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Evaluation of healthy pan bread enriched with sesame, peanut and sun flower seeds

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Abstract

The aim of the present study is to evaluate the nutritional, functional, and sensorial properties of pan bread enriched with oil seeds. Sesame seeds (S), peanut seeds (P), and sunflower seeds (SF) were used in different formulations as amendments for all-purpose wheat flour (WF). Results indicated that the formulations of S1(70%WF+30% S), P1(70%WF+30% P), SF1(70%WF+30%SF) and PS (60% WF+20%P+20% S) were higher content in crude fat, crude fiber, crude protein, total energy and ash, but low available carbohydrates contents compared with the control pan bread. Combining S and P together in one formulation resulted in better chemical properties. The formulations of P1 and S1 resulted in better mineral content, total essential amino acids, biological value (BV), protein efficiency ratio (PER), and total mono unsaturated fatty acids compared with the control pan bread. The fortified material had Significant decreased *(P<0.05)* specific volume in all samples compared with control. Pan bread W1 sample had darkening of the pan bread crumb and an increase in parameters redness (*a**), yellowness (*b**), and Cromo (C). SP sample had the highest hardness and chewiness value. All enriched pan bread exceeded the recommended dietary requirements for adolescents' nutrition. Our results indicated the importance of amending bakery products with nutritional quality and high BV with prospective health significance.

Keywords: Bakery product, sesame, peanut, sunflower, non-communicable diseases.

1. Introduction

Functional foods are the foods that impart or deliver additional function mainly health related over and above its basic nutrition **[1].** Functional foods include dietary fibers, minerals, vitamins, poly phenolic compounds, phytosterols, tocopherols and flavonoids. These foods are added during processing and are expected to deliver corroborated structure/function declarations and may support health claims **[2].**

Wheat (*Triticum aestivum*, L.) is belonging to *Poaceae* family. Wheat flour is poor in the lysine (a limiting amino acid) **[3, 4, and 5]**. In developing countries flours are used as composite which had an advantage in a better supply of protein for human nutrition. Sesame seeds (*Sesamum indicum;* family *Pedaliaceae*) powder had about 17% protein which meets the need of human body of the proteins compared to wheat bread **[6].**Substituting refined wheat flour with sesame led to a good source of bio-accessible minerals**[7].**Wheat flour supplemented with roasted sesame seed flour resulted in a product significantly higher in ash, fat, protein and minerals contents **[8].** Sesame products has the potential to resist kinds of health problems as hypercholesterolemia, aging, cancer and hypertension **[9].** Adding defatted sesame flour **s**ignificantly increased macro and micronutrients content in bread **[4].** Sesamin, sesaminol, and gamma-tocopherol, and sesame oil play a key role in the formation of good quality healthy foods **[10].** Developed effects of weight loss were reinforced by the consumption of sesame oil outcomes through decreased obesity **[11].** Brown and black sesame seeds are promising sources of edible melanin for food and biotechnological applications **[12].** *In vitro* digestion and colonic fermentation from phenolic compounds in sesame seeds led to significant improved health **[13].**

Peanut (*Arachis hypogaea* L.) is belonging to family *Fabaceae*. Bean/legume, peanut, sesame and sunflower oils had antioxidant and anti-inflammatory effects on the skin, treated of wound healing **[14]**. Groundnut seeds are a rich source of vitamins (E, K, and B complex), minerals (Ca, P, Mg, Zn, and Fe), and fiber **Singh and Nigam [15]** and **Mohamed [16].** Incorporation at 20% level for groundnut or sesame flour with wheat flour resulted

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acceptable sensory evaluation and developed nutrition values couponed to control **[16]**. Resveratrol in peanut oil helped the conversion of saturated fatty acids into unsaturated fatty acids increased the linolenic acid content **[17]**. Peanut has a good protein quality containing essential and non-essential amino acids **[18,19]**.

The seeds of sunflower (*Heliantus annus*), family *Asteraceae* contain phenolic compounds in kernel and hull which improved nutritional value **[20].** Sunflower sprouts have higher antioxidant activity than sunflower seeds, mainly due to the increase of total phenolic, melatonin, and total isoflavone contents during sprouting **Tarasevičien et al. [21].** sprouts are known to be richer in terms of phytochemical substances, proteins, vitamins, minerals, polyphynol, and resveratrol **Guo et al. [22].** resveratrol compound has many pharmacologic effects such as anti-apoptosis, neuroprotection, protection of heart and blood vessel system, antitumor, immunological regulation, and anti-inflammatory effects **Zhou et al. [23]** Production of Egyptian bread from wheat flour mixed with sunflower and sesame seeds led to improved nutritional values **[3].** Thirty percentage sunflower seed oil remedies are described to treat bacterial and fungal diseases **[24].** Substituting wheat flour with 1%, 3%, 6% and 9% sunflower meal protein on wheat bread, low-price protein may improve the nutritional quality of wheat bread **[25].** Sunflower and sesame seeds are rich in macro and micronutrient which support immune systems **[26].** Increasing the levels of sunflower protein in the gluten-free bread significantly improved the quality and the sensory acceptability of the bread **[27].** The bread sample supplemented with 7.5% Sunflower seeds had high acceptability **[28].** Sunflower and sesame seeds have benefits on human anti-obesity promotion **[29].**

Non-communicable (NCDs) diseases are the result of a combination of genetic, physiological, environmental, and behavioral factors. These diseases include four major NCDs namely: cancer **[30]**, diabetes **[31]**, cardiovascular diseases **[32],** chronic respiratory diseases **[33]** and osteoporosis diseases **[34]**. Incorporation seeds of oil crops with wheat led to improved functionality and nutritive value of the bread **[8, 16, and 25].**

The aim of the present study is to evaluate the nutritional, functional, and sensorial properties of pan bread enriched with Sesame seeds (S), peanut seeds (P), and sprouted sunflower seeds (SF) **and** to make recommendations for dietary allowances for male and female adolescences.

2. Materials and methods

2. 1 Materials

- All-purpose wheat flour (El Doha) obtained from local market, Egypt.
- Sesame seeds (Shandawel 3 variety), Peanut seeds (Giza 6 variety) and sunflower seeds (Sakha 53 variety) were obtained from the Field Crops Research Institute, Agricultural Research Center, Al Giza, Egypt.
- Corn oil, instant yeast {(*Scacharomyces Cerevisiae*), sorbitan monostearate (E491), Ascorbic acid(E300)}, improver, sugar, and table salt obtained from local market. All the chemicals were purchased from El-Gomorrah and El-Shark-Aloust Companies.

2.2. Methods

2.2.1. *Preparation of roasted sesame seed flour:*

Whole sesame seeds prepared according to the method described by **Elleuch et al. [35]** only seeds that were not damaged were sieved for removing stone and dust. Sieving, Humidification, washing with water, spinning was conducted. Whole sesame seeds were arranged in single layer in aluminum foil dishes and then placed in electric forced air oven **(Model R-5550, Sharp, Osaka, Japan)** at 120 ˚C for one hour**.** After roasting, the seeds were allowed to cool to ambient temperature, ground in an electric grinder by using a mixer (MIENTA super blender) (Model BL -721) then the flour was sieved to pass through a 280 µm sieve. The resultant sieved flour was then kept in an airtight container and stored at -18 °C until using.

2.2.2. *Preparation of roasted peanut seeds:*

Kernel of peanut seeds prepared according to the method described by **Aljuhaimi and Özcan, [36]** about 1Kg of seeds kernels that were not damaged, distributed uniformly as a thin layer on the trays and roasted in an oven **(Model R-5550, Sharp, Osaka, Japan)** at **120 °C** for **15 min. The** heated samples were left to cool at room temperature then removal hulls, then seeds were ground into powder using a grinder before analysis**,** the roasted seeds were packaged in polyethylene sample bags and stored at -18 °C until using.

2.2.*3. Preparation of sprout - roasted sunflower seeds*

Sun flower seeds germinated according to the method described by **Aishwarya and Anisha, [37]** with some modification, whole seeds (free from insects and diseases), then sunflower seeds were washed thoroughly under running water to eliminate any foreign particles and dust, then Soaking for 3-4 hours , then draining (in colander) to remove water, and leaved for germination the air for 48 hr ,then put into drying in **oven (Model R-5550, Sharp, Osaka, Japan)** at 115°C for 6-8hrs,then grinding (in food processor) pass through a 280 µm sieve and finally were storage at airtight containers (polythene bags) and stored at -18 °C until using.

2.2.4 Preparation of pan bread

The loaves of bread were prepared in laboratory of Pastry and Bread Research Department, Food Technology Research Institute. Agricultural Research Center, Al Giza, Egypt.

Formulas used in this study were in accordance to **AACC [38]** with some modification, were given in Table (1).

Preparation of different wheat Flour blends

Pre-test experiment was carried out to determine the best blending ratio of raw materials for pan bread this study as shown following in Table (2) and Fig. (1).

For pan bread preparation flour or its blends and all other ingredients were mixed for a duration obtained from farinograph data. The resulted dough was left to rest for 30 min, then divided into (160gm), portion rolled and molded automatically in molding.

Table (1): The formula used for preparing pan bread.

Ingredients	Amount
Wheat flour (all purpose) (g) or its blends (Table 2)	100
Sugar (g)	5
instant yeast (g)	3
Table Salt (g)	0.5
Corn oil (g)	3
Improver (g)	2
Water	According to farinograph absorption test.

Each piece was placed in baking bread (10x5x6cm) tightly greased to prevent the loaves from sticking and left to ferment for 60 min in a cabinet at 30°C and 85% relative humidity, then baked in electric oven at 250°C for 25-30 minutes. After baking, loaves were separated from the baking pan and allowed to cool for one hour at room temperature for sensory evaluation. The produced loaves were weighted, and the volume was measured.

