Pak. J. Chem. 3(1): 41-44, 2013 Full Paper
ISSN (Print): 2220-2625
ISSN (Online): 2222-307X DOI: 10.15228/2013.v03.i01.p07

The Effects of Squeezed Grapes Residue on the Preservation of Stored Fried Potato Chips

[*]N. M. Salih AL-Janabi, A. M. Mahmed AL-Samraee and [1]W. S. Ulaiwi
[*]Department of food science, College of Agriculture, Baghdad University, Iraq.
[1]Basic Sciences Section, College of Agriculture, Baghdad University, Iraq.
E-mail: [*]nidhalspring@yahoo.com

ABSTRACT
The squeezed grapes residue (SGR) was used as antioxidant. The oxidative activity SGR estimated in vitro by measuring the reducing power and scavenging of hydrogen peroxide. The concentration of SGR was 200ppm which was added to frying oil to prepare potato chips. The antioxidant activity was measured at 45°c for a storage periods 0, 3, 6, 9, 12 days. It was found that the peroxide (pov) and thiobarbuytric acid (TBA) values by using the SGR were lower than of the control and similar to BHT treatment (the (pov) values of control, BHT and SGR were 8.00, 6.00 and 6.00 meq /kg respectively). At the end of storage, TBA values of control, BHT and SGR were 1.17, 1.01 and 1.01mg/kg. The antioxidant activity of SGR was higher as compared with control, but similar to synthetic antioxidant (BHT.) Therefore, we are recommended SGR as natural antioxidant to be used in food systems.

Keywords: Natural preservatives, Waste of Grapes Juice, Potato Chips, Antioxidant

1. INTRODUCTION
Residues such as peels and seeds that result from fruit juice production may contain substantial amounts of valuable natural antioxidants and antimicrobials. Grape skin and seeds are rich source of healthy promoting polyphenols, including flavan-3- ols of different degree of polymerization that are potent free radical scavengers which is useful to be used as preventative agents against cancer, cardiovascular diseases and premature aging[1]. Grape (*Vitis vinifera*) is one of the world's largest fruit crops, with an approximate annual production of 58 million metric tons[2]. Grape seeds contain lipid, protein, carbohydrates and 5-8% polyphenols depending on the variety. The polyphenols are mainly, flavonoids, including: gallic acid, monomeric flavan-3-ols catechin, epicatechin, gallocatechin, epigallocatechin, epicatechin-3-o-gallate, procynidin (dimmers, trimmers and more highly polymerized procynidins). The most abundant phenolic compounds which were isolated from grape seeds are catechins, epicatechin, procynidin and some dimers and trimers[3]. Various herbs, vegetables and fruits contain numerous phytochemicals in addition to phenolic compounds[4-5]. Many of these phytochemicals possess significant antioxidants capacities that are associated with lower incidense and lower mortality rates of cancer in several human cohort[4]. Natural antioxidants capacities substances (NAS) usually have aphenolic moiety in their molecular structure, its NAS can act as antioxidants, or have synergistic effect when used together with phenolic antioxidants, which can be obtained from plant material, food waste, microorganisms and animal cells[6-7]. The word "antioxidant" means the implicitly restricted to chain breaking inhibition of lipid peroxidation[8]. Microbial activity is a primary mode of deterioration of many foods and is often responsible for the loss of quality and safety, concern over pathogenic and spoilage microorganisms in food is increasing due to the increase in outbreaks of food borne disease[9]. Currently there is a growing interest to use natural preservatives, like plant extracts for increasing the shelf life of foods, as these possess a characteristic flavor, antioxidant activity as well as antimicrobial activity[10]. Some potato chips companies have responded to the criticism, both informal and legal, by investing in research and development to modify existing recipes and create health conscious products also marketed baked potato chips as an alternative with lower fat content[11-12]. The present study aimed to use the squeezed grapes residue as a cheep (byproduct) natural preservative to increase the shelf-life of potato chips.

2. MATERIALS AND METHODS
Waste of grape juice (SGR): was obtained from a selling shop of grape juice in Baghdad. It was washing (3 times) and naturally dried. Sun flower oil without any synthetic antioxidants was obtained from plant oils Iraqi general company. Potato: was purchased at a local market in Baghdad (Iraqi potato variety).

Dried waste grape juice were crushed and extracted in a soxhlet extractor with petroleum ether (60-80°c for 6 hr) to extract the fatty material. The defatted SGR powder extracted in a soxhlet apparatus for 8 hr separately with methanol: water: acetic acid (90:9.5:0.5). The extracts were filtered and concentrated under vacuum to get crud extract[13].

