Benha Journal of Applied Sciences (BJAS) **print: ISSN 2356–9751**
Vol.(5) Issue(8) Part (1) (2020), (55-60) **online: ISSN 2356–976x**
http://bjas.journals.ekb.eg

Osteopontin Level in Androgenetic Alopecia and Its Relation to Metabolic Disorders

A.E.I.El-Taweel, A.I.Mustafa and D.M.Bahaaeldin
Dermatology, Venereology and Andrology Dept., Faculty of Medicine, Benha Univ., Benha, Egypt
E-Mail:dina2356@gmail.com

Abstract

A few past examinations have researched the relationship between factors identified with Metabolic disorder and Androgenetic alopecia. Osteopontin capacities as a favorable to incendiary cytokine where Osteopontin can balance the resistant reaction by upgrading articulation of T aide cytokines and extracellular grid corrupting catalysts. The point of the current investigation was to assess serum Osteopontin level in patients with androgenetic alopecia and appraisal of its clinical criticalness according to metabolic condition segments.This investigation was led on 50 patients experiencing AGA (Group A) notwithstanding 30 evidently sound patients of coordinated age and sex as a benchmark (Group B). Serum Osteopontin and FBS and lipid profile were estimated in all subjects. Mean serum level of Osteopontin in patients' gathering was higher than in control gathering and the thing that matters was measurably huge. There was a factually critical distinction among patients and control bunches with respect to serum level of FBS, fatty substances and LDL cholesterol. Additionally, serum fatty substances level was essentially higher in male than female patients. Serum osteopontin level was fundamentally emphatically associated with BMI, FBS, serum complete cholesterol and serum LDL levels which mirrors its conceivable function in pathogenesis of metabolic problems in AGA patients.

1. Introduction

Androgenetic alopecia (AGA) is the condition of reformist suspension of hair development on the human frontal region of the scalp, in all likelihood acquired and androgen-subordinate. In ladies, just as in men with androgenic alopecia, the development of frontal scalp hairs eases back down, and the change happens from terminal (pigmented and thick) hair type to vellus (nonpigmented and slight) hair type. The span of quick development periods (anagen) steadily decreases with every hair cycle, hair follicles become smaller and more limited, and dynamically scaled down [1].

The pathophysiological connect between metabolic disorder and AGA isn't surely known. Insulin obstruction related with AGA has recently been accounted for and might add to this affiliation [2].

AGA has been demonstrated to be related with a few infections, for example, coronary illness [3],Insulin opposition, Hypertension, Abnormal serum lipid profile and Obesity [4].

Osteopontin (OPN) is phosphorylated sialic corrosive – rich non-collagenous bone grid protein. OPN is found in a few organic liquids including human plasma, serum, bosom milk and urine.It was named for its capacity as an extension among cells and minerals. OPN has been involved as a significant factor in bone redesigning and communicated in invulnerable cells, including macrophages, neutrophils, dendritic cells with changing energy [5].

Osteopontin impacts cell interceded resistance and has Th 1 cytokine capacities. OPN assumes a significant function during both intense and ongoing irritation and is up managed in tissues during a few neurotic cycle including atherosclerosis, valve stenosis, myocardial localized necrosis and rheumatic joint inflammation [5].

Osteopontin (OPN), otherwise called bone sialoprotein that was first recognized in 1986 in osteoblasts. The prefix osteo-demonstrates that the protein is communicated in bone, despite the fact that it is likewise communicated in different tissues. The addition - pontin is gotten from "pons," the Latin word for connect, and implies osteopontin's function as a connecting protein. Osteopontin is biosynthesized by an assortment of tissue [6].

