



Received: 28-07-2026
Accepted: 08-09-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Gynecomastia as a Diagnostic Marker for Early Onset of Male Infertility

¹ Ezekiel Elemi Emeka, ² Okonkwo Chisom Esther, ³ Chisom Rita Chukwuka, ⁴ Ezike Linda Chukwuamaka, ⁵ Udeani Chikezie Bartholomew, ⁶ Amaechi Chiamaka Jessica, ⁷ Nzekwue Obianuju Jennifer, ⁸ Ezema Chioma Calista, ⁹ Blessed Samuel Nathaniel, ¹⁰ Francis Joy Udoka, ¹¹ Obayemi Adebisola Mercy, ¹² Afolabi Taoheed Damilare, ¹³ Cosmas Blessing Nneka, ¹⁴ Ugwu Ifebuche Nelson, ¹⁵ Isesele Favour, ¹⁶ Okeukwu God's Fvavour Ngozichukwu, ¹⁷ Ikechukwu God'sgift Chizaram

^{1, 2, 4, 8, 10, 14} Department of Medical Laboratory Science, University of Nigeria Enugu Campus, Enugu State, Nigeria

³ Department of Zoology and Envir Biology, University of California, Nsukka, Nigeria

⁵ Department of Anatomy, Enugu State University of Science and Technology, Enugu State, Nigeria

⁶ Department of Medical Laboratory Science, Ebonyi State University, Nigeria

⁷ Department of Physics Education, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

⁹ Department of Biochemistry, Abia State University, Uturu, Abia State, Nigeria

¹¹ Astrakhan State Technical University, Astrakhan State, Nigeria

¹² Department of Industrial Chemistry, University of Ilorin, Kwara State, Nigeria

¹³ Department of Biochemistry, University of Nigeria Nsukka, Enugu State, Nigeria

¹⁵ Science, Leaders Academy, Onewa, Uromi, Edo State, Nigeria

¹⁶ Science, Simawa High School, Sagamu, Ogun State, Nigeria

¹⁷ Science, King's Kids Christian International High School, Akwa-Ibom, State, Nigeria

DOI: <https://doi.org/10.62225/2583049X.2026.6.5.6898>

Corresponding Author: Ezekiel Elemi Emeka

Abstract

Gynecomastia, characterized by the benign enlargement of male breast tissue, may serve as an important clinical indicator of underlying hormonal abnormalities associated with male reproductive dysfunction. Male infertility is a growing reproductive health concern, and early identification of contributing factors is essential for effective management. This study examines the potential role of gynecomastia as a diagnostic marker for early-onset male infertility, with particular emphasis on hormonal imbalance and impaired testicular function. The presence of gynecomastia may reflect altered estrogen-to-androgen ratios, hypogonadism, endocrine disorders, medication effects, or other conditions capable of disrupting spermatogenesis. Clinical assessment of men presenting with gynecomastia, combined with

reproductive history, physical examination, semen analysis, and hormonal investigations, may therefore facilitate early recognition of fertility-related abnormalities. Although gynecomastia alone cannot establish a diagnosis of infertility, its presence may provide an early clinical signal warranting further reproductive and endocrine evaluation. Recognizing this association could improve early detection, counselling, and appropriate management of men at risk of infertility. This review highlights the diagnostic relevance of gynecomastia and emphasizes the need for further research to establish its predictive value, particularly among younger men presenting with unexplained breast enlargement and other signs of reproductive or hormonal dysfunction.

Keywords: Gynecomastia, Male Infertility, Hormonal Imbalance, Spermatogenesis, Androgen–estrogen Ratio

1. Introduction

Gynecomastia is the abnormal non-cancerous enlargement of one or both breasts in men due to the growth of breast tissue as a result of a hormone imbalance between estrogen and androgen^[1]. Gynecomastia can cause significant psychological distress or unease^[2]. Gynecomastia is different from “pseudogynecomastia” which is defined as an excess of skin and/or adipose tissue in the male breasts without the growth of true glandular breast tissue^[3]; this is commonly associated with obesity and can be ruled out by physical exam^[4]. Gynecomastia can be normal in: Newborn male babies, due to exposure to estrogen from the mother;

adolescent boys going through puberty; older men, over age 50; and obese men ^[1].

