Check for updates

(RESEARCH ARTICLE)

The levels of inhibin A and inhibin B in PCOS patients

Gurbanova Jamila Fazil *, Hasanova Afat Sadig, Maharramova Najiba Tofig and Islamova Jahan Ali

Scientific Research Institute of Obstetrics and Gynecology, Department of Obstetrics, Baku, Azerbaijan.

Abstract

Background: Polycystic ovary syndrome (PCOS) is one of the main factors leading to infertility and ovulatory dysfunction in women. The aim of the current research is to study the levels of Inhibin A and Inhibin B in women with PCOS, depending on the level of Anti-millerian hormone.

Materials and methods: 30 infertile women (I group) with PCOS (excluding hyperprolactenemia, hypothyreosis, autoimmune thyroiditis) and 30 healthy women (II group) were involved in the study. Hormone profile in blood were determined on the 3rd day of menstruation with ELISA immunoferment analyzer. Results. It was determined an increase in Anti-Müllerian Hormone (AMH) secretion in PCOS patients with hyperandrogenia. Inhibin A and Inhibin B were lower in I group patients.

Conclusion. The detection of Inhibin A and Inhibin B in women with PCOS depending on the level of AMH plays the important role in the evaluation of ovarial reserve in infertile women with hyperandrogenemia.

Keywords: Infertility; Hyperandrogenemia; Ovarian reserve; Hormone status

1. Introduction

Polycystic ovarian syndrome (PCOS) is primarily characterized by hormonal imbalances in women. The exact cause of these imbalances is not fully understood, but they involve multiple hormones in the body, including insulin, luteinizing hormone (LH), follicle-stimulating hormone (FSH), and androgens (such as testosterone) (1, 2, 3).

The elevated androgen levels in PCOS can interfere with the regular development and release of eggs from the ovaries. This can result in irregular or absent menstrual cycles, difficulty in conceiving, and the formation of small cysts on the ovaries (4). Another hormonal imbalance seen in PCOS is the ratio of luteinizing hormone (LH) to follicle-stimulating hormone (FSH). Normally, FSH promotes the growth and maturation of follicles in the ovaries, while LH triggers ovulation (5, 6). In PCOS, the increased androgen levels disrupt this balance, leading to a higher ratio of LH to FSH. This disrupts the normal ovulatory process and contributes to irregular menstrual cycles and difficulty in getting pregnant (7, 8, 9).

Inhibin A and Inhibin B are two important hormones that play a role in the regulation of the menstrual cycle and follicle development in women (10, 11). These are produced by the granulosa cells in the ovaries. Inhibin B is primarily secreted by the small growing follicles, while Inhibin A is produced by larger, more mature follicles. These hormones work together to regulate the secretion of follicle-stimulating hormone (FSH) from the pituitary gland (12, 13).

In PCOS, the hormonal imbalance leads to disrupted follicular development and altered Inhibin levels. Studies have shown that women with PCOS tend to have higher levels of Inhibin B compared to women without the condition. This

---

* Corresponding author: Hasanova A. S

is believed to be due to the increased number of small growing follicles that are characteristic of PCOS. The excess Inhibin B production can lead to an elevation in the levels of FSH, contributing to the hormonal irregularities seen in PCOS.

On the other hand, the levels of Inhibin A in women with PCOS can vary. Some studies have reported decreased levels of Inhibin A in PCOS patients, while others have found no significant differences compared to women without PCOS (14, 15).

The exact mechanisms underlying these variations are not fully understood, and further research is needed to clarify the role of Inhibin A and Inhibin B in PCOS.

The purpose of the current research is to study the levels of Inhibin A and Inhibin B in women with PCOS, depending on the level of AMH.

2. Material and methods

30 women (I group) with PCOS (excluding hyperprolactenemia, hypothyreosis, autoimmune thyroiditis) and 30 healthy women (II group) were involved in the study. All women have been examined and treated for infertility at the Institute of Obstetrics and Gynecology, Baku, Ayerbaijan. In all women, the prolactin, estradiol, FSH, LH, AMH, Inhibin A and Inhibin B hormones in blood were determined on the 3rd day of menstruation with ELISA immunoferment analyzer.