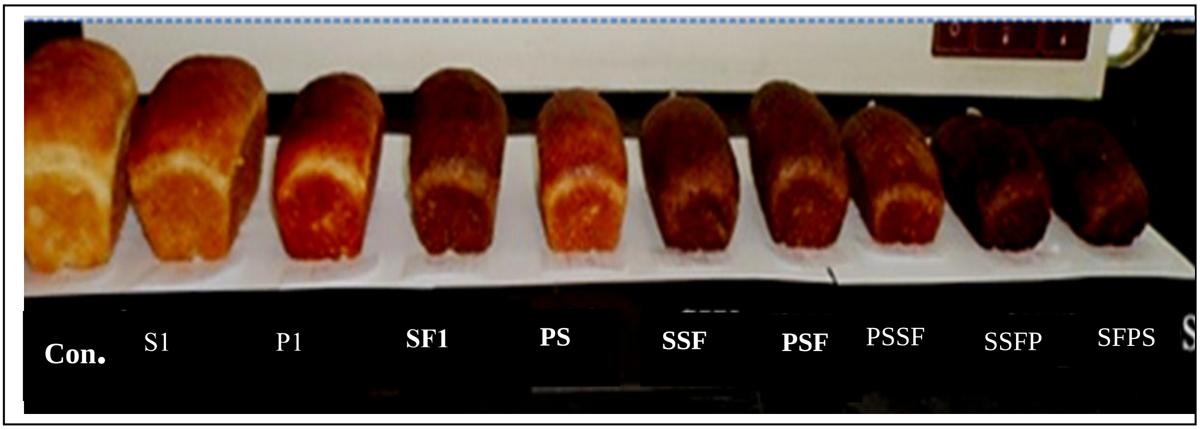

Fig (1): All treatment single, double and triple pan bread fortified with mixed levels of seeds of oil crops according to table (2).

Table (2): The blends used for preparing pan bread.

Treat.		Blends composition*	
Control		100% Wheat flour	C
Single mixes	1	70% wheat flour +30% sesame flour	S1
	2	70% wheat flour +30% peanut flour	P1
	3	70% wheat flour +30% sunflower	SF1
Double mixes	4	60% Wheat flour +20% peanut flour +20% sesame seed flour	PS
	5	60% wheat flour +20% sesame flour +20% sunflower seed flour	SSF
	6	60% wheat flour +20% sunflower seed flour+20% peanut seed flour	SFP
Multi mixes	7	50% wheat flour +20% peanut seed flour +20% sesame seed flour +10 sunflower seed flour.	PSSF
	8	50% Wheat flour +20% sesame seed + 20% sunflower seed flour+ flour+10% peanut seed flour.	SSFP
	9	50% Wheat flour + 20% sunflower seed flour+20%Peanut seed flour + 10% sesame seed flour.	SFPS

2.2.5 *Organoleptic evaluation of Pan Bread fortified with seeds of oil crops*

Types of pan bread were evaluated for their sensory characteristics by ten panellists from the staff of bread and pastry, Res. Dept., Food Technology Research Institute, Agric. Res. Center, Giza .According to method described by **Stone and Sidel [39]** as follows; General appearance score (20), Crust color (external surface color of loaves) (15), Crumb color (internal structure color of loaves) (15), Crumb distribution(gas cell wall distribute regular) (15), Taste (sweet, sour, bitter, salty taste) (20), Flavor (15) and Total score (100). Each sample was presented as slides of loaves bread showing both the crust and crumb in a white rectangular dish. The average of total score was converted to a descriptive category as follows:

Very good 90 – 100, Good 80 – 89, Satisfactory 70 – 79, Questionable less than 70

2.2.6. *Chemical analysis*

Moisture, protein, ash, crude fat, crude fiber contents were determined according to **AOAC No. 994.12 [40]** protein factor 6.25 for both peanut seeds and pan bread, wheat flour, sesame seeds and whole sun flower seeds 5.4.

Available carbohydrates content was calculated according to **Fraser and Holmes [41]** as following **equation 1**

*Available carbohydrates **(g/100g)** (on a dry basis) =100 – (Ash + Fat+ Protein+ Fiber).*

Total energy of pan bread was calculated According to **FAO/WHO [42]** following equation 2.

Total energy (K. Cal/100g) equals 4 (% carbohydrate + % protein) + 9 (% fat).

Atomic absorption spectrophotometer (3300 Perkin-Elmer) was used to identify the presence of minerals, including iron, zinc, calcium, manganese, phosphorous, potassium, copper, sodium, and magnesium. The system used for the analysis was high-performance Amino Acids analyzer (Biochrom30),

Amino acids were measured according to the method described by **AOAC Official Method 982.30 E (a, b, c) [43]. PER** As reported by **Alsmeyr et al. [44],**

the protein efficiency ratio was calculated following equation 3:

PER= 0.684 + 0.456 (leucine) - 0.047 (proline).

The biological value was calculated according to **Block and Mitchell [45],** following equation 4:

BV= 49.9 + 10.53PER.

Fatty acids were determined according to the method described by **IUPAC [46].**

2.2.7. Physical properties

Specific volume of different of pan bread was determined and the average was recorded. Specific volume (cm^3/g) which calculated by volume divided on weight, density (g/cm^3) calculated by weight divided by volume following equation 5 and 6: Volume: First, a certain amount of hemp seeds was placed into the container until over flow. Then, the hemp seeds were removed from the container, and the bread was placed in the container. Finally, the gaps were filled with hemp seeds to calculate the loaf volume based on the difference between the total volume and volume of remaining hemp seeds (ml) (after 2 h of the cooling process). Height (cm) and weight (g) of pan bread were determined individually within one hour after baking **AACC [47].**

$$\textit{Specific volume} = \frac{volume\ (cm^3)}{weight\ (g)}$$

$$\textit{Density} = \frac{weight\ (g)}{volume\ (cm^2)}$$

2.2.8. Color analysis

After pan bread cooling to the room temperature, color of bread crust was measured according to the method described by **Mc Gurie [48]** using a handheld Chroma meter Minolta, Japan). The colorimeter was calibrated using a standard white plate. The color was measured from three different positions for each of them namely bread surface (crust) and inside(crumb).The apparatus provided L*ranges from black= 0 to white = 100, *α**[(chromaticity on green (−) to red (+)], *b** [(chro maticity on a blue (−) to yellow (+)]c (color saturation), h° [(hue angle were 0˚ = red to purple, 90˚ = yellow, 180˚ = bluish to green and 270˚ = blue],each bread formulation were cut into four cubes (3 × 3 × 3 cm), and two measurements for each samples.

2.2.9. Texture Profile Analysis (TPA)

The texture profile of pan bread was measured using "Brook Field Ct3 Texture Analyzer operating instructions manual No. M08-372-C0113 stable Micro systems, USA" Hardness (N), cohesiveness, gumminess (N), chewiness (mj), adhesiveness (mj), springiness (mm) and resilience of samples as adopted by the standard method of **AACC (1995). Method 74–09 [49].** The samples (2.5 cm height and 4 cm diameter) were compressed twice to 40% of the original height using settings as Test TPA, probe-36 mm cylindrical, Trigger Load: 5N, probe: TA-AACC36, fixture: TA-BT-KIT, pre-test speed- 2mm/S, Test speed-2 mm/S, post-test speed 2 mm. Each bread sample was analyzed in duplicate. And the experiment was conducted under ambient conditions.

2.2.10. Recommended dietary allowances % (RDA)

Recommended dietary allowances from the dietary reference intakes calculated according to the Food and Nutrition Board as reported by the **National Academy of Science [50].** following equation 7.

$$RDA\%=\frac{Value\ in\ nutrientin\ sample\ of\ pan\ bread\ x\ 100}{RDA\ for\ the\ same\ nutrient}$$

2.2.11. Statistical analysis

The chemical composition, organoleptic evaluations, and physical attributes data were analyzed using ANOVA SAS program **[51]** Means ± standard deviation of the three replicates were used. When the treatment factor effect was found significant, ($p< 0.05$), differences among the respective means were determined using the least significant difference (LSD) at ($p < 0.05$).

3. RESULTS AND DISCUSSION

3.1. Chemical composition of raw materials

Data present in Table (3) compared the chemical composition of raw materials used in the tested treatment mixture and indicated that all-purpose wheat flour had the highest values of moisture and available carbohydrate (11.03 and 84.15 %, respectively) but it contains lower amounts of protein (12.60%), crude fat (2.34%), ash (0.56%), crude fiber (0.43%) and energy (407.26 Kcal/100g) compared to other raw materials. A significant increase *(P<0.05)* in all parameters were noticed, but available carbohydrates and moisture were significant decreased in all oil seeds compared to wheat flour. Sesame seeds contain the highest values of ash (4.65%), followed by sprouted sunflower seeds (3.04%) and peanut seeds (2.47%). Peanut seeds contained the highest value of protein (27.19%), fat (54.6%) and energy (619.81 k.cal/100g. Sprouted sunflower seeds recorded the highest value of crude fiber (23.60%), followed by sesame seeds (23.41%) and peanut seeds (10.93%) compared with wheat flour (0.43%) on a dry weight basis. Our results agreed with these of **Saly- Saleh [52]** who studied that wheat flour had low values in protein, fat and fiber compared with composite wheat. And nearly with **Abbas et al. [53]** who reported genotypes wheat carbohydrates ranged from 84.97% to 89.14%, fat content from 0.58% to 2.57% and fiber from 1.18% to 2.91%. On the other hand, our results similar with these of **Dossa et al. [54]** who found that the sesame seeds oil 53.0% and protein content 20.4%. Also, agreed with these of **Ahmed et al. [55]** who studied that moisture content ranged between 3.99% and 4.98%, ash content ranged between 4.41 and 5.42%, protein content ranged between 20.80% and 26.01%, oil content ranged from 44.69% to 55.37%, and crude fiber ranged from 17.30 to 28.78% for sesame seed. And agreed with these of **Melo et al. [56]** who studied that moisture sesame seeds content 2.7 ± 0.1%,5.1 ± 0.0 % ash and 53.1 ± 0.0% total fat. In the same table 3 clearly indicated that in agreed with these of **Shibli et al. [57]** who found peanut protein from 23.83% to 26.43%, fat value from 49.80 %to 50.90%, ash from 2.00% to 2.17% and fiber from 4.95% to 8.53% but differences in carbohydrate from 13.23% to19.42%. Also, our results were harmony with these of **Amoniyan et al. [58]** who found that moisture content of groundnut roasted without pod 2.88 ± 0.04 %, crude protein 26.64 ± 0.06%, ash 4.73 ± 0.02% and dry matter 96.17 ±0.04%, on the other hand differences in crude fat 49.04 ± 0.02%, crude fiber 4.26 ± 0.03%, carbohydrates 11.50 ± 0.04% and 587. 24± 4.00 K Cal/ 100 g. gross energy. In the same Table, our results arein agreement with these of **De Lamo and Gómez [59]** who found that sun flower carbohydrate 24.07% but differences in protein 19.33%, lipid 49.8%, fiber 9%, energy value 582kcal/100g, and water 1.2g/100g. Our results are in agreement with these of **Albahlol et al. [60]** who found that sun flower seeds flour moisture, protein, ash and carbohydrates (5.85%, 12.79%, 3.53% and 22.72% respectively) but differences in % fat and % fiber content (24.98 % and 35.98% respectively).

