European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 5 No. 04, April 2024
ISSN: 2660-5643

EFFECT OF ANTIOXIDANT AND TOTAL PHENOLS VALUES OF LAB-MANUFACTURED BISCUITS BY REPLACING WHEAT FLOUR WITH DIFFERENT PROPORTIONS OF TANGERINE PEEL POWDER

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Article history:

Received: 28th January 2024
Accepted: 20th March 2024

Abstract:

Study focused on impact of incorporating three different types of tangerine husk powder in to wheat flour. The inclusion percentages ranged from 12,8,4%. Antioxidants were estimated as they recorded an increase in the value of antioxidants, as it was noted that this value increased by increasing the replacement rates, as it reached at a concentration of A3 about 9.01 compared to the control sample (A), which amounted to 4.37, while in the raw materials for each of Fit reached 13.6 and F11.30 . The percentage of total phenols for manufactured biscuits and raw materials was also estimated, as there were significant differences between the ratios , as high percentage is recorded for A3 treatment, which amounted to 3.7%, and low percentage at A treatment amounted to 1.5%, while the A1 & A2 treatment was 1.59 and 2.7% respectively. While the ratio of total phenols to raw materials for coefficients F1and F is recorded (4.09&1.8)% respectively

Keywords: Tangerine peels, biscuits, antioxidants, total phenol

INTRODUCTION:

Biscuits are known as a product made from cereals and baked goods with a humidity of less than 5%, and therefore have a long shelf life if they are kept away from moisture and oxygen of the atmosphere, as biscuit is derived from the Pains biscoctus , a Latin term of origin means bread cooked twice, which refers to pieces of bread that were made specifically for sailors in the Middle Ages, and are made of flour and water only, (Al-Dharaf et al.,(2023).

Some biscuits have been used as part of dietary strategies to address many chronic and nutrition-related diseases, such as nutrient deficiencies, diabetes, obesity and cardiovascular disease (Canalis et al., 2017) .

Tangerines are fruits that contain a very high content of vitamin C and antioxidants and have a sweet taste. This type of fruit is relatively inexpensive and easy to obtain (Hapdang et al., 2021). Tangerines contain high amounts of carotenoids. It possesses a unique composition of carotenoid and apocarotenoid pigments because it is especially rich in B-cryptoxantin &A-citraurin B-cryptoxantin provides a deep orange color, and has been found to be a key compound to distinguish between orange and tangerine (Koodner,2001).

RESEARCH AIMS:

Conversion of waste and waste from citrus fruits into food additives Study the effect of replacing wheat flour with tangerine husk powder with different nibs and using it in the manufacture of functional biscuits, Study the most important content of biologically active compounds and antioxidant activity.

MATERIALS AND METHODS OF WORK:

Kuwaiti luxury wheat flour was used with a extraction rate of 72% obtained from of city of Tikrit, and tangerine fruits were obtained from of city of Tikrit during month of July 2023 and took their husks and after preparing them, they were washed with tap water after end of cleaning, then the peels were removed manually and the remnants of the pulp stuck on them were disposed of, and washed for the second time, as the presence of juice and pulp on peels encourages the growth of microbes, then presented T for solar drying for three days until weight is stable, then grinded with an electric grinder until the powder is homogeneous, then sift tangerine peel powder, powder was packed in vacuum polyethylene bags, and Kuwaiti wheat flour was used with a extraction rate of 72% obtained from of the city of Tikrit, and it was added in three levels, namely 4, 8, 12% The percentage of antioxidants was estimated and the

total phenols were estimated according to the method described by Akhtar et al. (2019). mixtures for the biscuit industry are prepared as follows:

Table 1 Proportions of mixtures

Samples Code	proportion tangerine peel powder	Flour ratio
A -contol	0	100
B	4	98
C	8	92
D	12	88

Prepare the biscuits as reported by Lashin, (2019) using the ingredients and ingredients mentioned in Table (1). Knead the dough for 10 minutes until we get a homogeneous dough and then enter it to the refrigerator at 6 ° C for 30 minutes. The dough is rolled, dough is cut into a circular shape using a 45 mm cutter and baked on an aluminum tray in an electric oven at 160 ° C for 6 minutes. The biscuits with added husk powder were prepared in the same way, but by replacing the wheat flour with three species 4, 8, 12%, then the samples were cooled for 30 minutes after that they were packed in polyethylene bags stored under drying

Table (2): Ingredients of the mixture

Ingredients	control	4g	8g	12g
Wheat flour	100	96	92	88
Butter	45	45	45	45
Powdered sugar	30	30	30	30
egg	50	50	50	50
Vanillin	2	2	2	2

ESTIMATION OF ANTIOXIDANT ACTIVIT :

Antioxidant capacity of the resulting tangerine peel powder and biscuits was determined using the DPPH method if 2 g of the sample was used, then the antioxidant efficacy was estimated according to described by Akhtar et al. (2019):

