

Original Article

Substitution Effect of Purple Sweet Potato Flour (*Ipomea batatas*) and Green Oca (*Abelmoschus esculentus*) As a High Dietary Fiber Snack Bar for Obese Adolescent Girls

Siti Nur Ramadhani¹, Annasari Mustafa^{2*}, I Komang Suwita¹, Astutik Pudjirahaju³

¹Bachelor of Applied Nutrition and Dietetics Study Program, Politeknik Kesehatan
Kementerian Kesehatan Malang, Malang, East Java Province, Indonesia

²Dietitian Professional Education Study Program, Politeknik Kesehatan Kementerian
Kesehatan Malang, Malang, East Java Province, Indonesia

³Diploma 3 Nutrition study program, Politeknik Kesehatan Kementerian Kesehatan Malang,
Malang, East Java Province, Indonesia

(Correspondence author's email, annasary@yahoo.com)

ABSTRACT

The trend of obesity among adolescent girls aged 10 – 19 years increased from 4.2% in 2014, 4.5% in 2015, and 4.7% in 2016. Followed by southeast asia in 2014 increased from 1.9% to 2.1% in 2015, and 2.3% in 2016. Riskesdas reported prevalence of obesity in adolescent girls was higher than adolescent boys, which was 1.5% in 2010, 1.9% in 2013, and 4.5 % in 2018. This study aims to analyze the effect of purple sweet potato and green oca as a substitutes for snack bars by considering chemical quality, nutritional quality, and organoleptic quality for obese adolescent girls. The study was carried out by using 4 levels of treatment with proportion wheat flour: purple sweet potato flour: green oca that is P0 (100: 0: 0), P1 (20: 40: 40), P2 (20: 30: 50), and P3 (20: 20: 60). The results of the study showed that purple sweet potato flour and green oca had a significant effect ($p < 0.05$) on water content, ash, protein, fat, carbohydrates, energy value, dietary fiber, color, taste, and texture but did not have a significant effect ($p > 0.05$) on aroma snack bars. Furthermore, the best level treatment is P2 (20: 30: 50), with the highest panelist acceptance and high in dietary fiber that is $6,99 \pm 0,035$ g/100 g in which good for obese adolescent girls. Serving size of snack bar P2 (20: 30: 50) is 55 grams according to Recommended Dietary Allowance for adolescent girls aged 16 – 18 years and 10% of the daily requirement for snacks.

Keywords: Obesity, Substitution, Snack Bar, Purple Sweet Potato Flour, Green Oca.

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INTRODUCTION

Obesity is a health problem for all people in the world, especially among young women because the differences in fat metabolism processes and body fat are greater than in men, so the accumulation of fat in adipose tissue is also greater¹. WHO (2022) reports that the obesity trend in adolescent girls

aged 10 - 19 years in the world continues to increase from 4.2% in 2014, 4.5% in 2015, and 4.7% in 2016². Followed by Southeast Asia in 2014 it was 1.9%, in 2015 it was 2.1%, and in 2016 it was 2.3%. Data from Riskesdas reports that the prevalence of obesity in adolescent girls is higher than in adolescent boys, in which 1.5% in 2010, 1.9% in 2013, and 4.5% in 2018.

Ratna (2021) showed there is a relationship between dietary fiber intake and the incidence of obesity in students at SMAN 2 Banda Aceh and low dietary fiber intake can increase the risk of obesity by 6 times greater than teenagers with good dietary fiber intake³. The average dietary fiber consumption in Indonesia generally tends to be low, that is around 10.5 grams per day⁴. There is a relationship between dietary fiber and preventing obesity, soluble dietary fiber such as pectin and some hemicelluloses have the ability to retain water and form a thick liquid in digestive tract. So that, it takes more longer to digest foods that contain high dietary fiber. Hull et al., (2020) showed a significant relationship between dietary fiber intake and the incidence of obesity where there was a reduction in body weight in women of 3.8 kg and a reduction in fat mass of 2.8 kg after consuming high dietary fiber foods for 6 weeks⁵.

