study design that uses a control group with pre-post test intervention. A total of 40 adults aged 19 to 60 years old with obesity were recruited from Yogyakarta, Indonesia. The intervention group was asked to consume fibre-rich snacks as much as 42 grams/day for 6 weeks. The fibre-rich snacks are made into chips from *Dioscorea esculenta, Arrowroot, Cassava,* and *Pumpkin*. All the subject were asked to maintain a constant dietary intake throughout the duration of the study. Waist circumference was measured using midline, then a lipid profile was analyzed through fasting blood sampling in order to calculate the atherogenic index of plasma value. The atherogenic index of plasma was measured and calculated as follows: Log10 (Triglyceride [TG]/ High-Density Lipoprotein [HDL-C]). Paired sample t-test using SPSS Version 25 was used to evaluate the results. The procedures and and informed consent has been approved by the Medical and Health Research Ethics Committee, Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University, Yogyakarta, Indonesia (KE/FK/0379/EC/2019).

Results

A total of 40 obese individuals, 14 men, and 26 women were included in the study. The baseline characteristic of the treatment and control groups are shown in table 1. After consuming fibre-rich snacks for 6 weeks, it was found that there was a significant decrease in waist circumference and atherogenic index of plasma in obese individuals ($p<0.05$) as shown in the chart.

Table 1. Baseline Characteristics of Treatment and Control groups

Variable	Mean + SD		p-value
	Treatment (n=20)	Control (n=20)	
Aged (y)	34,65 + 15,2	33,6 + 11,7	0,052
BMI (kg/m²)	31,9 + 3,70	31,3 + 5,10	0,402
WC (cm)	100,3 + 12,8	96,07 + 12,3	0,084
AIP (mmol/L)	0,564 + 0,261	0,44 + 0,28	0,051
Gender			
Male (n%)	50% (n=10)	20 % (n=4)	0,187
Female (n%)	50% (n=10)	80 % (n=16)	

BMI= Body Mass Index, WC= Waist Circumference,
AIP = Atherogenic Index of Plasma

Discussions

Dietary fibre intake is not digested in the upper gastrointestinal tract, but is fermented by gut bacteria and produces short chain fatty acids (SCFA), which release the peptide tyrosine tyrosine (PYY) and glucagon-like-peptide-1 (GLP-1) which will mediate the brain to produced satiety, slowing gastric emptying, and reduced food intake through activation of free fatty acid receptor 2 (FFAR2) and free fatty acid receptor 3 (FFAR3) on colonic L-cells (1). Activation of FFAR2 suppresses insulin signalling within adipocytes, which results in regulating fat accumulation and maintaining body energy homeostasis (2), while FFAR3 may have a role in insulin-stimulated glucose uptake (3). It has also been suggested that Fibre intake reduced LDL cholesterol by reducing substrate availability for hepatic lipoprotein production that is generally increased in obesity (4)

Conclusions

Our finding suggest that consumption of daily fibre-rich snacks have a positive effect on reducing waist circumference and atherogenic index of plasma in obese individuals. Therefore, fibre-rich snacks can be considered for daily consumption to prevent central obesity, which is a predictors of cardiovascular disease.

Acknowledgments

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