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Studying of the nutritional value, sensory properties and storage status of Patton Saleesupplemented with dried eggplant peels

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Abstract

This study was carried out to investigate of nutritional value, sensory properties and storage status of Patton Salee supplemented with dried eggplant peels (DEP).A sample of 30 EducationFaculty students, their ages ranged between 19-24 yearsare chosen to evaluate sensory properties of Patton Salee supplemented of DEP 5, 10, 15%.Taste, color, flavor, pores, textures and overall acceptability of supplemented Patton salee with DEP were recorded9.32,8.56 and7.71 respectively compared to control sample(10) degree to each property.The chemical analysis revealed thatby additionof 5 % DEPin Patton salee, the proteins, fats, crude fiber and ash increased from 10.527to 10.684, 0.744 to 1.892, 0.14 to 1.45 and1.13 to 1.52%,vitaminsB1, B2, B3, B9, B12 and C increased from 12.01 to 13.265, 0.76 to 20.56, 42.29 to 221.62, 6.02 to 54.89, 1.38 to 11.79, 386.59 to 1118.25mg/kg, mineral P, Mg, Mn, K and Cu increased from 69.16 to 75.52, 71.18 to 78.55, 0.521 to 8.50, 280.95 to 431.77 and 2.862 to 3.236 mg/ 100 gand bioactive compounds as total flavonoids, total phenols and total antioxidants increased from0 to 1.916, 46.53 to 71.02 and 32.83 to 54.83mg. The storage statuswas improved, the values of vitamins, minerals and bioactive compounds of supplemented sample with 5% of eggplant peels (stored oneand 20 days) compared to control sample. In conclusion, addition of dried eggplant peels to Patton Salee improved nutritional value of protein, ash, fiber, vitamins, minerals and bioactive compounds after the storage because eggplant peels is rich in ash, fiber, vitamin and minerals.

Keywords: Nutrition, vegetables peels, eggplant peels chemical composition, phytochemicals, antioxidants, flavonoids, and phenols.

Introduction

Healthy nutrition hasan important impact and effectiveinhuman health, it protect from chronic diseaseslike heart disease, osteoporosis, and cancer, alsofood awareness is very important for people to know exactly how many servings of fruits, grains, vegetables and fatsso food awareness programs recommend increasingthe intake of fruits and vegetables **(Janet*et al,* 2012**).A supplementeddietary providesnutrients that not be consumed in sufficient quantitiesas vitamins, minerals, fiber, fatty acids and amino acids,these nutrients may be classified as drugs **(Parmarand Kar,2009 and Grace and Emily, 2013).**Most supplements should be avoided except people not eat micronutrientsand people with clearly shown deficiency**(Guallar et al, 2013).**Thevegetables supply the diet with vitamins, minerals, dietary fiber , phytochemicals andphytonutriceuticals, so it improve the gastrointestinal health, good vision and reducethe risk of heart disease, stroke, chronic diseases like diabetes and some types of cancer**(Golberg, 2003 and Ifava, 2006 and Keatinge*et al,* 2010).**Vegetables play an important role in human nutrition, it is considered as a source of phytonutriceuticals as vitamins (C, A, B1, B6, B9 and E), minerals, dietary fiber, phytochemicals and antioxidants**(Dias, 2011).**

Low vegetable intake in unbalanced diets causes about 31% of heart disease and 11% of stroke in worldwide. According to the 2007 World health report,the unbalanced diets with low vegetable intake , low consumption of complex carbohydrates and dietary fiber cause about 2.7 million deaths each year **(Dias and Ryder, 2011),** Sodiets rich in fruits and vegetables decrease risk of diseases as diabetes and cancer **(Bernstein *et al*, 2002).**Malnutrition is of a major concern for many tropical developing countries for example, one third of the world's population have iron deficiency anemia**(Kumari, *et al*, 2004).**Vegetable and fruit peels have the same characteristics of vegetable, fruit and herbal extracts, it is rich in various bioactive compounds, and biological properties,although it is represent waste **(Hamendra *et al,* 2010).**Among these vegetables is eggplant.Eggplantis an important tropical and subtropical vegetable crop, it used for different types of recipes andit has a medicinal property **(FAO, 2011).**According to FAO, production of eggplant is highly concentrated with 90% of output coming from five countries. China is the top producer (58% of world output) and India is second (25% of output), followed by Egypt, Iranand Turkey, It is an important source of phenolic and flavonoid compounds (powerful antioxidants) such as Ncaffeoylputrescine, 5-caffeoylquinic acid, and 3-acetyl-5-caffeoylquinic acid, in addition to flavonol

