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Effect of daily consumption of dried ginger in the level of some hormones, cholesterol, and total fat in women's sample

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Abstract

This study was carried out at the General Al-Mohmmodia Hospital/ Al-Mohmmodia district/ Baghdad/Iraq. Ginger rhizome (Zingiber officinale) has become a subject of interest due to its bioactive contents such as an antioxidant and androgenic affect in diseases treatment in more countries world-wide. As an antioxidants ginger has an effective role on spermatogenesis and blood biochemical parameters. Thirty women almost of them suffering from high blood lipid profile and cholesterol, some of them had kidney dysfunction were taken. All women were conducted to explore the consumption of about 1gm daily for complete month on the physiological performance, lipid profile, kidney function and testosterone and progesterone hormones. The result of BMI showed significant difference of all ages groups and for all the kind of overweight and obesity. However Hb level showed a significant differences ($p<0.05$) between different ages, Hb showed no significant differences within the same age before and after consumption the ginger powder ($p>0.05$). Blood glucose was not differ significantly between the group ages, but it was significantly ($p<0.05$) difference before and after the ginger powder consumption. Serum cholesterol, total glyceride. LDL, HDL, and VLDL levels revealed significant ($p<0.05$) differences between group ages, but within group age 31-40 years were no significant ($p>0.05$) differences. On the other hand, result of this study showed a significant ($p<0.05$) differences in kidney functions (urea, creatinine, and salts) when compared its with normal ranges. However serum testosterone showed a significant ($p<0.05$) differences with all ages of women, the progesterone showed no significant ($p>0.05$) differences. Results revealed that consumption of 1gm daily of ginger powder significantly increased blood Hb, cholesterol, lipid profile, testosterone hormone, and improved kidney functions. So that we can suggest that ginger may be a promising in kidney and fertility function. In addition, its improve the biochemical parameters

Keywords: ginger-biochemical parameter-lipid profile- kidney function- hormones

Introduction

Ginger is the dried rhizome of Zingiber Officinale Roscoe (Zingiberacaceae). Zingiber come from the Greek "Zingiberis" and Arabic "Zindschebil" or the root of Zindschi (India), which is interpreted as "known already to the ancients"". Its common name "gringa" or "horn" and "vera" meaning body, in references to the shape of the root (1,2).

Ginger is cultivated commercially in India, China, South East Asia, West India, Mexico and other parts of the world. It is consumed worldwide as a spices and flavoring agent and is attributed to having many medicinal properties (3). Ginger is creeping perennial on a thick tuberous rhizome, which spreads underground. In the first year a green, erect reed like stem about 60cm high grows from this rhizome. The plant has narrow, lanceolate to linear-lanceolate, 15-30cm long leaves which die of each year. The odor and taste are characteristic, aromatic and pungent (4). Moreover, ginger is well known all over the world especially for its use in disorders of the gastrointestinal tract such as constipation, dyspepsia, nausea and vomiting. It was reported that ginger has medicinal properties against digestive disorders, rheumatism and diabetes (2, 5, 6, 7, 8). It was been concluded that ginger has some tremendous beneficial effect to human body to cure various types of diseases (Banerjee, et al. 2011).Ginger also has significant cholesterol and triglycerides lowering activity and to suppress platelet aggregation (Bhandari, et al. 1998, Akhani et al. 2004). It was concluded that both ginger and aspirin could potentiate the anti-platelet effect of nifedipine. A combination of 1g ginger with 10mg nifediprine would be

valuable in cardiovascular and cerebrovascular complication due to platelet aggregation (Haw-Yaw, Y. et al. 2006). Also, many studies concluded that ginger lowered LDL-cholesterol, VLDL-cholesterol and triglycerides level in apolipoprotein-E deficient mice (Jamel, M. et. al.2010, and Akhani et al. 2004, and Abd-Elraheem, et. Al. 2009, Zomrawi, et al. 2012). Ginger is a potential as an effective anti-emetic agent due to its constituent, such as 6-Gingessulfonic acid, 6-gingerol and 6-shogaol that isolated and studied for pharmacological and toxic effects (Masayuki, Y. et al. 1992, Samir, M and Amrit, P. 2003).

