RESEARCH STUDY

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Evaluate the level of Oxidative Stress markers and Lipids Profile in Patients with Bening Prostate Hypertrophy in Al-Khadhmyah Tteaching Hospital

ARTICLE INFORMATION

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ABSTRACT

Background: Benign Prostate Hypertrophy(BPH)is a common urological problem worldwide which is defined as denomatous hyperplasia of the periurethralpart of prostate gland that occurs especially in men over 50 years old and that tend to obstruct urination by constriction the urethra

Objectives: The study was aimed to investigate the level of Malondialdehyde (MDA), Nitric Oxide (NO) and Superoxide Dismutase (SOD) as an antioxidant, besides other factors such as the level of Lipids Profile (Total Chlosterol (TC), High Density Lipoprotein Cholesterol (HDL-C), Low Density Lipoprotein Cholesterol (LDL-C), Very Low Density Lipoprotein Cholesterol (VLDL-C), and Triglyceride (TG))in patients suffer from BPH .

Methods: In this study ;clinical ,specific prostate antigen and sonongraphy data of 80 persons were prospectively analyzed ; they are divided into two groups (40) male patients with Benign Prostate Hypertrophy (BPH) was previously diagnosed and another (40) healthy males as a control group .The study was performed at Al-Khadhmyah teaching hospital during the period from March 2001 till April 2003

Results: The evaluated data recorded a significant increase in the levels of (MDA) and (NO), while a significant decrease in the level of (SOD) ($P < 0.001$) in patients complain from BPH in comparison with the control group. Moreover, the results showed a significant increase in the levels of (TC), (TG) , (LDL-C) and a significant decrease in the level of (HDL-C) ($P < 0.001$) in comparison with the control group

Conclusions: Benign Prostate Hypertrophy (BPH) is the most common benign tumor in men and Malondialdehyde (MDA), Nitric Oxide (NO) ,Superoxide Dismutase and Lipid profile are beneficial markers to evaluate patients with BPH in comparison with those without BPH.

Introduction:

Benign Prostate Hypertrophy (BPH) is the most common benign tumor in men .globally, BPH affects about 210 million males as of 2010 (6% of the population)[(1)].

The earliest Clinical Manifestations symptoms of these diseases are usually nocturnal frequency of micturition and, as the disease progresses, frequently becomes a feature at day and night ..The urinary stream is weak, with hesitancy at the beginning of micturition and dribbling of urine at the end.

Slight haematuria is not uncommon and occasionally may be severe. At the early stages there is an increased libido and impotence become the rule later on.[(2)]

The most dramatic organic manifestation of andropause in terms of decreasing the quality of life due to prostate hypertrophy (BPH). Its ultimate consequences a life-threatening disease because of the obstruction of the urethra and later might be developed uremia.[(3)]

The process of prostatic hypertrophy involves all four major cells types in the prostate (smooth muscle, fibroblast, acinar and basal epithelial) , variety of hormones, growth factors, and their receptors. There is much evidence to suggest that benign prostatic hypertrophy is an endocrine disease. Regarding the male, adults testicular androgens regulate development, growth and functional maintenance of the prostate gland . One of the functions of Androgens is to regulate prostate specific antigen (PSA) secretion by acinar epithelial cells. [(4)]

PSA, a serine protease synthesized by benign and malignant prostatic epithelium, is a sensitive serum marker for prostatic hypertrophy and cancer.

In fact, increased PSA levels are often seen in carcinomas of the prostate, but also have been reported at the beginning of inflammatory disorders of the prostate. Lipid peroxidation is a well-established mechanism of cellular injury at both plants andanimals. This process, leading to the production of lipid peroxides and their by- products, and lately to the loss of membrane function and integrity, in such away that is widely accepted to be involved in the pathogenesis of several human beings diseases.[(5)]

Oxidative Stress (OS) occurs when the formation of bioactive oxidation products exceed the capacity of endogenous cellular antioxidant defense system.[6]

Under normal conditions, a dynamic equilibrium exists between the production of reactive oxygen species (ROS) and the antioxidant capacity of the cell. [7]

ROS includes some oxygen containing free-radical such as superoxide (O_2^-), hydroxyl (OH^-), peroxyl, alkoxy (RO), and nitric oxide (NO) free radicals. [8] Superoxide is the first reduction product of molecular oxygen, and it is an important source of hydroperoxides and deleterious free radicals. [9]

