International Journal of Medical and Health Research

Volume: 1, Issue: 2, 75-77
Sep 2015
www.medicalsjournals.com
ISSN: 2454-9142

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Aetiological pattern of infertility; an appraisal of contemporary trend in the Niger-Delta region of Nigeria

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Abstract
Background: The prevalence and pattern of infertility vary between countries and regions. This study aims to determine the current pattern and major causes of infertility as seen in a dedicated fertility clinic with assisted reproductive technology services in sub-Saharan Africa.
Method: This was a prospective observational study that included all patients accessing infertility treatment at the infertility clinic of the Hospital over a 30 month period. Infertile couples were fully investigated according to the World Health Organization guideline.
Results: Four hundred and five infertile couples formed the subject of this study. The mean age was 38.1±5.9 and 43.3±7.4 for female and male partners respectively. The duration of infertility ranged from 1 to 26 years with a mean duration of 8.0 ± 4.9 years. Of the 405 couples, 88 (21.7%) had primary infertility and 317 (78.3%) had secondary infertility. In comparison, male factors alone independently contributed more to the aetiology of infertility than female factors alone [121 (29.9%) vs 113 (27.9%)] though this was not statistically significant ($p > 0.05$). Overall, combined female and male aetiological factors accounted for most cases of infertility 161 (39.6%). 2.5% (10) had unexplained infertility. Majority of those with female factor infertility had tubal occlusion (94; 34.3%), while for the male partners, a majority 114(40.4%) had a combination of semen abnormality; oligo-astheno-teratozoospermia. There was a significant association between male factor infertility and primary type infertility, $p< 0.05$.
Conclusion: Secondary infertility is still dominant in our environment. Also, male factor infertility is increasingly common and contributes significantly to primary infertility. Treatment approach should emphasize the couple rather than the woman alone.

Keywords: infertility, tubal factor, male factor, semen abnormality, In-vitro fertilization.

1. Introduction
Infertility is a major burden for couples in developing nations, accounting for majority of gynaecological outpatient consultation [1-3]. The literature is replete with epidemiological data on infertility [2-6]. The prevalence and pattern of infertility vary between countries and regions, reflecting the prevalence of preventable conditions, which can lead to infertility. Available data from African countries, where the prevalence of infertility is thought to be the highest showed a 52% incidence of secondary infertility compared to 23% in Asia [5-9]. A previous report from Benin-City Nigeria showed primary infertility was 14.3% and secondary infertility was 85.7% and the dominant pattern of infertility was female infertility secondary to tubal disease from unsafe abortion [3]. Unsafe abortion has been associated with restrictive abortion laws and poor contraceptive practices have been reported among abortion seekers in Nigeria [10]. Tubal factor has been a leading cause of infertility, however some other reports have shown increasing contribution of male factor [3, 7-9, 11] Infertility treatment has advanced with the use of assisted reproductive technology including In vitro fertilization/embryo transfer (IVF/ET) and this is now also available in resource constrained settings. Empirical observation in our centre showed that the renewed hope brought in by assisted reproduction [ART] has increased the influx of patients seeking infertility treatment and willingness to divulge information and be investigated; thus varied aetiological patterns observed. The focus of this study was to determine the pattern of aetiological presentation of patients seeking intervention from a dedicated fertility clinic in a public institution with ART services. Findings from this study would help counseling and treatment planning.

2. Methodology

Setting; The Human Reproduction Research Programme [HRRP] of University of Benin Teaching Hospital (UBTH) is a dedicated centre that offers exclusive treatment in infertility, reproductive endocrinology and research. It offers services for IVF and receives patient from all parts of Nigeria especially from the Niger-Delta and South-West region and occasionally patients from other African countries and Europe.

This was a prospective observational study that included all patients accessing infertility treatment at the HRRP over a 30 month period from January 2009 to June 2011. Patients were assured of confidentiality before clinical assessment by the authors and trained resident doctors. Diagnosis was made following the World Health Organization guideline on the investigation of infertile couples adopted in this centre.[3] Information on sociodemographic data, duration of infertility, previous treatment, identified cause of infertility including laboratory and radiological findings were extracted from patients' case files and used to generate a database.

Results were aggregated and presented as frequency, percentages and means. Statistical test of significance was done using spss version 16 and p <0.05 was considered significant.

3. Results

Details of 405 patients accessing fertility treatment during the study period were extracted and reviewed. The mean age of the female partners was 38.1±5.9, a range of 23 to 55, while that of the male partners was 43.3±7.4, a range of 30 to 61. Of the 405 couples, 88 (21.7%) had primary infertility and 317 (78.3%) had secondary infertility. The duration of infertility ranged from 1 to 26 years with a mean duration of 8.0±4.9 years. Table I further shows the relative contribution of both female and male partners to the identifiable aetiology of infertility. A positive female factor alone was found in 113 (27.9%) cases and a positive male factor alone in 121 (29.9%) cases. One hundred and sixty one (39.9%) couples had combined factors (male and female) infertility while the cause of the infertility was unexplained in 10 (2.5%) couples. In comparison, combined female and male aetiological factors accounted for most cases of infertility (39.6%), although male factors independently contributed more to the aetiology of infertility than female factors [29.9% vs 27.9%], this was not significant($p < 0.05$). See table 1

Table I: Demographic variables of patients

Variables	n=405	%
Age[years] Mean[female] Mean[husband]	 38.1±5.9 43.3±7.4	
Duration of infertility[years] Mean Range	 8.0±4.9 1-26	
Infertility type		
Primary	88	21.7
Secondary	317	78.3
Parity		
Para 0^{+0}	88	21.7
Para 0^{+1}	226	55.8
Para1	74	18.3
Para2	17	4.2
Aetiological factor		
Female	113	27.9
Male	121	29.9
Combined	161	39.6
Unexplained	10	2.5

