P- ISSN 1991-8941 E-ISSN 2706-6703 *Journal of University of Anbar for Pure Science (JUAPS)* Open Access
2018,12 (1) :75-82

Effect of age on some renal function tests, uric acid, and gamma glutamyl transferase (GGT) in sample of Iraqi men over 40 years

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ARTICLE INFO

Received: 10 / 9 /2017
Accepted: 28 / 12 /2017
Available online: 27/11/2018
DOI: 10.37652/juaps.2022.171594

Keywords:
Age.
Men.
Renal function.
S.UA.
GGT,

ABSTRACT

Background: The prevalence of some aging markers that is part of metabolic syndrome elements are increasing worldwide, and the renal function is a major goal of this syndrome.

Aim: To correlate the age with some renal function tests (blood urea and serum creatinine), serum uric acid (S.UA) and serum gamma glutamyl transferase (S.GGT).

Material and methods: This study involve 127 men apparently healthy (≥ 40 years old) were analyzed for blood urea, serum creatinine, uric acid and gamma glutamyl transferase by the spectrophotometer methods by use the previously prepared kits from linear chemicals company..

Results: The mean age of men was (55.535±10.738)years. The men under study were divided into four groups according to age: 46 men (36.22%) their age range were ≥40 years, 33 cases (25.984%), 28 case (22.047%) and 20 others (15.748%) were (50-59), (60-69) and (≥70) years respectively. The mean ± Std. Deviation of variables in study were B. urea (42.387±3.682) mg/dl, S. creatinine (1.004±0.158) mg/dl, S.UA (6.216±0.829) mg/dl, and S.GGT (28.844±7.741) U/l.

Older age was significantly associated with increased in B. urea and S. creatinine, while no significant association was found between age and S.UA and S.GGT in Iraqi men at ($P \leq 0.05$ for all factors).

Conclusions: older men are more liable to have higher B. urea and S. creatinine, with no relation between age and the levels of both uric acid and GGT in serum of Iraqi men under study.

Introduction

Aging is defined as a chain of functional and morphological changes which happen over time. Also the term refers to the deterioration of the biological functions after an organism has achieve its maximum reproductive potential[1].

Metabolic syndrome (MS) is a collection of various metabolic and physiological distortions in the same individual, including, insulin resistance, glucose intolerance, dyslipidemia, obesity and hypertension and is linked with rise morbidity and mortality[2,3]. Age has a powerful effect on the presence of the MS, which affects on 43.5% of those aged 60-69[4]. The National Health and Nutrition Examination Survey 1999-2000 reported that the diffusion of the MS was 26.7% among adults in the United State[5].

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Several studies reported a decline in the renal function after the age of 40 years at rates of up to 1 ml/min/year of glomerular filtration rate (GFR) mean, associated with a greater decline in renal blood flow [6]. The results of Larsson et al. study[7] reported a small rise in serum creatinine with age progression, while Lindeman[8] clarified that lower muscle mass in the aging people obscures such a change, although he also observed that about one-third of an elderly people had no discernible change in GFR.

Uric acid is the end product of purine metabolism. Hyperuricemia can result from either increased uric acid synthesis or lower uric acid excretion, or from both of them [9]. Several reports have shown that hyperuricemia was mainly associated with MS which include: chronic kidney disease[10], dyslipidemia[11], diabetes mellitus[12], insulin resistance[13], increased systemic inflammation [14] and hypertension[15].

Gamma-glutamyl transferase (GGT: EC 2.3.2.2) is an enzyme present in sera and in most surfaces of cells[16]. It is involved in metabolism of glutathione by transferring the glutamyl moiety to an assortment of acceptor molecules including some of the L-amino acids, water and peptides. Also GGT may have a role in the pathogenesis of metabolic syndrome, diabetes mellitus, cardiovascular disease, and obstructive sleep apnea syndrome[17] In this study, we aimed to investigate the correlation between age and the renal function (Blood urea and serum creatinine). S.UA, and S.GGT in sample of healthy Iraqi men.