Interventions that can be carried out to reduce the incidence of obesity from dietary habit are paying attention to food intake, that is dietary fiber intake and develop processed food products that contain nutrient dense and high in dietary fiber that is *snack bars*. Because it is quite practical, easily accepted by the public especially teenagers, and can fill the stomach when hungry. Local food ingredients that can be used as high dietary fiber foods are purple sweet potato flour and green oca. Because contain high levels of dietary fiber that good for consumption by teenagers who are at risk of obesity. Purple sweet potato flour and green oca are native Indonesian commodities that need to be developed, especially green oca is still limited to savoury dish and only a few processed green oca are used as snacks.

The dietary fiber content in purple sweet potato flour is 4.7% per 100 grams of flour⁶. Yolanda et al., (2018) showed that there was an increase in dietary fiber content and decrease in fat content as the proportion of purple sweet potato flour increased in dried noodle⁷. Furthermore, Anggarawati et al., (2019) showed that higher proportion of purple sweet potato flour, the dietary fiber content in waffle products increased⁸. Dietary fiber content in every 100 grams of green oca is 3.2 grams. The highest dietary fiber content in pinch cake is 17.7% with the addition 35% of green oca. In line with Agustiana et al., (2020) the highest level of dietary fiber in wet noodle products is 9.92% with the addition 20% of green oca⁹.

Therefore, the development of a snack product in the form of a *snack bar* was carried out using substitution of purple sweet potato flour and green oca as an intervention for high dietary fiber product for obese teenage girls by paying attention to chemical quality, nutritional quality, and organoleptic quality.

METHOD

The study was conducted from August 2022 – May 2023. The type of study is an Experiment with a Completely Randomized Treatment Design (CRD) with 4 levels of treatment and 3 proportions of wheat flour: purple sweet potato flour: green oca that is P₀ (100: 0 : 0), P₁ (20 : 40: 40), P₂ (20: 30: 50), and P₃ (20 : 20: 60). The calculation of nutritional needs according to RDA for adolescent girls aged 16 – 18 years and 10% of the daily requirement of snack. So that energy requirement is 210 Kcal, 6,5 grams of protein, 7 grams of fat, and 30 grams of carbohydrates. Dietary fiber needs according to regulatory from BPOM No. 1, 2022 to dietary fiber content > 6 grams/100 grams product so that it can be said high dietary fiber food.

RESULTS

Nutritional Quality

Research results showed the average of water content for snack bar ranges from 9.91 – 12.88%. The highest water content in the level treatment is P₃ (12.88%) while the lowest level treatment P₀ (9.91%).

Table 1. Snack Bar Water Content for Every 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Oca)	Water content (%)
P ₀ (100: 0: 0)	9.91 ± 0.062 ^a
P ₁ (20: 40: 40)	11.08 ± 0.040 ^b
P ₂ (20: 30: 50)	12.36 ± 0.036 ^c
P ₃ (20: 20: 60)	12.88 ± 0.025 ^d

Research results showed the average of ash for snack bar ranges from 3.11 – 3.93. The highest ash content in the level treatment P₃ (3.93%) while the lowest level treatment P₀ (3.11%).

Table 2. Snack Bar Ash Content for Every 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Ash Content (%)
P ₀ (100: 0: 0)	3.11 ± 0.030 ^a
P ₁ (20: 40: 40)	3.66 ± 0.045 ^b
P ₂ (20: 30: 50)	3.77 ± 0.040 ^c
P ₃ (20: 20: 60)	3.93 ± 0.020 ^d

Research result showed the average of protein content for snack bars ranges from 13.48 – 15.64%. The highest protein content in level treatment P₀ (15.64%) while the lowest level treatment P₃ namely 13.48%.

Table 31. Snack Bar Protein Content for Every 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Protein Content (%)
P ₀ (100: 0: 0)	15.64 ± 0.050 ^a
P ₁ (20: 40: 40)	14.35 ± 0.060 ^b
P ₂ (20: 30: 50)	13.59 ± 0.040 ^c
P ₃ (20: 20: 60)	3.93 ± 0.020 ^d

Research result showed the average of fat content for snack bars ranges from 8.38 – 9.08. The highest fat content in level treatment P₁ (9.08%) while the lowest level treatment P₀ (8.38%).

Table 4. Fat Content Per 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Fat level (%)
P ₀ (100: 0: 0)	8.38 ± 0.045 ^a
P ₁ (20: 40: 40)	9.08 ± 0.040 ^b
P ₂ (20: 30: 50)	9.05 ± 0.045 ^c
P ₃ (20: 20: 60)	8.39 ± 0.020 ^a

Research result showed the average of carbohydrate content for snack bars ranges from 60.31 – 62.95%. The highest fat content in level treatment P₀ (62.95%) while the lowest level treatment P₃ (60.31%).

