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Short Communication

Correlation between Testosterone and Prostate Specific Antigen in Male Baldness in (Government Specialist Hospital, Sobi) Ilorin, West Local Government Area, Kwara State, Nigeria.

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SUMMARY
Background: Male pattern hair loss (MPHL) is influenced by increased androgenic activities in the body, prostatic diseases has been linked with high androgenic activities, especially Dihydrotestosterone (DHT) that influences the growth of hair on the body and prostatic cells. This study aimed to check the relationship between androgenic activity with respect to prostatic specific antigen (PSA) expression in bald and non-bald men.
Methods: Seventy (70) subjects participated in this study at the Kwara State Specialist Hospital, Ilorin. These subjects were divided into two equal groups of 35 subjects each. Group A- served as control subject; men with no apparent baldness while group B- comprised of men with apparent baldness. A questionnaire was given to each subject to ensure participation was voluntary. Blood sample was collected from each subject to be used for hormonal assay to check for PSA and TT concentrations using appropriate kits.
Results: Plasma testosterone significantly increased in men with apparent baldness ($P \leq 0.001$) compared to control subjects. PSA also increased insignificantly in men with apparent baldness which might be indicative of probable occurrence of prostate carcinoma or hyperplasia in men with apparent baldness.
Conclusion: This study revealed that prostate carcinoma might occur in male with apparent baldness due to progressive increase in PSA along with increased androgenic activity.

INTRODUCTION

Male pattern hair loss (MPHL) describes the most common form of hair loss in men and sometimes women in response to circulating androgens and it is also referred to as androgenetic alopecia or simply balding. Affected men typically present with hairline recession at the temples and vertex balding, while women normally present with diffusely thin hair over the top of the scalp.[1] Classical androgenic hair loss in males begins above the temples and vertex or calvaria of the scalp. Significant balding affects about one in five men (20 %) in their 20s, about one in three men (30 %) in their 30s and nearly half of men (40 %) in their 40s.[2] In women, androgen involvement is less established; Hamilton found post-pubertal recession to type II was common in Caucasian women with approximately 25 % exhibiting the type IV pattern by age 50, although this did not develop further.[3]

Male pattern hair loss is a condition associated with dihydrotestosterone (DHT) abundance. Dihydrotestosterone is the most powerful androgen and has 5x higher affinity to the androgen receptor than testosterone (TT). It has higher androgenic efficacy (approx. double or triple) than TT, DHT is produced via an irreversible reduction of testosterone by catalytic activity of 5α-reductase enzyme, and exists in two isoforms, type I and II. Type I of 5α-reductase is responsible for approximately ⅓ of circulating DHT, while Type II of 5α-reductase is found in prostate, seminal vesicles, epididymis, hair follicles, liver and it is responsible for ⅔ of circulating DHT.[4] Reports have linked increased androgen activity to possible risk factor of some diseases such as benign hyperplasia [5,6] and prostate carcinoma.[7,8] A prostate disease similarly to hair follicles, is more influenced by DHT than TT.

Prostate-specific antigen (PSA) is a glycoprotein enzyme secreted by the epithelia cells of the prostate gland, it liquefies semen in the seminal coagulum and allows sperm to swim freely.[9] It is usually present in minute quantities in the serum of men with healthy prostates, but is often elevated in the presence of prostate cancer or other prostate disorders.[3] Therefore, this study aimed to check the relationship between androgenic activity and plasma PSA expression in men with apparent baldness and non-bald men.

MATERIALS AND METHODS

Experimental Subjects

The study was carried out on 70 subjects at the Kwara State Specialist Hospital, Ilorin East Local Government Area of Kwara state.

The selection criteria were:

- All subjects were males between the ages of 25 and 75 years.
- The control group contained men with no visible sign of baldness.
- The baldness group contained males with visible signs of baldness (receding hairline and full baldness).
- All subjects had no diseases of the skin or scalp, or diseases related to hair loss
- Males with no chronic disease or any chronic illness that relates with apparent baldness.

The subjects were divided into two groups based on the criteria above, thirty-five (35) for each group. The control group were men without baldness and the test group were men with apparent baldness.