Material and method

This study was conducted in Iraq- Anbar province from October 2016 to end of April 2017 on 127 healthy men aged ≥ 40 year. The men in study were taken from department of urology (Al-Ramadi teaching hospital). After taking informed consent from those men the data of study was recorded according to administering questionnaire, and taking a sample 10 ml of blood. Serum was separated then transferred to the laboratories. Serum samples were divided into several eppendorf and stored at -20 ^{o}C until the variables were assayed.

The men under study were divided into 4 groups according to their age, that includes: (40-49), 50-59), (60-69) and (≥70) year.

Used ready-made solutions kits produced by linear biochemistry company in Spain, to measure all serum parameters as the following urea[18], creatinine[19], uric acid[20] and gamma glutamyl transferase activity[21] by colorimetric methods.

Statistical analysis of this study was done using Prism software version 7, Means (standard deviation) were obtained on variables and one way ANOVA Multiple comparisons (Tukey's multiple comparisons test) was used to test for a significant differences in the means. Statistical significance was set at $P \leq 0.05$.

Result:

The results of this study in table (1) show significantly higher increase in the levels of blood urea and serum creatinine in age groups (60-69) and (≥70) than that of (40-49) and (50-59) ($P \leq 0.05$) appendixes (1,2) in Iraqi men, but the level of S.UA in table (1) shows no significant change with age while it show changes in age group (≥70) only where a significant decrease ($P \leq 0.05$) was observed than in (40-49) appendix (3) in Iraqi men under study. With no-significant change was observed between age an S.GGT level in all groups ($P \leq 0.05$) appendix (4) in Iraqi men.

Table 1- Relation between age and levels of B. urea, S. creatinine, S.UA and SGGT in sample of Iraqi men at P≤0.05

	Age (year)			
Parameters	40-49 n=46	50-59 n=33	60-69 n=28	≥70 n=20
B. Urea (mg/dl) Range: Mean ± SD	a 36.0-48.0 40.924±3.747	ab 37.0-50.0 42.197±3.307	b 37.0-49.7 43.489±3.156	b 36.0-50.0 44.520±3.503
S. Creatinine (mg/dl)	a 0.60-1.30 0.948 ± 0.157	a 0.78-1.20 0.974±0.134	ab 0.82-1.40 1.046±0.156	b 0.90-1.30 1.124±0.125
S. Uric acid (mg/dl)	a 4.00-8.40 6.111±0.820	ab 4.00-7.60 6.251±0.875	ab 5.00-7.70 6.064±0.676	b 5.50-8.80 6.613±0.894
GGT (U/l)	a 15.00-40.00 26.68±7.414	a 18.90-44.00 31.091±7.692	a 12.10-43.00 29.275±7.112	a 18.90-54.00 29.500±8.657

Similar letters mean no significant differences at P≤0.05.

Figures (1,2) depict the correlation between age and the levels of serum urea and creatinine in all men in the study. There is significant positive correlation between age and the level of urea (r = 0.351) and creatinine (r = 0.376) at P≤0.05 , but there is non-significant correlation between age and the level of S.UA (r = 0.166) and S.GGT (r = 0.106) at P≤0.05in the Iraqi men.

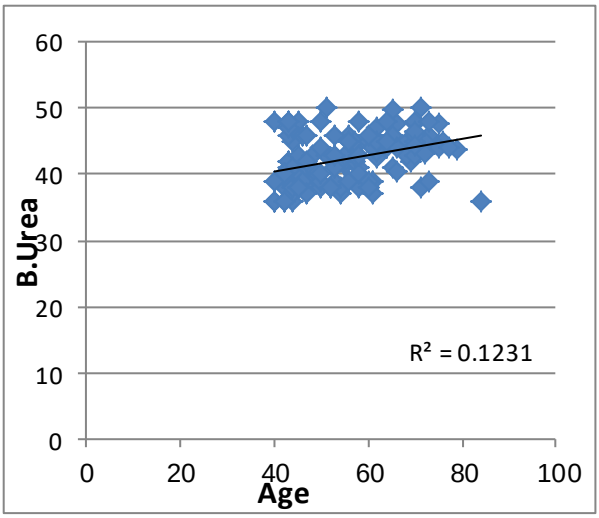

Fig. 1 Scatter chart showing the significant positive correlation between age and Blood urea at P≤0.05 in men under study.