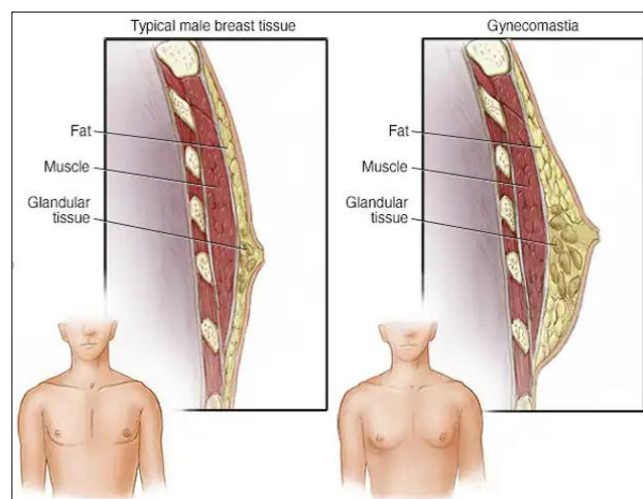
1.1 Signs and symptoms of Gynecomastia

In gynecomastia there is always enlargement of one or both breasts, symmetrically or asymmetrically, in a man. A soft, compressible, and mobile mass of breast tissue is felt under the nipple and its surrounding skin in contrast to softer fatty tissue which is not associated with a mass ^[5]. It may also be accompanied by breast tenderness or nipple sensitivity, which is commonly associated with gynecomastia observed in adolescents, typically early in development ^[4]. Gynecomastia that is painful, bothersome, rapidly-growing, associated with masses in other areas of the body, or persistent should be evaluated by a clinician for potential causes. Dimpling of the skin, nipple discharge, and nipple retraction are not typical features of gynecomastia and may be associated with other disorders ^[5]. Milky discharge from the nipple is not a typical finding, but may be seen in a gynecomastic individual with a prolactin secreting tumor ^[6]. An increase in the diameter of the areola and asymmetry of the chest are other possible signs of gynecomastia ^[7] [Figures 1 and 2]. Gynecomastia has psychosocial implications that may be particularly challenging for adolescents who are experiencing physical maturation and self-identity formation, which includes body image disturbances, negative attitudes towards eating, self-esteem problems, social withdrawal, anxiety, and shame ^[8]. Men with gynecomastia may appear anxious or stressed due to concerns about its appearance and the possibility of having breast cancer ^[9].



Source: www.wikimedia.org

Fig 1: Adult male with significant gynecomastia



Source: www.mayoclinic.org

Fig 2: Gynecomastia in men

1.2 Prevalence statistics and Epidemiology

Gynecomastia is the most common benign disorder of the male breast tissue and affects 35% of men, being most prevalent between the ages of 50 and 69 ^[1]. It is normal for up to 70% of adolescent boys to develop gynecomastia to some degree ^[2]. Of these, 75% resolve within two years of onset without treatment. If the condition does not resolve within 2 years, or if it causes embarrassment, pain or tenderness, treatment is warranted ^[10]. New cases of gynecomastia are common in three age populations: Newborns, adolescents, and men older than 50 years ^[11]. Newborn gynecomastia occurs in about 60–90 percent of male babies and most cases resolve on their own in about 2–3 weeks after delivery ^[9]. During adolescence, on average 33 percent of males are estimated to exhibit signs of gynecomastia ^[6]. Gynecomastia in older men is estimated to be present in 24–65 percent of men between the ages of 50 and 80. Estimates on asymptomatic gynecomastia is about up to 70% in men aged 50 to 69 years ^[9].

The prevalence of gynecomastia in men may have increased in recent years, but the epidemiology of the disorder is not fully understood ^[12]. The use of anabolic steroids and exposure to chemicals that mimic estrogen in cosmetic products, organochlorine pesticides, and industrial chemicals have been suggested as possible factors driving this increase ^[12]. According to the American Society of Plastic Surgeons, breast reduction surgeries to correct gynecomastia are fairly common but has been a recent decline. In 2020, there were over 18,000 procedures of this type performed in the United States which is down 11% compared to in 2019. The objectives of this review are to explore the association between gynecomastia and male infertility, shedding light on

the potential role of gynecomastia as a diagnostic marker for early detection of infertility in males. Examine the underlying hormonal imbalances and physiological mechanisms linking gynecomastia to impaired spermatogenesis and reduced sperm quality. Discuss the clinical implications of recognizing gynecomastia as an early indicator of infertility risk, emphasizing the importance of timely evaluation and intervention in affected individuals. Highlight current research findings, diagnostic tools, and screening protocols aimed at optimizing the use of gynecomastia in identifying males at risk of infertility. Foster interdisciplinary collaboration among healthcare professionals to enhance diagnostic accuracy, treatment efficacy, and patient outcomes in individuals with gynecomastia-associated infertility.

