The 7th international- 21th Arabic conference for Home Economics "Home Economics and sustainable development2030" December -15th, 2020

Journal of Home Economics

http://homeEcon.menofia.edu.eg **ISSN 1110-2578**

Potential Impactof Avocado Juice (*PerseaAmericana*) and ChamomileTea *(Matricaria recutita L.)* On Obese Rats

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Abstract

This study was carried out to evaluate the effect of different levels of avocado juice withChamomile teaas a source of anti-oxidant and phenolic compoundson body weight gain(BWG), feed intake, feed efficiency ratio, lipid profile, leptin and thyroid hormonesonobese rats. Thirty male albino rats were divided into two main groups; the first group (5rats) fed basal diet used as negative control group. The second group (25 rats) obese rats were divided into 5 sub-groups (5per each) sub group (1) served as positive control group, sub group 2,3 were fed basal diet and given orally avocado juice in a dose of 2.5 and 5 ml, respectively. Sub group 4,5 were fed basal diet and given orally mixture of avocado juice and chamomile tea in a dose of 2.54 and 5 ml, respectively.The results indicated that treatments significantly decreased the levels of BWG, FER FI, T.G, cholesterol, LDLc, VLDLc,liver enzymes (ALT, AST and ALP), uric acid, urea, creatinine,leptin and TSH as compared with positive control group.Onthe other hand, the treatments significantly increased HDL, T3 and T4as compared with positive control. In conclusion, avocado juice can improve lipid profile and thyroid hormones but the maximum improvement recorded for mixture of avocado juice and chamomile teaat the dose of 5mg.

Keywords: Avocado,chamomile, lipid profile, thyroid hormones, liver function, kidney function,Obesity.

1. Introduction

Obesity has become the first non-infectious inflammatory disease in the history of mankind. It is defined as an excessive or abnormal accumulation of adipose tissue that may impair health **(WHO, 2006).**

Obesity is a risk factor for several of the leading causes of preventable death, including cardiovascular disease, diabetes mellitus, and many types of cancer. Thus, successful treatment and control of obesity should be major imperatives. However, multiple studies have shown that detection and counseling rates among physicians remain low **(Jackson *et al.* 2005 and Haire-Joshu and Klein 2011).**

The Dietary Guidelines are based on evidence that eating a LF (20-35%) diet helps manage weight, promote health, and reduce the risk of

chronic disease. The guidelines include recommendations for "foods to reduce" (i.e., saturated and trans fat, cholesterol, sodium, added sugar, refined grains, alcohol) and "foods to increase" (i.e., fruits, vegetables, whole grains, low-fat dairy and protein foods, oils) in order to maximize the nutrient content and health promoting potential of the diet. Other examples of a LF diet are the DASH diet and those recommended by the American Diabetes Association, American Heart Association, and American Cancer Society, as well as commercial programs like Weight Watchers **(Bantle*et al.* 2008; Lichtenstein *et al.* 2006 and Kushi*et al.* 2006).**

Avocado, a nutrient-dense and medium-caloric-dense whole food, may help to reduce the risk of weight gain and excess adiposity. Benefits of avocados may be attributed to various components including dietary fiber, phytochemicals, mannoheptulose, and monounsaturated fatty acids.(MUFAs) **(Paturi *et al.* 2017).**

Phytochemical screening of chamomile flowers revealed its richness in beneficial active molecules such as phenolic compounds and terpenoids**(Sebai*et al.* 2015; McKay and Blumberg, 2006).**

Due to its antioxidant and anti-inflammatory properties, chamomile extracts exhibit many beneficial health effects such as hepatoprotective, gastro protective and neuroprotective activities **(Sebai*et al.* 2015;Jabri*et al.* 2016 and Bulgari *et al.* 2012).** Therefore, the present study was performed to examine the effect of avocado juice and chamomile tea on lipid profile and thyroid hormones for obese rats.