Infertility is a major health problems in life, many factors interferes with spermatogenesis process and leads to infertility. These factors, such as drugs, toxicants, infections, diseases, air pollutants, life style and insufficient vitamins and minerals intake have been presented to cause deleterious effects on spermatogenesis (Isidori, et al. 2006). Many studies showed that ginger (powder or its oil extraction) has a strong protective effect on DNA damage induced by H2O2 and might play a scavenger of oxygen radical and act as antioxidant so can improve sperm quality and consequently increase the rate of the fertility in men (Yang, et al. 2006).

Keeping in view the significant effect of ginger this study was conducted to observe the effect of consumption of dried ginger on the levels of blood biochemistry parameters of women samples (lipid profile, uric profile and to assess the ability of ginger on promoting and modulating follicle stimulating hormone (Testosterone and Progesterone).

Material and Methods

A total number of 30 women were included in the study. The weight and the body max index of all women were taken before starting the study. All women were consumed with about 1gm of ginger daily by taking 1 tablet of ginger after each meal (1 tablet contain about 0.4-0.5 g) for 7 weeks. Base line systolic blood pressure was recorded on day 0 and at the end of the study. Then, simultaneously blood sample was drowning to measure Lipid profile, urine profile, serum minerals, and hormonal dis-function. in the beginning and at the end of the study simultaneously blood sample was drawn to measure baseline of (Lipid profile, urine profile, serum minerals, and hormonal dis-function) after the experiment to show the effect of ginger on that's parameters and its health improvement.

Ginger (Zingiber officinale) rhizomes powder were purchased from local markets sterilized in Oven on 65°C /15 minutes, cooled, then filled the tablets with it, stored in sealable polythene bags into glass jar in a refrigerator at approximately 5°C before analysis and then was begun with the exp. by feeding the 30 women with 3 tablet/day/month.

Dose calculation

It was used the Lab. balance (Satorius BL3100 Max 3100 gm d=0.1g) for weighing the samples for analysis.

The weight of whole one dried ginger tablet(n=5) approximately was 0.55 grams.

The weight of empty tablet (n=5) equal 0.1 gm.

The weight of filled ginger powder tablet (n=5) approximately were 0.45, so the amount of dried ginger/ day equal to 1.35gm (three tablet after each meal of food).

Chemical analysis

Minerals determination (lead Pb, Iron Fe, Copper Cu, Cobalt Co, Nickel Ni, and Cadmium Cd):

Pb, Fe, Cu, Co, Ni, and Cd were determined ginger powder according to the method (16) by using Flam Atomic absorption (Flame Emission) from company Shimadzo (Model AA-7000), in lab of consumer research and protection center/Baghdad Univ./Iraq.

Experiment protocol

Thirty young women of high pressure, lipids, and total cholesterol were taken in this study. Women were fed 3 tablet/day/7 weeks on ginger powder. Control (n=5) normal women. Base line systolic blood pressure (SBP), and lipid profile on day 0 were determined, then blood samples were collected from women and simultaneously centrifuged for 15 min. at 3000-4000 rpm to separate the serum. The serum samples were stored at -20°C for the analysis of serum glucose, cholesterol and triglycerides (Franey and Elias 1986) using Randeox and Biomerinx kits.

Biochemical analysis in blood

All chemical analysis was conducted in the Al-Mahmmodia general hospital. Hemoglobin concentration (Hb) was determined using Hemoglobin-Drabkin kit. Plasma glucose and cholesterol were determined by enzymatic calorimetric methods using Kit GOD-PAP (Randox Lab. Ltd. London) method using cholesterol esterase, cholesterol oxidase and peroxidase.