2. Understanding gynecomastia

2.1 Causes and risk factors

In people assigned male at birth, the body mainly makes the sex hormone testosterone. It also makes small amounts of the hormone estrogen. Gynecomastia can happen when the amount of testosterone in the body drops compared with estrogen. The decrease can be caused by conditions that lower testosterone or block its effects. Or it can be caused by conditions that raise the estrogen level. Some things that can change the body's hormone balance include the following:

2.1.1 Natural hormone changes

The hormones testosterone and estrogen control sex traits. Testosterone controls traits such as muscle mass and body hair. Estrogen controls traits that include the growth of breasts.

Estrogen levels that are too high or are out of balance with testosterone levels can cause gynecomastia.

Gynecomastia in infants: More than half of male babies are born with enlarged breasts due to the effects of estrogen during pregnancy. The swollen breast tissue usually goes away within 2 to 3 weeks after birth.

Gynecomastia during puberty: Gynecomastia caused by hormone changes during puberty is somewhat common. Most of the time, the swollen breast tissue goes away without treatment within 6 months to 2 years.

Gynecomastia in adults: About 24% to 65% of men ages 50 to 80 get gynecomastia. But most adults with the condition have no symptoms.

2.1.2 Medicines

The following medicines can cause gynecomastia:

Anti-androgens used to treat conditions such as an enlarged prostate and prostate cancer. Examples of these medicines include flutamide, finasteride (Proscar, Propecia) and spironolactone (Aldactone, Carospir).

Anabolic steroids and androgens to treat delayed puberty or muscle loss from another disease.

Antiretroviral medicines. The estrogen-like properties of some HIV medicines can cause gynecomastia, especially efavirenz.

ADHD medicines that contain amphetamines, such as Adderall.

Anti-anxiety medications, such as diazepam (Valium).

Tricyclic antidepressants.

Some antibiotics.

Opioids to treat chronic pain.

Ulcer medicines, such as the nonprescription medicines cimetidine (Tagamet HB) and omeprazole (Prilosec).

Chemotherapy to treat cancer.

Heart medicines, such as digoxin (Lanoxin) and calcium channel blockers.

Stomach-emptying medicines, such as metoclopramide.

2.1.3 Recreational drugs, illegal drugs and alcohol

Substances that can cause gynecomastia include:

Alcohol.

Anabolic steroids used to build muscle and improve athletic performance.

Amphetamines.

Marijuana.

Heroin.

Methadone (Methadose).

2.1.4 Health conditions

Certain health conditions that affect the balance of hormones can either cause or be linked with gynecomastia. They include:

Hypogonadism: Conditions that lower the amount of testosterone the body makes can be linked with gynecomastia. Some examples are Klinefelter syndrome and pituitary insufficiency.

Aging: Hormone changes that happen with aging can cause gynecomastia, especially in people who are overweight.

Tumors: Some tumors can make hormones that shift the body's hormone balance. These include tumors involving the testes, adrenal glands or pituitary gland.

Hyperthyroidism: In this condition, the thyroid gland makes too much of the hormone thyroxine.

Kidney failure: About half the people who receive dialysis treatment develop gynecomastia due to hormone changes.

Liver failure and cirrhosis: Changes in hormone levels related to liver problems and cirrhosis medicines are linked with gynecomastia.

Malnutrition and starvation: When the body doesn't get enough nutrition, testosterone levels drop. But estrogen levels stay the same. This causes an imbalance in the hormones.

2.1.5 Herbal products

Some plant oils used in shampoos, soaps or lotions have been associated with gynecomastia. These include tea tree or lavender oil. This likely is due to compounds in the oil that may mimic estrogen or affect testosterone.

2.1.6 Risk factors

Risk factors for gynecomastia include:

Puberty.

Older age.

Obesity.

Use of anabolic steroids to improve athletic performance.

Certain health conditions. These include liver and kidney disease, thyroid disease, Klinefelter syndrome and some tumors.

2.2 Clinical presentation and diagnostic criteria

All males with breast enlargement should be examined with a view to answering the following questions^[13]:

1. How recent was the onset?
2. Is the enlargement associated with pain or tenderness?
3. Is the enlargement due to glandular proliferation or fat deposition?
4. Does the patient have signs or symptoms of breast cancer?
5. Could the condition be associated with a testicular tumor?
6. Is the patient uncomfortable as a result of the breast enlargement?

A healthy male with long-stable gynecomastia and a negative

history and physical examination generally does not require further evaluation^[13]. The presence of previously unreported breast pain or tenderness, or the new onset of enlargement, rapid growth, or a breast size >5 cm, should prompt further evaluation to detect any underlying systemic problems^[13].

History: A detailed history should include the onset and duration of breast enlargement, symptoms of pain or tenderness, weight loss or gain, change in size, nipple discharge, retraction, virilization symptoms, medication history (for example if gynecomastia is improved following discontinuation of a drug, it strongly suggests that the drug is responsible), the presence of systemic illness, fertility, sexual function, history of undescended testes and mumps. Finally, family history of gynecomastia should be assessed, which may suggest androgen insensitivity syndrome, familial aromatase excess, or Sertoli cell tumors^[13].