Table (3): Chemical composition of raw materials which used in preparation of (g/100g) on dry weight basis):

Composition (g/100g)	Wheat flour (WF)	Sesame seeds (S)	Peanut seeds (P)	›routed sun flower seeds (SF)	LSD at 5%
Moisture	$11.03^{a}\pm0.35$	$3.78^{c}\pm0.22$	$2.88^{d}\pm0.07$	$5.45^{b}\pm0.21$	0.44
Dry matter	$88.14^{d}\pm0.17$	$96.22^{b}\pm0.22$	$97.13^{a}\pm0.07$	$94.56^{c}\pm0.21$	0.33
Protein	$12.60^{d}\pm0.23$	$18.63^{b}\pm0.21$	$27.19^{a}\pm0.09$	$14.11^{c}\pm0.40$	0.48
Crude fat	$2.34^{d}\pm0.07$	$51.56^{b}\pm0.42$	$54.67^{a}\pm0.03$	$36.89^{c}\pm0.11$	0.41
Ash	$0.56^{d}\pm0.07$	$4.65^{a}\pm0.01$	$2.47^{c}\pm0.01$	$3.04^{b}\pm0.04$	0.07
Crude fiber	$0.43^{c}\pm0.02$	$23.41^{a}\pm0.10$	$10.93^{b}\pm0.09$	$23.60^{a}\pm0.27$	0.28
Available carbohydrates	$84.15^{a}\pm0.31$	$1.75^{d}\pm0.13$	$4.76^{c}\pm0.09$	$22.35^{b}\pm0.27$	0.44
Energy (K.cal/100g)	$407.26^{d}\pm0.15$	$545.54^{b}\pm2.44$	$619.81^{a}\pm0.15$	$477.89^{c}\pm1.47$	2.69

Data represents as mean ±SD. Each value within the same row followed by the same letter is not considered significantly different; at $P\leq 0.05$.

3.2. Minerals content of raw materials.

The data presented in Table (4), showed that sesame seeds had the highest value of Ca (114.01), Fe (2.37), Mn (1.75) and Na (90.69) (mg/100 g). Whole sunflower seeds had the highest value of P (65.16), Mg (30.73), K (554.45) and Zn (5.0) mg/100g. Peanut seeds recorded the highest value of cupper (1.71 mg/100g). On the other hand, all-purpose wheat flour has the lowest value in Ca (33.65), P (19.53), Fe (1.08), Zn (2.13), Mn (0.65), K (195.35), Na (40.76), Cu (0.13) and Mg (3.84) mg/100g, on dry weight base. Our data for wheat flour in agreement with these of **De Lamo and Gómez [59]** who found that calcium, iron and zinc (33, 3.7 and 2.96 mg/100g respectively) but differences in magnesium, phosphorous, potassium and sodium (117, 323, 394 and sodium 3 mg/100g respectively), while nearly in potassium sesame content (468mg/100g) but differences in all other elements. Also, in harmony with **Alshehry [61]** who showed manganese and, zinc value in wheat flour (0.70 and 3.83mg/100g) but differences in magnesium and sodium (102.25 and 4.84mg/100g respectively). Looking closely at the micronutrient contents, agreed with **Obeta et al. [62]** reported iron sesame seeds value 2.02 mg/100g, but calcium 151.83mg/10g. and similar with **Mohamed [16]** who recorded high ash value in sesame and groundnut flour compared to wheat flour which was low zinc while, sesame value recorded` 5.51 but differences in Mg(351.71),Ca (862.31), Fe (9.43), P(380.70) and K (385.68) mg/100g, but for ground nut seeds, nearly in Zn and Fe (5.31 and2.73 mg/100g) but differences in Mg (294.24),Ca (129.42),P (213.52) and K (868.71 mg/100g) compared with wheat flour which similar in Ca (35. 48), Fe (3.08) and Zn (2.07) mg/100g but differences in Mg (130.18), P(321.95)and K (362.24) mg/100g. on the other hand, for varieties sunflower seeds our data present were in agreement with **Muttagi and Joshi [63]** found that Ca (77.63-84.56mg/100g), Fe(3.83-4.67mg/100g) and Zn (3.77-4.0556mg/100 g), but differences in phosphorus (640-67056mg/100g). in the same review our results are in agreement with them which recorded in Zn (2.98) and Fe (3.31) mg/100g, but differences in Ca (60.79) and P (296.77) mg/100g for ground nut seeds.

Table (4): Minerals content of raw materials (mg/100g) on dry weight basis.

Minerals (mg/100g)	Wheat flour (WF)	Sesame seeds (S)	Peanut seeds (P)	Sprouted- sun flower seeds (SF)	LSD at 5%
Calcium (Ca)	$33.65^{d}\pm0.65$	114.01a±6.02	$95.53^{b}\pm0.95$	$69.60^{c}\pm6.18$	8.19
Phosphor (P)	$19.53^{c}\pm1.08$	$54.72\ ^{b}\pm0.42$	$48.31^{b}\pm5.95$	65.16a±5.62	7.78
Magnesium (Mg)	$3.84^{c}\pm0.399$	$30.25\ ^{a}\pm1.33$	$19.94^{b}\pm0.66$	$30.73^{a}\pm1.30$	1.89
Manganese (Mn)	$0.65^{b}\pm0.05$	$1.75^{a}\pm0.45$	$1.56\ ^{a}\pm0.24$	$1.40\ ^{a}\pm0.11$	0.50
Iron (Fe)	$1.08^{c}\pm0.08$	$2.37\ ^{a}\pm0.56$	$1.46^{bc}\pm0.14$	$1.67^{b}\pm0.05$	0.55
Potassium (K)	$192.35^{d}\pm4.19$	$441.33^{c}\pm9.51$	$531.18^{b}\pm2.55$	$554.45^{a}\pm5.95$	11.52
Sodium (Na)	$40.76\ ^{c}\pm2.65$	$90.69^{a}\pm9.66$	$89.19\ ^{a}\pm3.27$	$65.53\ ^{b}\pm12.53$	15.48
Zinc (Zn)	$2.13^{c}\pm0.13$	$4.50^{ab}\pm0.50$	$3.50^{b}\pm0.50$	$5.00\ ^{a}\pm1.00$	1.16
Cupper (Cu)	$0.13^{d}\pm0.03$	$1.50\ ^{b}\pm0.02$	$1.71\ ^{a}\pm0.04$	$0.42^{c}\pm0.03$	0.05

Data represents as mean ±SD. Each value within the same row followed by the same letter is not considered significantly different; at $P\leq 0.05$.

3. 3. Organoleptic evaluation of produced pan bread

Organoleptic test is involved to be a valuable tool in solving problems involving food acceptability. It is useful in product development, quality maintenance and more important in a new products improvement **[16, 59 and 60].** Data in Table (5) and Fig (2) showed that the best bread mix was in sample P1 sample (89.30) followed by S1 sample (88.60). Sample S1 achieved the highest score of general appearance, crust color while sample P1 highest score of crumb color, taste, flavor and total score. SF1 had lowest score for all organoleptic properties. P1, S1and SF1 had good acceptance compared with control sample which had very good acceptance. These results were in agreement with **Bilyk et al. [6]** who studied that bread which substitution sesame flour with wheat flour led to develop the shape, color of the crust and crumb, the taste and flavor of products. In the same table double mixes indicated significant decreased *P<0.05* in all the sensory characteristics when, substitution wheat flour. with double mixed of PS (60%WF +20%P+20%S), SSF (60%WF+20%S+20%SF) and PSF (60%WF + 20%P+20% SF). PS and SSF samples obtained the good acceptance while PSF had satisfactory acceptance compared to control sample. Also, from the same table triple mixes indicated significant decreased *P<0*.05 in all the sensory characteristics compared with control and PSSF sample got good acceptance while SSFP and SFPS samples got the satisfactory acceptance. Samples with the highest good score rating were selected for analysis (S1, P1, SF1 and PS).

Table (5): Sensory evaluation of pan bread fortified with single, double and triple level of different seeds of oil crops.

