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Early Baldness in Males and Hormonal Changes

Sura A. Abdul Sattar

Fatin F. Al-Kazazz

Othman Saleh Al-Ogaidi

Department of Chemistry, College of Science, AL-Mustansiriya University, Iraq

E-mail: sura742003@yahoo.com.

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Abstract:

Androgenetic alopecia (AGA) or baldness is a common form of hair loss, affecting men more than women. The exact causes and pathogenesis of baldness are not well understood. A search for new drug is still needed. This study aims to evaluate the role of gonadotropins hormones in hair loss in males and its possibility to be used as treatment target.

A total of 78 volunteers 43 with baldness and 35 healthy men were participated in this study. Their age ranged between (20-49) years, the studied groups were divided into two categories: firstly according to age (group1: 20-29 year), (group2: 30-39 year), and (group3: 40-49 year). Secondly according to baldness degree. LH and FSH were measured by using Enzyme Linked Immunosorbent Assay (ELISA) kits.

The results showed a significant decrease ($p < 0.05$) in LH levels for baldness group with age (20-29) years in comparison to healthy group, while a non-significant difference was found in FSH or LH levels in other age groups. Furthermore, no correlation was found between the two hormones with baldness degree or with the age.

In conclusion, the lowering in LH levels for twentieth baldness men may be due to the increase in their dihydrotestosterone level as a result to getting sexual activation drugs or they had a hypopituitarism or indirectly disorder in their hypothalamus gland.

Key words: Androgenetic, baldness, gonadotropins, LH, FSH.

Introduction:

Male pattern baldness, known as androgenetic alopecia (AGA)[1], is a public condition, widely prevalence, which progresses with aging, affecting up to 80% of men and 50% of women in the course of their life[2][3]. AGA is caused by a gradual shorthand in the, length, diameter and dye of the hair [3]. There

are three stages of hair cycle, anagen (active growth), catagen (inhibition of growth and atrophy of the hair follicle) and telogen (rest)[4]. Each strand of hair on the human body is at its own phase of development. The development gait of hair is nearly 0.5 inches /month, or 6 inches / year [5].

Two clinical features of male baldness have been known: a ready of scalp hair loss inherited from the father or grandfather(s) and a negative relation of scalp hair loss with the testes[6]. The pattern of male baldness was classified according to Hamilton-Norwood into 7 types. Type I scalp with no or lower recession of frontoparietal hair line, Type II and III scalps with moderate and deep recession, Types IV to VII scalps with severe recession and various degrees of absence of hair on the pate, Type VII being the most severe recession in which all that remains is a close band of hair beginning laterally frontal to the ears and extending posteriously low on the occiput[7]. The precise pathogenesis of androgenetic alopecia is not fully understood. Androgenetic alopecia is a phenotype which results from the interplay between genetic tendency and androgenic activity [8]. As the name reveal, the role of androgens and genetic tendency display to pattern hair loss due to gradual version of terminal hair into vellus hair [9].

The main male sex hormone is testosterone which is controlled by the release of luteinizing hormone (LH) from the anterior lobe of the pituitary gland. The production of male gametes depends on the collective action of the two gonadotropins follicle-stimulating hormone (FSH) and luteinizing hormone (LH) on the testis [10]. The action of LH is mediated through the production of testosterone by the Leydig cells. The synthesis and secretion of estrogens is stimulated by follicle-stimulating hormone (FSH). FSH is required for the determination of Sertoli cell number, and for induction and maintenance of normal sperm production. Both FSH and LH are controlled by the release of gonadotropin releasing hormone(GnRH) from the hypothalamus [10].

Finding of causes and medication hair loss is an important part of primary

care. Jain R. reported that only two FDA-approved synthetic drugs, minoxidil and finasteride, are used to cure AGA with only 35 and 48% success, respectively; therefore, a search for new drug based on the mechanism of androgens action is still needed [11].

The aims of the present study are to evaluate the role of gonadotropins hormones in hair loss in males and the possibility to use as treatment target.

Subjects and Methods

A total of 78 volunteers 43 with baldness and 35 healthy men from AL-Mustansiriya University were participated in this study. The studied groups were divided into two categories: firstly according to age (group1: 20-29 year), (group 2: 30-39 year),and (group3: 40-40 year).Secondly according to baldness degree. Five milliliters of venous blood samples were collected from the baldness and the healthy controls groups then immediately transferred into plan tube and allowed to coagulate at room temperature then centrifuged at 3000 rpm for 5 min. The serum was separated and stored at (-20°C) until assay. LH and FSH were measured competitively by using Enzyme Linked Immunosorbent Assay (ELISA) kits (Human Company (Germany)) and performed according to the manufacturer's instructions.

The statistical software SPSS program (v 15; Chicago, IL, USA) was used. The data were analyzed using unpaired *t*-test and person correlation coefficients. Differences were considered significant when $P < 0.05$.

Results and Discussion:

Male baldness is a common form of hair loss, characterized by a gradual hair follicular miniaturization, caused by androgen hormones on a genetically susceptible hair follicle, in androgenic-dependent areas [12].