2. Materials and Methods

2.1. Materials

- Casein, all vitamins, all minerals, cellulose, cholinchloride and Methionine, were obtained from El-gomhoriaCompany, Cairo, Egypt.
- Tallow which used in obesity induction, were obtained from local market from Shebin EL-kom, Menoufia, Egypt.
- The kits were supplied by Bio diagnostics company Cairo, Egypt.
- *PerseaAmerican* and*Matricaria Recutita L.* were obtained from Agricultural Research Center.

2.2.Methods

2.2.1.Induction of obesity:

Twenty five Rat fed on high fat diet to induce the obesity. High fat diet prepared from fine ingredients per 100g according to**Negm (2002).** The diet contained the following composition: 20% fat (tallow 10%+corn oil 10%), 10%casien (protein) content, mineral mixture4%, vitamin mixture 1%, cellulose 5%, choline chloride 0.2%, methionine 0.3%, corn starch up to 100% (59.5%).

2.2.2. Preparation of avocado juice

Avocado was carefully washed with tap water, then sliced into small pieces and squeezed it to juiceby electric blender with wateraccording to **Mohamed and Amr (2013).**

2.2.3. Preparation of chamomile tea

Tea was prepared by adding 1gm chamomile flowers in 150 ml boiling distilled water, covering and leaving to steep for 10-15 min and then allowed to cool for 15 min according to **Saira*et al.* (2014).**

2.2.4. Experimental design and animal groups

The experimental was done in the Faculty of Home Economics, Minufiya University, Shebin El-kom. Thirtywhite male albino rats, weighting 250±3gm. were used in the study. The animals were obtained from Research, center, Giza, Egypt. All rats were fed on basal diet which prepared according to **Reeves *et al.*(1993)** for 7 consecutive days. After this adaptation period, rats are divided into two main groups; the first group (5rats) fed basal diet used as control negative group. The second group (25 rats) obese rats were divided into 5 sub-groups (5per each) sub group (1) served as positive control group, sub group 2,3 were fed basal diet and given orally avocado juice in a dose of 2.5 and 5 mg, respectively. Sub group 4, 5 were fed basal diet and given orally mixture of avocado juice and chamomile tea in a dose of 2.54 and 5 mg, respectively.During the experimental period, the body weight and feed intake were estimated weekly and the general behavior of rats was observed. The experiment period was 28 days, at the end of the experimental period, each rat weight separately then, rats are slaughtered and collect blood samples. Blood samples were centrifuged at 3000 rpm for ten minute to separate blood serum, and then kept in deep freezer (-20°C) till using.

2.2.5. Biological evaluation:

The body weight gain (B.W.G.) and feed efficiency ratio (F.E.R) were determined according to **Chapman *et al*. (1959)**. Using the following equations:

B.W.G. =(Final weight - Initial weight)

$$\textbf{F.E.R.} = \frac{\text{Grams gain in body weight}}{\text{Grams feed consumed}}$$

2.2.6.Biochemical analysis:

Serum total cholesterol, triglyceride (TG) and high density lipoprotein(HDLc) were determined by using methods of **Allain*et al*. (1974),Fossati and prencip (1982) and Lopez-virella (1977),** respectively. The determination of low density lipoprotein cholesterol (LDLc) and very low density lipoprotein cholesterol (VLDLc)were carried out according to the methods of **Lee and Nieman (2019)** as follows:VLDLv= TG/5 and LDLc= TC – (HDLc + VLDLc).

The determination of thyroid stimulating hormone (TSH) carried out according to **Uotila*et al*. (1981).**Thyroid hormones (Tetraiodothyronine and Triiodothyronine) were estimated in serum using Radioimmunoassay (RIA) as described by **Patrono and Peskar (1987)**.The determination of leptin hormone carried out according to**Cosidine*et al*.(1996).**

2.2.7. Statistical analysis:

Data were statistically analyzed using statistical analysis system **(Armitage and Berry, 1987)**. One way analysis of variance (ANOVA) was used to test the variations among groups and post Hoc test (Duncan's Test) was used to compare group means.