Treatment	General appearance (20)	Crust color (15)	Crumb color (15)	Crumb distribution (15)	Taste (20)	Flavor (15)	Total score (100)	Acceptance
Sensory evaluation of pan bread fortified with single same levels of different seeds of oil crops								
Con. (100%WF)	19.60^{a} ±0.5 2	14.30^{a} ±0.68	14.6 0^{a} ±0.52	14.40^{a} ±0.70	19.20^{a} ±0.92	14.20^{a} ±0.92	96.30^{a} ±3.34	**V**
S1 (70%WF +30%S)	18.40^{b} ±0.52	13.40^{b} ±0.52	12.80^{c} ±0.42	13.50^{ab} ±1.18	17.40^{bc} ±1.27	13.10^{b} ±0.74	88.60^{b} ±2.72	**G**
P1 (70%WF+30%p)	17.60^{c} ±0.97	12.90$^{b\ c}$ ±0.99	13.70^{b} ±0.95	13.50^{ab} ±1.27	18.30^{ab} ±1.42	13.30^{ab} ±1.34	89.30^{b} ±5.52	**G**
SF1 (70%WF +30%SF)	16.90^{c} ±1.20	12.30^{c} ±1.16	11.70^{d} ±0.68	12.60^{b} ±1.08	16.40^{c} ±1.35	11.90^{c} ±1.37	81.80^{c} ±5.18	**G**
LSD at 5%	**0.77**	**0.79**	**0.61**	**0.98**	**1.14**	**1.02**	**3.95**	**……**
Sensory evaluation of pan bread fortified with double same levels of different seeds of oil crops								
Con. (100%WF)	19.60^{a} ±0.5 2	14.30^{a} ±0.68	14.6 0^{a} ±0.52	14.4 0 ^{a}±0.70	19.20^{a} ±0.92	14.20^{a} ±0.92	96.30^{a} ±3.34	V
PS (60%WF +20%P+20%S)	16.70^{b} ±1.06	12.50^{b} ±0.71	12.80^{b} ±0.42	12.50^{b} ±0.85	17.00^{b} ±1.70	11.90^{b} ±1.20	83.40^{b} ±4.50	G
SSF (60%WF+20%S+20%SF)	16.40^{b} ±0.84	11.80^{bc} ±0.92	12.10^{bc} ±0.88	12.30^{b} ±0.82	16.20^{bc} ±1.23	12.10^{b} ±1.10	80.90^{b} ±3.25	G
PSF (60%WF+20%P+20%SF)	13.90^{c} ±2.38	11.20^{c} ±0.92	11.60^{c} ±1.27	11.10^{c} ±0.57	14.60^{e} ±2.99	10.10^{c} ±2.13	72.50^{c} ±5.26	S
LSD at 5%	**1.26**	**0.74**	**0.76**	**0.67**	**1.71**	**2.03**	**3.78**	**---**
Sensory evaluation of pan bread fortified with triple levels of different seeds of oil crops.								
Con. (100%F)	19.60^{a} ±0.5 2	14.30^{a} ±0.68	14.60^{a} ±0.52	14.40^{a} ±0.70	19.20^{a} ±0.92	14.20a ±0.92	96.30^{a} ±3.34	V
PSSF (50%WF+20%P+20%S+ 10%SF)	15.50^{b} ±0.97	12.50^{b} ±0.53	12.80^{b} ±0.63	12.40^{b} ±0.52	16.00^{b} ±1.70	11.20^{b} ±0.42	80.40^{b} ±1.78	G
SSFP (50%WF+20%S+20%W+ 10%P)	13.10^{c} ±2.47	11.20^{c} ±0.92	10.80^{c} ±0.92	10.20^{d} ±0.79	14.10^{c} ±1.73	10.90^{b} ±1.10	70.30^{c} ±4.40	S
SFPS (50%WF +20%SF+20%P+10%S)	13.40^{c} ±2.72	11.10^{c} ±1.85	10.80^{c} ±1.48	11.20^{c} ±1.62	13.10^{c} ±1.91	10.70^{b} ±1.57	70.30^{c} ±7.70	S
LSD at 5%	**1.74**	**1.02**	**0.87**	**0.91**	**1.46**	**0.98**	**4.37**	**--**

*Data represents as mean ±SD. Each value within the same column followed by the same letter is not considered significantly different; at *P* ≤ 0.05.
*90-100 is very good (V); 80-89 is good (G); 70-79 is satisfactory (S); less than 70 is questionable (Q).
***WF**= wheat flour; S= roasted sesame seeds flour; **P**=roasted peanut seeds flour; **SF**= sprout whole sunflower seeds flour.

3. 4. Chemical composition of selected pan bread.

Proximate chemical composition of selected fortified pan bread with different oil seeds is summarized in Table (6). Increased significant *(P<0.05)* differences, of crude protein, crude fat, crude fiber and ash of all samples study, crude Protein content averaged (15.14%) for P1 sample and (11.26%) for SF1 sample comparison with (8.93%) for control pan bread.

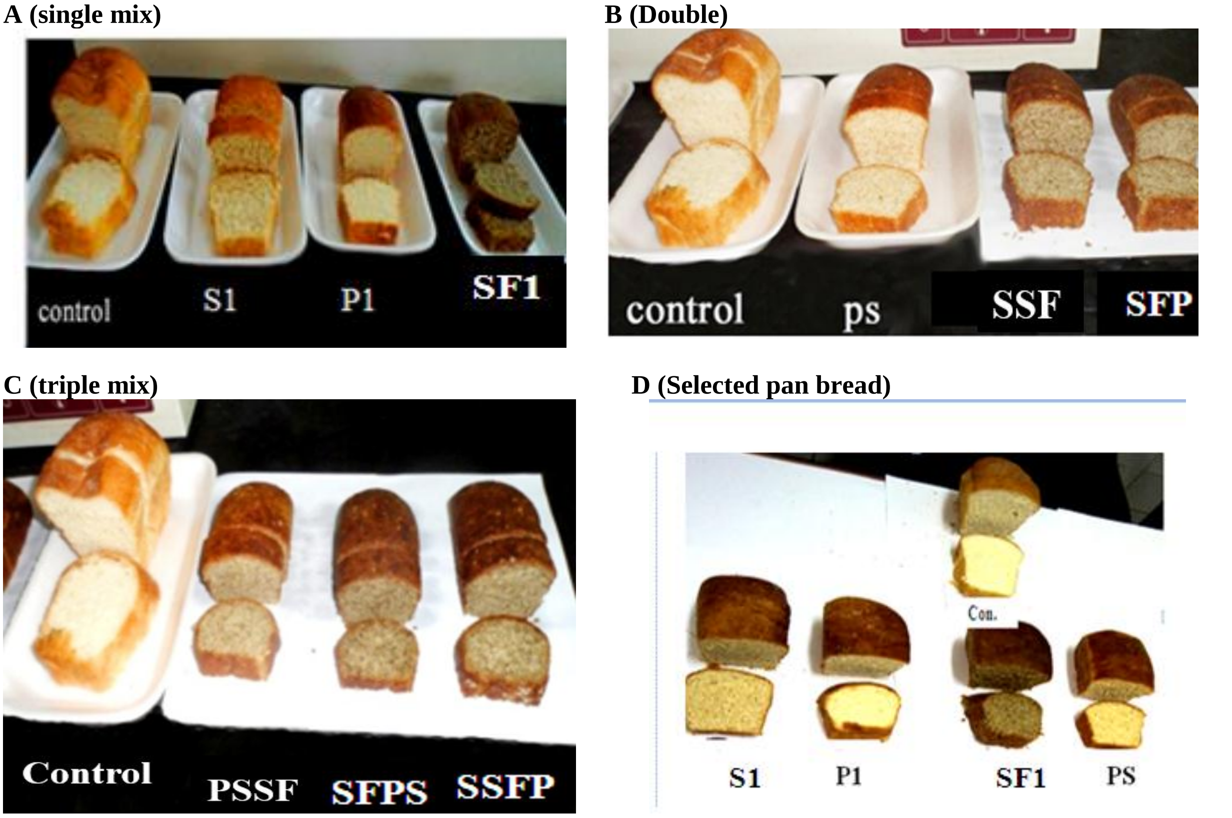

Fig (2): pan bread fortified with single, double and triple level of different seeds of oil crops.
Where: Control=100%WF; **S1**=70%WF+30%S; **P1**=70%WF+30%P; **SF1**=70%WF+30%SF; **PS**=60%WF+20%P+20%S. **SSF** =60%WF+20%S+20%SF; **SFP**=60%WF+20%SF+20%P; **PSSF**=50%WF+20%P+20%S+10%SF; **SSFP**=50%WF+20%S+20%SF+10%P. **SFPS**=50%WF+20%SF+20%P+10%S. **WF**= wheat flour. **S**= roasted sesame seeds flour. **P** = roasted peanut seeds flour. SF = sprout sun flower seeds flour.

Besides, crude fat content ranged between (23.30%) for PS sample and (16.12%) for SF1 sample compared with (4.17%) for control. In terms of ash content were (2.70%) for S1 sample and (2.11%) for **P1** sample compared with control (1.65%). Crude fiber content of different samples varied between (4.86%) for S1 sample and (2.12%) for **P1** sample compared with control sample (0.30%). Available carbohydrates content varied from (55.63%) for PS sample to (66.52%) for SF1 sample compared with control pan bread (84.97%). The total energy values ranged from (449.31 kcal/100g) for SF1 sample to 488.91 kcal/100g for PS sample compared with 414.78 Kcal/100g for control. High-energy foods tend to have a protective effect in the optimal utilization of other nutrients **[3,4,16 and 60].** These results come in close with **Ugwuona and Nwamaka [64]** who found that improved nutrition values with incorporation full and defatted oil sesame seeds for produced bread. Also, our result in better with **Umbur et al. [4]** who found that substitution wheat flour with defatted sesame seeds carried out increased protein, fats, fiber and ash values compared with control bread. These results come in close with **Bilyk et al. [6]** showed that wheat bread supplemented with 5% and 10% sesame led to increased nutrient values with increased levels sesame to produced pan bread. Also, **Annoh et al**. **[65]** carried out a study on bakery product who found that wheat flour incorporated with 25% sesame seeds carried out high crude protein, crude fat, ash and crude fiber content. Further in agreement with **De Lamo and Gómez [59]** who studied that wheat flour supplemented with oilseeds (sesame or sun flower seeds) improved macro nutrient values of bread produced. On the other hand, our data in Table (6) were in agreement with **Salve and Arya [66]** who stated that wheat flour substitution with 30% Peanut flour to made flat bread recorded high protein, ash and fat values. Substituting wheat flour with 0%, 1%, 3%, 6% and 9% sun flower meal protein isolation improved wheat bread quality and nutritional values **[25].** And our result come in close with **Kaur et al**. **[28]** who studied that incorporated wheat flour with at levels 2.5,5,7.5,10 and 12.5% from raw or roasted sun flower seeds recorded significant increase of protein, fat, ash and fiber in bread.