If 0.004 mg concentration (picryl-hydrazyl-2-diphenyl1) DPPH was dissolved a solution of preparation of DPPH and dissolved in 100 ml of methanol at a concentration of 95%, then 0.5 ml of each concentration of samples was taken and 3 ml of DPPH solution was added to it and models were incubated for half an hour in the dark at room temperature, then absorbance is read at a wavelength of 517 nm versus the control absorbance, which was prepared by taking 3 ml of DPPH solution. 5.0 ml of methanol solvent is added to it, and the root suppressant effect is calculated according to the following equation:

Root inhibitor = (batter absorbency - absorbency control)/(absorbency control) ×100

DETERMINATION OF TOTAL PHENOLS:

Take 5 g of the sample and put it in test tubes and add 5.0 ml of 10% diluted Volen reagent (v/v) and mix the mixture and leave it for 6 minutes and leave the mixture in a dark place at room temperature for one hours. Then absorbance is read at a wavelength of 765 nm an optical spectrometer and total phenols ratio was calculated by the standard curve for gallic acid**.**

STATISTICAL ANALYSIS:

Data are analyzed statistically through experimental system within ready-made statistical program (SAS, 2012) and using the CRD system, where the averages are selected according to Duncan test (Duncan, 1955). multi-range to determine significance of differences between averages of factors affecting characteristics studied.

RESULTS AND DISCUSSION:

Antioxidants in used wheat flour, tangerine husk powder and manufactured biscuits:

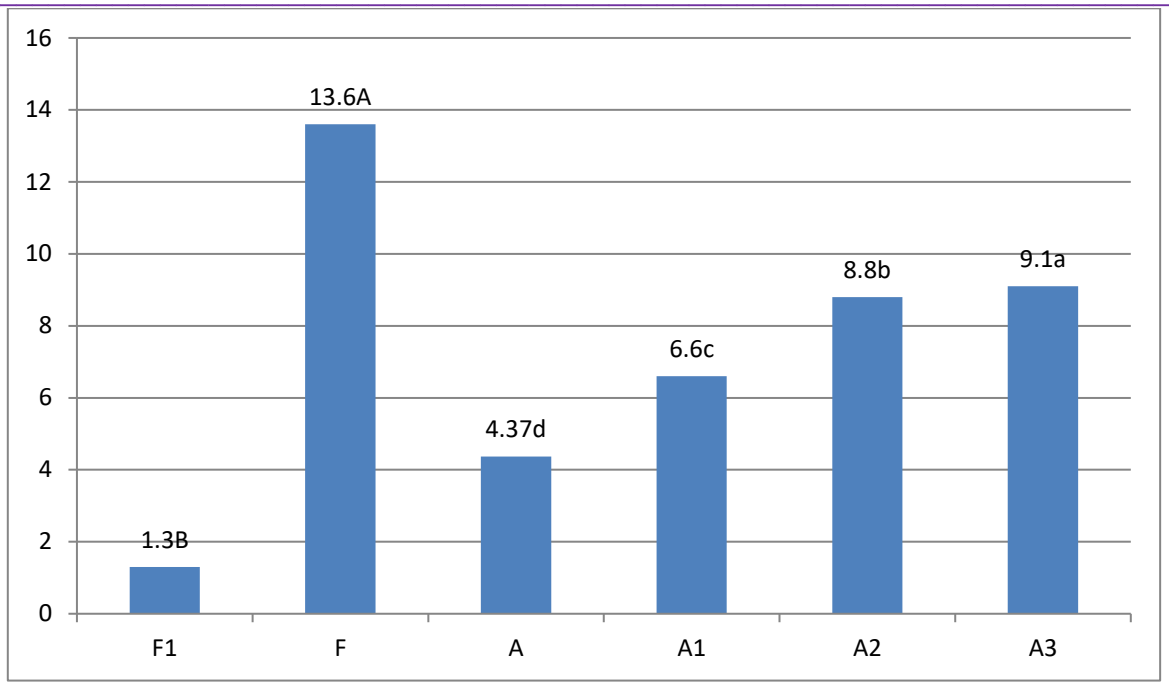

Figure 1: Antioxidant content

Figure (1) shows that antioxidant effectiveness in tangerine peel powder exceeded three times antioxidant capacity in F1 when detecting antioxidants using the DPPH method, as the value of antioxidants in F1 was 1.3 µg / g dry matter, and in F 13.6 µg / g dry matter, and these results are consistent with the findings of (Ohja & Thapa 2017) As well as in accordance with what(Sande et al. 2017). As shown by results of detection of antioxidants in studied biscuit samples, addition of tangerine peel powder by A3 achieved the highest values significantly, which amounted to 9.1 µg / g, while the lowest values reached 4.37 µg / g, which is the standard sample (A), and that the content of biscuits of antioxidants increased with increasing the percentage of powder, and these results are consistent with what Al Janaby found,(2022) and found that tangerine peel extract is more effective as an antioxidant and these data are consistent with those obtained by Brand – Williams et al., 1995 as shown by Omoba and Obafaye2018 that the percentage of DPPH root inhibition For each sample increases with the content of peel powder in biscuits, they attributed this to the high antioxidant activity of peel powder and confirmed the possibility of using peel powder as a functional and nutritional component in the production of biscuits.