Physical examination: Differentiating true gynecomastia from pseudogynecomastia and tumors is based on physical examination. The patient lies on his back with his hands behind his head and the physician places her/his thumb and forefinger on each side of the breast and slowly brings them together. In true cases of gynecomastia, the physician will feel a disc or firm tissue that is concentric with the nipple-areolar complex. In patients with pseudogynecomastia the fingers will not meet any resistance until they reach the nipple^[12].

In contrast, breast carcinoma usually presents as a unilateral hard, irregular mass located outside the areola, which may be accompanied by skin dimpling, nipple retraction and axillary lymphadenopathy^[13]. Physical examination should also include examination of the abdomen (an abdominal mass may be present) and testicles. Signs of liver, kidney disease, or hyperthyroidism can be determined by a physical examination. If the patient is adolescent and the results of physical and genital examinations are normal, pubertal gynecomastia is likely and evaluations should continue at 6-month intervals.

Laboratory evaluation: In cases of true gynecomastia without a clear cause, laboratory tests should be pursued, and must include, liver, kidney and thyroid function tests (to exclude the respective medical conditions), as well as hormonal tests (E2, total and free testosterone, A, LH, FSH, PRL, hCG, DHEA-SO₄ or 17 ketosteroids, SHBG and α FP)^[13]. In aging males, hypogonadism is commonly observed and measuring overnight T levels can be informative: If levels are low, T and LH levels should be measured. If testes are small, the patient's karyotype should be obtained to exclude Klinefelter's Syndrome. If all tests are negative, the patient should be diagnosed with idiopathic gynecomastia^[14].

Tissue biopsy: If differentiating between gynecomastia and breast cancer cannot be achieved using physical and imaging findings such as mammography, a percutaneous biopsy should be taken^[12]. However, the yield of cells taken in a gynecomastia biopsy is often insufficient, because gynecomastia is a predominantly fibrous lesion^[15].

Differential diagnosis: In patients presenting with palpable breast tissue, gynecomastia, pseudogynecomastia, breast carcinoma and benign lesions (including dermoid cysts, lipomas, sebaceous cysts, lymphoplasmocytic inflammation, ductal ectasia, hematomas and fat necrosis) should all be considered^[14]. Pseudogynecomastia and true gynecomastia can be differentiated by physical examination, as described above. Malign and benign conditions can be distinguished using mammogram or tissue sampling.

It is recommended that physicians follow the algorithm for gynecomastia in patients under the age of 50 years, unless one of the atypical criteria shown in Fig 1 is met^[13].

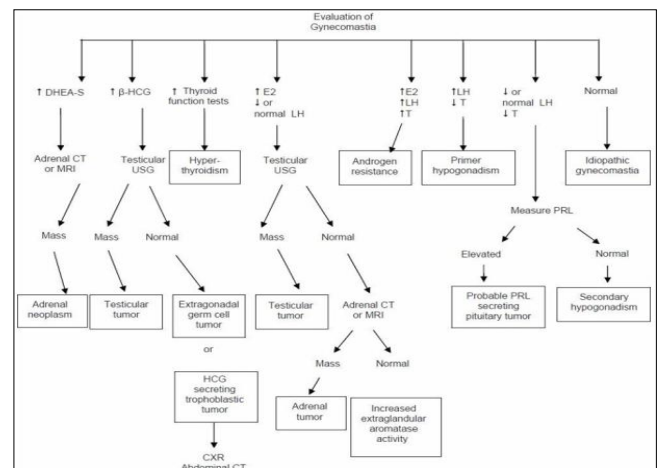


Fig 3: Hormonal evaluation of gynecomastia

2.3 Psychological and social implications

Body image isn't just a women's problem. Many studies show that an astoundingly high percentage of men are dissatisfied with, engrossed with, and even impaired by concerns about their appearance. One American study, for example, found that the percentage of men dissatisfied with their overall appearance (43%) has nearly tripled in the past 25 years and that nearly as many men as women are unhappy with how they look^[14].