3.Result and Discussion

The effect of different levels of avocado juice and chamomile tea on Feed Intake, feed efficiency ratio and Body weight gainwas tabulated

in table(1). Data presented could be observed that here were significant ($p \leq 0.05$) increase in FI;FER andBWGfor positive control group (20.13, 1.471 and 29.67g.), respectively. As compared to the healthy rats (negative control group) which were, 14.33, 1.21and 17.3gm, respectively.

Groups fed on high fat diet and avocado juice showed improving in body weight and feed intake compared to the positive control group, it seems that avocado juice at 2.5 and 5mg a protective effect against overweight. Treated obese groups fed on mixture of avocado juice and chamomile tea showed the best improvement at compared to positive control group and treated groups (3 and 4) by avocado juice. So the best result for BWG, FI and FER was recorded for group (6). These results are in harmony, with those obtained **by Naveh*et al.* (2002) and Fulgoni*et al.* (2013)**who indicated that avocado consumption is associated with lower body weight. Moreover, **Makni*et al.* (2008) and Barakat. (2011)**found thatthe feed efficiency ratio of treated obese groups fed on avocado juice recorded significant decreased($P \leq 0.05$).

Brai*et al.* (2007) reported that rats treated with avocado leaf extracts showed decrease in overall body weight gain.

Jabri*et al.* (2016) showed that treatment with chamomile decoction extract (100 mg/kg) significantly corrected these deleterious effects in body weight gain when compared to high fat diet control group.

Table (1): Effect of different levels of avocado juice and chamomile tea on Feed Intake, feed efficiency ratio and Body weight gain of obese rats

Parameters	Groups					
	(1) Control (-ve)	**(2) Control (+ve)**	**(3) 2.5 mg avocado juice**	**(4) 5mg avocado juice**	**(5) 2.5 mg avocado juice and chamomile**	**(6) 5 mg Avocado juice and chamomile**
FI (g)	14.33 ± 0.02^{f}	20.13 ± 1.021^{a}	19.17 ± 2.47^{b}	18.81 ± 1.02^{d}	19.12 ± 0.015^{c}	17.80 ± 0.09^{e}
FER (g)	1.21 ± 0.26^{b}	1.471 ± 0.98^{a}	-2.55 ± 0.75^{c}	-2.99 ± 1.03^{d}	-2.47 ± 0.078^{c}	-3.47 ± 0.034^{e}
BWG (g)	17.3 ± 3.51^{b}	29.67 ± 3.79^{a}	-49 ±1^{c}	-54 ±4.58^{d}	-47.4 ± 1.52^{c}	-59.8 ±0.58^{e}

- All values represented as mean±SD.
- Means with different superscript letters in the same column are significantly different at ($p \leq 0.05$).

Effect of different levels of avocado juice and chamomile tea on lipid parameters of obese rats presented intable (2) that the mean values of fastingserum T.C and T.G in positive control groups were (150.33and 144.63mg/dl), respectively.It being significantly higher when compared to the corresponding values in negative control groups which were (87.43 and 60.23mg/dl), respectively. All treatment obese groups showed significant decrease ($p \leq 0.05$) when compared to positive control group. The lowest significant decrease($p \leq 0.05$) recorded for group 5 which fed on mixture of avocado juice and chamomile tea in a dose of 5 mg which was103.50mg/dl.

