ABSTRACT

Yogurt is generally recognized as a healthy and multifunctional food. It is a coagulated milk product obtained from the lactic acid fermentation by the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. In this present studies, dragon fruit *Hylocereus polyrhizus* and *Hylocereus undatus* extract was added in milk and their effects during yogurt fermentation were investigated. The changes in pH and Titratable Acidity (TA) were measured during fermentation and after 14 days of storage at 4°C. The yogurt extracts were subsequently analysed for their syneresis, proteolysis, peptide content, total phenolic content, antioxidant activities, inhibitory activities on α-amylase and α-glucosidase, presence of exopolysaccharides (EPS) and organoleptic properties. pH values for both dragon fruits yogurt showed significant reduction while TA showed higher percentages compared to plain-yogurts during fermentation and after 14 days of storage. Syneresis in yogurt (52.93%) also has been increased (p>0.05) with the addition of *H. polyrhizus* (57.19-63.16%) and *H. undatus* (57.76-70.32%) compared to control (52.93%). The total phenolic content (TPC) in both dragon fruits yogurt (36.44-64.43ugGAE/ml) showed a greater increase (p<0.05) than plain yogurt (20.25ugGAE/ml). The addition of dragon fruits also increased (24.97-45.74%; p<0.05) antioxidant capacity compared to plain yogurt (19.16%). The peptides content in both dragon fruit yogurts were not different (p>0.05) from plain yogurt. Higher inhibitory activities (p<0.05) on α-amylase (17.30-52.20%), α-glucosidase (8.70-34.02%) and EPS production (214-738mg/L) in dragon fruit yogurts than in plain-yogurts were recorded (19.70%, 9.21%, and 181mg/L respectively). *H. polyrhizus* showed the highest score for visual appearance (7.77), aroma (5.9) and sweetness (4.22) while plain yogurt showed highest scores for body texture (6.81), sourness (7.13) and overall taste (5.45). In conclusion, the addition of *H. polyrhizus* and *H. undatus* in yogurt gave enhanced effects on physicochemical, therapeutic properties, production of EPS and organoleptic properties in yogurt.
ABSTRAK

Yogurt dikenali umum sebagai makanan yang berkhasiat yang mana ianya merupakan makanan yang terhasil daripada proses fermentasi susu oleh *Lactobacillus bulgaricus* dan *Streptococcus thermophilus*. Dalam kajian ini, ekstrak buah naga *Hylocereus polyrhizus* dan *Hylocereus undatus* telah dicampur semasa proses fermentasi susu dan kesan-kesanya turut dikaji. Perubahan daripada segi bacaan pH dan TA (titratable acid) telah diperhati dan diukur semasa proses fermentasi susu dan juga selepas 14 hari penyimpanan dibawah suhu 4°C. Selepas itu analisa berkaitan syneresis, proteolysis, kandungan peptida, jumlah kandungan sebatian berfenol, aktiviti antioksidan, penyekatan aktiviti α-amylase and α-glucosidase, penghasilan eksopolisakarida (EPS) dan ciri-ciri organoleptic dijalankan. Yogurt kedua-dua jenis buah naga mencatatkan peningkatan nilai pH dan penurunan nilai TA berbanding kawalan (plain yogurt). Syneresis yogurt (52.93%) bertambah (p<0.05) dengan penambahan kedua-dua buah naga (57.76-70.32%) berbanding kawalan (52.93%). Jumlah kandungan sebatian berfenol (36.44-64.43ugGAE/ml) juga menunjukkan peningkatan (p<0.05) berbanding kawalan (20.25ugGAE/ml). Peningkatan yang signifikan (p<0.05) juga dicatatkan untuk aktiviti antioksida dalam yogurt buah naga (24.97-45.74%) berbanding kawalan (19.16%). Walaubagaimanapun, kandungan peptida yogurt tidak berubah secara signifikan (p>0.05). Penambahan buah naga ke dalam yogurt memberikan peningkatan dalam peratus penyekatan (p<0.05) terhadap aktiviti enzim α-amylase (17.30-52.20%) dan α-glucosidase (8.70-34.02%) serta penghasilan EPS (214-738mg/L) berbanding kawalan (19.70%, 9.21%, and 181mg/L). yogurt buah naga merah (*H. polyrhizus*) mencatatkan nilai yang tinggi untuk ciri penampilan visual (7.77), aroma (5.9) dan tahap kemanisan (4.22) manakala control mencatatkan nilai tertinggi untuk ciri tekstur yogurt (6.81), tahap kemasaman (7.13) dan keseluruhan rasa (5.45). Kesimpulannya, penambahan kedua-dua buah naga memberikan kesan yang positif dari segi fisikokemikal, ciri-ciri therapeutik, penghasilan eksopolisakarida dan juga ciri-ciri organoleptic dalam yogurt.
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## CONTENTS