Gynecomastia is a noticeable physical difference that commonly affects males in adolescence and old age. While often transient in nature, gynecomastia persists indefinitely in 10% of cases. Even mild gynecomastia can have adverse psychological effects in boys, according to the study by ASPS Member Surgeon Dr. Brian I. Labow and colleagues of Boston Children's Hospital. They believe their findings have important implications for early intervention and treatment, including male breast reduction in appropriate cases. The following are notable psychological and social implications of gynecomastia:

2.3.1 Anxiety

The initial emotional reaction to the enlargement of glandular tissue in men is a feeling of anxiety. Patients are likely to have feelings of uncertainty over the eventual outcome of diagnosis and any potential treatment plan. Studies report that affected males are likely to make medical inquiries as to the possibility of gynecomastia leading to male breast cancer. A survey published by Breast Care reported that patients are most likely to experience significant episodes of apprehension secondary to anxiety if they present with other medical conditions, possess personal traits of anxiety, and/or have a high education background. Generally, the disturbing mental image shaped by this condition and persistent fear of the unspecified is the primary cause of anxiety^[13].

2.3.2 Low Self-Esteem

Men with gynecomastia are likely to have a recurring feeling of incompleteness due to body form dissatisfaction and social phobia. These patients are also likely to mentally imagine a society that attaches abnormality and stigma to the condition. A study published by the Journal of Plastic and Reconstructive Surgery revealed that compared to the normal population, psychological metrics that measure social phobia

and low self-esteem were significantly higher in men with gynecomastia. Patients especially reported feelings of shame to expose the body, especially in social gatherings with people they are not related with. Several publications have recommended psychotherapy sessions with a clinical psychologist as an adjunct therapy for the management of the condition with an extension to post-operative patients^[14].

2.3.3 Suicidal thoughts

People with this health condition have been found to develop severe trauma. They have even gone up to the level of experiencing suicidal thoughts in extreme cases. Gynecomastia is initially a physical problem. But because of the effects it can have on mental health, psychotherapy should also be considered as a part of the overall treatment plan.

2.3.4 Other ways in which it can affect mental health in males

The condition affects the emotional health of a person. Boys during school or college may have to face bullying and harassment practices. They may withdraw themselves from sports and other normal activities. It can even lead to poor general health, low confidence and improper eating patterns. Boys/men may withdraw themselves from social functions. All of this can drive the person towards depression. Boys in their adolescence with gynecomastia may need to cope with such issues during their most vulnerable time. Talking of grown-up men, they also find it impossible to indulge in various activities, such as playing in the water near a beach or splashing in the swimming pool.

3. Understanding male infertility

3.1 Definition and prevalence of male infertility

Infertility is usually defined as the inability of a couple to conceive even after one year of unprotected, frequent sexual intercourse. It affects about 15% of all couples in the United States and at least 180 million worldwide^[16]. Male infertility is defined as the inability of a male to make a fertile female pregnant, also for a minimum of at least one year of unprotected intercourse. The male is solely responsible for about 20% and is a contributing factor in another 30% to 40% of all infertility cases^[17]. As male and female causes often co-exist, it is important that both partners are investigated for infertility and managed together. Overall, the male factor is substantially contributory in about 50% of all cases of infertility.

There are several reasons for male fertility to occur, including both reversible and irreversible conditions. Other factors that could influence each of the partners could be their age, medications, surgical history, exposure to environmental toxins, genetic problems, and systemic diseases. The key purpose for evaluating a male for infertility is to identify his contributing factors, offer treatment for those that are reversible, determine if he is a candidate for assisted reproductive techniques (ART) and offer counseling for irreversible and untreatable conditions. In rare cases, male infertility could be a herald to a more serious condition. This is an additional reason to do a comprehensive evaluation of the male partners of infertile couples; so that any significant, underlying medical conditions can be identified and treated.

3.2 Causes and contributing factors

There are multiple causes for male infertility, which can be broadly classified due to their general underlying etiology. These include endocrine disorders (usually due to hypogonadism) at an estimated 2% to 5%, sperm transport

disorders (such as vasectomy) at 5%, primary testicular defects (which include abnormal sperm parameters without any identifiable cause) at 65% to 80% and idiopathic (where an infertile male has normal sperm and semen parameters) at 10% to 20%^[18]. These are broad estimates only as accurate statistics are unavailable due to general underreporting, cultural factors, and regional variations. Patients sent to a tertiary referral center are more likely to have their condition reported, while private patients may never have their data collected^[18]. A partial summary of specific etiologies is listed below:

Endocrinological causes

Congenital GnRH Deficiency (Kallmann syndrome), Prader Willi syndrome, Laurence – Moon – Beidl syndrome, iron overload syndrome, familial cerebellar ataxia, head trauma, intracranial radiation, testosterone supplementation, or hyperthyroidism.

Idiopathic

Idiopathic male infertility (10% to 20%) where semen parameters are all normal, but the male remains infertile.

Genetic causes

Mutations of the cystic fibrosis transmembrane conductance regulator (CFTR) gene, primary ciliary dyskinesia, Kallmann syndrome, Klinefelter's syndrome, Young syndrome, Sertoli cell-only syndrome, Kal- 1, Kal -2, FSH, LH, FGFS, GnRH1/GNRHR PROK2/PROK2R gene deficiencies, chromosomal anomalies, Y chromosome microdeletion, AR mutations, gr/gr deletion.