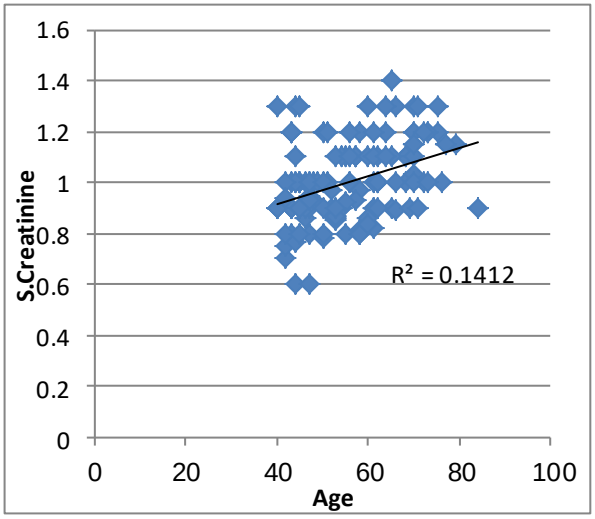

Fig. 2 Scatter chart showing the significant positive correlation between age and serum creatinine at P≤0.05 in men under study

Discussion:

The result of blood urea compatible with the result of Ahamed et al.[22] study which found that blood urea was increased significantly with increasing age in healthy volunteers, and agree with study of Musch et al.[23] that found positive relation correlation between blood urea and age. This could be attributed to reduction of body protein reserve with age leading to a lower of urea excretion[24].

The result of serum creatinine agree with the result of Salive et al.[25] that reported that the impaired renal function might be expected in older age and thus the level of normal creatinine may be expected to vary with increased age[26].

The previous studies found the flow of urine and urea clearance were low and showed a slight tendency to decrease with age, whereas the creatinine clearance

in the younger was normal and even high relatively subjects but fell markedly with age increasing[27].

Also may be decreasing in clearance urea and creatinine with increasing age due to prostate enlargement problems and urinary tract syndrome (UTS) that occur with older age.

The level of S.UA in table (1) show no significant change with age while it show changes in age group (≥70) only where a significant decrease (P≤0.05) was observed than in (40-49) in Iraqi men under study. There is insignificant correlation between age and S.UA at P≤0.05 in Iraqi men. Also in study of Marwah et al[28] that reported no significant correlation between age and the level of serum uric acid.

Always the S.UA levels depend on diet, kidney function and decreasing its level in cases of oxidant stress and other factors that effect on S.UA level dependent on rate metabolism for purines.

High levels of S.GGT are present in the prostate and this may explain for the fact that the activity of S.GGT in sera males is higher than in sera of females. Therefore, might be the prostatic malignancy a source of rise S.GGT activity in serum[29]. It is known that S.GGT has a protective effect in preserving appropriate glutathione levels in intracellular , which is a strong antioxidant. Therefore, it is possible that the generation of free radicals, which can occur in aging or central obesity, might deplete intracellular glutathione and thus promote the activity of S.GGT into the blood circulation. Oxidative stress with the attendant low-grade inflammation has been implicated in a number of pathological conditions, including atherosclerosis and aging.[30,31]. The level of S.GGT is affected with many inflammationaly factors, therefore, S.GGT was not considered a specialized in diagnostic cases.

Conclusions.