Table 2. Carbohydrate Levels Every 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Carbohydrate Content (%)
P ₀ (100: 0: 0)	62.95 ± 0.072 ^a
P ₁ (20: 40: 40)	61.82 ± 0.176 ^b
P ₂ (20: 30: 50)	60.62 ± 0.513 ^c
P ₃ (20: 20: 60)	60.31 ± 0.070 ^d

Research result showed the average of energy value from snack bars ranges from 374.64 – 389.79%. The highest energy value at level treatment P₀ (389.79 Kcal) while the lowest level treatment P₃ (374.64 Kcal).

Table 3. Energy Value Every 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Energy Value (%)
P ₀ (100: 0: 0)	389.79 ± 0.015 ^a
P ₁ (20: 40: 40)	386.44 ± 0.155 ^b
P ₂ (20: 30: 50)	383.76 ± 0.345 ^c
P ₃ (20: 20: 60)	374.64 ± 0.041 ^d

Research result showed the average of dietary fiber for snack bars around 3.98% – 8.08%. The highest dietary fiber at level treatment P₁ (8.08%) while the lowest level treatment P₀ (3.98%).

Table 7. Dietary fiber Content Per 100 Grams of Product

Treatment Level Percentage (%) (Wheat Flour: Purple Sweet Potato Flour: Green Ocra)	Dietary fiber Content (%)
P ₀ (100: 0: 0)	3.98 ± 0.075 ^a
P ₁ (20: 40: 40)	8.08 ± 0.020 ^b
P ₂ (20: 30: 50)	6.99 ± 0.035 ^c
P ₃ (20: 20: 60)	6.16 ± 0.020 ^d

Organoleptic Quality

Research result showed the average of level favorite panelist for color is 2.33 (dislikes) – 3.27 (likes). The highest score on level treatment P₁ that is 3.27 and the lowest level treatment P₀ that is 2.33.

Table 8. Distribution of Panelists based on Level of Likeness for Snack Bar Colors

Level of Treatment Percentage (%) (Flour Wheat: Purple Sweet Potato Flour: Green Ocra)	Amount Panelists		Average		
	Strongly Dislike	Like – Really Like	n	%	
P ₀ (100: 0: 0)	19	63	11	36	2.33 ± 0.661 ^a
P ₁ (20: 40: 40)	5	16	25	83	3.27 ± 0.828 ^b
P ₂ (20: 30: 50)	4	13	26	86	3.13 ± 0.629 ^c
P ₃ (20: 20: 60)	13	43	17	56	2.80 ± 0.887 ^c

Research result showed the average level favorite panelist for aroma is 2.90 (dislikes) – 3.07 (likes). The highest score on level treatment P₀ is 3.07 and the lowest level treatment P₃ is 2.90.

Table 4. Distribution Panelists based on Likeability Level towards Aroma Snack Bar

Level of Treatment Percentage (%) (Flour Wheat: Purple Sweet Potato Flour: Green Ocra)	Amount Panelists				Average
	Strongly Dislike		Like – Really Like		
	n	%	n	%	
P ₀ (100: 0: 0)	7	23	23	76	3.07 ± 0.828 ^a
P ₁ (20: 40: 40)	7	23	23	76	2.93 ± 0.828 ^a
P ₂ (20: 30: 50)	9	30	21	70	2.97 ± 0.850 ^a
P ₃ (20: 20: 60)	20	66	10	33	2.90 ± 0.845 ^a

Research result showed the average of level favorite panelist for taste is 2.33 (dislikes) – 3.30 (likes). The highest score on level treatment P₂ is 3.30 and the lowest level treatment P₃ is 2.33.

Table 5. Distribution Panelists based on Likeability Level on the taste of the snack bar

Level of Treatment Percentage (%) (Flour Wheat: Purple Sweet Potato Flour: Green Ocra)	Amount Panelists				Average
	Strongly Dislike		Like – Really Like		
	n	%	n	%	
P ₀ (100: 0: 0)	18	60	12	40	2.40 ± 0.724 ^a
P ₁ (20: 40: 40)	9	30	21	70	2.87 ± 0.776 ^a
P ₂ (20: 30: 50)	3	10	27	90	3.30 ± 0.651 ^b
P ₃ (20: 20: 60)	14	46	16	53	2.33 ± 0.884 ^c

Research result showed the average of level favorite panelist for texture is 1.90 (dislikes) – 3.13 (likes). The highest score on level treatment P₂ is 3.13 and the lowest level treatment P₃ is 1.90.