Estimation of lipid profile

Lipid profile was measured with the help of semi autoanalyser (Roche Company) and Infinite Kit (Accurex Biomedical Pvt. Ltd.) was used for plasma lipid estimation

Estimation of triglyceride (TG) level in serum

Infinite liquid triglycerides reagent is used for the determination of TG based on enzymatic method using lipoprotein lipase, glycerol kinase, glycerol phosphate oxidase and peroxidase (Young, 2001). Low-density lipoprotein (LDL) and very low density lipoprotein (VLDL) in samples precipitate with phosphotungestate and magnesium ions. After centrifugation the cholesterol concentration in the HDL fraction, which remains in the supernatant, is determined as described by Lopes-Virella, (1977).

Creatinine and urea were determined by enzymatic method according to the method (Patton, and Crouch 1977). Plasma uric acid was determined by quantitative determination of uric acid (Young, 2001).

Serum FSH, testosterone and progesterone measurements

Serum concentration of FSH, testosterone and progesterone were determined in duplicated samples using radioimmunoassay (RIA). Human FSH/prog. And testo. Kits obtained from Biocode Company-Belgium, according to the protocol provided with each kit. The sensitivieties of hormone detected per assay tube were 0.2 ng/ml and 0.14ng/ml for FSH, and prog. Serum concen. Of total testosterone was measured by using a double antibody RIA kit from immunotech Beckman Coulter Company-USA. The sensitivities of the hormone detected per assay tube were 0.025ng/ml (Khaki, et al. 2009).

Statistical analysis

The Statistical Analysis System- SAS (2012) was used to effect of different factors in study parameters. Chi-square test was used to significant compare between percentage & least significant difference –LSD test was used to significant compare between means in this study.

Result and Discussion

Obesity and overweight substantially increase the risk of death from hypertension, high cholesterol, diabetes II, coronary heart disease and endometrial, breast, prostate and colon cancers. Higher body weight are also attributed with increases mortality (Medstar Health, 2007). So that to assess the weight and body fat of the women samples in this study is important before the beginning of experiment. Instead of that, the weight and the shape of the body of the human reflect the personal health at first sight, so that the BMI which describes relative weight for height, is significantly correlated with total body fat content, and should be used to assess overweight

and obesity and to monitor changes in body weight. Measurements of body weight alone can be used to determine efficacy of weight loss therapy. There were a high significant differences of BMI% in obese women and normal women that were 35, then 30% of women lie in overweight. Also, there were high significant differences of BMI% in women between the different ages in this study as shown in table (1). This finding is agreed with many previous studies, due to resident age, and because of the menopause stop at this age (Hamdia, M. 2013).

Table 1: shows the % of Overweight and Obesity of women (30 women).

	Overall % of women		Percent of BMI in women within Age Group (Years)			
	No.	%				
			31-40 y	41-50 y	51-60 y	≥ 60
Underweight < 18.5	0	0	0	0	0	0
Normal+ 18.5-24.9	14	35	35.7	7.1	21.4	35.7
Overweight 25.0-29.9	12	30	16.6	33.3	41.6	8.3
Obesity (I, II, & III) 30.0-34.9	14	35	14.3	28.5	42.8	14.3

Effect of eating ginger powder on blood Hemoglobin.

Blood parameters results are shown in table 2. There were a quiet significant among all groups of ages with respect to hemoglobin percent (Hb%) ($p< 0..05$), whereas there were not significant differences among the same group of ages with respect to hemoglobin percent after consumption ginger powder. This result could be compared with the of Zomrawi, et al. (2011) who reported no significant differences among groups with respect to Hb% of broilers on diet supplemented with ginger.

Effect of eating ginger powder on blood glucose.

The administration of powdered ginger to the women who having high glucose especially at age over 50 years significantly reduced plasma glucose level when compared with normal level as shown in table 2. On the other hand, it was clear that level of plasma glucose was decreased in women pretreated with ginger in over 60 years group which decreased significantly from 123 to 115 mg/dl, the same thing with women of age 51-60 years. On the contrary, there were no significant differences in glucose concentration with respect of ginger administration in women with age 31-40 years and 41-50 years.

