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Research Article

Reproductive Hormone Abnormalities in Married Women of Child Bearing Ages Evaluated for Infertility in the Commercial City of Aba, Southeast Nigeria

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Abstract

Hormonal abnormalities, leading to disorders of ovulation, are recognized female risk factors in couple infertility. Other female causes of infertility include endometriosis, tubal diseases and unexplained causes which may occur singly or in combination. Because of the psychosocial importance attached to reproduction in the society, infertile couples usually present to fertility clinics for evaluation and treatment. The extent of reproductive hormonal abnormalities in married women of child bearing ages seeking fertility solutions in Aba, Southeast Nigeria is not known. This study, therefore, set out to bridge this gap in knowledge. This was a cross- sectional study in which 170 female patients presenting to the Fertility Clinic of the Department of Obstetrics and Gynaecology (O and G), Abia State University Teaching Hospital (ABSUTH), Aba for evaluation and treatment were consecutively recruited. This study lasted from January 1, 2021 to September 30, 2021. Relevant data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 23.0 software. A total of 170 women who met the inclusion criteria for the study were recruited among which 91.8% had abnormal reproductive hormonal profile. The commonest reproductive hormonal abnormalities noted were low progesterone levels, hyperprolactinaemia, high follicle stimulating hormone (FSH) and luteinizing hormone (LH) in 54.1%, 42.4%, 20.6% and 18.2% of the study participants respectively. Hyperprolactinaemia was not significantly related to age of the subjects. It is recommended that infertile women who do not have structural causes of female infertility be promptly evaluated for hormonal abnormalities and treated accordingly.

Keywords: *Aba; Female Reproductive Hormones; Female Infertility; Hyperprolactinaemia; Low Progesterone Levels; Southeast Nigeria*

Introduction

Couple infertility is due to female, male and both partners in 37%, 8% and 35% of cases respectively while the female causes of infertility includes ovulatory disorders, endometriosis, pelvic adhesions, tubal occlusions, other tubal abnormalities, hyperprolactinaemia and unexplained infertility [1]. In a Khartoum, Sudan study, female factor, male factor, both couple factor and unidentified factor accounted for 42.8%, 35.5%, 18.4% and 3.4% of infertility cases respectively [2]. The most common causes of female infertility are anovulation, tubal diseases, pelvic disorders, endometriosis, and unexplained infertility where a couple has no identifiable cause of the infertility [3]. Globally, common causes of female infertility include premature ovarian failure, fallopian tube blockade, endometriosis, leiomyoma, obesity and hormonal imbalance [4,5]. Recognized hormonal patterns in female patients with infertility include hypogonadism with resultant low oestrogen, hyperprolactinaemia, polycystic ovarian syndrome (PCOS) and thyroid dysfunction [4,5].

In their study in Calabar, Nigeria, Ekpe., *et al*. [6] reported that 96.6% of their study participants had hormonal abnormalities of which low luteinizing hormone (LH) levels (and the consequent anovulation) was the commonest pattern followed by prolactin excess and low levels of day 21-progesterone levels (i.e. luteal phase progesterone insufficiency). In another report from Bida metropolis, Nigeria, 83.3% of the women investigated for infertility had hormonal abnormalities of which secondary hypogonadism, hyperprolactinaemia/ hypogonadism, primary hypogonadism, hyperoestrogenamia and hyperprolactinaemia constituted 30%, 20%, 13.3%, 13.3% and 6.7% respectively [7]. In another Nigerian study, it was reported that 58% of the infertile women evaluated had hormonal abnormalities of which anovulation and hyperprolactinaemia were the major findings noted in them [8]. In their study in Warri, Nigeria, hormonal abnormalities [9] was noted in 39.4% of the infertile women with the patterns as follows: hyperprolactinaemia (23.7%), normo-gonadotropic, normo-oestrogen with anovulation (polycystic ovarian syndrome (13.08%), hypergonadotropic hypogonadism (33.08%), hypogonadotropic hypogonadism (3.84%) and hypergonadotropic hypogonadism with hyperprolactinaemia (14.62%).