At the same table,the results indicated that the mean value of HDL for positive control group was significantly lower than negative control group, which was 22.20and 47.46mg/dl, respectively.The best result was recorded for group 5 which fed on mixture of avocado juice and chamomile tea in a dose of 5 mg. As for LDLc, the results showed that the mean value for positive control group was significantly higher than negative control group, which were 99.20 and 72.93mg/dl, respectively.Rats which received different levels of avocado juice andchamomile teawere decreased significantly ($p \leq 0.05$) in serum LDL level when compared to positive control group. It could be noticed that the mean value of group 6 was lower than positive control group which was 52.03and 99.20mg/dl so the best result was recorded for group (6). Concerning VLDlc, the results indicated that the mean value of positive control group was significantly higher than negative control group, which were 28.92and 12.10mg/dl. The different levels ofVLDL in groups of avocado juice, andchamomile tea were decreased significantly in serum VLDL level when compared to positive control group. It could be noticed that the mean value of obese rats group fed on mix of avocado juice and chamomile 5 mg was lower than positive control group which was 20.70 and 28.92mg/dl so the best result was recorded for group (6) which given orally mix of avocado juice and chamomile tea in a dose of 5mg.**Naveh *et al.*(2002); Monika and Geetha (2014)** showed that rats fed defatted avocado fruit (100 mg/kg body weight/day for 14 weeks)of dietreduced total hepatic fat levels. In agreement with these finding, **Mohamed *et al.* (2017)** reported that ratstreatment with chamomile decoction extract (100 mg/kg) significantly corrected these deleterious effects in lipid metabolic parameters when compared to obese rats group fed on high fat diet.And **Brai*et al.* (2007)** reported that avocado contains phytosterols to compete with cholesterol for micelle formation in the intestinal iumen and inhibit cholesterol absorption.**Monika andGeetha (2015),** Reported that avocado decreased lipid profile except HDL on obese rats.

Table (2): Effect of different levelsof avocado juice and chamomile tea on lipid parameters of obese rats

Parameters	Groups					
	(1) Control (-ve)	**(2) Control (+ve)**	**(3) 2.5 mg avocado juice**	**(4) 5mg avocado juice**	**(5) 2.5 mg avocado juice and chamomile**	**(6) 5 mg Avocado juice and chamomile**
TC (mg/dl)	87.43 ± 0.83^{e}	150.33 ± 0.80^{a}	149.46 ± 0.95^{a}	129.40 ± 1.06^{c}	138.46 ± 1.01^{b}	109.33 ± 0.86^{d}
TG (mg/dl)	60.23 ± 1.90^{f}	144.63 ± 2.11^{a}	137.06 ± 1.33^{b}	112.83 ± 1.49^{d}	123.43 ± 1.95^{c}	103.50 ± 2.10^{e}
HDLc (mg/dl)	47.46 ± 1.09^{a}	22.20 ±1.13^{f}	26.66 ± 0.51^{e}	31.63 ± 0.58^{c}	29.260 ±0.20^{d}	36.60 ± 0.55^{b}
LDLc (mg/dl)	27.92 ± 4.28^{f}	99.20 ± 0.48^{a}	95.38 ± 0.97^{b}	75.09 ± 0.81^{d}	84.50 ± 1.45^{c}	52.03 ±0.36^{e}
VLDLc(mg/dl)	12.10 ± 0.38^{f}	28.92 ± 0.42^{a}	27.41 ± 0.26^{b}	22.56 ± 0.29^{d}	24.69 ± 0.4^{c}	20.70 ± 0.42^{e}

- All values represented as mean±SD.
- Means with different superscript letters in the same column aresignificantly different at ($p \leq 0.05$)

Effect of different levels of avocado juice and chamomile tea on leptin, T3, T4 and TSH hormones of obese rats were recorded in Table (3). Data clear for leptin, that the highest mean value was in the positive

control group and the lowest mean value was in the group (6) fed on mix of avocado juice and chamomile tea. It could be observed that there is no significant differences between group (4) and group (5). There were significant decrease between all treatments groups when compared with positive control group and the best effect was detected in the group (6) fed on mix of avocado juice and chamomile tea with mean value77.33ng/ml. For T3 hormone, the results showed that the mean value of T3 of positive control group was significantly lower than negative control group, which were 60.74and 80.232ng/ml, respectively. And showed a significant difference ($p\leq0.05$). All treatments showed significant increase ($p\leq0.05$) when compared with positive control group but the best result was recorded for group (6) fed on mix of avocado juice and chamomile tea5 mg.

