PRODUCTION OF HEALTHY MODIFIED FERMENTED MILK SUPPLEMENTED WITH POTENT ANTIOXIDANT SOURCES

By

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ABSTRACT

Marwa Mohamed El-Said: Production of Healthy Modified Fermented Milk Supplemented with Potent Antioxidant Sources. Unpublished Ph.D. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2016.

The current study was designed to raise the antioxidant activity of low fat stirred yoghurt supplemented with natural sources of antioxidant (pomegranate peel (PP) and milk thistle seeds (MTS)) and raising its nutritive value by using whey protein concentrate (WPC). The PP (outside, inside and whole) were dried using oven (40°C/48 h.) and solar energy (50±2°C/24 h.). Aqueous and methanolic extracts were prepared from the dried peels, and their total phenolic content (TPC), total flavonoid content (TFC) and antioxidant activities (DPPH and ABTS), were determined. Both extracts of the dried whole peel showed the highest antioxidant activities as compared to other pomegranate peel extracts (PPE). Low fat stirred yoghurt was prepared from reconstituted skim milk powder (12% TS) supplemented with 5, 10, 15, 20, 25, 30 and 35% of the PPE. Increasing the conc. of PPE significantly increased its content of TPC, TFC and antioxidant activity until 25% PPE, but, further increase in the percentage of added PPE had insignificant effect. Addition of PPE had inhibited effect on the growth of yoghurt starter bacteria (*S.thermophilus* and *L. delbrueckii subsp. bulgaricus*) and it had insignificant effect on the chemical composition and sensory properties (appearance and color, body and texture and flavor) as compared to the control sample. Low fat stirred yoghurt supplemented with different concentration of WPC (0.25, 0.50, 0.75, 1.00, 1.25 and 1.5 g/100ml) had high TPC and antioxidant activity until 0.5 (g/100ml). Addition of WPC increased the total count of *S.thermophilus and L. delbrueckii* subsp.

bulgaricus, and increased total solids, protein, lactose and fat% while it had insignificant effect on sensory properties until 0.5 (g/100ml). Milk thistle seeds extracted (MTSE) at 100°C had the highest TPC, TFC and antioxidant activity (DPPH and ABTS). Low fat stirred yoghurt supplemented with 25% PPE, 0.5 (g/100ml) WPC and MTSE (1, 1.5, 2, 2.5, 3, 3.5 and 4%) was manufactured. Increasing the concentration of MTSE increased TPC, TFC and antioxidant activity. During cold storage the TPC, TFC and antioxidant activity showed a gradually decrease for all yoghurt samples. Increasing the concentration of MTSE in yoghurt samples led to slight increase in total solids, lactose, fat and protein%, while these contents were slightly decreased during storage and there wasn't significantly difference during storage in fat%. Acidity% was decreased with increasing MSTE% and increased during storage. With increasing the MTSE conc. the counts of *S.thermophilus*, *L. delbrueckii* subsp. *bulgaricus* and molds and yeast were decreased and this also observed during storage at 5±1 °C for 15 days. There was a considerable decrease in the apparent viscosity of yoghurt samples with increasing the concentration of MTSE. Yoghurt samples with the different concentration of MTSE were accepted when fresh. While along the cold storage at 5°C for 15 days the sensory scores were decreased.

Key words: pomegranate peel extract (PPE), total phenolic content (TPC), total flavonoidscontent (TFC), antioxidant activity, whey protein concentrate (WPC) and milk thistle seeds extract (MTSE).

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LIST OF ABBREVIATIONS

PPE	Pomegranate peel extract
PP	Pomegranate peel
PPs	Pomegranate peels
PJ	pomegranate juice
AA	Antioxidant activity
Conc.	Concentration
WP	Whey protein
WPC	Whey protein concentrate
MT	Milk thistle
MTSE	Milk thistle seeds extract
MTS	Milk thistle seeds
ABTS	2,2-azino-bis-(3-ethylbenzothiazoline-6-sulphonic acid)
DPPH	2,2-diphenyl-1- picrylhydrazyl
TFC	Total flavonoid content
TPC	Total phenolic content
RSA	Radical-scavenging antioxidant
GAE	Gallic acid equivalent
HPLC	High performance liquid chromotography
HIV	The *human immunodeficiency virus*
HCV	*Hepatitis C virus*
β -Lg	Beta lactoglobulin
FFA	Free fatty acids
g	Gram
hr	Hour
L	Litter
mg	Milligram
ml	Milliliter
RE	Rutin equivalent
min	Minute