(quercetin-3- glycoside, quercetin-3-rhamnoside, and myricetin-3-galactoside)**(Lutheria *et al*, 2010 and FAO, 2011 and Alezandro *et al*, 2013 and Macedo*et al*,2013).**

The nutritional benefit of eggplant varies according to its type.The nutritional value depends upon the species,the overall shape, size and color. It is rich in calcium and itis advised to eatbypeople with deficient in calcium, calcium represents a vital role in thebones formation, Also eggplant contains nicotine, low calories, so it considered healthy for people suffering from obesity.Eggplant has many forms like ovoid, oblong, obovoid or long cylindrical and per100 g of eggplant provides the body calories 24.0 Kcal, Moisture content 92.7%, Carbohydrates 4.0%, Protein 1.4g, Fat 0.3 g and **vitamins130 mg**. Eggplant is characterized by bitterness because of glycol alkaloids, this glycol alkaloids may contain medicinal properties, For example, white eggplant is good for diabetic patients. It can cure toothache and recommended for people suffering from liver and asthma **(Khemnani *et al*, 2012).**Eggplant is nutritious because of it is considered a good source of minerals such as magnesium, iron, folic acid and potassium which used to control diabetes, hypertension and obesity, it low in fat, calories but high in fiber and contains a large volume of water **(Forestry and Fisheries, 2011).**

Eggplant has clinical properties such as lower blood cholesterol, helps counteract detrimental blood effects of fatty foods and clears toxic from the body,hypertension, stomach ulcers, colitis, and constipation, bleeding hemorrhoids, swellingsand tumors. The eggplant contains solasodine glycosides that are usednow for the treatment of skin cancers **(Bill and Cham, 2007).**There are also many reports on the health benefits of eggplant because it contains antioxidants**(Huang *et al*, 2004).(Smolin and Grosvenor, 2007)**investigated the antioxidant activity and Phenolic contents of five different parts (calyx, leaf, peel, pulp, and stem) of eggplant extracted by two different solvents (70% ethanol and water), Also the Phenolic compounds present in fruits and vegetables , which increased interest due to the beneficial effects for human health.Anthocyanins color ispresent in eggplant peel, it represents important naturally pigments of red or purple, the main compounds in eggplant peel are phenolics and Nasunin isconsidered a major component of anthocyanin pigment of eggplant, it was isolated from the eggplant peels, and its antioxidant activity was evaluated by **(Prakash *et al*, 2007).Also (Prakash *et al*, 2007)** mentioned that eggplant peels contain Anthocyanin 158.00ppm, this compounddecrease the levels of serum total cholesterol, low density

lipoprotein cholesterol, very low density lipoprotein and triglyceride and increased high density lipoprotein cholesterol.According to the study of**(Amany *et al,* 2012)** about determination of Anthocyanin in eggplant peels, anthocyanin becomes a new source of natural antioxidant for food,Also the eggplant peels were screened for their antioxidant activity in vitro. This study aimed to investigateof nutritional value, sensory properties and storage status of Patton Salee supplemented with dried eggplant peels.