Statistical analyzes: Statistical processing of the results obtained was carried out with the SPSS package (CBM, Armonic, NY, USA). Statistical accuracy of the results was conducted using the non-parametric Manni-Whitney method. Linear correlation coefficient for Spirmen and Pearson –r was calculated to determine the strength and direction of contact between the studied indicators. When $p < 0.5$, r was considered to be accurate.

3. Results

The average age of women with PCOS whom we examined was 29.9 ± 1.1, min 20-max 41. Table 1 provides to compare the hormone levels of two groups (I and II) in terms of AMH, Inhibin A, and Inhibin B.

The average AMH level in Group I is 325±25.5 ng/mL, with a range of 78-595 ng/mL. In Group II the average AMH level is 966±37 ng/mL, with a range of 47-1143 ng/mL. Thus, group II has significantly higher average AMH levels compared to Group I.

Group II (114.2±35.2 pg/mL, with a range of 27-434 pg/mL) has a slightly higher average Inhibin A level compared to Group I (88±40 pg/mL, with a range of 18-930 pg/mL), although the difference is not as significant as with AMH.

There is no substantial difference in the average Inhibin B levels between Group I (79±24 pg/mL, with a range of 42-387 pg/mL) and Group II (75.5±23 pg/mL, with a range of 2-291 pg/mL).

Table 1 Level of investigated hormones in study groups

Hormones	I group	II group
AMH, M±m, min-max	325±25,5 78-595	966±37* 47-1143
Inhibin A, M±m, min-max	88±40* 18-930	114,2±35,2* 27- 434
Inhibin B , M±m, min-max	79±24 42-387	75,5±23 2-291

Note: *- significance of difference in comparison between groups p<0,05.

When studying correlation relationships in women with PCOS it becomes clear that there is direct correlation between AMH and Inhibin A and Inhibin B (respectively, r=0,214; p<0,05 və r=0,210; p<0,05), and also direct correlation between Inhibin A and Inhibin B (r=0,279; p<0,05). In the control group, there is direct correlation between AMH and Inhibin A (r=0,412; p<0,05) and inverse correlation between Inhibin A and Inhibin B (r=−0,512; p<0,05).

4. Discussion

The results of the study provide valuable insights into the hormone levels of women with PCOS and their correlation relationships. The average age of the participants in the study was 29.9 ± 1.1, ranging from 20 to 41 years old. The focus of the analysis was on the hormone levels of two groups, referred to as Group I and Group II.

One of the key hormones examined in this study was AMH. The average AMH level in Group I was 325±25.5 ng/mL, with a range of 78-595 ng/mL. In contrast, Group II had a significantly higher average AMH level of 966±37 ng/mL, ranging from 47-1143 ng/mL. This finding suggests that women in Group II have higher AMH levels compared to those in Group I. Elevated AMH levels are often associated with PCOS, and this result aligns with previous research.

The study also looked at the levels of Inhibin A and Inhibin B in the two groups. Group II exhibited a slightly higher average Inhibin A level (114.2±35.2 pg/mL, ranging from 27-434 pg/mL) compared to Group I (88±40 pg/mL, ranging from 18-930 pg/mL). Although the difference in Inhibin A levels between the groups was not as significant as that observed with AMH, it still indicates a potential association between Inhibin A and PCOS.

Interestingly, there was no substantial difference in the average Inhibin B levels between Group I (79±24 pg/mL, ranging from 42-387 pg/mL) and Group II (75.5±23 pg/mL, ranging from 2-291 pg/mL). This finding suggests that Inhibin B may not play a prominent role in distinguishing between the two groups.

Further analysis of the data revealed correlation relationships between the hormone levels. In women with PCOS, there was a direct correlation between AMH and Inhibin A (r=0.214; p<0.05) as well as between AMH and Inhibin B (r=0.210; p<0.05). Additionally, there was a direct correlation between Inhibin A and Inhibin B (r=0.279; p<0.05) in this group. In the control group, a direct correlation was found between AMH and Inhibin A (r=0.412; p<0.05), while an inverse correlation was observed between Inhibin A and Inhibin B (r=-0.512; p<0.05).

These correlation relationships provide insights into the interplay between different hormones in women with PCOS and in the control group. The positive correlations between AMH and both Inhibin A and Inhibin B suggest that these hormones may be influenced by similar underlying factors or mechanisms in women with PCOS. On the other hand, the inverse correlation between Inhibin A and Inhibin B in the control group suggests a potentially different hormonal balance in individuals without PCOS.