The results showed that the mean value of T4 of positive control group was significantly ($p\leq0.05$) lower than negative control group, which were 1.03and 3.66ng/ml, respectively. All treatments showed significant increase ($p\leq0.05$) when compared with positive control group and the best result was recorded for group (6) fed on 5mg mix of avocado juice and chamomile tea.Concerning TSH, as shown the mean value of TSH of positive control group was significantly higher ($p\leq0.05$) than negative control group, which were 1.57and 0.12µg/dl, respectively. Also the mean value of groups fed on different levels of avocado juice and chamomile tea were significantly ($p\leq0.05$) decreased when compared to positive control group and the best mean value was recorded of group (6) which was(1.21)µg/dl.These findings are in harmony with those of**Ahlam*et al.* (2019),** they found that treatment with both chamomile extract resulted in an improvement in serum level of thyroid hormones (TSH, T3 and T4) and the disappearance of most thyroid gland pathological changes demonstrated by light and electron microscopes.Also, in agreement with these finding, **Monika and Geetha (2015)**reported that the avocado fruit extract influences leptin activity, which controls satiety and hunger to regulate the food intake.**Asma*et al.* (2016)** reported thattreatment with avocado decreased in TSH and increased in T3, T4 on rats. This is due to the fact that avocado contains selenium, zinc, and iodine which can boost thyroid function.

Table (3): Effect of different levels of avocado juice and chamomile tea on leptin , triiodothyronine (T3) , tetraiodothyronine (T4) andthyroid–stimulating hormone (TSH) hormones of obese rats

Parameters	Groups					
	(1) Control (-ve)	**(2) Control (+ve)**	**(3) 2.5 mg avocado juice**	**(4) 5mg avocado juice**	**(5) 2.5 mg avocado juice and chamomile**	**(6) 5 mg Avocado juice and chamomile**
Leptin (ng/ml)	53.52 ± 2.41^{f}	96.67 ± 5.21^{a}	92.33 ± 2.20^{b}	82.25± 3.12^{d}	87.37± 2.52^{c}	77.33± 1.08^{e}
TSH (µg/dl)	0.12± 0.02^{e}	1.57 ± 0.09^{a}	1.51± 1.75^{b}	1.37 ± 0.020^{c}	1.47 ± 2.24^{b}	1.21± 0.015^{d}
T3 (ng/dl)	80.23 ± 4.49^{a}	60.74 ± 0.015^{e}	62.40 ± 5.71^{d}	68.33 ± 1.87^{c}	62.8 ± 2.74^{d}	71.66 ± 3.37^{b}
T4 (ng/dl)	3.66± 0.15^{a}	1.03 ± 0.02^{e}	1.14 ± 0.84^{e}	2.23 ± 1.14^{c}	1.27 ± 2.01^{d}	2.43± 0.02^{b}

- All values represented as mean±SD.
- Means with different superscript letters in the same column are significantly different at ($p\leq0.05$)

Effect of avocado juice and chamomile tea on liver enzymes (ALT, AST and ALP) of obese rats presented in table (4). Serum levels of ALT, AST andALP (147, 254.3 and184.3U/L,respectively) were significantly higher at ($p\leq 0.05$) inuntreated obese rats (positive control rats), compared with thenormal control rats (66.67, 152.3and 85U/L,respectively). Administration of avocado juice atthe twodoses(2.5 and 5 mg) induced significantly lower at ($p\leq 0.05$) in serum ALT, AST and ALP concentrations,compared with untreated obese rats. These decreases were moredetectable with increasing level of avocado juice. Also, mix of avocado juice and chamomile tea at the two doses (2.5 and 5mg)induced significantly lower at ($p\leq 0.05$) in serum ALT, AST and ALP concentrations,compared with untreated obese rats and obese rats treaded with avocado juice . So the best result was recorded for treated obese rats with 5 mg mixture of avocado juice and chamomile tea.In agreement with these finding, **Mohamed and Amr (2013)** indicated that detected phenolic compounds in avocado caused significant decrease in serum concentrations of AST, ALT and ALP.Similar results were obtained by**Folasade*et al.* (2016) ; Etab and Fatimah (2017)** who reported that avocado can reduce hazards on liver function.Also,**Mohamed (2018)** showed that chamomile reduced serum levels of ALT and AST.No significant ($p>0.05$) different in ALP level between groups.