Materials and Methods

Materials:

A sample of eggplant peels was dried by the sun for five days and then dried in the oven at 60 °C for 20 minutes and grinded in electric blender to get powder and stored in fridge until using. Then sample of thirtystudents of education faculty, their ages ranged between 19-24 years are chosen to evaluate the sensory propertiestaste, color, flavor, pores, textures and overall acceptabilityof Patton Salee supplemented with different levels of DEP (5, 10 and 15%)compared to the control sample. The sample of Patton Salee is made by using wheat flour extraction (70-72%) was obtained from Cairo – Egypt, powder yeast, salt, sugar and cumin spices.

Methods:

Preparation of eggplant peels:

Fresh eggplant fruits were obtained from local market from Egypt in May 2017. The fruits were washed well by distilled waterto remove all the soil and unwanted dirtand were peeled by using a sharp knife,then the peels were dried in the sun forfive days and then dried in electric oven at 60 °C for 20 minutes, grinned in blender to get powder and stored in the fridgeat 18 °Cuntil using.

Preparation of Patton Salee samples supplemented with DEP.

Adding different levels of **DEP**(5%, 10% and 15%) to (100 g) to wheat flour extraction (70%-72%) to produce thePatton salee. The ingredients (wheat, salt, sugar, yeast, DEP and cumin spices) weremixedwell, then a little water is addedtoget similar dough and the Patton Salee was baked in the oven at temperature 180 ^{o}C for 10 min. The supplemented Patton salee with (5% **DEP**) wereevaluated sensory compared to the control sample.After that these samples were stored for (one and 20 days) to study their storage properties.

Proximate Chemical Composition:

The samples were analyzed in Food Technology Research Institute (FTRI)in Cairo, Giza.Determination of moisture, proteins, fats, carbohydrates, ash, crude fiber and minerals (on dry basis) contents

in wheat flour, eggplant peels and Patton salee supplemented with 5% DEP was according to**AOAC, (2005).**The crude protein content (N x 6.25) Total carbohydrates were calculated by difference: Total carbohydrates = 100- (g protein+ g fat +g ash + g fiber).

Determinations of Vitamin B complex:

Vitamin B complex (B1, B2, B3, B6, B9, B12 and C) contents were determined in Food Technology Research Institute (FTRI)in Giza, Egyptaccording to**A.O.A.C,(2005).**

Determination of minerals in supplemented Patton Salee with 5% DEP:

Mineralscontents (P, K, Cu, Mg, and Mn) were determined in Food Technology Research Institute (FTRI)in Giza, Egyptaccording to **A.O.A.C, (2005).**

Determination of bioactive compounds in supplemented Patton Salee with 5% DEP:

Bioactive compounds such as (Total flavonoids, Total Phenols and Total antioxidants) contents were analyzed in Food Technology Research Institute (FTRI) in Giza, Egypt according to **A.O.A.C, (2005).**

Statistical analysis:

The obtained data were Statistical analyzed by using computer (programme of Statistical analysis system"SAS"). The results were expressed as mean ± standard diviation"SD" and tested for significance using one way analysis of variance "ANOVA" test. And least significant difference "LSD" tests at a probability $P \leq 0.05$, according to **(Armitaage and Berry, 1987)** a value of $P \leq 0.05$ was considered to be statistically significant.

Resultsanddiscussion:

Mean of sensory properties in Patton Salee supplemented with (DEP).

Data in Table (1) shows that, there are significant differences at the level of $P \leq 0.05$ in the samples of Patton salee (control sample and supplemented with different levels of DEP 5%, 10% and 15%) in the sensory evaluation (taste, color, Flavour, pores, texture and overall acceptability). And the values of LSD of the sensory evaluation were recorded (0.1968, 0.340, 0.379, 0.1968, 0.1968 and1.01) respectively.Also these differences referred that, the lower and medium levels of DEP(5% and 10%) were showed improvement in the sensory evaluation compared to the control, the mean values in sensory evaluation of supplemented sample with 5% of DEP were (9.6 ±0.3, 9.3 ±0.1, 9.34 ±0.1, 9.23±0.03,9.12±0.2 and 9.32 ±0.16) respectively, but the mean values of the supplemented sample with 10% of DEP were (8.4 ±0.3, 8.8 ±0.26, 9.2 ±0.24, 8.2 ±0.11, 8.2