FSH secretion by the pituitary is under dual control by the hypothalamus and the gonads, where the hypothalamus produces GnRH, which maintains basal FSH secretion that in turn stimulates Sertoli cells in men, to undergo spermatogenesis [13].

The results presented in Table 1 indicate the presence of a non significant decrease in FSH level in baldness groups compared with control group in three age groups ($p > 0.05$). It was reported that the FSH levels decreased in men due to hypopituitarism, hypophysectomy, adrenal tumors, and testosterone medications [14].

A significant decrease in LH level was observed in baldness group 1 (20-29 year) in comparison with their level of control group ($p < 0.05$). While a non significant decrease in LH level was observed in baldness of both groups 2 (30-39 year) and 3 (40-49 year) in comparison with their control group ($p > 0.05$), as shown in Table 2.

Table 1: Mean values of FSH level in baldness and control groups

Group(age(year))	No	Mean (pg/ml)	±SD	SE	P value	
Group1 (20-29)	Baldness	16	36.25	28.88	7.22	0.581
	Control	14	41.714	24.11	6.44	
Group2 (30-39)	Baldness	15	37.133	34.28	8.851	0.179
	Control	10	21.200	14.17	4.481	
Group3 (40-49)	Baldness	12	46.5	39.30	11.34	0.854
	Control	11	43.27	43.61	13.14	

Table 2: Mean values of LH level in baldness and control groups

Group(age(year))	No	Mean (pg/ml)	±SD	SE	P value	
Group1 (20-29)	Baldness	16	67.00	67.35	16.84	0.036
	Control	14	114.35	46.49	12.42	
Group2 (30-39)	Baldness	15	55.667	46.70	12.06	0.292
	Control	10	77.900	52.28	16.5	
Group3 (40-49)	Baldness	12	90.08	66.08	19.07	0.315
	Control	11	65.63	44.5	13.42	

These results disagree with the result of [Narad, S. et al](#) who reported a non statistically significant difference found in serum hormonal profile (total testosterone, DHEA-S, FSH, LH and

Insulin levels) of 50 men with severe premature balding before 30 years of age when compared with the same numbers of age matched [15]. [Czubatka IU. et al](#) reported that dihydrotestosterone is the most influential androgen and seems to play a very important role in the pathogenesis of androgenetic alopecia [16].

The mean values of LH/FSH ratio showed the presence of a significant decrease in baldness group in comparison to control in two age groups 1&2 while a non significant difference was observed in group 3 as shown in Table 3.

Table 3: Mean values of LH /FSH ratio in baldness and control groups

Group (age(year))	No	Mean	±SD	SE	P value	
Group1 (20-29)	Baldness	16	1.766	0.68	0.12	0.002
	Control	14	3.595	2.25	0.60	
Group2 (30-39)	Baldness	15	2.003	1.25	0.32	0.008
	Control	10	4.045	2.28	0.72	
Group3 (40-49)	Baldness	12	6.51	3.19	2.8	0.29
	Control	11	8.2	1.44	0.43	

Male androgenetic alopecia can begin at different stages of life, but its incidence increases with the patient's age. It usually applies to 25% of men aged 25 years, 40% of those in their 40 and over 50% of men at age 50 [17].

Table (4) shows the correlations between the hormones FSH, LH, and LH/FSH ratio with age (depending on Pearson's correlations) in sera of baldness group. The current study found a non significant correlation ($p > 0.05$) between hormones and age.

Table 4: Correlations between age and hormonal parameters.

Hormone	R value	P value
FSH	0.118	0.304
LH	-.047	0.685
LH/FSH	0.147	0.2

All patients were classified to 7 degrees of hair loss by the Hamilton-Norwood scale. The percentage ratio was presented in Figure 1. Baldness

degrees among studied male presented that the degree 3 represents the larger one while the 5& 6 degrees represent the smaller.

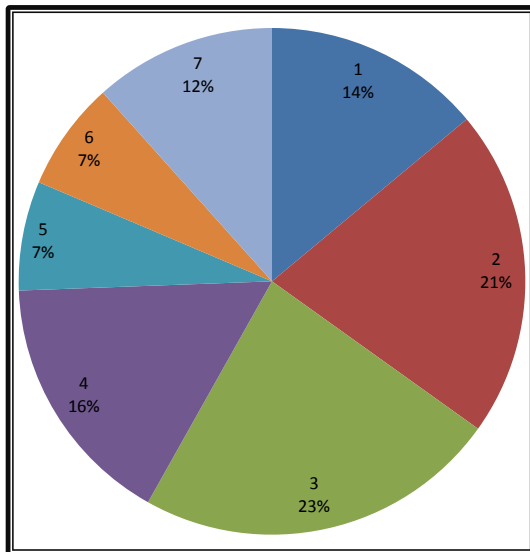


Fig.1: Percentage values of male baldness degrees

The hormones levels in sera of baldness groups were studied and evaluated according to baldness degree as shown in Figure 2 for FSH and Figure 3 for LH. The results indicted disorder increase of both FSH and LH with increase baldness degree.

