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Male breast cancer in Iraq: exploring the potential of chitotriosidase as a key diagnostic and prognostic biomarker

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ABSTRACT

Male breast cancer (MBC) is rare (accounting for less than 1% of all breast cancer cases worldwide), but remains a significant public health concern. The prevalence of MBC is rising, particularly in regions with limited epidemiological data, such as Iraq, where delayed diagnosis and low awareness exacerbate outcomes. This retrospective observational study was conducted at the Specialized Oncology Center in Tikrit (Iraq), between December 2020 and September 2024. A total of 24 patients were included, and key risk factors (such as hormone misuse, family history of cancer, and obesity) were assessed. Patients were stratified into four age groups for prevalence analysis. Descriptive and inferential statistical methods revealed that the highest incidence of MBC occurred in the 35–44 year group (N=7; 29.2%). Hormone use was most prevalent in the 25–34 year group (80%) and declined with advancing age. Obesity rates increased progressively from 40% in the 25–34 year group to 83% in the 55–70 year group. Similarly, the proportion of individuals reporting a family history of cancer rose from 20% to 67% across these respective age groups. Odds ratio (OR) calculations indicated that both obesity (OR: 2.10) and hormone use (OR: 1.93) were positively associated with increased MBC risk.

1. Introduction

Breast cancer remains a globally prevalent disease, primarily diagnosed in women, and is rare among men; less than 1% of cases involve

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male patients. Its rarity contributes to frequent misdiagnosis and delayed treatment[1]. A lack of qualified medical practitioners constitutes a principal challenge, often leading to substandard management and increased recurrence rates. Additionally, immunological and pathological treatment options are often complex due to limited early-stage medical attention[2]. Risk factors for male breast cancer (MBC) include obesity, hormone misuse, and genetic predisposition[3].

Chitotriosidase involvement in immune reactions suggests its potential utility in predicting MBC outcomes. Elevated levels of chitotriosidase in other cancers imply possible diagnostic relevance for MBC. This enzyme, associated with immune response and inflammation, has been reported to increase in various malignancies, supporting its putative role in MBC identification[4]. Growing evidence on BRCA1 and BRCA2 gene mutations in MBC underscores the importance of genetic screening and adjunctive early detection strategies[5]. The use of anabolic hormones has also been implicated in MBC, as exogenous androgens can disrupt endocrine balance, elevate oestrogen levels, and stimulate the development of breast tissue and tumorigenesis, particularly in younger males. Obesity, a well-established risk factor across multiple cancer types, contributes to a chronic inflammatory state. Adipose tissue–derived mediators, coupled with excess androgens, may facilitate oestrogen formation and promote carcinogenesis. These findings support the need for obesity prevention efforts in high-risk populations[6].

Given the current paucity of epidemiological data on MBC in Iraq, this study aimed at generating evidence that informs prevention, detection, and treatment strategies for Iraqi MBC patients.

2. Methodology

This retrospective observational study has analysed data from 24 MBC cases reported at the Specialized Oncology Center in Tikrit, Iraq, between December 2020 and September 2024. Patients were stratified into four age groups (i.e., 25–34, 35–44, 45–54, and 55–70 years), comprising: 5 cases (25–34 years), 7 cases (35–44 years), 6 cases (45–54 years), and 6 cases (55–70 years). Data on hormone use, obesity, and family history of cancer were collected. The self-reported use of anabolic steroids was defined as "hormone use". Obesity was identified as a body mass index (BMI) >30 kg/m^2. A family history was recorded if first-degree relatives had been diagnosed with cancer.

This study has received ethical approval from the Scientific Research Ethical Committee (SREC) of the College of Pharmacy, Tikrit University (approval number: SREC202012; December 2020). All participants have provided written informed consent, ensuring compliance with ethical standards for human research. Descriptive and inferential statistical methods were employed. Frequencies and percentages were calculated for the three risk factors across all age groups. Given the small sample size (N=24), the Kruskal–Wallis test was used in order to compare prevalence rates. Odds ratios (ORs) with 95% confidence intervals were calculated in order to assess associations with MBC. Statistical significance was set at $p<0.05$. All analyses were performed using the SPSS version 22 software.

3. Results and Discussion

The 35–44 year group exhibited the highest incidence of MBC (N=7; 29.2%), followed by the 45–54 and 55–70 year groups. Hormone use was most prevalent in the 25–34 year group (80%) and decreased with age, reaching 17% in the 55–70 year group. Obesity rates rose progressively with age, from 40% in the youngest group to 83% among the oldest. Similarly, the proportion of patients with a family history of cancer increased from 20% in the youngest group to 67% in the oldest (Table 1).

Kruskal–Wallis testing revealed statistically significant differences in hormone use, obesity, and family history across age groups ($p<0.05$). The undertaken OR calculations suggested that obesity (OR: 2.10) and hormone use (OR: 1.93) were associated with elevated MBC risk (Table 1).

These findings align with those of prior studies by Khan and Tirona[2] and by Bhardwaj *et al.*[3], which

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Table 1. Overview of the study's male breast cancer (MBC) cases, risk factor distribution, and statistical analysis. The latter was conducted using the Kruskal–Wallis test, with $p<0.05$ considered as statistically significant. Approximate odds ratios (ORs) are provided in order to assess the relative likelihood of MBC development associated with each risk factor across age categories. These data illustrate age-related patterns in risk factor prevalence and their potential contribution to disease occurrence.

Age group	Cases	Hormone use	Obesity	Family history	*p*-value	OR (approx.)
25–34 years	5	4 (80%)	2 (40%)	1 (20%)	0.028 *	1.93
35–44 years	7	5 (71%)	3 (43%)	2 (29%)	0.028 *	2.10
45–54 years	6	3 (50%)	4 (67%)	3 (50%)	0.020 *	0.91
55–70 years	6	1 (17%)	5 (83%)	4 (67%)	—	—

have reported increased MBC risk with age, lifestyle factors, and hormone exposure. The pronounced hormone use in the 25–34 year group affirms earlier observations linking anabolic steroid misuse in younger males to MBC. Similarly, the obesity's rising prevalence with age is consistent with studies by Seiler *et al.*[6] and Fox *et al.*[7], which have underscored its role in oestrogen elevation and carcinogenesis. Moreover, Lei *et al.*[8] have reported a positive correlation between family history and MBC, thereby supporting our findings. Collectively, our statistical analysis reveals robust associations between MBC and all three investigated risk factors.

4. Conclusion

Our study demonstrates that MBC among Iraqi males is strongly associated with hormone misuse, obesity, and family history of cancer. These findings advocate for targeted public health interventions, including nationwide awareness campaigns and preventive measures, particularly those addressing hormone use among younger males.

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Conflicts of interest

None exist.

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