



ORIGINAL ARTICLE

Analysis of Fiber, Calcium and Acceptability Cookies with Papaya Flour and Dates Puree Substitution

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Abstract

Adolescent need adequate nutritious snack. Cookies is one of the best snack products, made from low protein and flour than roasting until hard, cookies will taste crunchy when eaten. To make it more nutritious, papaya flour and dates puree is solution to increase dietary fiber and acceptability cookies. Analysing the effect of papaya flour and dates puree substitution in dietary fiber and acceptability of cookies. The type of research used complete randomized design with two repetitions. Making cookies using 4 formulation, there are control formulation papaya flour: dates puree, (PD1 10%: 30%), (PD2 20%: 20%) and (PD3 30%: 10%). The method used to determine dietary fiber content was multienzimatic method and acceptability was determined using hedonic test on colour, flavor, taste and texture by 90 panelists. The highest total dietary fiber content was PD3 15.9g/100g. The acceptability cookies showed that panelists preferred cookies with PD2 formulation. Substitution with papaya flour and dates puree increased the level of dietary fiber and cookies.

Keywords: *Calcium, cookies, dates puree, fiber, papaya flour*

Introduction

Dietary fiber is a component of edible vegetable food, undergoes fermentation in the large intestine and resistant to digestion and absorption of the small intestine (Howlett, 2010). According to Riskesdas 2018, 93.5% of the population > 5 years consumed vegetables and fruits under the recommendation. (Ministry of Health 2018). Research on 80 teenagers showed an average daily fiber intake of ± 7.6 g / day (Fajri, 2016). Another study at the boarding school said that fiber consumption each day female students is ± 7.5 g / day (Dwinoviya, 2018). This shows that some people lack fiber consumption. Dietary fiber have some benefit for health, classified as water soluble and water insoluble (Santoso, 2011). Water-insoluble dietary fiber will increase the volume of stool and will reduce its transit time. Dietary fiber can be easily found in vegetables and fruits (Winarti, 2010).

The cookie is one of the best known quick snack products (Iftikhar et al., 2015). Made from low protein flour and baked, cookies will taste crunchy when eaten. The water content of cookies

is low because it has gone through the roasting process to hard (Saksono, 2012). Cookie has become loved fast food products for every age group, because they are easy to carry about, tasty to eat, cholesterol-free, containing digestive and dietary principles of vital importance and reasonably cheap (Iftikhar et al., 2015). The average consumption of pastries in Indonesia is 0.40 kg/capita/ year (BPS, 2015). To rich the high level of dietary fiber cookies papaya flour and dates puree is solution. Addition of a dates paste on cookies can improve the protein and dietary fiber (Iftikhar et al., 2015).

Materials and Methods

Time and Place Research

The research carried out for 2 months from January until February 2019 at the Nutrition Laboratory University of Darussalam Gontor including making of cookies with papaya flour and dates puree and chemical analyzed conducted at the CV. Chemix Pratama Yogyakarta. The test of acceptance of cookies was done at Islamic Teacher Training College 2nd Gontor for Girls.

Research Design

This study used experimental method with a completely randomized design consisting of two factors with two repetitions. The study sample consisted of four substitution formulations (Table 1). The experimental group was the treated group in the form of substitution of 10%, 20% and 30% papaya flour from the total wheat flour in the control group (250g) and substituted for 30%, 20% and 10% of the dates puree from total sugar used in the control group (100g). Samples with substitution of 10% papaya flour and 30% dates puree were coded PD1, substitution of 20% papaya flour and 20% dates puree were coded PD2, substitution of 30% papaya flour and 10% dates puree were coded PD3. The control group in the absence of substitution was given the C code which is a comparison to the group given substitution.

Table 1: The study sample consisted of four substitution formulations

Ingredients	C	PD1	PD2	PD3
Wheat flour (g)	250	225	200	175
Papaya flour (g)	0	25	50	75
Sugar (g)	100	70	80	90
Dates puree (g)	0	30	20	10
Butter (g)	100	100	100	100
egg (g)	90	90	90	90
Milk powder (g)	25	25	25	25
salt (g)	1,5	1,5	1,5	1,5

Chemical Analysis

Dietary fiber was analysed using Multienzymatic method. Insoluble dietary fiber and soluble dietary fiber carried out by multi- enzymatic methods. Dietary fiber = insoluble dietary fiber + dissolved dietary fiber.