Effect of eating ginger powder on blood cholesterol.

The consumption of ginger powder by the women who had hypercholestermia hyperlipidemia and diabetic women significantly reduced plasma cholesterol, hyperlipidemia and glucose level when compared with normal women. The reduction was not enough to reach normal women, but it was still significantly higher when compared with normal women at age 51-60 years, as shown in Table 2.These finding are in agreement with previous studies Abd-Elraheem et al. (2009), Bhandari et al. (2005). The hypo cholesterol action may be done by ginger playing as a potential inhibitor of cholesterol synthesis as presented by Said et al. (2010) and . However,

ginger have a positive effect on women performance and lowering effect on blood serum cholesterol, triglycerides, and glucose, which can refer to strong anti-oxidative action and potential anti stress action.

Effect of eating ginger powder on lipid profile.

Serum triglyceride were significantly lower among all the age groups, and after consumption of powdered ginger for long period of time as shown clear in table 2. The consumption of ginger caused reduction in the levels of plasma triglyceride, LDL, and VLDL-cholesterol but HDL-cholesterol level significantly increased on the other hand, that may be due to the effect of ginger on elevation of the activity of hepatic cholesterol 7-alpha-hydroxylase which is a rate-limiting enzyme in the biosynthesis of the bile acids and stimulates the conversion of cholesterol to bile acids leading to the excretion of cholesterol from the body (Srinivasan and Sambaiah 1991). In addition of that, the presence of polyphenols and flavonoids in ginger might be responsible for the antioxidant nephroprotective activity (Ajith et al. 2007). These results are in accordance with the previouse studies done consumption ginger with or after meals (Akhani, et al.2004, and Nicoll and Henein,2009). So that, based upon this study, it can be include beneficially up to 1-2gm of powdered ginger daily consumption has a potential to provide not only the cheaper and natural product but also the effective preventive remedy for the risk of hypertension, hyperlipidemia of ischemic heart disease, and for reducing blood sugar and serum cholesterol levels with significantly lower side effects.

Table (2): The effect of consuming ginger powder on Biochemical test with diff. ages of patients.

Biochem. Test*		Age Group (Years)			
		31-40 y	41-50 y	51-60 y	≥ 60
Hb%	B	3.5	3.9	4.7	4.5
	A	4.0	4.0	4.6	4.6
B.glucose	B	110	115	120	123
	A	105	110	112	115
B.cholestrol	B	180	210	240	210
	A	175	195	200	190
S.T.G	B	150	220	250	240
	A	150	195	220	220
S.LDL	B	145	165	170	190
	A	142	150	150	170
S.HDL	B	44	33	33	40
	A	50	42	45	45
S.VLDL	B	35	55	46	50
	A	33	50	41	45

***=Biochemical test**

Kidney Function

The result of this study shows the women produced significant increase in the levels of plasma urine, creatinine, and the amount of the salt and the alkalinality (Serum alkaline phosphatase) of the urine among all the ages groups compared with normal levels table 3. While, the consumption of powdered ginger daily /7 weeks significantly reduced the levels of plasma creatinine, urea, uric acids, and the uric salts when compared with the normal levels. This refers that post-consumption with ginger normalized the plasma creatinine, urea and the urine salts especially with ages above 50 years. These finding agreed with (Mustafa, A. 2012) who concluded that kidney function had significant decrease in urea, uric acid, and creatinine.

