



***Chemical, Technological and  
Nutritional Studies on Prickly Pear  
and its using in Bakery Products***

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### **Abstract**

This study was carried out to study physical, chemical, and phytochemical properties of three species prickly pear fruits *Opuntia Ficus Indica* (OFI) yellow, red and *Opuntia Dillenii* (OD). as well as study nutritional evaluation of prickly pear peels and seeds (OFI yellow) as replacers of wheat flour for preparing biscuit and balady bread rich dietary fiber and minerals. Also, studying the possibility of using prickly pear peels and seeds (OFI yellow) on hepatic diseases, cholesterol and histopathological effects in experimental rats which have hepatic injury and fibrosis induced by CCl<sub>4</sub>. Results showed that the PPP (OD) contain a high ash content and crude fiber (15.49 and 6.21%, respectively) compared to that of PPP (OFI yellow) 10.97 and 5.25%, respectively and PPP (OFI red) 10.46 and 5.23%, respectively. Also, the PPPU (OD) contain a high crude protein and ash content (5.26 and 3.76%, respectively) compared to that of PPPU (OFI yellow) 4.30 and 2.09%, respectively and PPPU (OFI red) 4.66 and 1.84%, respectively while, PPS (OD) contain a lower crude protein and higher ether extract (6.56 and 12.30%, respectively) compared to that of PPS (OFI yellow) 8.18 and 8.84%, respectively and PPS (OFI red) 9.29 and 11.24%, respectively. PPP, PPPU and PPS from (OD) showed lower pH, and higher titratable total compared to that of OFI yellow and red. The PPP (OFI yellow) was higher in TPC (1106.4 mg GAE /100g) compared to PPP (OFI red) 1074.6 mg GAE /100g and PPP (OD) 743.99 mg GAE /100g, while the PPP (OD) was higher in DPPH (70.38%) compared to PPP (OFI yellow) 67.18% and PPP (OFI red) 59.74%. whereas, PPPU and PPS (OD) are higher than OFI yellow red in TPC and lower than them in DPPH. Done too minerals analysis, fatty acids composition and amino acid analysis of PPP and PPS (OFI yellow). Furthermore, Results indicated that the dietary fiber and ash contents of biscuits and balady bread made with PPP and PPS increased significantly with increasing the replacement ratio. Addition of PPP and PPS as replacement of wheat flour until levels of (6 and 3%, respectively) gave significant effect on sensory characteristics prepared biscuit and levels (10 and 5%, respectively) gave significant effect on sensory characteristics prepared balady bread. In addition, results showed that substitution of PPP and PPS (OFI yellow) for starch, especially at 10 and 15% in CCl<sub>4</sub> -intoxicated rats, decreased the levels of serum liver function enzymes, improved lipid profiles, and increased the activity levels of antioxidant enzymes in CCl<sub>4</sub> intoxicated rats. Histopathological examination revealed alleviation of hepatic lesions caused by CCl<sub>4</sub> by increasing the percentage of PPP and PPS used.

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## LIST OF ABBREVIATIONS

AA	Amino acid
AOAC	Association of Official Analytical Chemistry
ALP	Alkaline phosphatase
ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
AWRC	Alkaline water retention capacity
B.W	Body weight
BWG	Body weight gain
BU	Brabender unit
Ca	Calcium
CAT	Catalase
CCl <sub>4</sub>	Carbon tetrachloride
cm	Centimeter
Cu	Copper
D/H	Diameter/Height
dl	Deciliter
DW	Dry weight
EAA	Essential amino acids
FAO	Food and Agriculture Organization
Fe	Iron
g	Gram
GAE	Gallic Acid
GOT	Glutamic oxaloacetic transaminase
GPT	Glutamic pyruvic transaminase
GSH-Px /GPx	Glutathione peroxidase
HDL-C	High density lipoprotein-cholesterol
K	Potassium
Kg	Kilogram
L	Liter
LDL-C	Low density lipoprotein-cholesterol
Mg	Magnesium
mg	Milligram
min	Minutes
ml	Milliliter
mm	Millimeter
OD	Opuntia Dillenii
OFI	Opuntia Ficus-Indica
P	Phosphorus
PPP	prickly pear peel
PPS	prickly pear seed
PPPU	prickly pear pulp
PN	Proportion number

ppm	Part per million
RE	rutin
SOD	Superoxide dismutase
TC	Total cholesterol
TF	Total flavonoids
TG	Triglyceride
TP	Total protein
TPC	Total phenolic compounds
U/L	Unit per liter
UNO	United Nations Organization
VLDL-c	Very low density lipoprotein cholesterol
WF	Wheat flour
WHO	World Health Organization
Zn	Zinc