±0.14 and 8.56 ±0.26) respectively, the mean values of the control (10.00 , 10.00, 10.00, 10.00and 10.00).the supplemented Patton salee with 5%DEPachieved a best result in sensory evaluation compared to control .Generally, the data in Table (1) shows that there are significant difference between the control sample and the three levels of DEP, but the supplemented Patton salee with 5% and 10% DEPisgood in the sensory evaluationcompared to the control,and the best resultswere appearedin supplement Patton salee with 5% DEP.

Table 1: Mean of sensory properties in Patton Salee supplemented with DEP.

Samples of Patton Salee	Taste	Color	flavor	Pores	Texture	Overall acceptability
Control	10.00^{a}	10.00^{a}	10.00^{a}	10.00^{a}	10.00^{a}	10^{a}
5% DEP	9.6 ± 0.3^{bc}	9.3 ± 0.1^{b}	9.34 ± 0.3^{bc}	9.23 ± 0.02^{bc}	9.12 ± 0.2^{bc}	9.32 ± 0.16^{bc}
10% DEP	8.4 ± 0.3^{c}	8.8 ± 0.26^{cd}	9.2 ± 0.24^{cd}	8.2 ± 0.11^{cd}	8.2 ± 0.14^{cd}	8.56 ± 0.26^{cbd}
15% DEP	7.73 ± 0.01^{dce}	7.8 ± 0.06^{de}	8.6 ± 0.21^{dec}	7.2 ± 0.31^{dec}	7.20 ± 0.01^{dec}	7.71 ± 0.04^{dec}
LSD at 5%	0.1968	0.340	0.379	0.1968	0.1968	1.01

Values are expressed as mean ±SD Significant at p≤0.05 using one way ANOVA test.LSD: Least significant difference.

Chemical composition of Patton Salee supplemented with 5% of DEP.

Data in **Table (2)**explains the Chemical composition of Patton Salee supplemented with 5% of (DEP).The rate of protein insupplemented Patton Salee with 5% DEPrecordedincreasing from (10.527to 10.684), fat from (0.744 to 1.892),fiber from (0.14 to 1.45) and ash from (1.13 to 1.52), but carbohydrates and moisture decrease from (79.71 to 76.969) and (7.749 to 6.485).Generally, the rates of protein, fat, crude fiber, and ash increased with additionof DEP, but the carbohydrate and moisturerate showed gradually decreasing in supplemented Patton Salee with 5%DEP compared to the control Patton Salee. These results agreement with**Khemnani*et al*, (2012)**who determined chemicalcomposition of eggplant,which providedcalories 24.0 Kcal, moisture 92.7%, carbohydrates 4.0%, protein 1.4g, fat 0.3 g and vitamins130 g per100 g. Also**Mazza*et al*, (2004) and Smolin and Grosvenor, (2007)** mentioned the nutritionvalue of eggplant per 100 g,the eggplant is low in fat 0.23g and protein 0.83 g,and it contains some fiber 2.5g, sugars 3.20g and

give energy 35kcal, so it has healthy benefits for people needs weight lossor diet.

Table 2: Chemical composition of Patton Salee supplemented with 5% of DEP.

Component (%)	Paton salee	Paton salee + 5% DEP 5%
Protein	10.527±2.00	10.684±0.110
Carbohydrate	79.71±3.00	76.969±3.002
fat	0.744±0.231	1.892±0.201
Moisture	7.749±1.012	6.485±1.003
Fiber	0.14±0.121	1.45±0.102
Ash	1.13±0.141	1.52±0.112

* Mean of three replicates. *Calculated by difference.