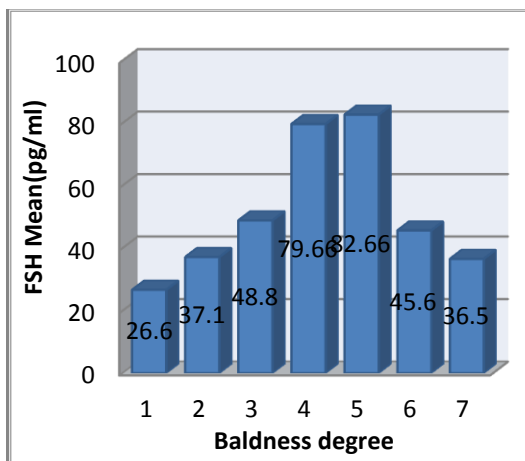


Fig.2: Mean values of FSH level according to baldness degree

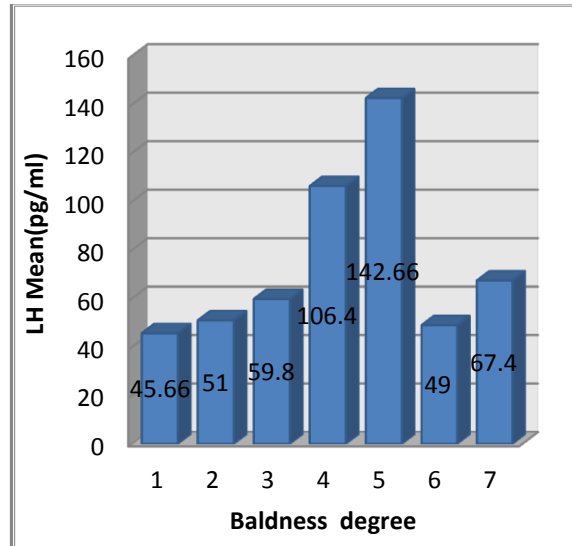


Fig.3: Mean values of LH level according to baldness degree

The baldness in men is a one of sexual male characterizers that this disorder due to LH alteration and this agree with our studied results .The explanation for the reasons in decreasing LH levels is an increasing in testosterone levels which are synthesized in Leydig cells present in interstitial testes tissues through feedback control [18].

Conclusion:

The lowering of LH levels in twentieth baldness men may be due to increase in their testosterone levels as a result to getting sexual activation drugs or they had a hypopituitarism or indirectly disorder in their hypothalamus gland.

Recommendation

We recommend the adoption of LH measurement in the diagnosis of baldness and use as a treatment according to their level.

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الصلع المبكر عند الرجال والتغيرات الهرمونية

عثمان صالح العكيدي

فاتن فاضل الفزاز

سرى احمد عبد الستار

قسم الكيمياء، كلية العلوم، الجامعة المستنصرية.

الخلاصة:

داء الثعلب أو الصلع هو شكل شائع من تساقط الشعر، يؤثر على الرجال أكثر من النساء. والاسباب الحقيقية لحدوث الصلع ليست مفهومة جيدا ولا تزال هناك حاجة إلى البحث عن عقار جديد. تهدف هذه الدراسة إلى تقييم دور الهرمونات المنشطة للمنسل في تساقط الشعر عند الذكور وإمكانية استخدامها كعلاج. شارك في هذه الدراسة 78 متطوع: 43 من الرجال المصابين بالصلع و35 رجلا من الاصحاء. تراوحت أعمارهم بين (20-49) سنة، تم تقسيم المجموعات المدروسة إلى فئتين: الأولى وفقا للسن المجموعة الاولى (29-20 سنة)، المجموعة الثانية (30-39 سنة)، المجموعة الثالثة (40-49 سنة). والفئة الثانية وفقا لدرجة الصلع. تم قياس الهرمون اللوتيني والهرمون المحث للجريب باستخدام طريقة الاليزا. أظهرت النتائج انخفاض معنوي في مستويات الهرمون اللوتيني لمجموعة الصلع بعمر (20-29) سنة مقارنة مع مجموعة الاصحاء ($p < 0.05$)، في حين تبين وجود اختلاف غير معنوي لهرمون اللوتيني والهرمون المحث للجريب للمجموع العمريه الاخرى. علاوة على ذلك تبين عدم وجود علاقة بين الهرمونين مع درجة الصلع أو مع التقدم في السن. نستنتج ان خفض في مستويات LH للرجال الصلع بعقد العشرين قد يكون نتيجة الزيادة في مستوى ديهيدروتستوسترون بسبب تناول الأدوية المنشطة جنسيا أو لديهم قصور النخامية أو سبب غير مباشر كأضطراب في الغدة تحت المهاديه.

الكلمات المفتاحية: ذكرية، الصلع، كوندوتروبين، هرمون المحث للجريب، والهرمون اللوتيني.