Table II shows the major specific contributors of abnormalities found in the female and male partners. Majority of those with female factor infertility had tubal occlusion (94; 34.3%), while ovulatory problems and uterine factors accounted for 27.7% (76) and 8.8% (24) respectively. 29.2% of female partners had a combination of the aforementioned factors. Also shown is the type abnormality found in the male partners. Sixty-nine (24.5%) had oligozoospermia and 43 (15.2%) had azoospermia. In 37 (13.1%) cases, though the sperm count was normal the morphology was significantly abnormal (teratozoospermia), similarly 19 (6.7%) had low motility (asthenozoospermia). A majority, 114 (40.4%) of male partners had a combination of semen abnormality; oligo-astheno-teratozoospermia.

Table II: Contribution of specific abnormalities of female and male factors

Female factors	n	%
Tubal	94	34.3
Anovulatory	76	27.7
Uterine	24	8.8
Combination	80	29.2
Male factors	n	%
Oligoasthenoteratozospermia	114	40.4
Oligospermia	69	24.5
Teratozoospermia	37	13.1
Asthenozoospermia	19	6.7
Azoospermia	43	15.2

In table III, A comparative analysis of the relationship between type of infertility and aetiology showed that there was a significant association between male factor infertility and primary type infertility, $p< 0.05$.

Table III: Association between infertility type and aetiological factor

	primary	Secondary	P value
Female factor	18	95	
Male factor	42	79	0.004
Combined factor	25	136	
Unexplained	3	7	

3. Discussion

The pattern of infertility observed in this study clearly shows that secondary infertility is still prevalently dominant in our environment. Acquired infertility has been abundantly reported as the more common type of infertility in most regions of the world. In sub-saharan Africa, consistently over 50% of cases present with secondary infertility however in some areas, particularly in Asia, the percentage of secondary infertility is quite low [5-8]. Our finding corroborates previous report by Orhue and Aziken [3], of 85.7% prevalence of secondary infertility over a ten year study period.

Globally, female factors, mainly tubal have been commonly implicated as the major cause of infertility. Although we observed tubal pathology as the major contributor to female infertility, we also noticed a trend where male factors alone contributed more to the aetiology of infertility than female factors alone. This observation is quite noteworthy especially in sub Saharan Africa where the burden of infertility is left at the doorstep of the woman. 'It is time to beam the search light on the man'. Data from previous studies showed that the male factor accounts for 20-50% of the causes of infertility in different parts of the country (Nigeria) [11-12].

The preponderance of male causal factor may be explained by varying postulations ranging from increasing sexually

transmitted infections to harmful dietary and social practices, and also the possibility of potential environmental biohazard. Previous Nigerian research have suggested that identification of specific causes of male infertility in the country is still elusive, and some aspects regarding aetiology of male infertility are unexplained [12]. Okonofua and co-workers [13] in a case-control study of risk factors for male infertility found a significant association between male infertility and various proxies of sexually transmitted infections and poor healthcare-seeking behavior for STIs among Nigerian men. Furthermore they observed that use of native medications, cigarette smoking and moderate-to-heavy alcohol intake are associated risk factors for male infertility in this population [13]. Similarly, Ogunbajo *et al.*, [14] had identified as a major cause of semen abnormality: reproductive tract infection, with 68% of the cases having positive bacterial growth on the semen culture, while Osegbe and Amaku [15] implicated varicocele as a primary factor. Also, various semen abnormality have been documented in literature; azoospermia was the most common abnormality detected in Mongolia [8] while Imade *et al.* in Nigeria [16], working with a computer-aided sperm analyser (CASA), found oligozoospermia and asthenozoospermia to be the most common semen abnormalities in their series. In this study we observed a trend towards mixed pattern of semen abnormalities, as most infertile male partners had a combination of oligo-astheno-teratozoospermia.

The increased contribution of male factors observed in this study differ from previous studies [3, 17] from the same centre which reported female factor infertility (mainly from tubal occlusion) as the major causal factor, and this may be a reflection of the trend in management modalities in the centre. We suggest that, with the availability of IVF services in response to the growing infertility needs in sub-Saharan Africa, an avenue is created where most couple presents at the clinic together. Also owing to the renewed vista of hope and the financial implications of treatment most men are now willing to go through the full lenght of clinical assessment and investigation. From the foregoing a true reflection of the cause of infertility in a couple is probably made obvious. Researchers had opined that the advent of assisted reproductive technology also makes it possible for any couple, no matter the cause of their infertility, to have an improved chance of a child of their own [3, 11].

Overall, in this study, couples with identified combined male and female pathologies represented majority of the causal factor for infertility. This further reflects the contribution of male factor to the aetiology of infertility. We can deduce that although there exists a significant positive correlation between male infertility and primary type of infertility, albeit, the influence of the contribution of combined male and female factors ensures that overall secondary type infertility still predominates. Several other authors have reported, as we noted in this study, an increased preponderance of primary infertility amongst couples identified with male-factor only infertility [12, 15].

In conclusion, the study has exposed an increasing role of male factor in the aetiology of infertility (29.9% as sole cause and 39.9% combined male and female factor) in our environment, which fact represents a notable shift towards approaching infertility management from a couple point of view and not the woman alone. This is especially relevant in sub Saharan Africa where hitherto the burden of infertility had been placed solely on the woman. Our findings suggests that the renewed hope brought by the availability of assisted reproductive technology services in sub Saharan Africa which now encourages patients participation as couples rather than individuals and may over time influence the trend in observed aetiological pattern of infertility.

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