Congenital urogenital abnormalities

Absent, dysfunctional, or obstructed epididymis, congenital abnormalities of the vas deferens, undescended testes, ejaculatory duct disorders (cysts).

Acquired urogenital abnormalities

Bilateral obstruction or ligation of the vas deferens, bilateral orchiectomy, epididymitis, varicoceles, retrograde ejaculation.

Immunological causes

Lymphocytic hypophysitis, hemosiderosis, hemochromatosis, sarcoidosis, histiocytosis, tuberculosis, fungal infections, etc.

Urogenital tract infections

Gonococci, chlamydia, syphilis, tuberculosis, recurrent urogenital infections, prostatitis, and recurrent prostatovesiculitis.

Sexual dysfunction

Premature ejaculation, anejaculation, infrequent sexual intercourse, and erectile dysfunction.

Malignancies

Sellar masses, pituitary macroadenomas, craniopharyngiomas, and surgical or radiation treatment to these conditions, testicular tumors, or adrenal tumors leading to an excess of androgens.

Medications or drugs

Cannabinoids, opioids, psychotropic drugs can cause inhibition of GnRH, exogenous testosterone or androgenic

steroids supplementation, GnRH analogs and antagonists used in prostatic carcinoma, chronic glucocorticoid therapy, alkylating agents, antiandrogens, ketoconazole, cimetidine.

Environmental toxins

Insecticides, fungicides, pesticides, smoking, excess alcohol.

3.3 Impact on individuals and relationship

Research suggests that men and women differ in their psychological responses to infertility [19]. Samaira Malik, from the Institute of Work, Health, and Organizations at the University of Nottingham, United Kingdom, said, "men are in fact equally affected by the unfulfilled desire for a child but are less open about their feelings" [19]. Dr. Rheta Keylor of the Massachusetts Institute for Psychoanalysis stated that, male infertility is an "assault on a man's sense of self revives feelings of competition, castration, and experiences of developmental trauma." [20].

Men undergo various battles when facing personal infertility. These battles include anxiety concerning potency, masculinity, and sexual adequacy.

Effects of infertility on potency

Feelings of stress, depression, guilt, or anxiety in infertile men can cause psychogenic impotence, which heightens the feelings of inadequacy that already accompany infertility. The psychological stress of infertility has been shown to affect sperm parameters in significant and demonstrable ways that may further contribute to difficulties with erectile potency; emotional reactions to the infertility may alter or even undermine a previous consolidation of a sense of self as sexually adequate [20].

Infertility weighs on many males' minds; this creates mental instability, which often results in impotence. Psychological causes of impotency may include: Clinical depression, medications, fatigue, stress, social interaction, relationship issues.

Effects of infertility on masculinity

Infertility diagnosis often triggers doubts about masculinity in men, particularly due to the stigma associated with male factor infertility, which is often viewed as stemming from sexual dysfunction. This stigma leads to heightened insecurities and stress in infertile men, sometimes causing them to suppress their emotions and assume a protective stance within the relationship. Consequently, infertile men may experience depression, anxiety, lower self-esteem, and reduced masculinity scores. Despite societal pressures, emotional suppression can have negative consequences on mental health if prolonged [19].

Effects of infertility on sexual adequacy

Feelings about fertility and sexual adequacy are interconnected for many men [20], especially through male factor infertility. The problems infertile men have with sexual inadequacy stem from social ridicule and resulting low self-esteem. M.J. Muller, from the University of Mainz, Germany, said, "Sexual dissatisfaction of infertile men could also be related to a withdrawal from sexual activities and hence to even lower chances of conception" [20].

Effects of infertility on relationships

Male factor infertility can have significant impacts on men within a relationship. It often triggers feelings of inadequacy,

leading to increased stress, depression, and anxiety. Men may also experience a sense of loss of control over their reproductive abilities, which can strain the relationship with their partner. Additionally, societal stigma surrounding male infertility may lead to feelings of shame and isolation, making it challenging for men to seek support or discuss their feelings openly with their partner. Overall, male factor infertility can profoundly affect both the emotional well-being of men and the dynamics of their relationships. Some even develop the fear of losing their partners in a relationship due to infertility.

4. Linking gynecomastia to male infertility

4.1 Hormonal pathways linking Gynecomastia and male infertility

Gynecomastia Development

Gynecomastia occurs due to an imbalance between estrogen and testosterone levels, often with estrogen dominance.

Hormonal Imbalance

Elevated estrogen or reduced testosterone disrupts the normal hormonal balance crucial for male reproductive function.