Table 6. Distribution Panelists based on Likeability Level to Snack Bar Texture

Level of Treatment Percentage (%) (Flour Wheat: Purple Sweet Potato Flour: Green Ocra)	Amount Panelists				Average
	Strongly Dislike		Like – Really Like		
	n	%	n	%	
P ₀ (100: 0: 0)	14	46	16	53	2.40 ± 1.037 ^a

P ₁ (20: 40: 40)	6	20	24	80	3.00 ± 0.743 ^b
P ₂ (20: 30: 50)	6	20	24	80	3.13 ± 0.730 ^b
P ₃ (20: 20: 60)	24	80	6	20	1.90 ± 0.803 ^c

Level of The Best Treatment

Analysis results for the best level treatment using de Garmo method of 11 variables obtained results that rate dietary fiber occupy order the first as variable most importantly at the snack bar for obese adolescent girls.

Table 12. Average Ranking of Variables in Determining Treatment Levels Best

Quality Variables	Average	Rank
Water content	4.2	10
Ash content	4	11
Protein content	6,8	6
Fat level	6	7
Carbohydrate levels	7.4	4
Energy Value	8.3	2
Dietary fiber content	9.2	1
Color	5.8	9
Aroma	5.9	8
Flavor	8	3
Texture	7.1	5

DISCUSSION

Enhancement of the water content of the snack bar caused by green ocra is vegetables classified that have high water content that is 89.58%¹⁰. While purple sweet potato flour classified as processed from tubers that have lower of water content that is 9.4%¹¹. In line with study Janice (2022), showed that the more high proportions of green ocra that 4%, 5%, 6%, and 7% then more high of water content of jelly candy¹². More carry on study Giyatmi et al., (2022) showed that the highest proportions of green ocra (50%) is the highest water content (84.3%)¹³. Water content matters for protein content in food, where the more high water content then protein levels decreased¹⁴. This matter caused by myogen that water soluble protein in water. In line with study Murdiati et al., (2015) showed the level treatment with the highest water content (31.85%) has lowest protein content (0.68%)¹⁵.

Enhancement of the ash content of snack bars caused by purple sweet potato flour has rate ash content higher than flour wheat that is 2.8 grams every 100 grams¹¹. In line with study

Montolalu et al., (2019) the more high proportion of purple sweet potato flour that 10%, 30%, 50%, 70%, and 90% then ash content also increased because mineral content such as phosphorus 74 mg, astringent iron 0.70 mg, and calcium 29 mg per 100 grams of purple sweet potato flour¹⁶. Other research showed that higher proportion of purple sweet potato flour that 70%, 80%, 90%, and 100% at the snack bar then ash content also increased¹⁷. While ash content on green oca is 0.86 grams every 100 grams¹⁰. Study Xavier et al., (2022) showed that green oca with proportions of 5%, 10%, and 15% provide influence to enhancement rate ash in cookie products¹⁸. The more high proportion of green oca (50%) then ash content is increased (3.89%). So, purple sweet potato flour and green oca can influence enhancement of ash content on snack bar. Ash content is substance organic from remainder results burning something material organic. Ash content of the product food influential to internal mineral content product food. The higher ash content so existing mineral content in product food is also getting high¹⁹. Decreasing protein levels of snack bar caused by materials used in substitution classified tubers and vegetables with low relative protein content. Purple sweet potato flour including in group tubers with protein content 2.8 grams every 100 grams¹¹. Meanwhile, green oca including in group vegetables with protein content 2 grams every 100 grams¹⁰. In line with study Montolalu et al., (2019) showed that the highest substitution of purple sweet potato flour (90%) have lowest protein content (7.45%)¹⁶. More further, research Putri et al., (2020) showed that decreasing protein content in biscuits along with enhancement proportion of purple sweet potato flour 70% and 100%²⁰. While study Xavier et al., (2022) showed that increasing proportions of green oca that 5%, 10%, and 15% then protein content in *cookies* the more decreased¹⁸.