Table (3): The effect of consuming ginger powder on Urine profile and liver function with different ages of patients

Urine profile And liver function	Age Group (Years)					LSD value
	Stage	31-40 y	41-50 y	51-60 y	≥ 60	
S. Urea	B	65 b	69 b	90 a	85 a	12.39 *
	A	45 b	60 a	50 ab	55 ab	10.94 *
S. Creatinine	B	0.6 b	1.2 b	1.9 a	2.2 a	0.663 *
	A	0.5 b	0.9 b	1.1 b	1.8 a	0.602 *
S.a.l.t (G.O.T.)	B	18.2 c	20.5 c	35 b	45 a	8.953 *
	A	18.1 b	18.1 b	25 b	40 a	9.003 *
S.a.l.t (G.P.T.)	B	20.0 c	22.2 c	33 b	40 a	6.135 *
	A	17.1 b	18.1 b	29 a	35 a	7.946 *
S. Alkaline Phosphatase	B	35 b	30 b	55 a	33 b	6.852 *
	A	37 b	40 ab	45 a	35 b	6.214 *
Final Appearance	---	Tired, Arthritis ,and having salt	Lipid, and cholesterol	Kidney failure	Arthritis , high pressure And kidney failure	---

*** (P<0.05).**

Ginger is used medically for its strong antioxidant substance and may either mitigate or prevent generation of free radicals, its regarded a safe herbal medicine with only few side effects (Ali, et al. 2008), androgenic (Kamtchouing et al. 2002). The active components of ginger roots such as zingerone, gingerdiol, zingibrene, gingerols and shogaols produced antioxidant activity (Zancan et al. 2002). These natural components can protect DNA and other molecules from cell damage induced by oxidation and can enhance sperm quality and increase reproductive efficiency of men (Yang et al. 2006, Dalia. 2010). The present study aimed also to determine whether ginger powder improves partial infertility in women sample by quantitative measurements of testosterone and progesterone in their serum as shown in table 4. After daily consumption of ginger powder for 30-40 consecutive days significantly increased serum total testosterone level ($p<0.05$) in women received 3gm/day for 30-40 consecutive days in comparison to zero day (before beginning the exp.). The concentration of serum total testosterone level was (2.9, 1.5, 0.2 and 0.1 ng/ml respectively) for (31-40, 41-50, 51-60 and ≥ 60 years) groups of different ages, while there were no significant effect on serum progesterone levels. Our finding are in line with those who confirmed that the testosterone level increased significantly at dose of100mg/kg body weight of ginger powder (Hossein, et al. 2013, Arash, et al. 2009). The present increasing in testosterone concentration with ginger consuming sample result due to the increase androgen activity that increase the a-gjycosidase enzyme in epididymis, and fructose sugar in seminal vesicle, and both increased due to increase formed androgen which result by increased in cholesterol was primary substance to produce the androgen activity (AArash, et al. 2009).There were significant reduction of serum total testosterone and progesterone levels compared with obese women especially with adult age (30-50 years).

Table (4): shows the effect of ginger on levels of testosterone and progesterone with age group compared with obesity.

Range of age group(Years)	Testosterone Concentration (ng/ml)		Progesterone Concentration(ng/ml)		Percent of Overweight & Obesity women (BMI)
	Before	After	Before	After	
31-40	2.9 a	3.5 a	0.3	0.6	30.9 c
41-50	1.5 b	2.1 b	0.5	0.6	61.8 b
51-60	0.2 c	0.9 d	0.4	0.4	84.4 a
≥ 60	0.1 d	0.5 c	0.2	0.3	22.6 c
LSD value	0.782 *	1.024 *	0.302 NS	0.309 NS	12.463 *

Table (5): The effect of consuming ginger powder on serum minerals concentration compared with % of overweight and obesity for different ages of patients.

Range of age group	Percent of Overweight & Obesity women (BMI)	Percent of serum minerals						
		Mn ppm	Mg Ppm	Co ppm	Pb Ppm	Cd ppm	Fe ppm	Cu Ppm
31-40	30.9 c	0.12 c	52.5 a	8.78 b	12.15 c	0.05 d	33.56 a	2.93 b
41-50	61.8 b	1.15 a	45.6 b	9.24 b	19.24 b	0.67 c	30.09 a	4.18 b
51-60	84.4 a	0.10 c	34.9 c	5.62 b	35.20 a	1.23 b	22.58 b	10.15 a
≥ 60	22.6 c	0.69 b	22.6 d	18.60 a	35.98 a	2.12 a	5.24 c	7.88 a
LSD value	12.463 *	0.437 *	8.331 *	6.491 *	6.730 *	0.482 *	6.613 *	33.075 *