Total phenolic, free phenolic and tannin in squeezed of grape juice extract (SGR) were determined quantitively by using titration method[14-15]. Assessment antioxidant activity of (SGR) in vitro were Measured by two methods, scavenging hydrogen peroxide[16] and reducing power[17].

*Corresponding Author Received 27th August 2012, Accepted 2nd January, 2013

Preparation of potato chips peeled potatoes were cut in to slices using a slicer machine (Turkish-origin/kenod). The slices were macerated in dis- water with (2.5gm/lL) salting for 15 min at room temp (22°c), and it were rinsed under running tap water. Then the excess water was drained before being fried, after that the slices were divided into three allots, the first: counted as a control. The second: potato was fried in an oil (sun flower) with 200ppm of SGR, and the third with BHT (2%) as synthetic antioxidant at 195°c min in an electric container fryer. Fried potato chips were drained while cooling to remove excess oil. Three samples of potato chips were placed in an incubator at 45°c for 12 days, stored and periodically used for analysis[18].

Extraction of oil from potato chips:- the stored potato chips were crushed, n-hexane added and the mixture was shaken twice for 30 min in a stomacher at room temperature in a dark place. The extract were filtered (what man no.4) to obtain particles free extract and then concentrated with a rotary evaporator 35c°. The extracted oil analysis was based on: Peroxide value (pov)[19] and thiobarbutiric acid (TBA)[20].

3. RESULTS AND DISCUSSION

The total phenols were 13.312% (Tannin 8.32 %and free phenols 4.992%) in (SGR) extract. Most of the phenolic or polyphenolic compounds in nature have antioxidative activities, like tocopherol, flavonoid and other organic acids[21]. [Fig -1] shows the comparison of the scavenging of peroxide abilities of (SGR) extract with ascorbic acid were (42.91, 101.4, 107.2 and 115.7)% for (SGR) at concentration (2,4,6 and 8) mg/ml respectively, while were in the following order (101.20, 120.64, 183.80 and 199.19)% for vit. C at the same concentrations mentioned above. The ability of scavenging was increasing with the increase of concentration of SGR extract and vit. C. scavenging of hydrogen peroxide by phenolic compounds due to donor of electrons[22].

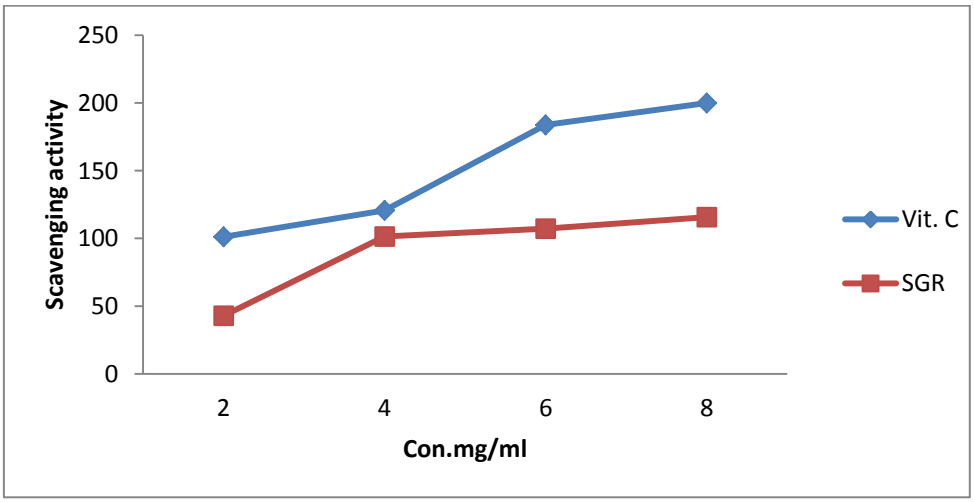

Fig-1: Antioxidant activity of SGR by Scavenging of peroxide

The results showed that (SGR) extract was effective nearly as BHT at con. 40 mg/ml the reducing power for it was 88.60 % for BHT and 88.91% for SGR. while reducing power for PG less than 66.66 %. Reducing power activity of (SGR) extract was enhanced by increasing its concentration [Fig -2]. Reducing power indicates compounds that are electron donors, which can act as primer and secondary antioxidant[23]. These results agreed with result of[24] Vit. C had Scavenging peroxide activity at 1.0 mlmole concentration reached 70.4% and gallic acid 93.3% at the same concentration[24].