The metabolic disorder was analyzed by the new International Diabetes Federation definition as: focal weight (characterized as abdomen boundary with identity explicit worth ≥90 cm for Indian men) in addition to any two of the accompanying four elements (1) Raised fatty substances ≥150 mg/dL (1.7 mmol/L) or explicit treatment for this lipid irregularity , (2) Reduced high-thickness lipoprotein (HDL) cholesterol <40 mg/dL (1.03 mmol/L) in men and <50 mg/dL (1.29 mmol/L) in ladies or explicit treatment for this lipid anomaly, (3) Raised BP: Systolic BP ≥130 or diastolic BP ≥85 mm of Hg or treatment of recently analyzed hypertension, (4) Raised fasting plasma glucos0e (FPG) ≥100 mg/dL (5.6 mmol/L) or recently analyzed sort two diabetes [7].

Anyway metabolic condition is identified with various illnesses and their unfriendly impacts including atherosclerosis and diabetes type II [8]. A few investigations have demonstrated the relationship between metabolic condition and the alopecia grade in ladies; the relationship for men isn't clear [9]. Additionally another examination announced the relationship between metabolic disorder and androgenic alopecia with the most effect by HDL segment [10].

The point of the current examination was to assess serum osteopontin level in patients with androgenetic alopecia and evaluation of its clinical importance corresponding to metabolic disorder segments.

2. Patient and method

A case –control study was conducted on 50 patients suffering from AGA (Group A) and 30 apparently healthy individuals of matched age and sex as a control group (Group B). Patients were recruited from the

outpatient clinic of Dermatology and Andrology Department of Nasr City One Day Surgery Hospital.

2.1 Inclusion criteria

All patients enrolled in the study had:

- Clinically typical androgenetic alopecia lesions with different clinical varieties.
- Different degrees of severity of androgenetic alopecia. Based on the Norwood–Hamilton scale for men
- Age between 20 and 50 years.

2.2 Exclusion criteria

- Patients with androgenetic alopecia on topical or systemic therapy.
- Pregnant female patient.
- Patients with congestive heart failure

All patients were subjected to Full History Taking, Complete general examination, Complete dermatological examination and the following Laboratory investigations:

- Serum level of osteopontin.
- Fasting blood glucose (FBS) level.
- Serum lipid profile including total cholesterol, triglycerides (TGs), high density lipoprotein (HDL) and low-density lipoprotein (LDL).

3. Results

Patients and controls of the study were age and sex matched with mean age of 32.43 y. On comparison between patients and control group regarding BMI there was no statistically significant difference (p value 0.085)

On comparison between patients and control groups regarding smoking history there was no statistically significant difference (p value 0.637) The duration of the disease ranged from 2-20 years.

Twenty four (48%) patients were giving history of psychological stress about their disease.Patients using previous treatment represented 44.0% of the studied patients.Thirty four (68%) patients gave positive family history of AGA.The mean waist circumference of the patients was 96.56 ± 16.17 centimeters.The mean SBP of the patients was 126.60 ± 15.60 mmHg.

The mean DBP of the patients was 82.40 ± 9.38 mmHg.On clinical examination, three (15%) of the female patients had hirsutism . According to Hamilton-Norwood classification five patients (16.7%) were graded as class II, fifteen patients (50.0%) were graded as class III, seven patients (23.3%) were graded as class IV, one patient (3.3%) was graded as class V and two patients (6.7%) were graded as class VI.

According to Ludwig scale six (30%) female patients were grade I, eleven patients (55%) were grade II and three patients (15%) were grade III.There was no statistically significant difference between patients and control groups regarding waist circumference, SBP and DBP

Serum osteopontin, FBS, TGs and LDL were significantly higher in AGA patients than control group (p value 0.000, 0.030, 0.016 & 0.033 respectively) There was no statistically significant difference between patients and control groups regarding serum total cholesterol and serum LDL levels Serum TGs level was significantly higher in male than female AGA patients (P value 0.034) There was no statistically significant difference between male and female patients regarding BMI, waist circumference, blood pressure, FBS, serum HDL and serum OSTEOPONTIN levels Serum OSTEOPONTIN level in AGA patients was significantly positively correlated with BMI, FBS, total cholesterol and LDL levels (p value 0.009, 0.015, 0.000 & 0.000 respectively)