Vitamins content of Patton Salee supplemented with 5% DEP. Vitamins content of Patton Salee supplemented with 5% DEPare shown in **Table (3).** This data referred that the mean of values of vitamin B complex and vitamin C increased gradually as a result ofaddingtheDEP(13.268, 20.56,221.62, 26.73, 54.89, 11.79 and 1118.25) respectivelycompared to control sample (12.01, 0.76, 42.29, 19.60, 6.02, 1.38 and 386.59) respectively. These results agreed with the results of **Mazza et al, (2004) and Smolin and Grosvenor, (2007) and Parmar and Kar, (2009)and Grace and Emily, (2013)**mentioned thateggplant is a good source of vitamins and minerals. Also the study of **(Eze, S.O. and Kanu, C.Q., 2014),** they deteriminedthe vitamin B2 and B3 content in eggplant, the results recorded that eggplant was high in vitamin B2 and B3.

Table (3): Vitamins content of Patton Salee supplemented with 5%DEP.

Vitamins mg/kg	Paton salee	Paton Salee + 5% DEP 5%
Vit.B1	12.01±2.142	13.268±3.100
Vit.B2	0.76±0.232	20.56±3.310
Vit.B3	42.29±3.013	221.62±4.251
Vit.B6	19.60±2.210	26.73±3.612
Vit.B9	6.02±1.041	54.89±3.00
Vit.B12	1.38±0.301	11.79±2.150
Vit.C	386.59±4.00	1118.25±5.021

Minerals content of Patton salee supplemented with 5% DEP.

Minerals content of Patton salee supplemented with 5% DEP in Table(4)shows that adding DEP to Patton salee led to increasing the

minerals as P, Mg, Mn, K and Cu compared to the control, the value of P increasedgradually in Patton saleefrom (69.16 to 75.52), Mg increased from (71.18 to 78.55), Mn increased from (0.521 to 8.50), K increased from (280.95 to 431.77) and Cu increased from (2.862 to 3.236).These results agreement with **Smolin and Grosvenor, (2007)** whomentioned that eggplantis high in potassium.Also according to the study of **Nareman and Rasha, 2015** about nutritional content of pies fortified with potato and eggplant peels, they reported that the levels of Mn, Cu, Mg, Na, K and P was higher in the sample of blends than control sample.

Table (4): Minerals content ofPatton salee supplemented with 5%DEP.

Minerals (mg/100g)	Paton salee	Paton salee + 5% DEP
P	69.16±3.125	75.52±3.005
Mg	71.18±3.030	78.55±2.060
Mn	0.521±0.311	8.50±2.021
K	280.95±4.005	431.77±3.042
Cu	2.862±1.003	3.236±1.011

Determination of bioactive compound in Patton Salee supplemented with 5% DEP.

Data presented in Table (5)Indicates thatby adding DEP to Patton salee,total flavonoids, total phenolic and total antioxidant increased respectively (1.916, 71.02and 54.82) compared to the control (0, 46.53and 32.83). Generally, the results were appeared that, total flavonoids, total phenolic and total antioxidants improved by adding DEP because of eggplant peels is a rich source in bioactive compound such as antioxidants, flavonoids and phenolic. These results agreement with (**Lutheria *et al*, (2010)**who showed that eggplant is an important source of phenolic and flavonoid compounds which considered powerful antioxidants, according to(**Oke***et al*, 2009**and Macedo** et al, 2013 and **Mazza*et al*, 2004 and Smolin and Grosvenor, 2007)**,Nasunin is a major component of anthocyanin pigment of eggplant and it has antioxidants properties and prevents from cancer, it is isolated from the eggplant peels, the level of anthocyanin was 158.00ppmand its antioxidant activity was evaluated. Also**Southon, (2000)**evaluatedthe antioxidant activity and phenolic contents in five different parts (calyx, leaf, peel, pulp, and stem) of eggplant extracted by two different solvents (70% ethanol and water).According to the study of**Amany***et al*, (2012)about determination the antioxidant activity of Anthocyanin from eggplant peels,it can become a new source of

natural antioxidant for food, nutraceutical and pharmaceutical industries.**Grussu *et al,*(2011**)reported that dietary antioxidants and phenolics are considered to be key health promoting compounds with several biological effects including antibacterial, anti-inflammatory, ant allergic, hepatoprotective, antithrombotic, antiviral, ant carcinogenic and vasodilator actions.