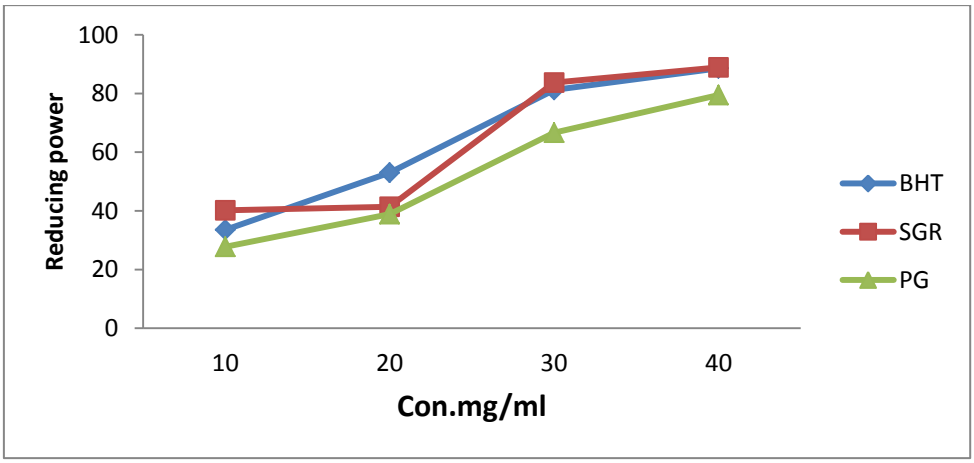

Fig-2: Antioxidant activity of SGR (6%) by Reducing power for 12 days

Determination of (pov) can be used as an oxidation index during the early stages of lipid oxidation as the primary products (hydroperoxids). [Fig- 3] shows increasing in pov during storage and the control was the highest, followed by (SGR) and BHT treatment which were 10.00, 8.00, 8.00 meq/kg respectively. After 6 days of storage pov of (SGR) treatment was the slowest than of control and BHT, but after 9 days the pov decreased for all treatment. Control, SGR and BHT [Fig-3] but pov of the (SGR) was lowest than the BHT and control, while after 12 days of storage pov of (SGR) decreased progressively and the peroxide value was 8.00 meq/kgm for control which was highest than BHT and (SGR) treatments [Fig-3].

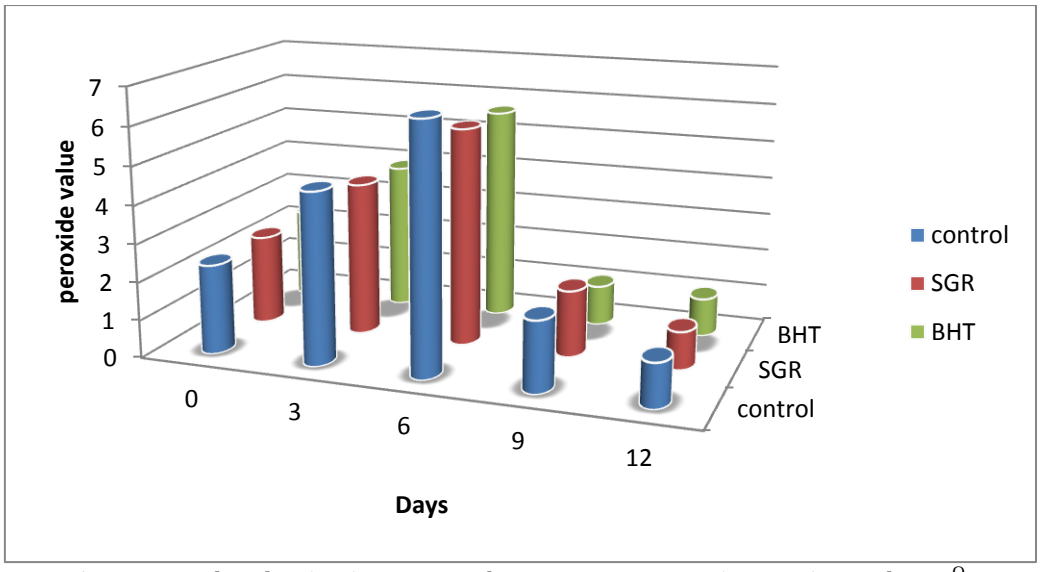

Fig-3: Peroxide value (pov) on potato chips containing SGR (200ppm) stored at 45^{O}C

In the present study we have applied waste of grape juice to characterize the direct preservation food matrix. We have also compared it with a synthetic antioxidant (BHT). Plant extract with antioxidant effect have been tested in several food systems like ground beef[25], ground beef patties[26], fish meat system[27]. SGR used in this study to know the effect of it on the oxidative stability of fried potato chips.