Acceptability Analysis

The acceptability of cookies with papaya flour and dates puree with substitution from variety of additions was carried out based on a hedonic test which included sensory testing of the overall color, flavor, taste and texture. In hedonic test, panelists needed the criteria for adolescents to have good sensory senses, not having health problems that affect sensory sensitivity, and being

willing to be included as panelists in testing the preference for cookies with substitution of papaya flour and dates puree. The panelists who met the criteria were resulted from 2nd Gontor for girls as many as 90 panelists. These consumer panelists from teenagers who low fiber consumption. Panelists were asked to give an impression of the colour, aroma, taste and texture of the sample provided. The code 734 was used for sample formulation group PD1, code 138 was used for sample formulation group PD2, code 490 was used for sample formulation group PD3, code 846 was used for sample control group without substitution in its production. Organoleptic was tested using five favorite categories with numerical scales and assessment criteria

Data Analysis and Statistical Method

All data obtained was tested for normality and homogeneity to determine the method of testing. Furthermore, bivariate analysis was carried out using Anova (analysis of variance) in one direction for normally distributed data and using the Kruskal Wallis test for not normally distributed to determine differences in dietary fiber content, calcium and acceptability. The difference in the Anova or Kruskal Wallis test indicated by the p value <0.05, the data analysis was continued using the Tukey test or the Mann Whitney test to see which formulation group has the most differences group (Sopiyudin, 2010).

Results

Dietary fiber

Analysis of dietary fiber content in Cookies made with substitution of papaya flour and dates puree is done to find out the influence of substitution. The data obtained were then processed using the Kruskal Wallis test and continued with the Man Whitney test presented in Table 2.

Table 2: The data obtained processed

Formulation group	N	Mean \pm SD	p Value
C	4	10.1 \pm 0.10 ^a	0.00*
PD1	4	12.8 \pm 0.66 ^b	
PD2	4	14.0 \pm 0.08 ^c	
PD3	4	15.9 \pm 0.47 ^d	

Significant values on the Kruskal Wallis test showed $p = 0.00$ ($p < 0.05$) so that it was concluded that there was a significant effect between substitution of papaya flour and dates puree in dietary fiber content cookies. Because the results were significant, then the test continued with post hoc analysis, post hoc analysis for the Kruskal Wallis test was Mann Whitney. Further testing was carried out to find out which groups had the most significant differences between each formulation group.

The results of the post hoc test shown in the Table 3, each data has a different superscript letter, so concluded that there were differences in dietary fiber levels between each formulation group. Significant differences between groups were caused by increased levels dietary fiber cookies.

Acceptability

The results of cookies with papaya flour substitution and dates puree were analyzed for the level of acceptance using the hedonic test method on colour, aroma, taste and texture. Results from analysis of acceptability cookies with the papaya flour substitution and dates puree carried out as follow

Table 3: The results of the post hoc test

Formulation Group	Color Modus \pm SD	Aroma Modus \pm SD	Taste Modus \pm SD	Texture Modus \pm SD
C	3 \pm 0.99	3 \pm 1.10	3 \pm 0.91	3 \pm 1.00
PD1	3 \pm 1.03	3 \pm 0.91	3 \pm 0.97	3 \pm 0.92
PD2	5 \pm 1.05	4 \pm 0.92	4 \pm 0.81	4 \pm 0.99
PD3	2 \pm 1.24	3 \pm 1.01	2 \pm 1.20	3 \pm 1.10
P Value	0.000	0.001	0.000	0.026

Discussion

Significant differences between groups of formulations were caused by high levels of dietary fiber in additives ingredient (papaya flour and dates puree). Papaya has a fiber content of 1.6g / 100g, while papaya flour has a fiber content of 3.35g / 100g (Rupanjali et al., 2018). Higher compared to wheat flour which has fiber content of 2.7g / 100g (Yusufu et al., 2014). The substitution used in addition to papaya flour was dates puree, made from sukkari dates containing fiber 8.2g / 100g sukkari dried dates. The total fiber content in dried dates is higher than fresh dates, because of the reduction in moisture and the maturation process, which the enzymes gradually break down these substances into more soluble compounds which soften the fruit (Al-Farsi, 2008).