Table (4): Effect of Effect of avocado juice and chamomile tea on liver enzymes (ALT, AST and ALP) of obese rats:

Parameters	Groups					
	(1) Control (-ve)	**(2) Control (+ve)**	**(3) 2.5 mg avocado juice**	**(4) 5mg avocado juice**	**(5) 2.5 mg avocado juice and chamomile**	**(6) 5 mg Avocado juice and chamomile**
GPT(ALT) U/L	66.67± 1.53^{f}	147 ± 2 ^{a}	142.67± 2.52^{b}	128 ± 2 ^{d}	137.33 ± 2.08^{c}	122.33± 2.517 ^{e}
GOT(AST) U/L	152.3± 2.52^{f}	254.3 ± 4.04 ^{a}	244± 3.61 ^{b}	204 ± 3.5^{d}	234± 3.5^{c}	194.67±3.1^{e}
ALP (U/L)	85± 4.16^{f}	184.3 ± 4.17 ^{a}	174.6 ± 3.51 ^{b}	154.3 ± 4.50 ^{d}	166 ± 3.6 ^{c}	134.6± 3.5^{e}

- All values represented as mean±SD.
- Means with different superscript letters in the same column are significantly different at ($p\leq 0.05$).

Effect of avocado juice and chamomile tea on kidney function of obese rats showed in table (5). Results revealed that untreated obese rats (positive control group) had significantly ($p\leq 0.05$)higher values of uric acid, urea and creatinine(4.33, 89.30and 1.03mg/dl, respectively), compared with those of the

normal healthy rats (1.46, 34 and 0.26mg/dl), respectively. Administration of avocado juice at the two different levels (2.5 and 5mg) induced significantly lower ($p \leq 0.05$)in serum activity of uric acid, urea and creatinine, compared with those of untreated obese rats. It obvious those, the decrease in serum activity of uric acid, urea and creatinine were more detectable with increases avocado juice levels. While administration of mixture of avocado juice and chamomile tea at the two different levels (2.5mg and 5mg) induced significantly ($p \leq 0.05$)lower in serum activity of uric acid, urea and creatinine, compared with those of untreated obese rats and treated obese rats with avocado juice. So the best result was recorded for obese rats treated with mixture of avocado juice and chamomile tea in a dose of 5mg. In agreement with these finding, **Etab and Fatimah(2017)**reported that diet fortified at 15% and 25% avocado can reduced kidney function. **Fatemeh*et al.* (2018);Najla*et al.* (2012);Anthony *et al.* (2017) andElbessoumy and Mahmoud (2013)** reported that consumption of antioxidant activity of chamomile isone of the most important treatment strategies to cause reduction in serum creatinine.Also, **Elly*et al.* (2019)** showed that alkaloids, flavonoids and polyphenol at avocado, which can increase the glomerulus filtration, rate, and inhibit the increase of urea and creatinine.