There were no significant correlation between neither serum OSTEOPONTIN nor age of the patients, duration of disease, serum TGs or serum HDL level) Regarding Hamilton-Norwood grading in male patients, serum OSTEOPONTIN level was significantly variable among different grades of the disease (p value 0.030While, there was no statistically significant difference of serum OSTEOPONTIN level regarding family history, hirsutism and Ludwig grading among female patients (p value 0.344, 0.602 & 0.255 respectively).

Receiver operating characteristic curve (ROC) was used to determine sensitivity and specificity of serum level of OSTEOPONTIN in early diagnosis of some metabolic complications among AGA patients when cut off point >495.8 ng/L with sensitivity and specificity 100% .

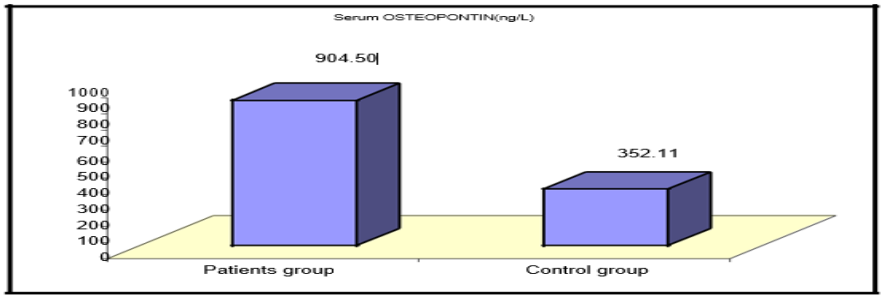


Fig (1) Comparison of serum level of OSTEOPONTIN between patients and control groups.

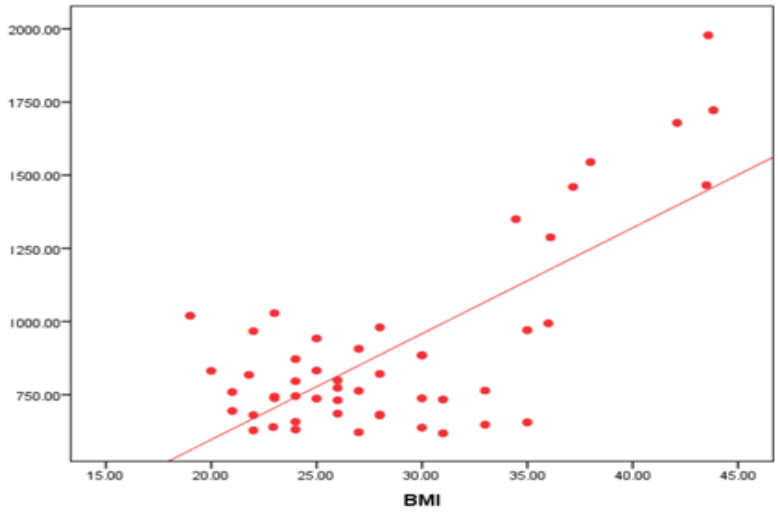


Fig (2) Significant positive correlation between serum OSTEOPONTIN level and BMI in patients group.