**ACKNOWLEDGEMENT** i  
**ABSTRACT** ii  
**ABSTRAK** iii  
**1.0 INTRODUCTION** 1  

**2.0 LITERATURE REVIEW** 3  
2.1 Milk 3  
2.2 Fermentation of milk 3  
2.3 Fermented milk 3  
2.4 Yogurt 4  
   2.4.1 Yogurt as a functional food 5  
   2.4.1(i) Control of intestinal infections 5  
   2.4.1(ii) Reducing lactose intolerance 6  
   2.4.1(iii) Discouraging vaginal infections 6  
   2.4.1(iv) Reducing serum cholesterol level 7  
   2.4.1(v) Anticarcinogenic activity 7  
2.5 Probiotics 8  
2.6 Extracellular polysaccharides (Exopolysaccharides) 11  
   2.6.1 Exopolysaccharides in yogurt 12  
2.7 Syneresis 14  
2.8 Proteolysis 15  
   2.8.1 O-phthalaldehyde in the evaluation of proteolysis 16  
2.9 α-Amylase and α-glucosidase enzyme 18  
   2.9.1 Inhibition of pancreatic α-amylase and intestinal α-glucosidase 18  
2.10 Antioxidant activity 20  
   2.10.1 Oxidative stress and antioxidants 20  
   2.10.2 Determination of Antioxidant Capacity 21  
2.11 Phenolic phytochemicals 22  
2.14 Dragon fruit (Pitaya) 24
3.0 MATERIALS AND METHODS

3.1 Materials

3.1.1 Fruits

3.1.2 Yogurt bacteria

3.2 Methods

3.2.1 Apparatus

3.2.2 Preparation of starter culture.

3.2.3 Preparation of yogurt

3.2.4 Preparation of yogurt water extract

3.2.5 pH and titratable acid measurement

3.2.6 Syneresis measurement

3.2.7 The total phenolic content assay

3.2.8 Antioxidant activity by 1, 1-diphenyl-2-picrylhydrazyl radical (DPPH) inhibition assay

3.2.9 Proteolysis assessment of yogurt

3.2.10 Inhibition of α-glucosidase activity

3.2.10.1 Preparation of reagents

3.2.10.1.1 α-Glucosidase enzyme solution

3.2.10.1.2 0.1 M potassium phosphate buffer (pH 6.90)

3.2.10.2 α-Glucosidase inhibition assay

3.2.10.3 Preliminary studies on the inhibition of enzymes by yogurt water extract

3.2.11 α-amylase inhibition assay
3.2.11.1 Reagent preparation

(i) α-amylase enzyme solution
(ii) Sodium phosphate buffer (0.02M, pH 6.9 with 0.006 M sodium chloride)
(iii) Starch solution
(iv) Dinitrosalicylic acid (DNSA) reagent

3.2.11.2 α-Amylase inhibition assay

3.2.11.3 Preliminary experiments on optimisation of α-amylase assay conditions

(i) The optimal composition of DNSA reagent
(ii) The optimum dilution factor of yogurt extracts
(iii) The optimum incubation time
(iv) The optimum boiling time

3.2.12 Production of exopolysaccharides in dragon fruits yogurts

3.2.12.1 Extraction, purification and quantification of exopolysaccharides

3.2.12.2 Phenol-sulphuric acid assay

3.2.13 Sensory evaluation of yogurts

3.2.14 Statistical analysis

4.0 RESULTS

4.1 DPPH inhibition: Preliminary experiment

4.2 OPA assay: Preliminary experiment

4.3 α-Amylase Inhibition assay

4.3.1 The optimum composition of DNSA reagent

4.3.2 The optimum dilution factor of yogurt water extracts

4.3.3 The optimum incubation time after the addition of substrate

4.3.4 The optimum boiling time after the addition of DNSA reagent

4.4 α-Glucosidase inhibition assay: Preliminary experiments

4.4.1 The optimum enzyme concentration and incubation time
4.4.2 The optimum dilution factor yogurt water extracts 50

4.5 Experiments on plain and dragon fruit-yogurt 51
   4.5.1 Reduction of yogurt pH during fermentation 51
   4.5.2 Titratable acid 54
   4.5.3 Syneresis measurement 56
   4.5.4 Total phenolic content (TPC) in dragon fruit yogurts 57
   4.5.5 Antioxidant activity of dragon fruit yogurts 58
   4.5.6 Effects of dragon fruit extract on proteolysis of milk protein 59
   4.5.7 α-Glucosidase inhibition assay 60
   4.5.8 α-Amylase inhibition assay 62
   4.5.9 Sensory evaluation 64
   4.5.10 Exopolysaccharides productions 65

5.0 DISCUSSION 66

5.1 Effects of dragon fruits on the changes of physicochemical properties of yogurt 66
   5.1.1 pH of yogurt 66
   5.1.2 Titratable acid of yogurt 67
   5.1.3 Syneresis of dragon fruits yogurts 68

5.2 Effects of dragon fruits on therapeutical properties of yogurt 69
   5.2.1 Total phenolic content (TPC) 69
   5.2.2 Antioxidant activity by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical inhibition assay 70
   5.2.3 α-Glucosidase inhibitory potentials of yogurt 72
5.2.4 α-Amylase inhibitory potentials of yogurt 73

