

Supplementary materials to

Effect of Chickpea (*Cicer arietinum* L.) Flour Incorporation on Quality, Antioxidant Properties, and Bioactive Compounds of Shortbread Cookies

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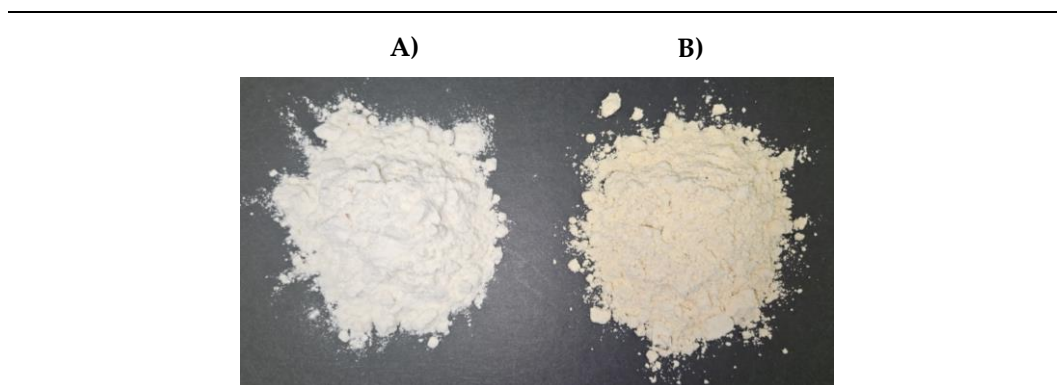


Figure S1. Wheat flour (A) and chickpea flour (B) used for shortbread cookies preparation.

Table S1. Objective color parameters of flours used in the production of shortbread cookies (L^* - lightness, a^* - redness, b^* - yellowness, C^* - saturation, h^* - hue).

Flours	Color parameters				
	L^*	a^*	b^*	C^*	h^*
Wheat	$88.9^a \pm 0.50$	$1.5^a \pm 0.10$	$10.1^a \pm 0.08$	$10.2^a \pm 0.09$	$81.3^a \pm 0.52$
Chickpea	$85.8^b \pm 0.16$	$3.5^b \pm 0.06$	$19.2^b \pm 0.06$	$19.5^b \pm 0.06$	$79.7^b \pm 0.17$

^{a,b}Means \pm SD in columns with the same lower case letter do not differ significantly ($P < 0.05$)

Table S2. Proximate composition and properties of wheat flour and chickpea flour used in the study.

	Wheat flour	Chickpea flour
Moisture [g/100 g]	9.45 ^a ± 0.93	8.61 ^a ± 0.41
Protein [g/100 g]	10.88 ^a ± 0.07	20.10 ^b ± 0.23
Fat [g/100 g]	1.36 ^a ± 0.09	5.95 ^b ± 0.12
Carbohydrates [g/100 g]	77.86 ^a ± 1.12	62.19 ^b ± 0.99
Starch and sugars [g/100 g]	73.48 ^a ± 0.95	44.16 ^b ± 0.18
Ash [g/100 g]	0.451 ^a ± 0.026	3.153 ^b ± 0.031
IDF	1.97 ^a ± 0.08	13.68 ^b ± 0.90
SDF	2.41 ^a ± 0.10	4.35 ^b ± 0.45
TDF	4.38 ^a ± 0.17	18.03 ^b ± 0.81
TPC [mg GAE/g]	0.310 ^a ± 0.009	0.520 ^b ± 0.006
TFC [µg QE/g]	3.90 ^a ± 0.27	4.08 ^a ± 0.32
TC [µg/100g]	5.07 ^a ± 0.115	41.57 ^b ± 0.153
TEAC [µmol TE/g]	3.63 ^a ± 0.05	4.89 ^b ± 0.19
FRAP [µmol TE/g]	30.07 ^a ± 1.79	32.69 ^a ± 0.41
RSA [µmol TE/g]	0.169 ^a ± 0.016	0.456 ^b ± 0.021
Phytates [mg PA/g]	0.126 ^a ± 0.011	0.132 ^a ± 0.009
HMF [µg/100 g]	2.483 ± 0.101	nd
Water activity	0.567 ^a ± 0.020	0.608 ^a ± 0.022
Water absorption capacity [g/g]	0.666 ^a ± 0.006	0.737 ^b ± 0.001
Oil absorption capacity [g/g]	0.620 ^a ± 0.099	0.880 ^b ± 0.006

TPC - total phenolic compounds; GAE - gallic acid equivalent; TFC - total flavonoids compounds; TC - total carotenoids content; QE - quercetin equivalent; TEAC - Trolox equivalent antioxidant capacity; TE - Trolox equivalent; FRAP - Ferric reducing antioxidant power; RSA - Radical scavenging ability; FCA - ferrous chelating ability; EDTA - ethylenediaminetetraacetic acid; PA - phytic acid; HMF - hydroxymethylfurfural; IDF - insoluble dietary fiber; SDF - soluble dietary fiber; TDF - total dietary fiber;

^{a,b} Means ± SD in row with the same lower case letter do not differ significantly ($P < 0.05$)

Table S3. Content of phenolic compounds in wheat and chickpea flours [mg/100 g]

	Wheat Flour	Chickpea Flour
Gallic acid mg/100 g	0.625 ± 0.008	nd
Protocatechuic acid mg/100 g	1.27 ^a ± 0.01	3.68 ^b ± 0.31
chlorogenic acid mg/100g	74.66 ^a ± 1.28	490.0 ^b ± 10.8
(+) catechin mg/100 g	nd	374.8 ± 5.6
hippuric acid mg/100 g	nd	18.26 ± 0.24
4-hydroxybenzoic acid mg/100 g	nd	0.116 ± 0.011
caffeic acid mg/100 g	nd	0.075 ± 0.001
(-)epicatechin mg/100g	0.129 ^a ± 0.014	2.85 ^b ± 0.07
3-hydroxybenzoic acid mg/100g	0.751 ^a ± 0.026	13.83 ^b ± 0.20
<i>p</i> -coumaric acid mg/100g	0.269 ^a ± 0.022	0.107 ^b ± 0.005
quercetin mg/100 g	1.91 ^a ± 0.44	0.936 ^b ± 0.058

nd - not detected

^{a,b} Means ± SD in row with the same lower case letter do not differ significantly ($P < 0.05$)

