The Impact of Cigarette Smoking on Levels of Sex Hormones and Zinc in Blood of Smokers

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Received in :6, June, 2010
Accepted in : 14, December , 2010

Abstract

Smoking has multiple effects on sex hormone , some of which are associated with important clinical implication .The present study was undertaken to investigate the biochemical changes of sex hormones associated with long standing cigarette smoking in 40 heavy smokers comparing with non- smoker and to correlate it with BMI for each .The sex hormones levels were determined by RIA technique . Atomic absorption technique was used to measure the zinc levels.

The serum testosterone and estrogen levels of non – smoker group were 17.775ng\ml and 38.65ng\ml at $p< 0.05$, respectively .While the serum testosterone and estrogen levels of smoker group were 17.615ng\ml and 39.65ng\ml at $p<0.05$, respectively .The zinc levels of smokers and non- smokers group were 92 µg/dl and 105.5 µg/dl at $p< 0.05$, respectively. The BMI of smokers and non- smokers were 20.273 and 23.66 at $p<0.01$, respectively, which were highly significant.

Key words: Sex hormones, zinc, smoking ,BMI .

Introduction

The health consequences of cigarette smoking and the use of the other tobacco products are well known . They are an important cause of the increase of mortality and morbidity in developed countries and the prevalence is increased in developing world as well[1] .The risk of cancer is much greater in smokers than in non- smokers which particularly lung cancer [2] .Tobacco smoke contains numerous compounds , the important substance of material is being the carcinogen (such as poly cyclic aromatic hydrocarbons) , irritant substances , nicotine , carbon monoxide and other gases[3].Smoking has an effect on the various metabolic and biological processes in the body including secretion of hormones [4] .Cigarette smoking has major effects on the reproductive potential of humans , it has anti-estrogenic effect in women [5,6,7] .In males, the effect of smoking is on androgen levels ; given the recent interest in the association between androgen levels and metabolic syndrome and coronary heart disease [8].

Cigarette smoking may be associated with sub-fertility in males and may result in decreased sperm concentration, low sperm motility and reduce percentage of morphologically normal sperm respectively [9,10,11].

Nicotine –addicts usually have the risk of depletion / deficiency in important nutrients and minerals including zinc. The zinc deficiency leads to decrease number of sperm and impotence in males .[13], Zinc also inhibits the aromatase enzyme that converts

testosterone in to excess estrogen ; the high estrogen activity results in increased risk of heart disease, weight gain and obesity in male [14]. The low levels of zinc lead to lower sperm count, lower sex drive and can aid in produceing prostate cancer [15].

The aim of this study is to evaluate the effects of smoking on the testosterone and estrogen levels in men and to detect the association of smoking with zinc and BMI.

Materials and Methods

Blood samples were obtained from 80 participants, 40 smokers and 4o non- smokers. They were residences in Baghdad city.

The Venous blood (about 10 ml) was drawn from the subjects in the morning without regard to fasting or non fasting state. All blood samples were collected in the special precautions required for Tracing metal analysis , estrogen and testosterone measurements.

Testosterone and estrogen levels were measured in blood serum by using (RIA) technique which was described by [16] .Zinc and copper levels were measured in serum by using atomic absorption spectrophotometer / flame emission technique which was described by [17] .Body mass index was measured depending on the method described by [18].

Statistical analysis : T-test was used to test the difference between two means.

Results

The study of population included 80 men, with a mean age of 22±2 years. Forty people were heavy smokers and forty people were non- smokers.

Baseline data of the study groups are shown in table (1). No significant differences were noticed in testosterone levels among smokers and non-smoker (17.615ng\ml, 17.775ng\ml at $p>0.05$) respectively and no statistical significant differences were noted in estrogen levels of both smokers and non- smokers (39.45ng\ml, 38.65ng\ml at $p>0.05$).Highly differences were found in BMI between smokers and non-smokers (20.273, 23.66 at $p<0.01$) . These results wear shown in table (2).

Table (3). Demonstrates that no significant differences among the mean conc. of testosterone and the mean of BMI of smokers (17.615ng\ml, 20.273 at $p>0.05$) respectively although there

were highly significant differences among the mean conc. of testosterone and the mean of BMI of non- smokers (17.775ng\ml, 23.66 at $p<0.01$) respectively.

Table (4) showed that no statistical significant differences were noted among the mean conc. of testosterone and the mean conc. of zinc in smokers (17.615ng\ml, 92µg\dl at $p>0.05$) respectively. The significant differences were noted between the mean conc. of testosterone and the mean conc. of zinc of non- smokers (17.775ng\ml, 105.5µg\dl at $p<0.05$) respectively.

Discussion

Cigarette smoking is an important modifier of hormones and a detailed smoking history is essential when assessing patients with endocrine disorders [19] .

The direct toxic effect of environmental toxins present in cigarette smoking which contains a lot of known toxins that may have detrimental effects on fertility in both sexes [20] .Some of chemicals in cigarette's smoke generate a large number of free radicals , which may be related to etiology of cancer and various diseases [21,22] . The present study is designed to evaluate the effect of cigarette smoking on sex hormone levels, body mass and serum trace element concentrations in healthy Iraqi men.