5. Conclusion

Overall, the findings of this study contribute to our understanding of the hormone profiles in women with PCOS. The differences in AMH and Inhibin A levels between the two groups indicate potential biomarkers for diagnosing or monitoring PCOS. Further research is warranted to explore the mechanisms underlying these hormone imbalances and their implications for the management and treatment of PCOS.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This study was approved by Ethics Committee of Scientific Research Institute of Obstetrics and Gynecology

References

[1] Anderson KS, Segars JH. Predicting fertility with antimullerian hormone: is a cutoff value adequate? Fertil Steril. 2012; 98(6):1421–2.

[2] Ashrafi M., Madani T.A., Seirafi Tehranian, and F. Malekzadeh, // Follicle stimulating hormone as a predictor of ovarian response in women undergoing controlled ovarian hyperstimulation for IVF, International Journal of Gynecology and Obstetrics, vol. 91, no. 1, pp. 53–57, 2005.

[3] Bellver J, Melo MA, Bosch E, Serra V, Remohi J, Pellicer A. Obesity and poor reproductive outcome: the potential role of the endometrium. Fertil Steril 2007; 88: 446-51.

[4] American Society for Reproductive Medicine, "Quick Facts about Infertility", http://www.asrm.org/detail.aspx?id=2322.

[5] Barad DH, Weghofer A, Gleicher N. Comparing anti-Müllerian hormone (AMH) and follicle-stimulating hormone (FSH) as predictors of ovarian function. Fertil Steril 2009;91:1553–5

[6] Bowen S., Norian J., Santoro N., and Pal L., // Simple tools for assessment of ovarian reserve (OR): individual ovarian dimensions are reliable predictors of OR," Fertility and Sterility, vol. 88, no. 2, pp. 390–395, 2007.

[7] Almog B., Shehata F., Shalom-Paz E., Tan S. L., and Tulandi T., // Age-related normogram for antral follicle count: McGill reference guide," Fertility and Sterility, vol. 95, no. 2, pp. 663–666, 2010.

[8] Azziz R, Woods KS, ReynaR, Key TJ, Knochenhauer ES, Yildiz BO. "The Prevalence and Features of the polycystic ovary syndrome in an unselected population". Journal of Clinical Endocrinology & Metabolism, June 2004; 89(6): 2745-9. Doi:10.1210/jc.2003-032046. PMID 15181052.

[9] Bancsi L. F., Broekmans F. J., Eijkemans M. J., et al., // Predictors of poor ovarian response in in vitro fertilization: a prospective study comparing basal markers of ovarian reserve," Fertility and Sterility, vol. 77, no. 2, pp. 328–336, 2002.

[10] Barad DH, Weghofer A, Gleicher N. Utility of age-specific serum anti-Mullerian hormone concentrations. Reprod Biomed Online. 2011; 22(3):284–91.

[11] Bellver J, Muñoz EA, Ballesteros A, Soares SR, Bosch E, Simón C, et al. Intravenous albumin does not prevent moderate-severe ovarian hyperstimulation syndrome in high-risk IVF patients: a randomized controlled study. Hum Reprod 2003; 18:2283–8 [http://dx.doi.org/ 10.1093/humrep/deg451].

[12] Bachelot A, Binart N. Reproductive role of prolactin. Reproduction. 2007 Feb;133(2):361-9.Review.

[13] Bozaoglu K, Bolton K, McMillan J, Zimmet P, Jowett J, Collier G, et al. Chemerin is a novel adipokine associated with obesity and metabolic syndrome. Endocrinology 2007; 148: 4687-94.

[14] Boomsma CM, Eijkemans MJ, Hughes EG, Visser GH, Fauser BC, Macklon NS. A meta-analysis of pregnancy outcomes in women with polycystic ovary syndrome. Hum Reprod update, nov- Dec, 2006; 12(6): 673-83.

[15] Boomsma CM, Fauser BC, Macklon NS. "Pregnancy complications in women with polycystic ovary syndrome". Semin. Reprod. Med., 2008; 26(1): 72-84. Doi: 10.1055/s-2007-992927. PMID 18181085.