Table (6): Proximate Chemical composition of selected pan bread (g/100g) on dry weight basis.

Composition	Con.	S1	P1	SF1	PS	LSD at 5%
Dry matter	93.54[c] ±0.48	94.94[ab] ±0.59	95.27[a] ±0.65	94.19[bc] ±0.65	94.84[ab] ±0.22	0.98
Crude protein	8.93[e] ±0.38	13.06[c] ±0.35	15.14[a] ±0.32	11.26[d] ±0.34	14.02[b] ±0.84	0.88
Crude fat	4.17[e] ±1.44	18.31[c] ±0.31	20.84[b] ±0.26	16.12[d] ±1.36	23.30[a] ±0.22	1.66
Ash	1.65[c] ±0.17	2.70[a] ±0.20	2.11[b] ±0.21	2.39[ab] ±0.08	2.64[a] ±0.24	0.34
Crude fiber	0.30[c] ±0.05	4.86[a] ±1.56	2.12[bc] ±1.04	5.37[a] ±1.14	4.23 [ab] ±2.07	2.23
Available carbohydrates	84.97[a] ±0.86	61.04[c] ±1.39	62.35[c] ±1.99	66.52[b] ±0.04	55.63[d] ±0.51	2.14
Total energy (K. cal/100g)	414.78[d] ±0.40	476.78[b] ±0.89	477.05[b] ±0.19	449.31[c] ±11.68	488.91[a] ±8.28	11.67

*Data represents as mean ±SD. Each value within the same row followed by the same letter is not considered significantly different; at $P\leq$ 0.05.; **Con.**= 100%WF; **S1**= 70%WF +30%S.; **P1** = 70% WF +30%P; **SF1**=70%WF +30%SF.; **PS**=60% WF +20% S+20% P. W**F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF1**= sprout-roasted whole sun flower seeds flour

Finally, that is possible feeding adolescences with pan bread fortified with sesame, peanut and whole sun flower seeds to protect from non-communicable diseases. And feeding pan bread supplemented with whole seeds as described by **Khan et al**. **[67]** whole grain dietary fiber and phenol acids are linked to health regulation.

3. 5. Minerals composition of selected pan bread (mg/100g) on dry weight base

The minerals content of all pan bread study shown in the Table (7**)**. Sample fortified with sesame seeds (S1) had the highest values of Ca (58.32), Fe (1.44), Zn (2.53) and Cu (0.64) mg/100g. Pan bread fortified with peanut seeds sample (P1) had the highest value of Na (73.40mg/ 100g**.** SF1 sample recorded the highest value in phosphor (59.27), Mn (0.82) and K (302.20) mg/100g. PS sample had the highest value in Mg (6.50) mg/100g. In the same table control sample had the lowest value for Ca (39.22), P (30.54), Mg (4.07), Mn (0.47), Fe (1.20), K (241.83), Na (66.23), Zn (1.84) and Cu (0.13-mile gram per 100 gram). Sodium and potassium are vital in the maintenance and balance of body fluid balance, nerve transmission as well as muscle contraction. Our results were in agreement with **Abd El- Kader [3]** who found improved micronutrient values in Egyptian bread with incorporated sesame and sunflower seeds flour to wheat flour. And these results come in close with **Umbur et al. [4]** who found that increased mineral elements content of bread fortified with increased levels defatted sesame seeds flour. This flour had a good food-to-food fortification be harnessed in the bakery industry to therapy malnutrition. Further these results in agreement with **Bilyk et al. [6]** who studied that wheat bread supplemented with 15% sesame seeds increased micro nutrient (Ca and Mg) with increased levels sesame. Our results come in close with **Mohamed [16]** who stated that increased micronutrients with increased sesame or ground nut level supplemented with wheat flour. Also, our results agreed with **Salve and Arya** [66] who studied that wheat flour supplemented with 30% Peanut flour were significant improvement mineral values in flat bread. Further results come in close with **De Lamo and Gómez [59]** who studied that wheat flour incorporated with oilseeds carried out improved micro nutritional values of bread. Then we recommended adolescences feeding on bread fortified with sesame, peanut and sun flower seeds. Magnesium Sunflower enriched to prevent from non-communicable diseases **[68].** According to **Barman and Srinivasan [69]** who recorded supplementation with zinc may significantly contribute to its clinical application in the management of diabetic hyperglycaemia so recommended bread fortified with sesame and peanut seeds. And **Yuan et al. [70]** reported peptide–calcium complexes from sunflower seeds and peanuts carried out enhancing bone mineral density.

3.6. Amino Acids composition of selected with pan bread.

Protein quality is partly dependent upon its amino acid profile. On the other hand, the essential amino acids are very important from the nutritional point of view **[71].** Lysine is an essential amino acid which cannot be synthesized in the human body. Thus, the only way to have enough lysine content according to human body requirement is to take it from fortified food **Mollakhalili-Meybodi et al. [72].** Looking closely at the amendment’s nutrition, essential amino acid content in protein quality and Protein Efficiency Ratio (PER) and Biological Value (BV). The data in Table (8) and Fig (3), indicated that the SF1 pan bread sample recorded the highest value of lysine, all pan bread fortified with oil seeds crops recorded that, the high values total essential amino acids (TEAA), protein efficiency ratio (PER) and biological value (BV) compared with control.

Table (7): Minerals composition of selected pan bread (mg/100g) on dry weight bases.

Minerals (mg/100g)	Con.	S1	P1	SF1	PS	LSD at 5%
Calcium	$39.22^{c}\pm6.48$	$58.32^{a}\pm2.71$	$53.10a^{b}\pm3.57$	$48.02^{b}\pm5.76$	$51.15^{a}b\pm0.41$	8.02
Phosphor	$30.54^{d}\pm8.78$	$41.82^{bc}\pm5.94$	$35.45^{cd}\pm5.43$	$59.27^{a}\pm1.08$	$51.65^{ab}\pm2.92$	10.01
Magnesium	$4.07^{b}\pm0.41$	$5.37^{ab}\pm0.72$	$5.08\ ^{ab}\pm0.33$	$5.36\ ^{ab}\pm0.90$	$6.50^{a}\pm1.31$	1.48
Manganese	$0.47^{d}\pm0.01$	$0.72^{b}\pm0.02$	$0.53^{c}\pm0.02$	$0.82^{a}\pm0.01$	$0.74^{b}\pm0.02$	0.03
Iron	$1.20^{bc}\pm0.13$	$1.44^{a}\pm0.14$	$1.10^{c}\pm0.05$	$1.34a^{b}\pm0.04$	$1.35\ ^{ab}\pm0.03$	2.23
Potassium	$241.83^{b}\pm7.72$	$288.05^{a}\pm9.74$	$294.29^{a}\pm7.27$	$302.20^{a}\pm12.00$	$295.90^{a}9.61$	17.13
Sodium	$66.23^{a}\pm1.08$	$56.42^{b}\pm1.04$	$73.40^{a}\pm2.60$	$67.68^{a}\pm2.58$	$65.87^{ab}\pm11.11$	9.59
Zinc	$1.84^{d}\pm0.06$	$2.53^{a}\pm0.07$	$2.18^{c}\pm0.06$	$2.38\ ^{b}\pm0.07$	$2.40\ ^{b}\pm0.07$	0.12
Copper	$0.13^{b}\pm0.01$	$0.64\ ^{a}\pm0.17$	$0.53\ ^{a}\pm0.02$	$0.19^{b}\pm0.01$	$0.62^{a}\pm0.02$	0.14

*Data represents as mean ±SD. Each value within the same row followed by the same letter is not considered significantly different; at $P\leq 0.05$.; **Con.**= 100%WF; S1= 70%WF +30%S.; P1 = 70%WF +30%P; SF1=70% WF +30%SF.; PS=60% WF +20% S+20% P. W**F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**=roasted - sprout whole sun flower seeds flour

The S1 pan bread sample had the highest value of (TEAA), (PER), and (BV) than control pan bread and other pan bread samples. So, S1 sample is a suitable food for children and adolescences**.** Protein is an essential component for the improvement of new cells to replace worn-out body cells and tissues in children and both men and women **[73].**

Table (8): Amino Acids composition (g A.A /100g protein) of selected with pan bread on dry weight base.