Dietary fiber is a material component of edible vegetable food, undergo fermentation in the large intestine and are resistant to digestion and absorption in the small intestine (Howlett, 2010). Classified dietary fiber as water soluble and water insoluble (Santoso, 2011). Dietary fiber has several advantages to maintain health, especially in the digestive system, and can prevent the occurrence of diseases such as appendicitis, constipation, haemorrhoids and colon cancer (Hardinsyah, 2017). Recommended daily fiber requirements for adolescent girls is 30g, consuming 100g cookies with a substitution of papaya flour and dates puree can contribute 30 - 50% of the daily fiber requirement for adolescent girl.

The most preferred sample was PD2 formulation with 20% papaya flour and 20% dates puree in the "very like" category, the sample with this formulation had a colour that was not too pale and not too dark so the panellists chose it. The lowest preferred sample was a sample with PD3 formulation with a substitution of papaya flour 30% and a dates puree of 10% in the "dislike" category, panellists did not prefer this formulation caused the color too dark. Factors that cause dark colors in cookies are a substitution of papaya flour larger than dates puree. Papaya flour has a darker color compared to dates puree. This is caused the browning reaction during the process of making papaya flour (Yusufu et al., 2014). The browning reaction caused by the activity of the oxidase enzyme that oxidizes polyphenol compound. Other than that, browning on cookies can be caused by the Maillard reaction (Amandasari, 2009). Maillard reaction is a non-enzymatic browning reaction that occurs because of a reaction between reducing sugars with amino groups free of amino acids or proteins, this reaction will produce flavours and aromas (Winarno 2008).

The results test for aroma preference by 90 panellists showed that the formulation of PD2 with substitution of 20% papaya flour and 20% dates puree more preferred by panellists in the "like" category. PD3 formulation with 30% substitution of papaya flour and 10% puree dates were in the category of "quite like" because the aroma of papaya was stronger. Papaya flour has a strong aroma, then added more of papaya flour caused stronger aroma in cookies. Aroma cookies are formed during the roasting process. During roasting, volatile compounds evaporate so that the aroma of the base material is mostly spread due the cooking proses (Febrianto et al, 2014). Also, the aroma of cookies can be caused by various components of other ingredients in dough such as margarine, sugar and developer ingredients (Subandoro, 2013).

The taste of cookies affected by the comparison of the substitution concentration added. A comparison that fits between the main components of the material will produce the right taste and not dominant in one component. In the PD2 formulation, the comparison of dates puree and papaya flour was proportionate so the panellists chose it, while PD3 formulation papaya flour was more than dates puree produce a dominant taste of papaya and not preferred by panellists. Taste is a chemical stimulation sensation that formed by the interaction of each component in a food caught by the taste senses, where the interaction between the nature of the aroma, taste and texture is a sense of taste (Winarno, 2008). PD2 formulations were most different from other formulation samples. Evaluation of the sample by 90 panelists concluded that the most preferred was PD2 formulations with 20% substitution of papaya flour and 20% dates puree were preferred in the "likes" category. For the lowest preferred formulation was PD3 in the "dislike" category.

The most panellists preferred texture is PD2 formulations with 20% substitution of papaya flour and dates puree. The texture of PD2 samples was preferred because it is not easily damaged and more crunchy. The sample that the panellists don't like is PD3 with 30% substitution of papaya flour and 10% dates puree, this formula is not preferred because it has a hard texture and drags. The factor that caused a hard texture is the substitution of larger papaya flour. Papaya flour has a texture that is not too soft, an increase in fiber substitution in cookies will increase strictness (Varastegani et.al, 2015).

Conclusion

There was an increase in dietary fiber levels in each formulation. The dietary fiber content in the control formulation was 10.1g / 100g, PD1 formulation was 12.8g / 100g, PD2 formulation was 14g / 100g and 15.9g / 100g of PD3 formulation. There most preferred panelist was PD2 with adding 20% papaya flour and 20% dates puree.

Acknowledgments

The reference section will follow the "Acknowledgment" section. References should be in alphabetical order as follows. Use APA style 6th edition when formatting references.

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