Table (5): Determination of bioactive compound inPatton Saleesupplemented with 5% DEP.

Bioactive compounds (mg/100g)	Paton salee	Paton salee+ 5% DEP
Total flavonoids	ND	1.916±0.5
Total phenolic	46.53±3.065	71.02±3.541
Total antioxidants	32.83±1.113	54.82±2.023

Vitamins content of control and supplemented Patton Salee stored for (one day and 20 days).

The results of Vitamin B complex including B1, B2, B3, B6, B9 and B12and vitamin C of control Patton Salee (stored for one and 20 days)are outlined in Table (6). The data indicates that,The values of vitamin B complex and vitamin C increased in Patton Salee supplemented with 5% DEP and stored forone and 20 days, it wasrecorded (13.268, 25.19, 221.62, 26.73, 54.89, 11.79and 1415.79)and (12.01, 20.56, 152.85, 26.64, 28.48, 5.81and 1118.25) respectively, compared to control Patton Salee stored for one and 20 days (11.60, 2.13, 135.62, 26.53, 12.51, 2.48 and 618.83) and (10.09, 0.76, 42.29, 19.60, 6.02, 1.38 and 386.59). In the end, data in Table (6)showsthat vitamins values improved as a result of adding (5%) DEP, because the DEP is a rich in vitamins B complex and vitamins C.These results agreement with (**Guillermo NIÑO-MEDINA, 2014)** who said that eggplant has highest levels of ascorbic acid (Vitamin C), also the study of Offor and Igwe, 2015, studied the comparative Analysis of the vitamin Composition of two different species of garden egg (*Solanum aethiopicum and Solanum macrocarpon*), they reported that Solanum macrocarpon contained higher amount of ascorbic acid.

Table (6): Vitamins B complex content of control and supplemented Patton Salee stored for (one day and 20 days).

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Vitamins	Control sample stored for one day Paton salee	Control sample stored for 20days Paton salee	Supplemented Paton salee with 5% DEP stored for one day	Supplemented Paton salee with 5% DEP stored for 20 days
Vit. B1	11.60±2.120	10.09±2.031	13.268±3.100	12.01±2.142
Vit. B2	2.13±1.100	0.76±0.243	25.19±2.221	20.56±3.310
Vit. B3	135.62±3.054	42.29±3.013	221.62±4.251	152.85±3.331
Vit. B6	26.53±2.320	19.60±2.210	26.73±3.612	26.64±2.102
Vit. B9	12.51±2.110	6.02±1.041	54.89±3.00	28.48±3.501
Vit. B12	2.48±1.010	1.38±0.301	11.79±2.150	5.81±2.110
Vit. C	618.83±4.056	386.59±4.00	1415.79±6.564	1118.25±5.021

Minerals content of control and supplemented Patton Salee stored for (one day and 20 days)**.**

Data presented in Table (7)reveal that, there is improvement in minerals content by adding DEP to Patton salee compared to control sample (stored for 20 days), the value of P improved from (68.64 to 70.16), the value of Mg improved from (71.18 to 81.81), Mnimproved from (0.521 to 10.47), K improved from (254.28 to 473.62) and Cu improved from (2.79 to 3.973).There are observed improvement between the control Patton Salee sample (stored for one day) and the supplemented sample with 5% DEP (stored for one day) in the minerals content, the value of P improved from (69.16 to 71.75), the value of Mg improved from (78.17 to 83.13), Mn improved from (8.78 to 11.25),K improved from (280.95 to 491.18) and Cu improved from (2.80 to 4.63).These results agreement with (Zenia Michalojc and Halina Buczkowska**, 2008)**whomentioned that eggplant is rich in mineralswhich have a vital role in the bones formation as potassium, magnesium and iron, so it is good for human healthy. According to Arivalaganet al, (2013) analyzed mineral in eggplant (Solanum melongena L.), the results indicated that Potassium and magnesium ranged from 177.19 to 274.48 mg and 6.25 to 18.34 mg/100 g fresh weight (FW), respectively. Copper, iron and zinc ranged from 0.024 to 0.178, 0.170 to 0.846 and 0.073 to 0.233 mg/100 g FW, respectively.