Experimental Procedure

A questionnaire was given to each subject to ensure participation was voluntary, and to get bio data from each, and also to check if the baldness was inherited or a sole appearance in each subject's family. Blood sample was collected from each subject to be used for hormonal assay to check for PSA and TT concentrations.

Blood Sample Collection

The subjects were made to sit comfortably in a relaxed position at ambient temperature in the hospital's phlebotomy room. A tourniquet was tied around the upper arm to make the veins more prominent, the veins were then palpated. The skin was cleaned with cotton wool soaked with methylated spirit to disinfect the spot and a sterilized syringe was carefully injected into the vein.

Blood was drawn in with the pulling of the plunger and when the level of the blood reached 5 ml mark of the syringe the tourniquet was released and the needle was removed. A dry cotton wool was then placed on the area with the arm held up. Blood collected from each subject was drained immediately into the Lithium Heparin collecting bottle and labelled accordingly. The blood samples were centrifuge and centrifuged for 20 min at 1000 rpm. The plasma was collected using disposable rubber pipettes, one for each subject, and put into the plain bottles and taken for hormone assay was carried out for the concentrations of TT and PSA.

Hormonal Analysis

Plasma testosterone (TT) and prostate specific antigen (PSA) were measured using their respective ELISA kits, (Elabscience, U.S.A.) according to manufacturer's instructions. These immunoassays utilized specific antibody-coated paramagnetic micro-particles and chemiluminescent substrate.

Statistical Analysis

Data collected were analysed using paired student's T-Test with the aid of GraphPad Prism version 6 (GraphPad Software Inc., USA). A p value of 0.05 was considered statistically significant.

RESULTS

The mean concentration and correlation of testosterone (ng/dL) and prostate specific antigen (PSA) between control and experimental group (bald headed men) is shown in Table 1. The mean concentration of testosterone in bald headed men (4.41±0.36) was significantly increased ($p<0.001$) when compared to men in the control group (2.46±0.31), and though there was an increase in PSA levels in the experimental group (6.39±0.19), this was not significant ($p>0.05$), when compared to control (5.97±0.29).

Table 1: Mean concentration and correlation of testosterone (TT) and Prostate specific antigen (PSA) between control subjects and men with apparent baldness

Groups	TT conc. (ng/dL)	PSA conc. (ng/dL)
Control	2.46±0.33	5.97±0.29
Bald	4.413±0.36***	6.39±0.19

*** - $p\leq0.001$.

DISCUSSION

Increased androgenic activities and other symptoms of metabolic disorder (such as increased body mass index, fasting blood glucose and cholesterol) have been linked with prostate diseases, that is, prostate carcinoma and benign prostate hyperplasia.[11] Testosterone, through the action of DHT, is involved in the growth of the prostate and hair growth, this study aimed to find out if men who are balding are at an increased risk of prostate carcinoma.

The significant increase observed in the concentration of circulating testosterone in male baldness is in consonant with earlier studies which also observed an increase in plasma testosterone level within the age group of 45-60 years.[12-14] Though the PSA rise is insignificant ($p>0.05$) when compared to control subjects, but it is an indicator of probable occurrence of prostate carcinoma or hyperplasia in men with apparent baldness. Both MPHL and prostate disease are influenced by 5-α-reductase enzymatic pathways.[11] Prostate diseases occur mostly in middle-aged men and is associated with high levels of DHT formed by 5α-reductase enzymatic conversion of testosterone to DHT. The effect of DHT on the prostate is hyperplasia followed by the urinary symptoms.[15]

Cindy *et al*,[16] associated frontal plus moderate vertex baldness at age 45 years with an increased risk of aggressive prostate cancer compared with no baldness. Although the association between MPHL and prostate cancer has been inconsistent, a positive relationship has been suggested by other scientists.[17,18]

CONCLUSION

Male with apparent baldness are prone to having prostate carcinoma or hyperplasia due to increased androgenic actions, physicians should monitor patients with male pattern hair loss for the development of various prostate diseases.

Conflict of Interest

The authors declare no competing interests.

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