5.3 Effects of dragon fruits on proteolysis of yogurt 74

5.4. Effects of dragon fruits on exopolysaccharides production of yogurt 75

5.5. Effects of dragon fruits on organoleptic properties of yogurt 76

CONCLUSIONS 77

REFERENCES 78

APPENDICES 95
LIST OF FIGURES

Figure 2.0 (a) *Hylocereus undatus* 25

Figure 2.0 (b) *Hylocereus polyrhizus* 25

Figure 2.1 Sugar composition of *Hylocereus undatus* and *Hylocereus polyrhizus* extracts analysed by Wichienchot *et al.*, (2010) 26

Figure 4.1 The changes in absorbance readings at 517nm after the addition of yogurt water extracts in 30µM DPPH reagent 41

Figure 4.2 The changes in absorbance readings at 517nm after the addition of yogurt water extracts in 60µM DPPH reagent 41

Figure 4.3 The changes in absorbance readings at 517nm after the addition of yogurt water extracts in 120µM DPPH reagent 42

Figure 4.4 The changes of absorbance readings with time after the mixing of yogurt water extracts with OPA reagent 43

Figure 4.5 The α-amylase inhibitory activity of yogurt water extracts at different concentration of DNSA 45

Figure 4.6 Absorbance readings of yogurt water extracts at 540 nm with and without phenol and bisulfite in α-amylase inhibition assay 45

Figure 4.7 The α-amylase inhibitory activity of yogurt water extracts at different dilution factors 46

Figure 4.8 The α-amylase inhibitory activity of yogurt extracts at different incubation time 47

Figure 4.9 The α-amylase inhibitory activity of yogurt water extracts at different boiling time 48

Figure 4.10 The α-glucosidase activity of control sample (without inhibitor) with different dilution factors of enzyme solution 49

Figure 4.11 The α-glucosidase activities of plain yogurt water extract at different dilution factors 50

Figure 4.12 Changes in pH during yogurt fermentation in the absence or presence of dragon fruit (10, 20 or 30% w/w) 52

Figure 4.13 Changes in titratable acid (lactic acid percentage) during fermentation of yogurt 55

Figure 4.14 Changes in syneresis in yogurt in the presence of dragon fruit. 56
Figure 4.15 Total phenolic content in red and white dragon fruit yogurt

Figure 4.16 DPPH antioxidant activities in yogurts. Values represent mean of 3 independent experiments (n=3) and bar represent standard error on the means (SEM)

Figure 4.17 Proteolysis in dragon fruit yogurts as determined using O-phthalaldehyde assay

Figure 4.18 Inhibition on α-glucosidase activity by dragon fruit yogurts extracts

Figure 4.19 IC₅₀ values for α-glucosidase inhibition by dragon fruit yogurts

Figure 4.20 Inhibition on α-amylase activity by dragon fruit yogurts extracts

Figure 4.21 IC₅₀ values for α-glucosidase inhibition by dragon fruit yogurts

Figure 4.22 Sensory evaluation score of plain and dragon fruit yogurts

Figure 4.23 Exopolysaccharides concentration in plain and dragon fruits yogurts
LIST OF TABLES

Table 2.1: Benefits and potential therapeutical applications 10

Table 3.1: Criteria evaluated in sensory evaluation 40

Table 4.1 pH values of plain and dragon fruit-yogurt on the 14\textsuperscript{th} day of storage 53

Table 4.2: Titratable acid (TA) of dragon fruit yogurts on the 14\textsuperscript{th} day of storage 54
LIST OF ABBREVIATIONS

LAB

Lactic acid bacteria

°C

Degree Celcius

L. acidophilus

Lactobacillus acidophilus

S. thermophilus

Streptococcus thermophiles

L. delbrueckii ssp. Bulgaricus

Lactobacillus delbrueckii ssp Bulgaricus

L. casei

Lactobacillus casei

L. plantarum

Lactobacillus plantarum

B. bifidum

Bifidobacteria bifidum

B. infantis

Bifidobacteria infantis

cfu

Colony forming unit

ml

Millilitre

μl

Microliter

μg

Microgram

mg

Milligram

nm

Nanometer

mm

Millimeter

HCl

Hydrochloric acid

NaOH

Sodium hydroxide

DPPH

2,2-Diphenyl-1-Picrylhydrazyl

TA

Titratable acid

dH2O

Distilled water

EPS

Exopolysaccharides
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAS</td>
<td>Generally recognized as safe</td>
</tr>
<tr>
<td>TNBS</td>
<td>Trinitrobenzenesuphonic</td>
</tr>
<tr>
<td>OPA</td>
<td>O-phthaldehyde</td>
</tr>
<tr>
<td>NADH</td>
<td>Nicotinamide adenine dinucleotide</td>
</tr>
<tr>
<td>ATP</td>
<td>Adenosine triphosphate</td>
</tr>
<tr>
<td>GSH</td>
<td>Glutathione</td>
</tr>
<tr>
<td>FCR</td>
<td>Folin-Ciocalteau’s reagent</td>
</tr>
<tr>
<td>DNSA</td>
<td>Dinitrosalicylic acid</td>
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