Table (7): Minerals content of control and supplemented Patton Salee stored for (one day and 20 days)**.**

Micronutrients	Control Paton salee and stored for one day	Control Paton salee and stored for 20 days	Supplemented Paton Salee with 5% DEP and Stored for one day	Supplemented Paton Salee with 5% DEP and Stored for 20 days
P	69.16±3.125	68.64±3.611	71.75±0.1	70.16±3.540
Mg	78.17±3.602	71.18±3.030	83.13±0.56	81.81±3.001
Mn	8.78±2.124	0.521±0.311	11.25±0.51	10.47±2.300
K	280.95±4.005	254.28±4.465	491.18±0.19	473.62±4.030
Cu	2.80±0.712	2.79±1.061	4.63±0.89	3.973±1.003

Bioactive compounds and antioxidants content of control and supplemented Patton Salee stored for (one day and 20 days)**.**

Data in Table (8)showsbioactive compounds and antioxidantsin control and supplemented Patton salee with 5% DEP (stored for one and 20 days). The values oftotal flavonoids, total phenolic and total antioxidants were increased gradually in stored Patton Salee for oneand 20 days)because ofadditionDEP(3.01, 182.86 and 74.57) and (1.916, 102.04 and 54.82) respectivelycompared to control sample and stored for one and 20 days (0,71.02 and 40.18) and (0,46.53 and 32.83).These results agreement with **(Southon, 2000)**who evaluatedthe antioxidant activity and phenolic contents of five different parts (calyx, leaf, peel**,** pulp, and stem) of eggplant extracted by using two different solvents (70% ethanol and water).Also**(Amany *et al*, 2012)** determined the antioxidant activity of Anthocyanin from of eggplant peels and indicatedthat eggplant can be a new source of natural antioxidant of food and usingin the nutraceuticals and pharmaceutical industries. According to **(Kadiveca *et al,* 2015),** they mentioned that Phenolic compounds content ranged from 13.46 to 29.42 g kg–1 in eggplant peel and due to higher phenolic compounds contents, should be use of eggplant peels as natural ingredient for functional products formulation in future research.

Table (8): Bioactive compounds and antioxidants content of control and supplemented Patton Salee stored for (one day and 20 days)**.**

Bioactive compounds	Control Paton salee stored for one day	Control Paton salee stored for 20 days	Supplemented Paton salee with 5% DEP for one day	Supplemented Paton salee with 5% DEP for 20 days
Total flavonoids (mg/g)	ND	ND	3.01±1.102	1.916±0.5
Totalphenolic (mg/100g)	71.02±3.541	46.53±3.065	182.86±4.673	102.04±3.701
Total antioxidants (%)	40.18±2.151	32.83±1.113	74.57±3.520	54.82±2.023

Conclusion, supplementationof Patton Salee with DEP led to improvement in the sensory evaluation andnutritional valueofprotein, fiber, ash, crude fiber, vitamins, mineral and bioactive compounds, so DEPhas a role important in nutrition and human health. On the basis of the above mentioned data, the results of sensory properties showed that, supplementation of Patton salee with different levels of DEP was shown good improvement in sensory evaluation, and the best results were shown in the supplement Patton salee with low level 5% of DEP, also addition of DEP to Patton Saleeimproved nutritional value of vitamins, minerals and bioactive compounds during the storage. So it recommended using DEP in bakery products to improve the nutritional value of fiber, ash, vitamin, minerals and bioactive compounds.