Amino Acids	Pan bread					
	Con.	**S1**	**P1**	**SF1**	**PS**	**FAO/WHO Pattern (1991)**
	Essential Amino Acids (EAA)					**Adult**
Histidine	**1.40**	**2.76**	**2.60**	**2.55**	**2.59**	**1.6**
Lysine	**3.11**	**3.15**	**3.44**	**4.09**	**3.08**	**1.6**
Isoleucine	**3.71**	**3.98**	**3.77**	**4.18**	**3. 81**	**1.3**
Leucine	**6.61**	**6.94**	**7.04**	**6.64**	**6.56**	**1.9**
Methionine	**1.00**	**1.76**	**1.26**	**0.82**	**1.22**	**--**
Cysteine	**1.70**	**1.48**	**1.34**	**1.09**	**1.22**	**--**
Methionine+Cysteine	**2.70**	**3.24**	**2.60**	**1.91**	**2.44**	**1.7**
Phenylalanine	**4.71**	**4.91**	**5.78**	**4.64**	**4.37**	**--**
Tyrosine	**3.41**	**3.70**	**3.52**	**3.55**	**3.89**	**--**
Phenylalanine+Tyrosine	**8.12**	**8.67**	**9.30**	**8.19**	**8.26**	**1.9**
Threonine	**3.10**	**3.70**	**3.10**	**3.36**	**3.16**	**0.9**
Valine	**4.31**	**4.63**	**4.36**	**4.73**	**4.37**	**1.3**
***Tryptophan**	**--**	**---**	**----**	**---**	**---**	**0.5**
Total (without histidine)	**32.66**	**34.25**	**33.61**	**33.10**	**31.68**	**11.1**
Total EAA	**34.06**	**37.02**	**36.21**	**35.65**	**34.27**	**12.7**
Arginine	**4.62**	**8.06**	**7.96**	**6.09**	**8.34**	
Aspartic acid	**5.72**	**7.04**	**8.47**	**7.90**	**8.82**	**--**
Serine	**4.41**	**5.09**	**4.86**	**4.72**	**4.77**	**--**
Glutamic acid	**30.47**	**25.19**	**24.06**	**26.09**	**25.58**	**--**
Proline	**9.52**	**7.42**	**8.63**	**8.81**	**8.09**	**--**
Glycine	**6.31**	**4.82**	**4.78**	**5.81**	**5.42**	**--**
Alanine	**3.71**	**4.35**	**3.86**	**3.81**	**3.64**	**--**
Total NEAA	**64.76**	**61.87**	**62.62**	**63.23**	**64.66**	**--**
Total AA	**98.82**	**98.89**	**98.83**	**98.88**	**98.93**	**--**
PER	**3.25**	**3.51**	**3.49**	**3.30**	**3.30**	**--**
BV	**84.12**	**86.86**	**86.65**	**84.65**	**84.65**	**--**

Con.= 100%WF; **S1**= 70%WF+30%S.; P1 = 70%WF +30%P; **SF1**=70%WF +30%SF.; **PS**=60%WF +20% S+20% P. W**F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout whole meal sun flower seeds flour

Sesame seeds protein had a high quality, which is essential in combating protein energy malnutrition. Our result in agreement with **Ijarotimi et al. [19]** who found that glutamic acid was the most abundant of groundnut seed flours. Also, our result come in close with **Papchenko et al. [74]** who found that the formulation of the food system containing 20 % of the composition of sunflower meal comparison with wheat flour increased the limited amino acids – lysine and biological value. Type two diabetes risks depend on the context of dietary patterns, branched-chain amino acid intakes and not exclusively on ranched-chain as described by **Okekunle et al**. **[75].**

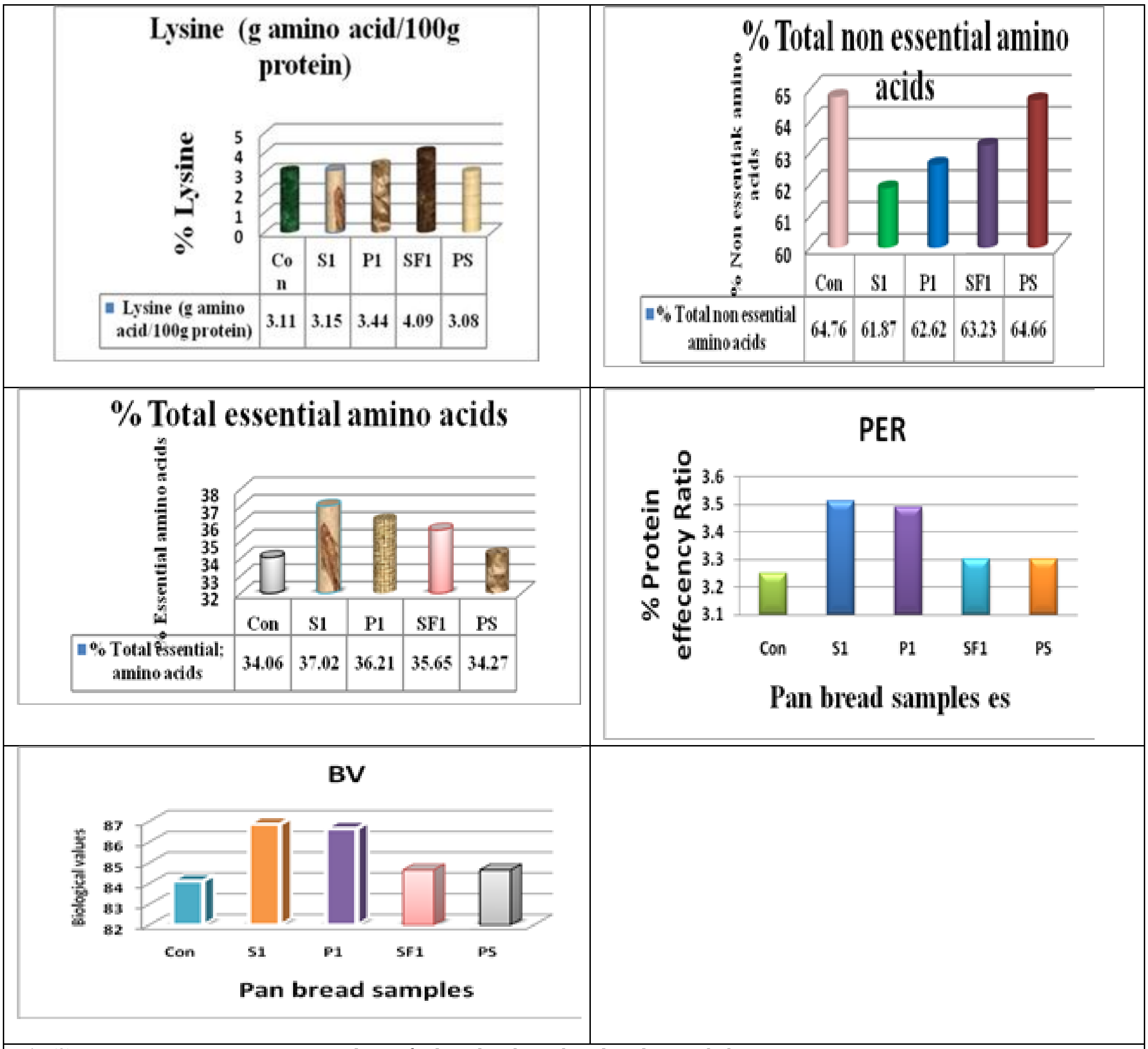

Fig (3): Lysine, TEAA, TNEAA, PER and BV of selected with pan bread on dry weight base.
Con.= 100% WF; **S1**= 70%WF +30%S.; **P1** = 70% WF +30%P; **SF1**=70% WF +30%SF; **PS**=60% WF +20% S+20% P.
WF= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout whole meal sun flower seeds flour.

Further, Sunflower seed peptide-Calcium and peanut peptide-Calcium can develop Ca bioavailability; effectively enhance bone mineral density and structure, accordantly with **Yuan et al. [70]**. Our results are in agreement with **Albahlol et al. [60]** who found that wheat flour supplemented with sun flower seeds flour carried out improved protein efficiency ratio and biological value with increased sun flower flour levels to produced bread compared with bread without supplementation**.** So incorporated wheat flour with peanut and sun flower seeds flour together to produced bread, carried out protected from osteoporosis for children and male, female adolescences.

3. 7. Fatty acids composition of selected pan bread

Data in Table (9) and Fig (4) showed palmitic acid was the major value for saturated fatty acids (SFAs) for control and other oil samples of pan bread. On the other hand, Oleic acid was the highest value of monounsaturated fatty acid (MUFAs) compared with other MUFA. All samples of pan bread enriched with oil seeds recorded the highest value of total unsaturated fatty acids (TUFAs) but, low values of (TSFAs) in comparison to control sample. The TUFAs contents recorded (88.12%) for SF1 sample followed by S1 sample (84.59%) compared with control and other samples. To reduce risk of human coronary heart disease the intake of TUFAs must be increased and a low of saturated fat **Wang et al. [76]**. Our result agreed with **Al-Bachir [77]** who studied that peanut, sunflower and sesame oils enriched unsaturated fatty acids such as oleic and linoleic acids. And our result agreed with **Ijarotimi et al. [19]** who found that palmitic acid as the most abundant saturated fatty acids in ground nut flour, but difference in Oleic acid value had higher than Linoleic acids in ground nut oil. On the other hand, these results come in close with **De Lamo and Gómez [59]** who stated that sesame oil had monounsaturated fatty acids higher than sun flower oil especially C18:1 oleic acid and sun flower oil had higher Polyunsaturated fatty acids especially C18:2 Linolic than sesame oil but differences in saturated lipids sun flower oil, it had lower than sesame oil. Sesame seeds oil had developed the antioxidant status with lower total cholesterol, low density lipoprotein cholesterol and higher high density lipoprotein cholesterol values of hypercholesterolemic rats as described by **Aslam et al. [78].** And **Dou et al. [79]** who found that n-3 poly unsaturated fatty acids could slightly enhance the level of bone mineral density, more significant for postmenopausal women increased effect on bone mineral density. On the other hand, our results differences with **Albahlol et al. [60]** who stated that wheat flour fortified with sun flower flour to produced bread led to high total saturated fatty acids value and low unsaturated fatty acids with increased sun flower flour level.

Table (9). Fatty acids composition (% oils of sample) extracted of fortified pan bread.