There have been studies on the pattern of hormonal abnormalities in various Nigerian centres [6-9] but none in ABSUTH, Aba, Southeast, Nigeria. This study, therefore, set out to bridge this gap in knowledge necessitated by a dearth of published data on hormonal abnormalities in married female patients evaluated for infertility in ABSUTH, Aba. Findings from the index study will, also, help government policy makers, managers of health care institutions and health care professionals (HCP) in the appropriate allocation of scarce healthcare resources and services in the area of maternal and child health.

Subjects and Methods

Study design and setting

This was a prospective descriptive study conducted at the Fertility clinic of the Department of Obstetrics and Gynaecology of ABSUTH, Aba. Aba is a commercial city in the southeast region of Nigeria where the people are involved in lots of trading, craftwork and commercial activities. The Fertility clinic offers fertility solutions to infertile couples in Aba and the neighboring communities and states. It is run once a week by residents in O and G department of the hospital who are overseen by a consultant Obstetrician and gynaecologist. The fertility clinic gets laboratory support services from the Endocrinology unit of the facility's Department of Chemical Pathology. The clinic, also, enjoys support from the nursing unit, medical records, pharmacy section and the cleaners. Study subjects who met the inclusion criteria were consecutively recruited when they sought evaluations and treatment at the fertility clinic. As part of their evaluations, all the recruited subjects had their female reproductive hormones (prolactin, FSH, LH, oestrogen and progesterone) assayed.

Inclusion criteria

All married female patients aged 15 - 50 years presenting at the fertility clinic for diagnosis and treatment of their infertility (primary or secondary) were included in the study.

Exclusion criteria

Female patients that presented to the fertility clinic and evaluated for pelvic, uterine or tubal causes of infertility were excluded from the study. Women of child bearing age who were single or had their hormones assayed for other health reasons besides infertility eg measurement of prolactin level in a young lady with galactorrhoea were, also, excluded. Again, infertile women who declined consent when counseled and invited for participation were excluded from the study.

Subjects recruitment, sample collection and chemical analysis

From January 1, 2021 to September 30, 2021, using the consecutive type of non-probability sampling technique [10] 170 accessible subjects that met the inclusion criteria for the study constituted the sample population. Demographic characteristics of the study subjects were captured at recruitment after which 10 ml of each participant's venous blood was collected at the antecubital fossa under aseptic conditions and dispensed into a plain tube container. The blood samples were sent to the Chemical pathology Department of the hospital; each blood sample was allowed to clot and spun at 4000 rpm for 8 - 10 minutes to obtain a clean serum which was put into another plain container kept frozen until measurement of follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin, oestrogen and progesterone using the enzyme linked immunosorbent assay method. All the measurements were carried out according to the manufacturer's instructions and the reagents were from DRG Diagnostics, Germany. Thyroid function tests were not requested. Ethical approval was obtained from the Institution's Health Research Ethics Committee before commencing the study.

Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc. Chicago IL. USA) version 23.0 statistical software was used for data analysis. For continuous variables such as the ages of the study subjects, mean values and standard deviations (SD) were calculated. Categorical variables such as the hormonal assay values were summarized using proportions expressed in percentages. The categorical variables were compared using the non-parametric test, chi square test. The level of statistical significance was set at $p < 0.05$.

Results

A total of 170 infertile married women, aged between 18 - 48 years with a mean age of 32.15 ± 6.51, made up of 72 (42.4%) primary infertility and 98 (57.6%) secondary infertility, participated in the study. Low level of progesterone in 92 (54.1%) was the commonest hormonal abnormality followed by hyperprolactinaemia in 72 (42.4%) of the subjects, high levels of FSH and LH in 35 (20.6%) and 31 (18.2%) respectively (Table 1). The age group distribution of the study subjects in general and in relation to hyperprolactinaemia are shown in table 2. The difference between the prolactin levels of the different age groups was not statistically significant ($X^2 = 9.83$, $p = 0.455$). Finally, LH and FSH was higher than normal values (as seen in hypergonadotropic hypogonadism of primary ovarian failure) in 31 (18.2%) and 35 (20.6%) of the study participants respectively.