The fat content of the snack bar decreased because of purple sweet potato flour classified at tubers with low relative fat content than flour wheat that is 0.6 grams every 100 grams¹¹. In line with Yolanda's research (2018) showed that dry noodles with the highest proportion of purple sweet potato flour (40%) have lowest fat content (0.23%)⁷. Decreasing fat content with enhancement proportion purple sweet potato flour. Meanwhile, green oca owns low relative fat content because classified in vegetables with fat content 0.2 grams every 100

grams¹⁰. Decreasing fat content (3.15%) along with with enhancement portion of green oca (50%). Apart from that, the baking process can influence fat content depends on the temperature and time used, where temperature 160°C for 60 minutes can lower fat content of 3.88%²¹. Decreased fat content can occurs due to susceptible fat to temperature high so the fat will melt and evaporates (volatile).

Decreasing carbohydrate content caused by green oca classified as vegetables with low relative carbohydrates that is 7.45 grams every 100 grams¹⁰. In line with study Xavier et al., (2022) showed that the more high proportions of green oca so rate of carbohydrate *cookies* are more low¹⁸. Proportions of green oca the highest (50%) have rate lowest carbohydrates (66.07%). Purple sweet potato flour own rate carbohydrate enough high that 84.4 grams every 100 grams¹¹ because purple sweet potato flour is processed from purple sweet potatoes which belongs to food source carbohydrate²². In line with study Karo et al., (2022) the more high proportion purple sweet potato flour used (10%, 20%, 30%, 40%, 50%, and 60%) then rate carbohydrates content in the product chip experience decreased²³. The more high proportion purple sweet potato flouris used so rate more carbohydrates too low.

Energy value influenced by protein content, fat content, and fat content carbohydrates. Every 1 gram Carbohydrates and protein each contain 4 calories energy, while 1 gram of fat contains 9 calories. Additionally, value _ energy in each material compiler give influence to mark energy from the snack bar. Energy value purple sweet potato flouris amounting to 354 Kcal / 100 grams¹¹. Whereas mark green oca energy is 33 Kcal / 100 grams¹⁰. Study Xavier et al., (2022) showed that proportions of green oca the highest (15%) have mark energy lowest (451.23 Kcal)¹⁸. The higher proportion of green oca (50%) then mark energy the lower (364.55%).

Decreasing rate dietary fiber caused by green oca own more low than purple sweet potato flour that is 3.2 grams every 100 grams¹⁰. Whereas rate dietary fiber purple sweet potato flour own rate dietary fiber 12.9 grams every 100 grams¹¹. In line with study Anggarawati et al., (2019) showed the more high proportion purple sweet potato flour that 20%, 40%, 60%, and 80% then rate the dietary fiber in the waffle is increasing high⁸. More further, research Suladra (2020) showed that the more high proportion of

purple sweet potato flour is used, then rate dietary fiber of cake yangko is also increasing²⁴. Green ocra has dietary fiber content classified more high than other vegetables²⁵. It is known that rate green ocra dietary fiber higher than come on that is as big as 1.3 grams every 100 grams¹¹.

Organoleptic Quality

Decreasing level favorite panelist to color is caused by green ocra give influence color towards the snack bar. Color pigments in green ocra caused the presence of color pigments chlorophyll. The more big proportions of green ocra so the resulting color the more green. More carry on study Giyatmi et al., (2022) showed color pudding with addition of green ocra is white greenish¹³. Purple sweet potato flour contains color pigments anthocyanins that can give color purple until purple concentrated in a way experience. In line with study Montolalu et al., (2019) the more high proportion purple sweet potato flour so the result of color the more thick¹⁶. Other research says that addition of purple sweet potato flour as much as 20% on each level treatment give difference in a way significant to change color⁸. Influence more colors in snack bar products dominated by purple sweet potato flour. So, snack bar with level treatment P₁, P₂, and P₃ own color dominant increasing purple faded along with decreased proportion of purple sweet potato flour and increasing green ocra proportions. Study Pehulisa (2016) showed substitution flakes color purple sweet potato flour and skin peanut powder dominated by color purple²⁶.