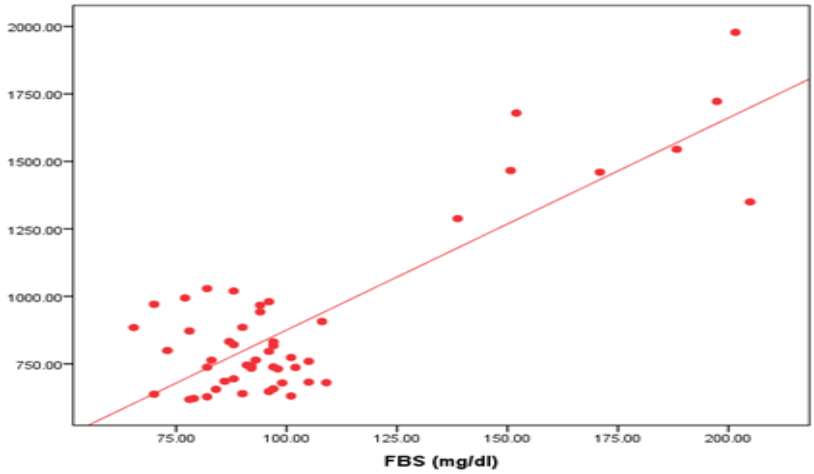
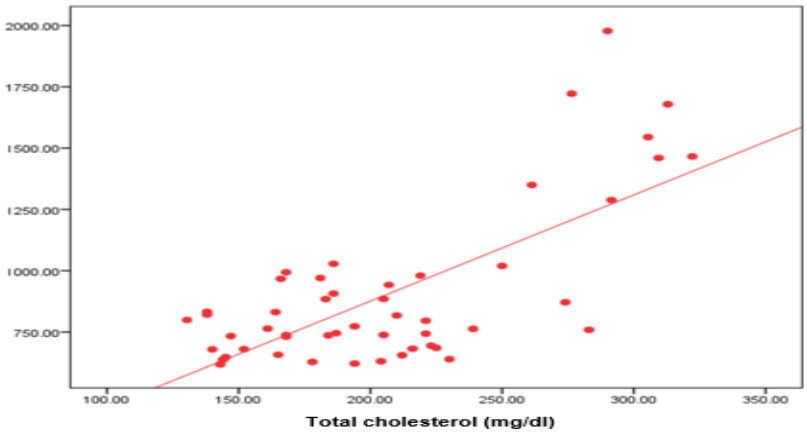


Fig (3) Significant positive correlation between serum OSTEOPONTIN level and FBS level in patients group.



Fig(4) Significant positive correlation between serum OSTEOPONTIN level and serum total cholesterol level in patients group.

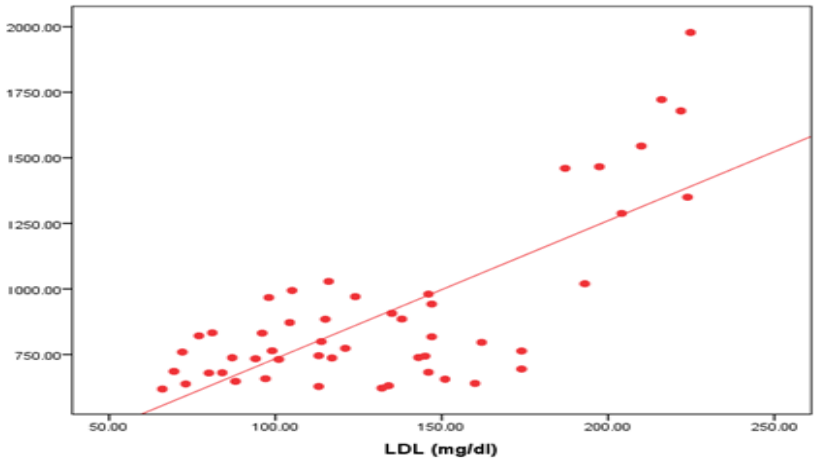


Fig (5) Significant positive correlation between serum OSTEOPONTIN level and serum LDL level in patients group.

4. Discussion

Androgenetic alopecia (AGA) is the most well-known type of alopecia, influencing up to 80% of men and half of ladies throughout their life. AGA is brought about by a reformist decrease in the width, length and pigmentation of the hair [11].