Hormone types	Low	Normal	High
Luteinizing hormone (LH)	8 (4.7%)	131 (77.1%)	31 (18.2%)
Follicle stimulating hormone (FSH)	14 (8.2%)	121 (71.2%)	35 (20.6%)
Prolactin	4 (2.4%)	94 (55.3%)	72 (42.4%)
Progesterone	92 (54.1%)	74 (43.5%)	4 (2.4%)
Oestrogen	16 (9.4%)	84 (49.4%)	70 (41.2%)

Table 1: *Reproductive hormonal profile of the study subjects.*

Age groups in years	Total no. of study subjects (n = 170, (%))	No with hyperprolactinaemia (no = 72, (%))
18 - 25	28 (16.5)	13 (18.1)
26 - 30	47 (27.6)	21 (29.2)
31 - 35	41 (24.1)	22 (30.6)
36 - 40	37 (21.8)	11 (15.3)
41 - 45	12 (7.1)	4 (5.6)
46 - 50	5 (2.9)	1 (1.4)

Table 2: *Age group distribution of the study participants and distribution of those who had hyperprolactinaemia.*

Discussion

The main findings of this study were that hormonal abnormalities were found in majority (91.8%) of the study subjects while low levels of progesterone and hyperprolactinaemia were the predominant reproductive hormonal abnormalities in the married women of child bearing age that presented for infertility evaluation at the Fertility clinic of ABSUTH, Aba within the study period. Again, a considerable proportion of the study subjects had high LH and FSH levels suggestive of primary (premature) ovarian failure and hyperprolactinaemia was not significantly affected by age groups.

Hormonal abnormalities in 91.8% of the participants in the index study is comparable to the findings in the Calabar [6] and Bida [7] studies in Nigeria where hormonal abnormalities were found in 96.6% and 83.3% respectively. Similarly, in this study, hyperprolactinaemia was the second commonest hormonal abnormality in the married women evaluated for infertility just as was reported in the Calabar and Bida studies. These observations are, however, not in tandem with the findings in the Abuja [8] and Warri [9] studies in Nigeria where only 58% and 39.4% of the study subjects evaluated for infertility had hormonal abnormalities. Reasons for these differences are not clear.

In all these Nigerian studies [6-9] including ours, hyperprolactinaemia was the second commonest hormonal abnormality encountered. The explanation for the considerable number of hyperprolactinaemia among married Nigerian women evaluated for infertility in these studies is not known but the implication of the findings is that hyperprolactinaemia may be asymptomatic and, being a treatable cause of female infertility when the diagnosis is made, should be checked for in all infertile women without structural causes of infertility.

In the index study, low progesterone levels as the commonest hormonal abnormality in 54.1% of the study subjects was at variance with the other Nigerian studies. However, a report of high FSH and LH in a considerable proportion of the study participants in the index study (20.6% and 18.2% respectively), suggestive of possible primary ovarian failure, is worrisome. This is because one will be worried as to the cause of premature primary ovarian failure in women of the age group under evaluation. This is similar to the 33.06% of the study subjects in the Warri [9] study who had hypergonadotropic hypogonadism.

Finally, other sundry findings such as low levels of oestrogen, LH, FSH and prolactin were noted in this study and their contributions to the infertility in the women being evaluated were not fully known. When other hormonal abnormalities such as testosterone and thyroid hormones are assayed and considered too, a clearer picture of the role of hormonal assays to female infertility will be obtained. The aforementioned forms a limitation of the index study. The usefulness of these findings in the area of maternal and child health is an informed public health planning and execution.

Conclusion/Recommendations

This study has shown that abnormalities in the female reproductive hormones of infertile married women are very common with a predominance of low progesterone and hyperprolactinaemia. Again, the study showed that hyperprolactinemia, a predominant hormonal abnormality in the study, was not significantly affected by the age groups of the subjects. It is, hereby, recommended that early detection and effective management of hormonal abnormalities be pursued in all female infertility cases to minimize the psychosocial issues associated with couple infertility. Effective health education and early diagnosis are important weapons in infertility management.

Author's Contributions

Dr Marcellinus O. Nkpozi - Conception and design of the research, drafting of the manuscript and taking care of the overall responsibility for the study.

Dr C O Kamanu - Collection and analysis of the data.

Dr J U Ohiri - Supervision of chemical analysis of specimens, interpretation of the data and statistical analysis.

Prof. Chuks Kamanu - Final approval and critical revision of the manuscript.

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