Decreasing level favorite panelist to the aroma caused by the aroma that produced by the snack bar is langu. Delicious aroma typical green ocra originate from content fatty acids do not fed up especially linoleate catalyzed by lipoxygenase enzymes²⁷. The more high proportions of green ocra then the smell is pleasant the more strong. Other research showed that the more increase proportion of green ocra in the product wet noodles then the aroma increases not enough liked by the panelists⁹. The pleasant aroma produced by green ocra minimized moment *pre-treatment* that is use method *blanching*. *Blanching* is a heating process that requires temperature aim range is 75 - 95°C for deactivate possible enzymes for happen change color, taste, texture, and aroma of material food²⁸. Study Larasati & Muarif (2020) showed best blanching duration is for 3 minutes²⁹. Study the mention that the blanching

process takes 15 minutes can reduces the unpleasant aroma of green ocra.

Enhancement level favorite panelist to the taste of snack bar development caused by material substitution classified tubers with rate enough carbohydrates high. A sweet taste is produced from sugar arrangement like monosaccharides and disaccharides contained in purple sweet potato flour. In line with study Anggarawati et al., (2019) waffle with highest proportion of purple sweet potato flour has a sweet taste⁸. More carry on study Syafitri & Mandasari (2021) showed shrimp crisp with highest substitution of purple sweet potato flour has a slightly sweet taste³⁰. Decreasing level favorite panelist to taste at level treatment P₃ caused by enhancement proportion of green ocra and decreasing proportion sweet potato flour purple. Panelists mention the level P₃ treatment has a tending taste originating language of green ocra because there is diosgenin compounds included saponin group so can give rise to unpleasant *aftertaste* typical green ocra. Saponins are type lots of glycosides found in plants and forms colloid Water soluble, when the saponin is shaken and foams can gives rise to a bitter taste³¹. In line with Pratiwi et al., (2021), increasingly high proportion of green ocra used then the feeling that arises dominant unpleasant typical green ocra³². Proportion green ocra (50%) had the highest level favorite lowest (5.3).

Enhancement level favorite panelist to texture caused Because the texture produced by the snack bar tends to be congested. There is connection between texture with water content, where the more low water content then the resulting texture the more hard³³. along with decreased proportion purple sweet potato flour and increased proportion of green ocra on level P₃ treatment then the texture of the resulting snack bar soft with the surface of the snack bar is inclined sticky. This matter because mucilage produced by green ocra cause the texture of the snack bar is getting better wet. Texture own connection with protein, where the lower protein levels then Gluten protein levels also increase low. Gluten proteins consist of gliadin and glutenin, where gliadin plays a role as adhesive so that dough become elastic and glutenin has function make dough still sturdy and expanding.

Dietary fiber content occupy order as first as the most important variable in snack bars for obese adolescent girls. Intake recommendations dietary fiber daily for adolescent girl aged 16 – 18 years according to

the RDA 2019 is as big as 37 grams in a day, and recommendations intake dietary fiber daily in food Intermezzo is 10% of total requirements or the same with 3.7 grams. Content dietary fiber food in product can written in two ways, such as claims and information mark nutrition. At the substitute snack bar purple sweet potato flour and green oca give claim high dietary fiber. According to BPOM Regulation No. 1 of 2022 written that something product food can give claim high dietary fiber if in 100 grams product food contains 6 grams of dietary fiber or more. Variable most important second is mark energy. Intake recommendations energy consumed adolescent girl with range aged 16 – 18 years based on the 2019 AKG is of 2100 Kcal in a day³⁴. Intake energy for food Intermezzo by 10% of need energy in a day, which is 210 Kcal for adolescent girl. Variable most important third is taste quality. Taste is factor important in evaluation to quality product food. In substitute snack bar products purple sweet potato flour and green oca, the resulting flavors dominantly sweet originating from use sweet potato flour purple. Level of treatment best furthermore determined with use calculation index effectiveness and level treatment P2 has a total value highest yield (NH) that is 0.594.

CONCLUSION

The study results indicate that vitamins C Substitute snack bar purple sweet potato flour and green oca give significant influence to quality chemistry covers water content and grade ash. Substitute snack bar purple sweet potato flour and green oca give significant influence to quality nutrition covers protein content, fat content, content carbohydrates, value energy, and levels dietary fiber. Substitution of purple sweet potato flour and green oca give significant influence to quality organoleptic covers quality color, taste, and texture. While purple sweet potato flour and green oca give significant influence to aroma quality. Treatment level P₂ with proportion flour flour, sweet potato flour purple, and green oca (20: 30: 50) are level treatment best with a Result Value (NH) of 0.594.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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