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دراسة القيمة الغذائية والخواص الحسية والحالة التخزينية لمنتج الباتون سالية المدعم بقشر الباذنجان المجفف

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الملخص العربى:

يهدف هذا العمل الى دراسة الخواص الكيميائية والحسية والتخزينية لمنتج الباتون سالية المدعم بمسحوق قشر الباذنجان الأسود، حيث تم استخدام عينة من طالبات كلية التربية عددهم ٣٠طالبة، تراوحت أعمارهم ما بين ١٩-٢٤ سنةلإجراء التقييم الحسى للمنتج المدعم بنسب مختلفة من المسحوق (٥ ، ١٠ ، ١٥%)، وأوضحت نتائج التقييم الحسى مدى تقبل منتج الباتون سالية المدعم من حيث الطعم، اللون، الرائحة، المسام، القوام ومدى التقبل العام للمنتج، وأفضل النتائج سجلت في المستوى المنخفض من مسحوق قشر الباذنجان(٥%), حيث سجلت النتائج للعوامل السابقة على التوالي٩.٦، ٩.٣، ٩.٣٤، ٩.٢٣، ٩.١٢ مقارنته بالعينة الكنترول التي تحمل ١٠ درجات لكل عامل وأشارت نتائج التركيب الكيميائي أنه بزيادة مستوى مسحوق قشر الباذنجان في منتج الباتون سالية زاد مستوىكل من البروتين من ١٠,٥٢٧ الى١٠,٦٨٤%، الدهون من ٠,٧٤٤ الى ١,٨٩٢%، الألياف من ٠,١٤ الى ١,٤٥%، الرماد من ١,١٣ الى ١,٥٢%، فيتامين ب ١ من ١٢,٠١ الى ١٣,٢٦٥ %، ب ٢ من ٠,٧٦ الى ٢٠,٥٦%, ب ٣ من ٤٢,٢٩ الى ٢٢١,٦٢%، ب ٩ من ٦,٠٢ الى ٥٤,٨٩%, ب ١٢ من ١,٣٨ الى ١١,٧٩%, ج من ٣٨٦,٥٩ الى ١١١٨,٢٥%، المعادن منها الفوسفور زاد من ٦٩,١٦ الى ٧٥,٥٢%، الماغنسيوم من ٧١,١٨ الى ٧٨,٥٥%، المنجنيز ٠,٥٢١ الى ٨,٥٠%، البوتاسيوم من ٢٨٠,٩٥ الى ٤٣١,٧٧%، النحاس من ٢,٨٦٢ الى ٣,٢٣٦% والمركبات النشطة حيوياً منها الفلافونويد الكلية زادت أيضاً الى ١,٩١٦%، الفينولات الكلية من ٤٦,٥٣ الى ٧١,٠٢% وكذلك النشاط المضاد للأكسدة زادت من ٣٢.٨٣ الى ٥٤,٨٣%،كما أوضحت نتائج التخزين تحسن مستوىكل من الفيتامينات ، المعادن وكذلك المركبات النشطة بيولوجياللعينة المدعمة بمستوى (٥%) مسحوق قشر الباذنجان مقارنته بالعينة الكنترولوالمخزنة لمدة ٢٠ يوم.الخلاصة:خلصت الدراسة أنإضافة مسحوق قشر الباذنجانإلى منتجات المخابز حسن من القيمة الغذائية لكل من البروتين، الرماد، الألياف، الفيتامينات، المعادن وكذلك المركبات النشطة بيولوجيا، و أيضاً تحسنت القيمة الغذائية لمنتج الباتون سالية بعد فترة التخزين بسبب اضافة قشر الباذنجان المجفف، حيث أنه غنى بالالياف والفيتامينات والمعادن.

الكلمات المفتتاحية:

التغذية, قشر الخضراوات, التركيب الكيميائي لقشر الباذنجان, مضادات الأكسدة, الفلافونات و الفينولات .