Total phenols content in wheat flour, tangerine husk powder and manufactured biscuits:

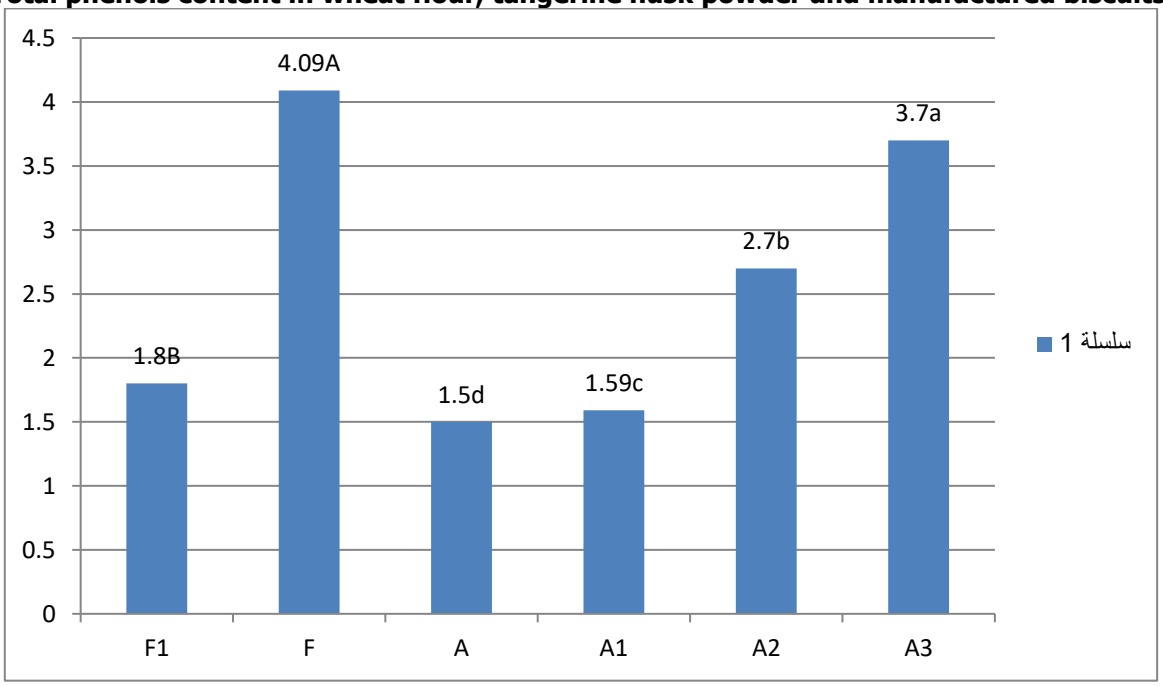

Figure2: Total phenolic content

Figure (2) shows a significant difference between the phenolic content of F1 and F, which amounted to 1.8 and 4.09 mg / g dry matter respectively, and from previous studies, (Al-Dharf et al., 2023), obtained the phenols content in wheat flour amounted to 1.49 mg / g dry matter, while Magda et al., (2008) obtained when analyzing tangerine peel powder that the phenolic content reached 4.19 mg / g dry matter. And for the phenolic content inBiscuit samples added to them tangerine peel powder, as results of statistical analysis showed a significant difference between them, as

addition rate exceeded A3, reaching 3.7%, while addition rates reached A1 & A2 1.59, 2.7 mg / g dry matter respectively, and it is noted that there is an increase in concentration of phenols by increasing the percentage of adding tangerine peel powder, as despite loss some phenolic compounds due to baking, but addition of the powder raised the phenolic content and anti-abilityFor oxidation in biscuits This is consistent with findings of Ayo et al., (2022) . Results of Mahmoud et al. (2017) showed a significant increase in the total phenolic content among all treatments when adding dried orange peels led to an increase in total phenolic content in biscuits, as Imeneo study showed Others, (2021) that biscuits with lemon peel powder added recorded a higher phenolic content than in control group biscuits, while Janabi, (2022) obtained results similar to results of this study when adding orange peel powder to manufactured biscuits.

CONCLUSIONS:

A functional biscuit was produced that contains a quantity of protein and dietary fiber The results of the determination of antioxidants gave good percentages for their presence in the biscuit samples. As well as the high values of total phenolic compounds .

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