*** (P<0.05).**

CONCLUSION

In summary, this study showed that supplementation with ginger powder along with a hypertension and high cholesterol, triglyceride, and blood sugar in human patient, reduced the hypertension and lipid profile significantly. These effects can be due to the phenolic compounds have been found to have high antioxidant activity suggesting that ginger may have dietary health benefits and commercial use Boyer and Liu (2004). Also, it was found that the ginger powder had the strong antioxidant activity and also greatly inhibited cancer cell proliferation Aprikian et al. (2002). So that, its very important to focus on that functional safe herbal medicine with only few and insignificant adverse/side effects.

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تأثير الإستهلاك اليومي لمسحوق الزنجبيل في مستوى بعض الهورمونات والكولسترول والدهون الكلية لعينة من النساء

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الملخص

اجريت هذة الدراسة في مستشفى المحمودية العام/قضاء المحمودية/بغداد/العراق. وقد حضى نبات الزنجبيل باهتمام لمحتوياته الفعالة مثل مضادات الاكسدة ومنشطات الذكورة والمستخدمة في علاج الامراض الواسعة الانتشار في اغلب الاقطار. وتلعب مضادات الاكسدة هذة دورا فعالا في الحيوانات المنوية والعوامل الكيميائية الحيوية للدم. تم أخذ (30) ثلاثون إمرأة أغلبهن يعانين من إرتفاع في مستوى الدهون والكولسترول في الدم, والبعض منهن يعانين من عجز الكلية. إن جميع النساء تم تعريفهن الى إستهلاك (1غم) من الزنجبيل المجفف يوميا ولمدة شهر, ومتابعة تأثيره على فسلجة الجسم مثل, الدهون, وضائف الكلية, وهرمونات التستسترون والبوجستيرون. أظهرت نتائج مؤشر كتلة الجسم BMI تغيرا معنويا في كل مجاميع الاعمار لجميع الانواع زيادة الوزن والسمنة, وكذلك في مستوى الهيموكلوبين. وأظهرت النتائج تغيرا معنويا في مختلف الاعمار, وعدم وجود تغير معنوي (P<0.05) ضمن نفس العمر قبل وبعد الاستهلاك لمسحوق الزنجبيل. وأن كلكوز الدم لم يتغير معنويا بين مجموعة الاعمار ولكنه تغير معنويا (P<0.05) قبل وبعد إستهلاك مسحوق الزنجبيل. أما مستوى الكولسترول والدهون الكلية (TG,LDL, VLDL, and HDL) هناك تغيرا معنويا (P<0.05) بين مجموعة الاعمار, ولكن ضمن المجموعة (31–40سنة) لم يظهر اي تغيير معنوي (P>0.05) في وظائف الكلية (اليوريا, الكرياتين, والاملاح) عند مقارنتها مع المستويات الطبيعية. ومع ذلك تبين ان مستوى التستستيرون في مصل الدم تغير تغيرا معنويا (P<0.05) في جميع اعمار النساء في العينة, أما البروجستيرون فقد أظهرت النتائج عدم وجود أي تغيير معنوي (P>0.05). من ذلك كله نستنتج بأن إستهلاك 1غم يوميا من مسحوق الزنجبيل المجفف إزداد هيموكلوبين الدم زيادة معنوية, وانخفض كلا من الكولسترول, الدهون الكلية, وهرمون الستستيرون وأدى الى تحسين وظائف الكلية. لذا يمكننا ان نقترح بأن الزنجبيل ربما يكون واعدا في تحسين وظائف الكلية وعوامل الخصوبة فضلا عن تحسين الوظائف الكميائية الحيوية.

الكلمات المفتاحية:الزنجبيل–العوامل الكيمائية الحيوية–الدهون الكلية–وظائف الكلية– الهرمونات.