It is all around acknowledged that dihydrotestosterone (DHT) is answerable for androgenetic alopecia in people. DHT prompts scaling down of hair follicles by a few components including quickening the mitotic pace of the lattice, shortening of hair cycle, expanding telogen shedding, just as expanding the span of the slack stage or catagen [12].

Metabolic Syndrome (MetS) is interrelated gathering of metabolic variations from the norm, described by stomach heftiness, hypertension, weakened lipoprotein digestion and glucose narrow mindedness. Stomach weight is related with raised fatty oils (TGs) and low high-thickness lipoprotein (HDL) level. The glucose level might be ordinary early however insulin obstruction creates over the long run and the pancreas neglects to emit insulin and type 2 diabetes creates [13].

The pathophysiological components engaged with metabolic condition are perplexing in nature and included dysregulation of numerous biochemical and physiological administrative frameworks in the body [14].

Osteopontin (OPN) directs different organic exercises including grid redesigning and tissue calcification, monocytes/macrophages movement and chemotaxis, creation of an assortment of proinflammatory cytokines and chemokines, and hindrance of apoptosis exercises [15].

The current examination included 50 patients experiencing androgenetic alopecia. Notwithstanding 30 evidently solid people of coordinated age and sex were filled in as a benchmark group. Patients were enrolled from the outpatient center of Dermatology and Andrology Department of Nasr City One Day Surgery Hospital. The investigation was affirmed by the neighborhood morals council and an educated assent was acquired from every person prior to being tried out the examination.

Consequences of the current work demonstrated that 68% of examined patients were giving positive family ancestry, these outcomes were not the same as the investigation led by [16] who revealed that family ancestry was positive in 98% of AGA patients. This can be clarified by the way that more patients were taken in their investigations in which they took 100 patients contrasted with 50 patients in our examination.

The current examination results demonstrated that there was no factually critical contrast among patients and control bunches in regards to age (P value=0.085), these outcomes concurred with the past finding of [17], who announced that there was no age preference in AGA patients.

Contemplated patients were 30 guys and 20 females, the thing that matters was measurably immaterial (P esteem =1.000), these outcomes concurred with the past finding of [18], who revealed no sex inclination among AGA patients.

Consequences of the current work indicated that there was no factually huge distinction among patients and control bunches in regards to BMI, these outcomes concurred with the past finding of [17]. In any case, these outcomes couldn't help contradicting discoveries of [19], who revealed that BMI was altogether higher in patients with AGA. This could be clarified by prohibition of patients with dismal stoutness in the current examination.

Consequences of the current work indicated that there was no factually huge distinction among patients and control bunches in regards to midsection boundary estimation (p value=0.659), our outcomes concurred with the past finding of [19]. Be that as it may, couldn't help contradicting the past finding of [16], and this could be clarified by the bigger number of patients remembered for their examination. Likewise, cut-off an

incentive for midsection boundary is probably going to be populace explicit as there are clear contrasts across ethnic populaces [21].

Aftereffects of the current work indicated that there was no measurably huge contrast among patients and control bunches in regards to systolic pulse (p value=0.057), our outcomes concurred with the past finding of [22]. In any case, these outcomes couldn't help contradicting the past finding of [4], who found that systolic BP values were higher in AGA patients' gathering more than control gathering.

Additionally, the current work indicated that there was no measurably huge contrast among patients and control bunches in regards to diastolic pulse (p value=0.311), our outcomes concurred with the past finding of [17]. This finding is not quite the same as [23], where they found a positive connection between diastolic BP and AGA in which their examination uncovered that the diastolic BP was higher in patients gathering, this distinction can be clarified by avoidance of patients with hypertension in our investigation.

Apparently no distributed investigation about the part of OSTEOPONTIN with AGA is accessible. Aftereffects of the current work demonstrated that mean serum level of OSTEOPONTIN in patients' gathering was higher than in control gathering and the thing that matters was measurably huge and this can be clarified by proinflammatory function of OSTEOPONTIN which prompts oxidative pressure and resulting hair follicle scaling down [8].