Some endogenous enzymes such as xanthine oxidase (XO), NO synthase, and monoamine oxidase (MAO) can directly produce ROS. [10]

Malondialdehyde (MDA) is a product derived from the peroxidation of polyunsaturated fatty acids and related esters. [11]

Malondialdehyde (MDA) is the most common marker that is used to investigate the presence of oxidative stress in biological system, and glutathione redox cycle is a major antioxidant defense system for the detoxification of reactive oxygen species (ROS) within erythrocyte.[12]

Recent studies have proved the importance of Oxidative Stress as an indicate of many diseases, In a study which is designed to evaluate the changes at serum levels of malomdialdehyde (MDA) and total antioxidant status (TAS) for patients with different stages of malignant prostatic cancer (PCa) and benign prostatic hyperplasia (BPH), The results showed significant differences between the four stages of PCa patients in all parameters; however, highly significant difference was observed at stage IV in comparison with the control group and BPH patients. In conclusion, total antioxidant status could be utilized for marking the advanced stages of malignant PCa.[13] Another study about the estimation of the oxidative stress status in patients with different parasitic infections showed that the parasitic infections are associated with significant degree of free radicals formation as indicated by significantly higher MDA and lower SOD levels among those patients. [14], while the evaluated effect of hemorrhoids on the levels of antioxidants such as vitamin E and C, as well as the malondialdehyde(MDA) levels as the end product of lipid peroxidation and peroxynitrite (ONOO-) levels as a parameter of peroxidative stress for 35 patients(20 males,15 females) affected by hemorrhoids, before and after rubber band ligation by using baron band ligation device compared with the healthy control groups of 35(20 males, 15 females) indicated that the measurement of lipid peroxidation and peroxidative product matched with evaluation of antioxidants, may be the best indicators for that hemorrhoids induce oxidative stress compared with healthy control groups and the treatment, due to a decrease at oxidative stress and tissue damage[14].

Lipids Profile is a term used to find out the cholesterol and triglyceride amounts, besides LDL, HDL, and VLDL. After nutrition, the body digests fats in food and releases it into bloodstream into two forms, cholesterol and triglyceride. For the test, blood is drawn from an arm vein and sent to a laboratory for determinations. To get an accurate results, it's best to fast for at least 12 hours before blood is drawn[16]. A rising level of blood fats can alert doctors to an increased risk of blood vessel damage of the patient. Knowing the blood fat levels also helps doctors to decide if there is any benefit from medication to lower the cholesterol or triglyceride levels. Diet and exercise are the first defenses against unhealthy blood fat levels, just as they are in managing diabetes. A cholesterol or triglyceride lowering medication may be prescribed if these steps aren't effective or if LDL or triglyceride levels are extremely high [17].Lipids Profile used as an indication in (BPH) debases for diagnosis and therapeutic Progressing[18].

Methods:

The whole study was done in Al-Khadhmyah teaching hospital during the period from March 2001 to April 2003, the samples included (40) male patient with Benign Prostate Hypertrophy (BPH) there age over 50 years old and (40) healthy male without BPH considered as control group there age over 50 years old . Diagnosis of prostate hypertrophy was based on clinical and biochemical tests according to the result of the Elisa method to determine total prostate specific antigen (TPSA) and C.R. protein by agglutination test. A full history was taken for each patient followed by abase line distance (Snellen Chart).

Oxidant and Antioxidant Test:

5mls after fasting(12-14 hours) blood sample were collected in to the plain pulp and serum was separated after clot reaction, the serum was analyzed previously for levels of Malonaldehyde (MDA)[19], Nitric Oxide (NO) [20], and Superoxide Dismutase (SOD) [21].

Lipids Profile Test:

5ml venous blood was drawn (after 12-14 hours of fasting), then centrifuged for 10 minutes. at 300 rpm for serum separation. Total cholesterol, triglycerol and HDL-C was measured by enzymatic method with commercially available kit (Biomerieux-France), while VLDL was measured according to the conventional Friedewald equation. LDL was determined according to the following equation [22].

$$LDL\ (mg/dL) = TC - (VLDL+HDL)$$

Statistical analysis:

The statistical analysis was done via students (T) test. The means and standard deviations (SD) were recorded for all data, P-values less than 0.001 were considered significant.