TBA values of potato chips storage are shown in [Fig-4], after 6 days of storage potato chips at 45^{O}C:TBA value of control treatment was highest than that of BHT and SGR treatments, the TBA value in SGR was 6.52 mg/kg where TBA value of SGR 5.74 mg/kg approach to TBA value of BHT 5.64 mg/kg after 6 days of storage.

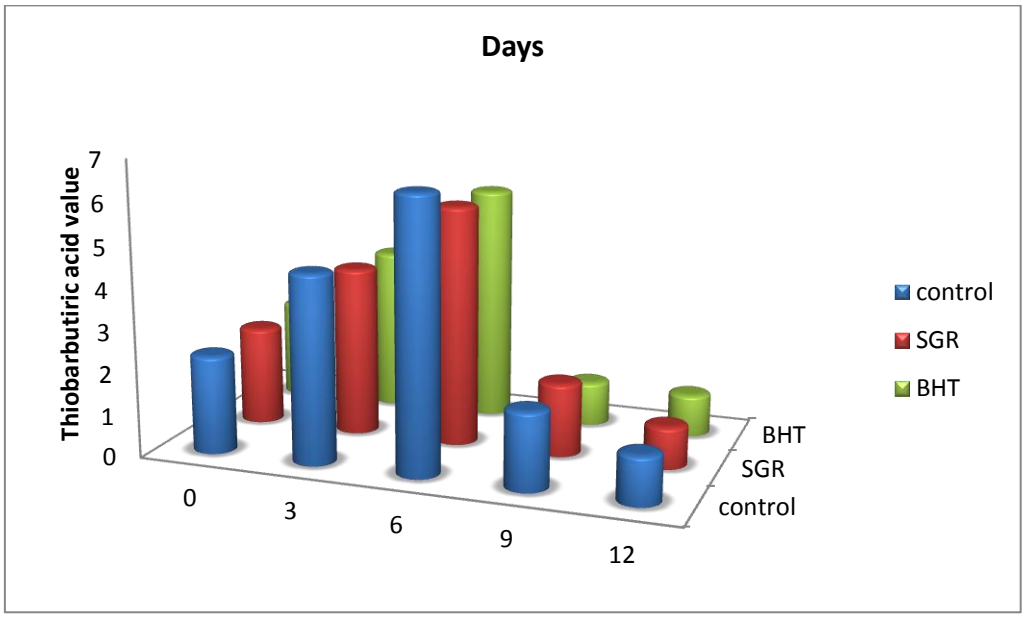

Fig-4: Thiobarbitric acid value (TBA) on potato chips containing squeezed grapes residue (200ppm) stored at 45 ^{O}C

After the storage period finished (12days), SGR and BHT treatment exhibited similar results. However, control treatment result in a higher increase. Some studies provided that the oligomeric procyanidine from grape seed and pine bark, bilberry and ginko exhibited total antioxidant activities in the range of 5.12 -2.57 mHTrolox. An indication of valuable antioxidant capacity[28], in other studies about the natural antioxidants (NA) used of oleoresin rosemary, Sage extract and citric acid improved the sensory acceptability of potato chips during 5 days repeated deep fat frying[29].

Also presence of rosemary extract or ascorbyl palmitate in the frying oil caused a marked reduction in the rate of loss of the tocopherols[30]. These results were contemporary to result in precedent study, provided antioxidant activity of SGR extract (in vitro) like antioxidant activity of BHT and PG by estimate (pov) through β-carotene bleaching test[31]. The antioxidant activity of SGR due to phenolic compounds moiety. Phenolic compounds have antioxidant activity manly due to their redox properties, which can play an important role in adsorbing and neutralizing free radicals[32].

4. CONCLUSION

We thought waste of grape juice can be used as abiological coats, coating material and preservative of food as antioxidant and antimicrobial, these results showed that adding 200 ppm of SGR to potato chips were good level as a natural antioxidant due to decreasing peroxide values and TBA value, even though SGR may be a source of phenolic compounds.