The current examination results demonstrated that there was positive connection between's serum levels of OSTEOPONTIN in patients' gathering and the contemplated boundaries; BMI, serum level of FBS, complete cholesterol and LDL. A few examinations show the urgent function of OPN to direct leukocyte fascination during irritation. OPN isn't just basic for macrophage enlistment, yet additionally controls the discharge of cytokines during cell-intervened resistance [24].

A few examinations have depicted OPN as a basic controller of fat tissue aggravation, insulin obstruction and diabetes mellitus. OPN articulation is radically upregulated by 40 and 80-crease in fat tissue from diet-actuated and hereditarily stout mice, separately [25].

OPN inadequacy prompted diminished fat tissue aggravation, yet additionally improved entire body glucose resilience and decreased insulin opposition in mice autonomous from body arrangement or energy consumption [26].

The momentum study results indicated that there was no huge relationship neither between serum levels of OSTEOPONTIN nor period of patients, term of infection, serum fatty oils or HDL levels in patients' gathering. Additionally, there was no critical distinction between serum OSTEOPONTIN level with respect to sex, smoking and family background of AGA.

As to grades in male patients, consequences of the current investigation indicated that serum OSTEOPONTIN level was fundamentally factor in various evaluations of the sickness (p=0.030). Then again, there was no critical distinction between the three Ludwig degrees with respect to the mean serum OSTEOPONTIN level in female patients as (p=0.255). No distributed investigation was found to contrast our examination and.

Our outcomes demonstrated that serum level of OSTEOPONTIN was a magnificent marker for early determination of AGA related metabolic difficulties with 100% affectability and explicitness at the cut-off degree of >495.8 ng/L.of upper endoscopy for screening and reviewing of esophageal varices.

5.Conclusion

From the results of the present study it’s concluded that:

Some metabolic disorders are more commonly associated with AGA.

Osteopontine might play a role in the development of these disorders in affected patients.

6.References

[1] D.Stough,K.Stenn,R.Haber, Psychological effect, pathophysiology, and management of androgenetic alopecia in men. Mayo Clin Proc,Vol.80, PP.1316-1322, 2015.

[2] V.Matilainen,P.Koskela and S.Kiukaanniemi, Early androgenetic alopecia as a marker of insulin resistance. Lancet,Vol.356(9236), PP.1165–1166, 2000.

[3] K.Sasmaz,E.Zervas, S,Vittorakis, , Osteopontin expression and relation to disease severity in human asthma. J.Eur.Respir,Vol.37(2), PP.331-34, 2011.

[4] P.Hirsso,M.Laakso, V.Matllainen, Association of insulin resistance linked diseases & hear loss in elderly men. Finnish population- based study. Cent Eur J Public health,Vol.14, PP.78-81, 2006.

[5] S.P.Sase, J.V. Ganu, and N. Nagane, Osteopontin A Novel Protein molecule. Ind.Med.Gazette,Vol.8, PP.883-895, 2012.

[6] W.L.Barfield, K. Uaesoontrachoon, C.S.Wu, Eccentric muscle challenge shows osteopontin polymorphism modulation of muscle damage. Hum.Mol.Genet.,Vol.23(15),PP.4043-4050,2014.

[7] K.Alberti, P.Zimmet and J.Shaw, IDF epidemiology task force consensus group. The metabolic syndrome- a new worldwide definition. Lancet,Vol.366(9491), PP.1059-1062,2011.

[8] F.Kahles, H.M.Findeisen, D.Bruemmer, Osteopontin: A novel regulator at the crossroads of inflammation, obesity and diabetes. Mol Metab,Vol.3(4), PP.384-393, 2014.

[9] A.Singal, S.Sonthalia and P.Verma, Female pattern hair loss. Ind J Dermatol Venereol Leprol,Vol.79(5), PP.626-640, 2013.