Results:

Results of this study showed as (table:1) reveals the values of (MDA, NO) as oxidants and SOD as antioxidant, the evaluated data recorded a significant ($P < 0.001$) increase at the level of MDA where it was about (6.12 ± 0.12) μmol/L and for NO where about (198.93 ± 0.61) μmol/L in patients respectively compared with the control group where about (72.51 ± 0.21) μmol/L for NO while the result showed a significant ($P < 0.001$) decrease at the level of SOD which was about (4.93 ± 0.18) μmol/L compared with a control group which was about (6.98 ± 0.14) μmol/L.

Table (1): Values of MAD , NO and SOD in serum of patients with benign prostate hypertrophy.

Parameters	Units	Patients group N = 40	Control group N = 40	P
Serum MAD	μmol / L	6.12 ± 0.12	3.03 ± 0.31	P < 0.001 (S)
Serum NO	μmol / L	198.93	72.51 ±	P < 0.001

		± 0.61	0.21	(S)
Serum SOD	Units / L	4.93 ± 0.18	6.98 ± 0.14	P < 0.001 (S)

(S): Significant

P < 0.001 as compared with control group.

Values are expressed as mean ± S.D.

The table(2) illustrates the levels of TC, TG, LDL-C, VLDL-C, and HDL-C in serum of patients with PBH compared with the control group, the results recorded a significant (P < 0.001) increase at the level of TC, TG, LDL-C, where it were about (224 ± 7.21) mg/dL, (198 ± 2.31) mg/dL and (146 ± 7.33) mg/dL respectively in comparison with the control group which were about (175 ± 27) mg/dL, (179 ± 3.21) mg/dL and (95 ± 5.21) mg/L respectively. Also, (table:2) showed a significant decrease at the level of HDL-C which was about (31 ± 7.42) mg/dL in patients with PBH compared with the control group which was about (56 ± 9.21) mg/dL while no change was recorded at the level of VLDL-C in patients with PBH which was about (41 ± 5.51) mg/dL compared with the control group which was about (39 ± 9.2) mg/dL.

The table(2) the levels of TC, TG, LDL-C, VLDL-C, and HDL-C in serum of patients with PBH compared with the control group.

Serum Lipids	Patients group N = 40	Control group N = 40	P
TC. Mean ± S.D (mg/ dL)	224 ± 7,21	175 ± 27	P < 0.001 (S)
TG. Mean ± S.D (mg/ dL)	198 ± 2.31	179 ± 3.12	P < 0.001 (S)
LDL Mean ± S.D (mg/ dL)	146 ± 7.33	95 ± 5.21	P < 0.001 (S)
VLDL Mean ± S.D (mg/ dL)	41 ± 5.51	39 ± 9.31	(N.S)
HDL Mean ± S.D (mg/ dL)	31 ± 7.42	56 ± 9.21	P < 0.001 (S)

(S): Significant

(N.S): No Significant

P < 0.001 as compared with control group.

Values are expressed as mean ± S.D.

Discussion:

The significant increase at the level of TC, LDL-C and TG in patients with BPH in comparison with healthy group may be attributed to some metabolic problems especially in metabolism of lipids resulting from lowering the level of testosterone hormone which is prevent the formation of hydrosterone which affects the metabolism of lipids[23]. Moreover, the results indicate a significant decrease of the level of HDL-C where their is an increase of the level of prostate specific antigen (PSA)[24].

The major role of this research was to assess oxidative stress marker Malondialdehyde (MDA), Nitric Oxide (NO) as oxidant , and Superoxide Dismutase (SOD) in serum of patients under study. Under certain conditions an increase of oxidants and a decrease of antioxidants could not be prevented, and the oxidative/antioxidative balance shifts towards the oxidative status [6].

MDA is the key of the most studies that deals with poly unsaturated fatty acid peroxidation that can show an increase of the oxidative stress [25].

In this study, the mean level of serum MDA and NO was significantly higher in patients group in comparison with the healthy group, also the results illustrated the mean level of serum SOD was insignificant at patient with BPH in comparison with control group. The results of this study were in agreement with previous study [26].

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