5. REFERENCES

1. Torres, J. L., and Bobet, R., J. Agric Food chem. **(2001)**, 49:4627-4634, http://dx.doi.org/10.1021/jf010368v.
2. FAO. "Production year Book, FAO statistics no.51. food and Agriculture Organization of the United Nations. Rome", **(1997)**, p151.
3. John, She., Jianmel, Yu., Joseph, E. P. and Yukio, ka. Journal of Medicinal. Food, **(2003)**, 6, 4, 291-299.
4. Velioglu, Y. S., Maza, G., Gao, L. and Oomah, B. D., J. Agric. Food. Chem. **(1998)**, 46:4113-1227, http://dx.doi.org/10.1021/jf9801973.
5. Larson, R. A., phytochemistry, **(1988)**, 27:969-978.
6. Dugan, L. R., MA, USA, **(1980)**, pp263-282.
7. Langseth, L., JLSI. Europe, Brussels. Belgium, **(1995)**, pp4-13.
8. Halliwell, B., Grootreld, M. and Gutteridge, J. M., C. Meth. Biochem. Anal., **(1989)**, 33:59-90, http://dx.doi.org/10.1002/9780470110546.ch2.
9. Tauxe, R. V., Dariy. Food Environmental Sanitation**, (1997)**, 17:788-795.
10. Smid, E. J. and Gorris, L. G. M. "Natural antimicrobials for food preservation. In M. Shafiurr Rahman (Ed), Handbook of food preservation (pp.285-308)". New York: Marcel Dekker, **(1999)**.
11. Mekay, B. PepsiCo develops design salt to chips away at sodium intake. Journal. "http://onlion-wsj.com/article", **(2010)**.
12. Niddk, Win Notes, "http//win-niddk.nih.gov/notes/article 19", **(1998)**.
13. Jayaprakasha, G. K., Tamil, S. and Sakariah, K. K. Food Research International, **(2003)**, 36:117-122, http://dx.doi.org/10.1016/S0963-9969(02)00116-3.
14. Got, K., Kanaya, S. and Nishikawa, T. Ann. Long. Tem cara, **(1998)**, 6:1-7.
15. Harold, E., Romald, S. K. and Romald, S. Great Britain, **(1981)**, pp.1-290.
16. Chou, HJ., Kuo, JT. and Lin, ES. J. Food Drug Anal, **(2009)**, 17:489-496.
17. Ruch, R. J., Cheng, S. J. and Klauning, J. fE., J. Food Sci. Tech., **(1989)**, 10:1003-1008.
18. Kim -Yong, S. and Shin, Hwa. Dong, Food Science. Biotechnology, **(2001)**,10(4):418-422.
19. A. O. A. C., "Official Methods of Analysis of the Association of Official Analytical Chemists", Washington, U.S.A, **(1980)**.
20. Egan, H., Kirk, R. S. and Sawyer, R. "Pearson chemical analysis of food". Butter and Tanner Ltd. Britain, **(1981)**.
21. Kim, HK., Kim, YE., Do, JR., Lee, YC. and lee, BY. J. Food Sci. Technol, **(1995)**, 27:80-85.
22. Wettasinghe, M. and Shahidi, F. Food Chem., **(2000)**, 70:17-27.
23. Yen, GC. and Chen, HY., J. Agric. Food Chem., **(1995)**, 43:27-32, http://dx.doi.org/10.1021/jf00049a007.
24. Balasundram, N. A. T., Sambanthamurthi, R., Sundram, K. and Samman, Asia. J. Clin. Nutr., **(2005)**, 4:319-324.
25. Wu, S. Y. and Brewer, M. S. J. Food Sci., **(1994)**, 59:702-709.
26. Heltiarachchy, N. S., Glenin, K. C., Gnana Sambandam, R., and Johnson, M. G. J. Food Sci., **(1996)**, 61:516-519, http://dx.doi.org/10.1111/j.1365-2621.1996.tb13146.x.
27. He, Y. and Shahidi, F., J. Agri. Food chem. **(1997)**, 45:4262-4266, http://dx.doi.org/10.1021/jf9706134.
28. Pitta, P., Simonetti, P. and Mauri, P., J. Agri. Food chem., **(1998)**, 46:4487-4490.
29. Irwandi, J., yaakob, B. and David, D. K. Food Research International, **(2000)**, 33 (Issue 6): 501-508.
30. Michael, H. G. and Lenka, K. Food chem., **(1995)**, 52. (Issue 2): 175-177.
31. Al- Samraee Ashraq, M. M. "Extraction of some phenolic compounds from grape seeds Shada Sodda, Bedha and waste of grape juice and studying antimicrobial and antioxidants activities". MSc- Baghdad University /Collage of Agriculture, **(2011)**.
32. Osawa, T., "Novel antioxidant for utilization in food and biological systems. In postharvest Biogeochemistry of plant, Food- Materials in the Topics: Uritant, I., Garcia, V. V., Mendoza, E. M. Eds; Japan Scientific Scietific Scocieties press: Tokyo, Japan ", **(1994)**, pp241-251.