[10] L.H.Su and T.H.Chen. Association of androgenetic alopecia with smoking and its prevalence among Asian men: a community-based survey. Arch Dermatol,Vol.143(11), PP.1401-1406, 2010.
[11] B.M.Piraccini and A.Alessandrini,Androgenetic alopecia. G Ital Dermatol Venereol,Vol.149(1),PP.15-24,2014.
[12] A.Sato and A.Takeda, Evaluation of efficacy and safety of finasteride 1 mg in 3177 Japanese men with androgenetic alopecia. J Dermatol,Vol. 39(1), PP.27-32, 2012.
[13] S.J.Appel, E.D.Jones and L.Kennedy-Malone, Central obesity and the metabolic syndrome: Implications for primary care providers. J Am Acad Nurse Pract,Vol.16, PP.335-342, 2004.
[14] V.Srinivasan, Y.Ohta, J.Espino . Metabolic syndrome, its pathophysiology and the role of melatonin. Recent Pat Endocr Metab Immune Drug Discov,Vol. 7, PP.11-25,2012.
[15] A.N.Kothari, M.L.Arffa, V.Chang . Osteopontin-A master regulator of epithelial-mesenchymal transition. J Clin Med,Vol.5,PP.39-41, 2016.
[16] O.A.Bakry, M.A.Shoeib, M.K.El Shafiee, Androgenetic alopecia, metabolic syndrome, and insulin resistance: Is there any association? A case-control study. Indian J Dermatol,Vol.5(3), PP.276-281, 2014.
[17] Arias-Santiago.Androgenetic alopecia and cardiovascular risk factors in men and women: a comparative study.J Am Acad Dermatol,Vol.23(3), PP. 420-429, 2010.
[18] U.Blume-Peytavi, A.Blumeyer, A.Tosti S1 guideline for diagnostic evaluation in androgenetic alopecia in men, women and adolescents. Br J Dermatol,Vol.164, PP.5-15, 2011.
[19] S.Chakrabarty, R.Hariharan, D.G.Gowda. Association of premature androgenetic alopecia and metabolic syndromein a young indian population Int J Trichology ,Vol.6(2) , PP.50-53,2014.
[20] S.Ahouansou, P.Le Toumelin, B.Crickx . Association of androgenetic alopecia and hypertension. Eur J Dermatol,Vol.17(3), PP.220-222,2007.
[21] J.P.Despre´s, C.Couillard,J.Gagnon. Race, visceral adipose tissue, plasma lipids, and lipoprotein lipase activity in men and women: the Health, Risk Factors, Exercise Training, and genetics (heritage) family study. Arterioscler Thromb Vasc Biol,Vol.20, PP.1932-1938,2000.
[22] L.Budamakuntla, E.Loganathan, S.Kumar. Early androgenetic alopecia and insulin resistance- a case control study.Ind J Clin Exp Dermatol,Vol.2(3),PP.88-92, 2016.
[23] C.Mumcuoglu, T.R.Ekmekci, and C.Ucak. The investigation of insulin resistance and metabolic syndrome in male patients with early-onset androgenetic alopecia.Eur J Dermatol,Vol.2, PP.79-82, 2011.
[24] M.Scatena, L.Liaw, C.M.Giachelli. Osteopontin: a multifunctional molecule regulating chronic inflammation and vascular disease. Arteriosclerosis, Thrombosis, and Vascular Biology,Vol.27, PP.2302–2309, 2007.
[25] F.W.Kiefer, M.Zeyda, J.Todoric , Osteopontin expression in human and murine obesity: extensive local up-regulation in adipose tissue but minimal systemic alterations. Endocrinology,Vol.149, PP.1350–1357, 2008.
[26] S.Psarras, M.Mavroidis, D.Sanoudou. Regulation of adverse remodelling by osteopontin in a genetic heart failure model. European Heart J.,,Vol.33, PP.1954–1963,2012.