Fatty Acids	Pan bread samples				
	Con.	S1	P1	SF1	PS
	Saturated Fatty Acids (SFA)				
C14:0 Myristic acid	0.14	0.03	0.04	0.06	0.03
C16:0 Palmitic acid	14.73	10.16	12.20	7.98	11.14
C17:0 Margaric acid	0.09	0.06	0.07	0.06	0.07
C18:0 Stearic acid	2.48	4.50	2.33	3.05	3.71
C20:0Arachidic acid	0.39	0.52	1.00	0.25	0.70
C22:0 Behenic acid	0.22	0.14	1.90	0.48	0.79
Total saturated fatty Acids (TSFA)	18.05	15.41	17.54	11.88	16.44
Mono unsaturated Fatty Acids (MUFA)					
C16:1Palmitooleic acid	0.13	0.12	0.10	0.06	0.11
C17:1 Heptadeccunoic acid	0.04	0.04	0.04	0.03	0.04
C18:1 Oleic acid	28.20	38.88	38.34	18.36	38.99
C20:1 Gadoleic	0.32	0.22	0.89	0.19	0.47
Total mono unsaturated fatty Acids (TMUFA)	28.69	39.26	39. 36	18.64	39.61
Poly unsaturated Fatty Acids (PUFA)					
C18:2 linoleic acid	52.37	44.85	42.79	69.05	43.56
C18:3n-3 Linolenic acid	0.89	0.48	0.32	0.43	0.39
Total Poly unsaturated Fatty Acids (TPUFA)	53.26	45.33	43.11	69.48	43.95
Total unsaturated Fatty Acids (TUFA)	81.95	84.59	82.47	88.12	83.56
Total Fatty Acids	100.00	100.00	100.00	100.00	100.00

Con.= 100%WF; S1= 70%WF +30%S.; P1 = 70%WF +30%P; SF1=70% WF +30%SF.; PS=60%WF +20% S+20% P. W**F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; SF= sprout sun flower seeds flour

3. 8. Physical properties of selected pan bread

From data recorded in Table (10). The results showed that the moisture content on the fresh weight was in all samples decreased significantly ($p<0.05\%$), ranged from (21.63 to 25.40%) for PS sample and SF1 sample compared with control (27.81%). The height of pan bread had ranged from (6.75 and 5.67cm) compared with pan bread control it was 8.35cm. The maximum high was S1 sample was 6.75 cm, while the lowest pan bread hight was PS sample 5.67 cm. And weight of pan bread ranged from 138.60g for PS sample to 151.36g for SF1 sample compared with control sample (152.29 g). Specific volume of all fortified sample had significantly decreased compared with control. On the other hand**,** density recorded significantly increased for all samples compared with control (0.36 g/cm^3). Our results were in agreement with **Ugwuona and Nwamaka [64]** who found that the residual moisture content of the bread samples decreased with increased levels of whole sesame seed flour. And come in close with **Mohamed [16]** who studied that the moisture content of pan bread fortified with peanut 6.59% and similar decrease in loaf specific volume by increased levels of sesame or groundnut.

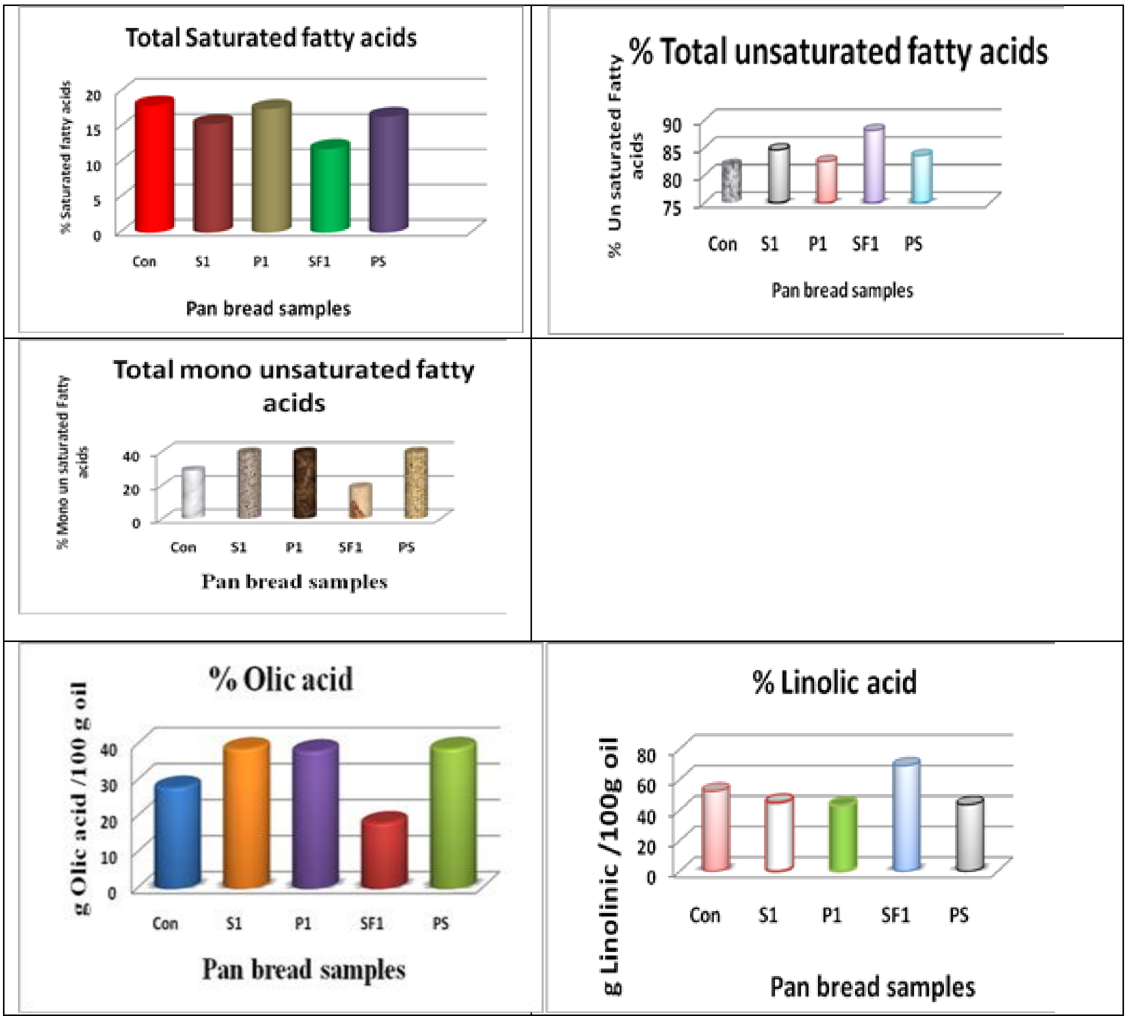

Fig (4): TSFA, TUFA, TMUFA, Oleic acid and linoleic acid composition (% oils of sample) extracted of fortified pan bread. **Con.**= 100% WF; **S1**= 70%WF +30%S.; **P1** = 70%WF +30%P; **SF1**=70% WF +30%SF; **PS**=60%WF +20% S+20% P. **F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout sunflower seeds flour.

These results are in agreement with **Bilyk et al. [6]** who stated that reduce Specific volume with the increased level of sesame flour in pan bread. Also, **Shongwe et al. [5]** who studied increased levels of peanut flour led to decreased specific volume. These results are in agreement with **Mohammed et al. [25]** who found bread volume significant decreased with increasing Percentage of 1%, 3%,6% and 9%Sunflower Meal Protein Isolate substitution. The control wheat bread had higher volume and specific volume compared with composite bread loaves.

Table (10): Physical properties selected the best good score pan bread.

Parameters	Pan bread samples					
	Con.	**S1**	**P1**	**SF1**	**PS**	**LSD at 5%**
Moisture (%) on fresh weight basis	27.81[a] ±0.63	22.19[d] ±0.04	23.14[c] ±0.22	25.40[b] ±0.17	21.63[d] ±0.36	0.63
Height (cm)	8.35[a] ±0.35	6.75[b] ±0.25	6.40[bc] ±0.20	5.97[cd] ±0.35	5.67[d] ±0.15	0.50
Loaf weight (g)	152.29[a] ±1.92	144.52[b] ±1.60	144.44[b] ±0.77	151.36[a] ±5.62	138.60[c] ±1.60	5.23
Loaf volume ($cm^{3.}$)	425.00[a] ±15.00	375.00[b] ±15.00	355.00[c] ±10.00	347.00[c] ±2.52	295.00[d] ±5.00	19.62
Specific volume (cm^3/g)	2.80 [a] ±0.14	2.41[bc] ±0.36	2.46[b] ±0.06	2.29[bc] ±0.12	2.13[c] ±0.01	0.33
Density (g/cm^3)	0.36[d] ±0.02	0.39[c] ±0.02	0.41[c] ±0.01	0.44[b] ±0.02	0.47[a] ±0.00	0.03

*Data represents as mean ±SD. Each value within the same row followed by the same letter is not considered significantly different; at $P\leq 0.05$.; **Con.**= 100%WF; **S1**= 70%WF +30%S.; **P1** = 70% WF +30%P; **SF1**=70%WF +30SF %.; **PS**=60%WF +20% S+20% P. **WF**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout whole meal sun flower seeds flour

3. 9. Color values of produced pan bread.