Table (5): Effect of avocado juice and chamomile tea on kidney function of obese rats

Parameters	Groups					
	(1) Control (-ve)	**(2) Control (+ve)**	**(3) 2.5 mg avocado juice**	**(4) 5mg avocado juice**	**(5) 2.5 mg avocado juice and chamomile**	**(6) 5 mg Avocado juice and chamomile**
Uric acid (mg/dl)	1.46±.07^{e}	4.33±.05 ^{a}	3.90± 0.89 ^{b}	3.30± 1.5 ^{c}	3.78 ± 2.01 ^{b}	2.76 ± 0.81 ^{d}
Urea (mg/dl)	34 ±2.83^{d}	89.30±3.54 ^{a}	86.32± 4.04 ^{a}	70.34± 2.5 ^{c}	78.00± 3.01 ^{b}	68.4 ± 2.47^{c}
Creatinine(mg/dl)	0.26 ± 0.06^{e}	1.03± 0.025^{a}	0.70 ± 0.01 ^{b}	0.57 ± 0.036^{c}	0.65 ± 0.04 ^{c}	0.48 ± 0.08^{d}

- All values represented as mean±SD.
- Means with different superscript letters in the same column are significantly different at ($p \leq 0.05$)

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Journal of Home Economics

المؤتمر الدولى السابع- العربى الحادى والعشرون للإقتصاد المنزلى
" الإقتصاد المنزلى والتنمية المستدامة ٢٠٣٠ "
١٥ ديسمبر ٢٠٢٠م

http://homeEcon.menofia.edu.eg ISSN 1110-2578

التأثير المحتمل لعصير الأفوكادوو شاي البابونج علي الفئران المصابة بالسمنة

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الملخص العربى

أجريت هذة الدراسة لتقييم تأثيرمستويات مختلفة من عصيرالأفوكادو وشاي البابونج علي الفئران المصابة بالسمنة لكونهم مصادر غنيهبمضادات الأكسدة والمركبات الفينولية ودراسة تأثيرهم علي كل من معدل الوزن المكتسب والمأخوذ من الطعام ومعدل الإستفادة من الغذاء ودهون الدم و هرمونات الغدة الدرقية وهرمون اللبتين ووظائف الكلي والكبد. وقد تم استخدام ثلاثون فأر بالغوتقسيمهم الي مجموعتين رأسيتين.ووضعت المجموعة الرئيسية الأولي كمجموعة ضابطة سالبة بينما المجموعة الرئيسية الثانية كانت مكونة من ٢٥ فأر وتم إصابتهم بالسمنة ثم تقسيمهم الي ٥ مجاميع فرعية حيث وضعت المجموعة الفرعية الأولي كمجموعة ضابطة موجبة بينما المجموعة الثانية والثالثة تم تغذيتها علي الوجبة الأساسية بالإضافة الي عصير الأفوكادو بتركيز ٢.٥ و ٥ مجم علي التوالي بالحقن عن طريق الفم. في حين تم تغذية المجموعة الرابعة والخامسة علي الوجبة الأساسية بالإضافة الي خليط من عصير الأفوكادو وشاي البابونج بتركيز ٢.٥ و٥ مجم علي التوالي بالحقن عن طريق الفم. وأوضحت النتائج أن تناول كل من عصير الأفوكادو وشاي البابونج أدي الي إنخفاض معنوي في بعض التحاليل مثل معدل إكتساب الوزن – الغذاء المأكول – معدل الإستفادة من الغذاء – التراي جلسريد – الكوليسترول – الليبروتينات منخضة الكثافة - الليبروتينات منخضة الكثافة جدا- هرمون اللبتين –هرمون TSH– ووظائف الكبد (ALT-AST-ALP) – ووظائف الكلي. ولكن مع ارتفاع معنوي في الليبوبروتينات مرتفع الكثافة – وهرمون T3وT4 وذلك عند مقارنتهم بالمجموعة الضابطة الموجبة . وأخيرا فإنه يمكن لعصير الأفوكادو تحسين مستويات دهون الدم ومستوي هرمونات الغدة الدرقية ووظائف كلا من الكبد والكلي ولكن يصبح خليط عصير الأفوكادو وشاي البابونج أكثر تحسينا لتلك التحاليل بجرعه ٥ ملجم .

الكلمات الأفتتاحية:الأفوكادو – البابونج – دهون الدم – هرمونات الغدة الدرقية – وظائف الكبد- وظائف الكلي - السمنة.