Impact on Hormonal Axis

This imbalance affects the hypothalamus-pituitary-gonadal (HPG) axis, which regulates sex hormone production.

Decreased Testosterone Production

Reduced LH secretion due to estrogen dominance leads to decreased testosterone production in the testes.

Effect of reduced/low levels of Testosterone in reproduction

Impaired spermatogenesis: Testosterone is essential for initiating and supporting spermatogenesis, the process of sperm production. Lower testosterone levels impair spermatogenesis, leading to decreased sperm production and poor sperm quality.

Decreased Libido: Lower testosterone levels may result in a decrease in sex drive or interest in sexual activity.

Erectile Dysfunction: Testosterone is involved in the process of achieving and maintaining erections. Insufficient testosterone levels can contribute to erectile dysfunction, making it more difficult to achieve or sustain an erection.

Effect on Male Fertility

Reduced sperm production and quality, in addition to decreased libido and erectile dysfunction contribute to male infertility, making conception difficult.

5. Diagnostic utility of gynecomastia

5.1 Role of gynecomastia as a potential early indicator of infertility

Gynecomastia, the benign enlargement of breast tissue in males, has long been a subject of medical interest due to its association with hormonal imbalances. While not directly linked to infertility, gynecomastia can sometimes signal underlying issues that may affect reproductive health.

Hormonal Imbalance and Gynecomastia

Gynecomastia often results from an imbalance between estrogen and testosterone levels, leading to the proliferation of breast tissue in males. Estrogen, typically associated with females, can increase relative to testosterone due to various factors such as puberty, aging, medication use, or underlying

medical conditions like liver or kidney disease. This hormonal imbalance is a hallmark of gynecomastia and may indicate disruptions in the endocrine system.

Association with Infertility

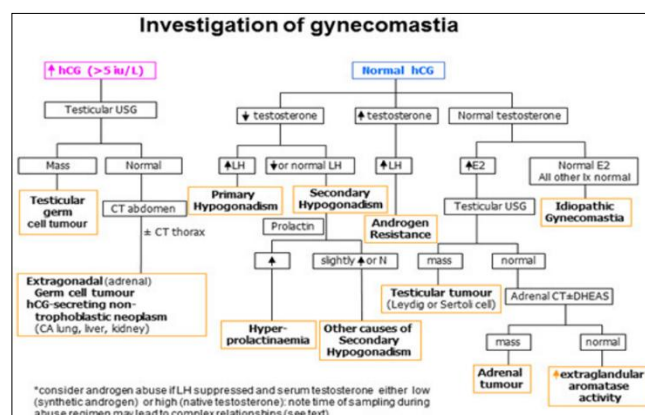
While gynecomastia itself is not a direct cause of infertility, its presence can be indicative of underlying factors that may affect reproductive health. Hormonal imbalances associated with gynecomastia, such as elevated estrogen levels or decreased testosterone levels, can potentially interfere with sperm production and quality, cause low libido and erectile dysfunction, thereby impacting fertility. Additionally, certain medical conditions linked to gynecomastia, such as hypogonadism or Klinefelter syndrome, are known to have implications for male fertility.

Clinical Evaluation and Management

When evaluating individuals with gynecomastia, healthcare providers should consider the possibility of underlying conditions that may affect fertility. A comprehensive medical history, physical examination, and laboratory tests, including hormone levels and semen analysis, are essential for identifying potential causes and assessing fertility status. Management of gynecomastia may involve addressing underlying hormonal imbalances through lifestyle modifications, medication, or surgical intervention, depending on the severity and underlying etiology.

Also, given the complex interplay between gynecomastia, hormonal imbalances, and infertility, a multidisciplinary approach involving endocrinologists, urologists, and reproductive specialists is often warranted. Collaboration among healthcare providers facilitates comprehensive evaluation, tailored treatment plans, and optimal management of both gynecomastia and infertility. Moreover, patient education regarding the potential implications of gynecomastia on fertility is crucial for informed decision-making and proactive management. Healthcare providers should remain vigilant in assessing individuals with gynecomastia for potential implications on fertility and initiate appropriate evaluation and management as needed. By addressing hormonal imbalances and addressing underlying causes, it is possible to optimize fertility outcomes and improve overall reproductive health in affected individuals.