Color is a vital quality attribute of foods and plays on important role in sensory and consumer acceptance of products which exists by Millard reaction during pan bread baking **Mohamed [16].**

Data in Table (11), displays the effect of substituting wheat flour with different oil seeds on the color characteristics of the produced pan bread. It can be noticed that the changes in external color of crust pan bread crust lightness values recorded significant decrease *(p< 0.05)* in all samples, it ranged from S1 sample (47.70) to SF1(30.81) compared to control (56.03) the higher values were observed among the composite bread samples. low *L** and high *a**values in the crust of composite bread may be attributed to their higher protein content due to the addition of whole sun flower seeds flour as well as the Millard and caramelization reactions during baking **Mohamed and Ijarotimi et al. [16 and 19]**. Crust redness (*a**) value had significant, increased P1 sample had the highest value (14.69), compared to other samples and control (11.07). yellowness (*b**) values recorded S1 sample (31.91) to SF1 sample (14.33) compared with control (33. 67). SF1 sample had the lowest croma (15.64) compared with control (25.84), PS sample had the lowest hue angle (*h*°) value (63.67) compared with control (73.88). On the other hand, crumb lightness(*L**) value decreased significant (p<0.05) from (75.30) for P1 sample to (46.40) for SF1 sample compared with control (80.76). SF1 sample had the highest redness (*a**) value (0.94) compared to control (-2.23) may be brown pigments (chloroginic acid) appear as browning. This result Looking closely at the with **De Oliveira Filho and Egea [20].** Increased significant differences both yellowness value (*b**) and Croma, (*b*)* ranged from PS sample (24.94) to SF1 sample (19.35) compared with control (18.35). Croma values ranged between S1 (18.55) and SF1 (14.12) comparison to control (13.26). However, hue angle values recorded decreased significant ranged from P1 sample (94.61) to SF1 sample (88.09) compared to control (96.47). The difference in the color of the samples is due to the difference in color of the raw material used to its supplemented **Grasso et al [80].** Our result was in differences with **Mohamed et al. [25]** who studied low lightness and redness but increased yellowness *b** in crumb bread fortified with sun flour meal protein. Also, addition of sesame flour to wheat bread had no effect on color attributes *L**, a* and *b**values **Naderi and Zarringhalami [81].** But our result was in agreement with **Blicharz-Kania et al. [82]** who studied sunflower cake addition resulted in darkening of the gluten-free bread crumb and an increase in parameters *a*, b**, and *C**.

Table (11): Color measurements of selected pan bread.

	parameters	Con.	S1	P1	SF1	Ps	LSD at 5%
Crust	***L****	56.03^{a} ±2.99	47.70^{b} ±2.38	38.76^{c} ±1.16	30.81^{d} ±1.94	37.06^{c} ±0.70	3.66
	a*	11.07^{c} ±0.58	13.04^{b} ±0.89	14.69^{a} ±0.34	7.68^{d} ±0.53	13.57^{b} ±0.14	1.01
	b*	33.67^{a} ±0.40	31.91^{a} ±0.82	24.88^{b} ±1.56	14.33^{d} ±3.57	22.26^{b} ±0.40	3.27
	C*	25.84^{a} ±3.85	22.33^{a} ±2.03	22.34^{a} ±1.86	15.64^{b} ±0.09	22.75^{a} ±0.89	3.92
	h°	73.88^{a} ±0.43	72.13^{a} ±5.84	65.84^{bc} ±1.14	70.6^{ab} ±3.68	63.67^{c} ±1.18	5.78
Crumb	***L****	80.76^{a} ±0.53	70.58^{c} ±0.21	75.30^{b} ±0.61	46.40^{d} ±0.33	69.68^{c} ±0.91	1.03
	a*	-2.23^{e} ±0.03	-0.26^{c} ±0.19	-2.03^{d} ±0.07	0.94^{a} ±0.07	0.26^{b} ±0.08	0.18
	b*	18.35^{d} ±0.36	22.26^{b} ±0.41	20.25^{c} ±0.17	19.35^{cd} ±0.08	24.94^{a} ±1.62	1.40
	C*	13.26^{c} ±1.06	18.55^{a} ±2.29	16.25^{ab} ±0.13	14.12^{bc} ±1.20	17.60^{a} ±2.09	2.84
	h°	96.47^{a} ±0.50	89.35^{c} ±0.23	94.61^{b} ±0.17	88.09^{d} ±0.64	89.72^{c} ±1.08	1.12

Values are mean ±SD. Each value with the same column followed by the same letters is not significantly different at level of 0.05. **Con.**= 100%W F; **S1**= 70%WF +30%S.; **P1** = 70%WF +30%P; **SF1**=70%WF +30%SF.; **PS**=60%WF +20% S+20% P. **WF**= wheat flour, **S**=roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout whole meal sun flower seeds flour.

3.10. Texture profile analysis of the selected pan bread

Table (12) represents the texture profile values of pan bread samples, data showed that resilience and cohesiveness decreased significantly *p<0.05* in all pan bread samples compared with control sample. On the other hand**,** springiness, and chewiness increased significantly *p<0.05* in all pan bread samples compared with control sample. PS sample had the highest hardness and chewiness values (18.24 N and 32.15 mj respectively) compared to their control (10.33N and 14.25 mj respectively) Looking closely at the our result differences with **Naderi and Zarringhalami [81]** who found that the qualitative characteristics of bread samples that addition of sesame flour to bread formulation tends to decrease crumb hardness, also differences line with **Blicharz-Kania et al. [82]** who studied sun flower cake addition resulted exhibited lower hardness and chewiness.

3.11. Percentages of the recommended dietary allowances (RDA %).

Recommended dietary allowances percent provided from one hundred gram of produced pan bread for adolescences both males and females are shown in Table (13), it could be noticed that all % RDA values in all sample have high protein, energy, minerals (i.e. ,Zn, Ca ,P, Fe, Cu, K and Mn) which supplemented pan bread compared with control un-supplemented pan bread , this result agreement with **Agrahar-Murugkar [7].**

Table (12): Texture profile analysis of the highest good degree good selected pan bread.

Storage period	Parameters	Con.	pan bread				LSD at 5%
			S1	P1	SF1	PS	
Zero time	Hardness(N)	10.33^{b}±0.75	17.82^{a}±4.00	15.90^{ab}±3.0	12.36 ^{ab}±2.53	18.24^{a}±5.35	**6.35**
	Adhesiveness(mj)	0.20^{a}±0.00	0.15^{ab}±0.15	0.05^{b}±0.05	0.15^{ab}±0.05	0.10^{ab}±0.00	**0.14**
	Resilience	0.14^{a}±0.01	0.11^{b}±0.03	0.10^{b}±0.00	0.09^{b}±0.01	0.10 ^{b}±0.01	**0.03**
	Cohesiveness	0.57^{a}±0.05	0.46^{b}±0.12	0.44^{b}±0.06	0.38^{b}±0.00	0.45^{b}±0.05	**0.12**
	Springiness (mm)	2.21^{b}±0.01	3.85^{a}±0.11	3.72^{a}±0.34	3.62 ^{a}±0.60	3.83 ^{a}±0.45	**0.68**
	Gumminess(N)	6.32^{b}±0.01	8.42^{a}±0.87	7.28^{ab}±0.14	7.85^{ab}±1.73	8.29 ^{a}±1.03	**1.79**
	Chewiness(mJ)	14.25^{b}±0.85	31.50^{a}±2.20	28.76^{a}±0.25	29.45^{a}±140.95	32.15^{a}±7.35	**11.04**

Values are mean ±SD. Each value with the same column followed by the same letters is not significantly different at level of 0.05. Con.= 100% WF; S1= 70%WF +30%S.; P1 = 70%WF +30%P; SF1=70%W F +30%SF.; PS=60%W F +20% S+20% P. W**F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; SF= sprout sun flower seeds flour.

Table (13): Percentage of the RDA of some nutrient provided from 100g pan bread for adolescence males and females.

Age group	Nutrient	RDA*	% RDA from pan bread samples**				
			Con.	S1	P1	SF1	PS
Male (14-18) years	**Carbohydrate**	130 g	65.36	46.95	49.67	65.21	42.95
	Protein	52 g/d	17.15	25.19	29.12	21.66	26.96
	Fiber	38g/d	0.79	12.79	5.58	14.92	11.13
	Energy	3152 K.cal	13.16	15..12	15.13	14.26	15.51
	Ca	1300mg/d	2.50	5.64	4.04	3.50	5.29
	Mg	410mg/d	0.99	1.31	1.24	5.90	1.59
	Cu	0.89 mg/d	14.61	71.91	59.55	21.35	69.66
	Fe	11 mg/d	10.91	13.09	10.00	12.18	12.27
	Mn	2.2 mg/d	21.36	32.73	24.09	37.27	33.64
	P	1250 mg/d	1.95	4.81	3.29	5.18	4.13
	Zn	9 mg/d	1.67	23.00	19.82	21.64	21.82
	K	4007mg/d	6.04	7.19	7.34	7.54	7.38
Female (14-18) years	**Carbohydrate**	130 g/d	65.36	46.95	49.67	26.21	42.95
	Protein	46 g/d	19..41	28.48	32.91	24.48	30.45
	Fiber	26g/d	1.15	18.69	8.15	20.42	16.27
	Energy	2368 K. cal	17.52	20.13	20.14	18.97	20.63
	Ca	1300mg	2.50	5.64	4.04	3.56	5.29
	Mg	360 mg/d	1.31	1.449	1.41	1.31	1.81
	Cu	0.89 mg/d	14.61	71.91	59.55	21.35	69.66
	Fe	15 mg/d	8.00	9.60	7.35	8.93	9.00
	Mn	1.6 mg/d	29.36	45.00	33.13	37.27	46.25
	P	1250 mg/d	1.95	4.81	3.29	5.18	4.13
	Zn	9 mg/d	20.44	28.11	24.22	26.44	26.67
	K	4007 mg/d	6.04	7.19	7.34	7.54	7.38

* Recommended dietary allowances from the Dietary Reference Intakes according to Food and Nutrition Board as reports by **[49].**
** % RDA=Value of nutrient in the sample of pan bread × 100 / RDA for the same nutrient**.**
.; Con.= 100%W F; S1= 70%WF +30%S.; P1 = 70%W F +30%P; SF1=70%W F +30%SF.; PS=60% WF +20% S+20% P.W **F**= wheat flour, **S**= roasted sesame seeds flour; **P**= roasted peanut seeds flour; **SF**= sprout sun flower seeds flour

4. Conclusion

Good acceptability and increased nutritional value can be achieved by enrichment wheat flour with roasted powder of sesame, peanut seed and sprouted sunflower seed separately by 30% to enhance the nutritional value of the pan bread. So, this prepared pan bread could be recommended for adolescence and adults, and possibly prepared by housewife at home to their family as a healthy diet.

5. Conflicts of interest

"There are no conflicts to declare".

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