This study concluded the older men are more liable to have higher blood urea and serum creatinine, with no relation between age and the levels of both uric acid and S.GGT in serum of Iraqi men under study.

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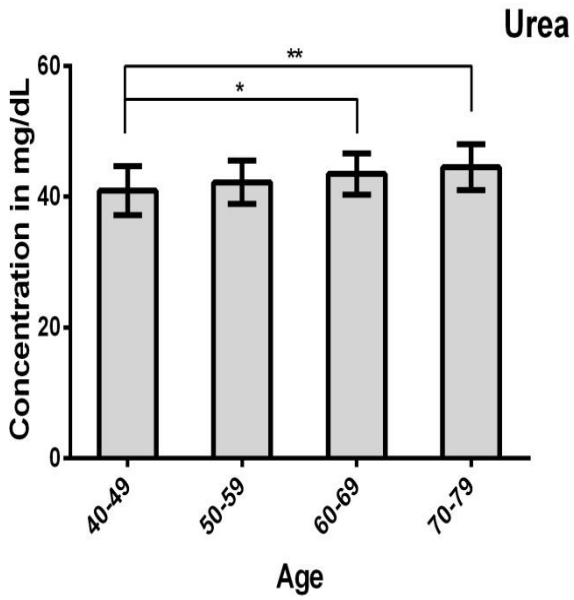
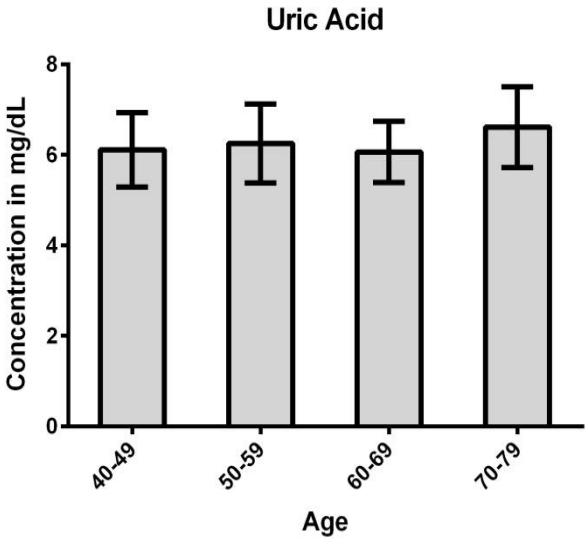
Appendix:

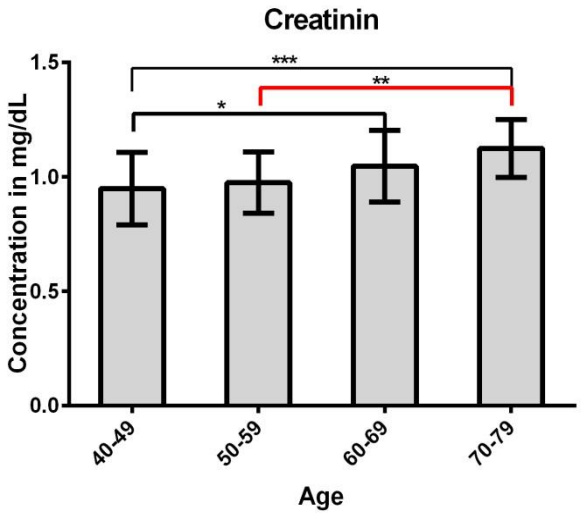


Appendix 1. The level of blood urea in all groups under study

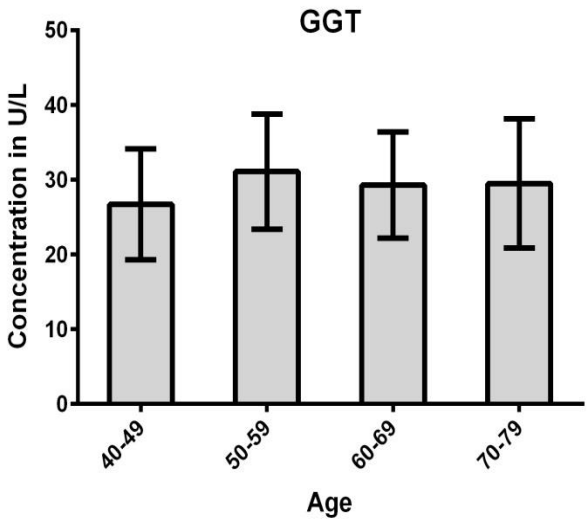


Appendix 2. The level of serum creatinine in all groups under study

*significant at P≤0.05 ** at P≤0.01 *** at P≤0.001



Appendix 3. The level of serum uric acid in all groups under study



Appendix 4. The level of serum GGT and creatinine in all groups under study

P- ISSN 1991-8941 E-ISSN 2706-6703 *Journal of University of Anbar for Pure Science (JUAPS)* Open Access
2018,12 (1) :75-82

تأثير العمر على بعض اختبارات وظائف الكلى، حمض اليوريك و كاما كلوتاميل ترانسفيراز في عينة من الرجال العراقيين الاكبر من اربعين عاما

مصطفى سالم ابراهيم , زياد حماد عبد , خالد فاروق الراوي

الخلاصة:

ان انتشار بعض علامات الشيخوخة التي هي جزء من متلازمة التمثيل الغذائي (MS) في تزايد في جميع أنحاء العالم، والتي تشمل مخاطر الاصابة الكلوية.

الهدف من الدراسة: لربط العمر مع بعض وظائف الكلى (اليوريا و الكرياتينين)، حامض اليوريك S.UA و كاما كلوتامايل ترانسفيراز (S.GGT) لدى عينة من الرجال العراقيين بأعمار من 40–79 سنة.

المواد والطرق: تضمنت الدراسة 127 رجلاً اصحاء ظاهريا باعمار (40–79 سنة) تم اخذهم من استشارية المجاري البولية في مستشفى الرمادي التعليمي. استخدمت طرائق التحليل الطيفية Spectrophotometric methods لتقدير كل من: يوريا الدم، الكرياتينين، حمض اليوريك وكاما كلوتامايل ترانسفيراز في مصل دم الرجال العراقيين تحت الدراسة.

النتائج: كان متوسط عمر الرجال (55.535 ± 10.738) سنة. تم تقسيمهم إلى أربع مجموعات حسب العمر: 46 رجلا (36.22٪) تتراوح أعمارهم بين (40–49) سنة، 33 رجلاً (25.984٪)، 28 رجلاً (22.047٪)، و 20 أخرين (15.748٪) كانت اعمارهم (50–59)، (60–69) و (70–79) سنة على التوالي. وجد ان مستويات المتغيرات المدروسة هي كالاتي: يوريا الدم (42,387±3,682) ملغم/100مل , كرياتينين المصل (1,004±0,158) ملغم/100مل, حامض اليوريك في المصل الدم (6,216±0,829) ملغم/100مل و كاما كلوتامايل ترانسفيراز في مصل دم (28,844±7,741) وحدة دولية/لتر.

اذ وجدت علاقات الارتباط المدروسة ارتباط معنوي ايجابي بين زيادة العمر لدى الرجال تحت الدراسة ومستوى كل من اليوريا والكرياتينين، فيما لم يكن هناك ارتباط معنوي بين العمر ومستوى كل من حامض اليوريك و كاما كلوتامايل ترانسفيراز و لدى الرجال العراقيين تحت الدراسة عند مستوى الاحتمالية ($P \leq 0.05$).

الاستنتاجات: الرجال العراقيين الأكبر سنا هم أكثر عرضة لارتفاع اليوريا والكرياتينين، مع عدم وجود علاقة بين العمر ومستويات كل من حامض اليوريك و كاما كلوتامايل ترانسفيراز في مصل الرجال العراقيين تحت الدراسة.