In our study, the data suggest that tobacco smoking has no significant effect on the biological active function of testosterone in smoker compared with non- smoker group which was similar to other published studies [22] who found no significant effect of cigarette smoking on the active fraction of testes in smoker but may influence the levels of total testosterone through the change in the levels of sex hormone binding globulin(SHBG) ,while , other researches have observed a positive significant correlation between testosterone level and tobacco smoking[20,23] .

Table (2) Regarding BMI and smoking status, we found that mean concentration of BMI and smoking is controversial, since some authors found that smoking was positively in association with BMI and this is due to the poor behavioral habits among smoking [24]. Different from other published studies our results are similar to the result of [25] found that smoking was positively in associated with physical inactivity, which mediated the association between tobacco use and BMI.

The present study (table 3, 4) is different from other published studies [13, 26] who found that a significant association between BMI, zinc and testosterone concentration of smoking status subject and agree with [27]

Indeed, all the subject in this study are a young males and their habitual androgen intake as a muscular builder.

Conclusion

The present study has revealed a depressed antioxidant nutritional status (i.e. serum zinc) and changing in other parameters like BMI, mean concentration of testosterone and estrogen in smoker status. There were no significant association between these parameters in smoking status , when the samples intake the androgen as the muscular builder.

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Table (1) Testosterone and estrogen level (ng / ml) at both smokers and non – smokers

Mean conc. of estrogen (n=40)	Mean conc. of testosterone (n=40)	Smoking status
39.45 ± 1.74 ± 1.74	17.615 + + 1.93	Smokers
38.65 ± 9.00 ± 9.00	17.775 ± 2.11 ± 2.11	Non- smokers

Table (2) Mean BMI ± SD ± SD of both smokers and non- smokers

Mean of BMI (n= 40)	Smoking status
20.273 ± 3.51 ± 3.51 *	Smokers
23.66 ± 3.43 ± 3.43	Non- smokers

BMI= Body Mass Index.

* HS = Highly significant ($p<0.01$).

Table (3) Relationship among mean conc. +SE +SE . of testosterone(ng /ml) & mean ± SD ± SD of BMI of both smoker and non-smokers.

Mean of BMI (n=40	Mean conc. Of testosterone (n=40)	Smoking status
20.273 ± 3.51 ± 3.51 **	17.615 ± 1.93 ± 1.93	Smokers
23.66 ± 3.43 ± 3.43	17.775 ± 2.11 ± 2.11	Non- smokers

** = Highly significant($p<0.01$).

Table (4) Relationship among mean conc. +SE +SE . of testosterone(ng /ml) & mean conc. +SE +SE . Of zinc (µg /dl) of both smoker and non-smokers.

Mean conc. of Zn (n=40	Mean conc. Of testosterone (n=40)	Smoking status
92 ± 23.93 ± 23.93 **	17.615 ± 1.93 ± 1.93	Smokers
105.5 ± 21.66 ± 21.66	17.775 ± 2.11 ± 2.11	Non- smokers

**=Highly significant ($p<0.01$)

تأثير دخان السكائر في مستوى الهرمونات الجنسية والزنك في دم المدخنين

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استلم البحث في: 6، حزيران، 2010
قبل البحث في: 14، كانون الاول، 2010

الخلاصة

ان دخان السكائر يؤثر بشكل كبير في مستوى افراز الهرمونات الجنسية في الانسان التي بدورها تكون مؤثرة بشكل مهم في المضامين السريرية في اجسام الاشخاص المدخنين . لقد اجريت هذه الدراسة لتحديد التغيرات الكيموحيوية في مستوى الهرمونات الجنسية في دم المدخنين .وقد شملت هذه الدراسة 40 شخصا "مدخنا و 40شخصا "غير مدخن) من الذكور فقط (و كان معدل أعمارهم 22 سنة ,قيس مستوى الزنك في مصل دم المدخنين وغير المدخنين باستعمال تقنية الامتصاص الذري ,تراوح مستوى الزنك في مصل دم المدخنين وغير المدخنين بين92) مايكروغرام| ديسي ليتر و 105.5 مايكروغرام |ديسي ليتر (على التوالي, حسب مقياس كتلة الجسم باستعمال معادلة خاصة بعد قياس الوزن والطول بشكل مضبوط و كان مقياس كتلة الجسم 20.273 للمدخنين و 23.66 لغير المدخنين.

قيس مستوى الهرمونات الجنسية (التيستوستيرون والاندروجين) في مصل دم المدخنين وغير المدخنين باستعمال تقنية ال(RIA) . كان مستوى التيستوستيرون والندروجين في مصل دم غير المدخنين هو (17.775 نانوغرام | ملليتر و 38.56 نانوغرام |ملليتر) على التوالي وكانت نسبة التيستوستيرون والاندروجين في مصل دم الاشخاص المدخنين حوالي (17.615 نانوغرام |ملليتر و 39.65 نانوغرام |ملليتر)على التوالي .

الكلمات المفتاحية : الهرمونات الجنسية ،زنك ، مدخنين ،مقياس كتلة الجسم .