5.2 Screening protocols and diagnostic algorithms



Source: National Center for biotechnology information

Fig 4: Algorithm for investigation of gynecomastia

6. Conclusion

6.1 Summary of key findings and insights

In our comprehensive investigation of “Gynecomastia as a diagnostic marker for early onset of male infertility,” a profound revelation has surfaced: The urgent need for healthcare practitioners to incorporate fertility assessments seamlessly into the diagnostic framework for patients presenting with gynecomastia. Our exploration has illuminated the intricate relationship between gynecomastia and male infertility, highlighting the potential role of gynecomastia as a harbinger of underlying reproductive health issues. By meticulously scrutinizing gynecomastia cases and integrating fertility evaluations into the diagnostic process, healthcare professionals can unveil subtle indicators of male infertility at an early stage. This proactive approach not only facilitates the timely detection and intervention of fertility-related complications linked to gynecomastia but also ensures comprehensive patient care. By embracing this holistic perspective, clinicians can address the multifaceted dimensions of gynecomastia and mitigate the potential impact on reproductive health. Through meticulous attention to detail and a commitment to early diagnosis and intervention, we can pave the way for improved outcomes and enhanced quality of life for individuals affected by gynecomastia and male infertility.

7. References

1. Thiruchelvam P, Walker JN, Rose K, Lewis J, Al-Mufti R. Gynaecomastia. *BMJ*. 2016; 354.
2. Niewoehner CB, Schorer AE. Gynaecomastia and breast cancer in men. *Bmj*. 2008; 336(7646):709-713.
3. Pinelli M, Ceccarelli P, Bianchini MA, Pedrieri B, Iughetti L, De Santis G. Surgical management of adolescents with severe gynecomastia: Personal experience and outcome analysis. *Acta Bio Medica: Atenei Parmensis*. 2023; 94(2):e2023055.
4. Braunstein GD. Gynecomastia. *New England Journal of Medicine*. 2007; 357(12):1229-1237.
5. Chau A, Jafarian N, Rosa M. Male breast: Clinical and imaging evaluations of benign and malignant entities with histologic correlation. *The American Journal of Medicine*. 2016; 129(8):776-791.
6. Narula HS, Carlson HE. Gynaecomastia—pathophysiology, diagnosis and treatment. *Nature Reviews Endocrinology*. 2014; 10(11):684-698.
7. Cordova A, Moschella F. Algorithm for clinical evaluation and surgical treatment of gynecomastia. *Journal of plastic, reconstructive & aesthetic surgery*. 2008; 61(1):41-49.
8. Rew L, Young C, Harrison T, Caridi R. A systematic review of literature on psychosocial aspects of gynecomastia in adolescents and young men. *Journal of Adolescence*. 2015; 43(1):206-212.
9. Cuhaci N, Polat SB, Evranos B, Ersoy R, Cakir B. Gynecomastia: Clinical evaluation and management. *Indian Journal of Endocrinology and Metabolism*. 2014; 18(2):150.
10. Dickson G. Gynecomastia. *American family physician*. 2012; 85(7):716-722.
11. Pozza C, Selice R, Barbonetti A, Hasenmajer V, Lotti F, Menafra D, *et al*. Management of gynecomastia in adolescence and adults: The clinical practice guidelines from the Italian Society of Andrology and Sexual Medicine (SIAMS). *Journal of Endocrinological Investigation*, 2026, 1-28.
12. Barros AC, Sampaio MD. Gynecomastia: Physiopathology, evaluation and treatment. *Sao Paulo Medical Journal*. 2012; 130(3):187-197.
13. Carlson HE. Approach to the patient with gynecomastia. *The Journal of Clinical Endocrinology & Metabolism*. 2011; 96(1):15-21.
14. Johnson RE, Murad MH. Gynecomastia: Pathophysiology, evaluation, and management. In *Mayo Clinic Proceedings* 2009 Nov 1 (Vol. 84, No. 11, pp. 1010-1015). Elsevier.
15. Daniels IR, Laver GT. Gynaecomastia. *European Journal of Surgery*. 2001; 167(12):885-892.
16. Thonneau P, Marchand S, Tallec A, Ferial ML, Ducot B, Lansac J, *et al*. Incidence and main causes of infertility in a resident population (1 850 000) of three French regions (1988–1989). *Human reproduction*. 1991; 6(6):811-816.
17. Hull MG, Glazener CM, Kelly NJ, Conway DI, Foster PA, Hinton RA, *et al*. Population study of causes, treatment, and outcome of infertility. *British Medical Journal (Clinical research ed.)*. 1985; 291(6510):1693-1697.
18. Winters BR, Walsh TJ. The epidemiology of male infertility. *Urologic Clinics*. 2014; 41(1):195-204.
19. Malik SH, Coulson NS. Computer-mediated infertility support groups: An exploratory study of online experiences. *Patient education and counseling*. 2008; 73(1):105-113.
20. Keylor R, Apfel R. Male infertility: Integrating an old psychoanalytic story with the research literature. *Studies in Gender and Sexuality*. 2010; 11(2):60-77.