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REVIEW **Open Access**

From Fibroadenomas to Phyllodes: Unravelling the Spectrum and Clinical Profile of Benign Breast Diseases

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ABSTRACT

Benign breast diseases (BBD) encompass a wide array of non-malignant conditions that are among the most common breast-related complaints in females, often leading to significant physical discomfort and psychological distress due to their symptomatic overlap with breast cancer. These conditions range from simple cysts and fibroadenomas to proliferative lesions with or without atypia, each with distinct clinical implications and risks. This comprehensive review examines the epidemiology, classification, clinical presentations, diagnostic approaches, management strategies, and the associated risk of progression to malignancy in BBD. Drawing on recent literature, including systematic reviews, meta-analyses, and cohort studies, it is evident that BBD affects millions of women globally, with fibrocystic changes and fibroadenomas being the most prevalent. While most BBDs pose minimal risk, certain proliferative lesions, such as atypical hyperplasia, significantly elevate breast cancer risk, necessitating tailored surveillance and prevention strategies. The review underscores the importance of multidisciplinary care, integrating clinical evaluation, advanced imaging, and histopathological confirmation to optimise patient outcomes and alleviate anxiety. Key insights highlight the role of hormonal, genetic, and lifestyle factors in BBD development and the need for personalised risk assessment models to enhance clinical management.

Keywords: breast disease, breast cancer, psychological distress, BBDs

INTRODUCTION

Benign breast diseases (BBD) represent a heterogeneous group of non-cancerous conditions that account for the majority of breast-related clinical consultations, far outnumbering malignant diagnoses [3]. These disorders are characterized by diverse pathological changes in breast tissue, manifesting as palpable lumps, mastalgia (breast pain), nipple discharge, or incidental findings on imaging [4]. The clinical significance of BBD lies in its symptomatic burden, its potential to mimic malignancy, and, for certain subtypes, its association with an increased risk of breast cancer [5]. Historically, BBD has been a source of considerable patient anxiety due to diagnostic uncertainty, often prompting extensive evaluation to rule out malignancy [6].

The study of BBD has evolved significantly since the mid-20th century when early cohort studies began to elucidate the link between specific benign lesions and subsequent breast cancer risk [7]. For instance, long-term follow-up of women
with biopsy-proven BBD revealed elevated cancer incidence compared to the general population, particularly for proliferative lesions [8]. In modern practice, advancements in imaging technologies, such as digital mammography and high-resolution ultrasound, have improved detection rates, while minimally invasive techniques like core needle biopsy (CNB) have enhanced diagnostic precision [9]. These developments have shifted clinical management towards risk-stratified approaches, balancing conservative observation with targeted interventions for high-risk cases [10].

Epidemiologically, BBD is ubiquitous, with an estimated one million women diagnosed annually in the United States alone [11]. The prevalence peaks during reproductive years (20-50 years), driven by hormonal fluctuations, particularly in estrogen and progesterone levels, which influence ductal and lobular epithelium proliferation [12]. Globally, regional variations are noted, potentially due to differences in screening practices, lifestyle factors, and genetic predispositions. For example, fibrocystic changes affect over 50% of women over 30, while fibroadenomas are reported in up to 25% of females, with higher rates in younger populations [13]. In developing countries like India, fibroadenomas dominate, comprising 40-60% of BBD cases, often presenting in the second and third decades of life [14].
The pathophysiology of BBD is complex, involving hormonal imbalances, genetic factors, and environmental influences [15]. Studies have explored potential endocrine abnormalities, such as elevated free estradiol or subnormal androgen levels, though consistent patterns remain elusive [16]. Biochemical analyses of cyst fluid have identified elevated levels of androsterone sulfate, dehydroepiandrosterone sulfate, and carcinoembryonic antigen in fibrocystic disease, suggesting potential diagnostic markers [16]. Lifestyle factors, including smoking and obesity, are implicated in inflammatory BBD, while family history and mammographic density amplify risk for proliferative lesions [17].
The clinical challenge of BBD lies in differentiating benign from malignant conditions, as symptoms like lumps and discharge often overlap [18]. The obstetrician-gynecologist or breast specialist plays a pivotal role in initial assessment, employing a combination of clinical breast examination, imaging, and biopsy when indicated [19]. Management strategies range from reassurance and symptom relief for low-risk lesions to surgical excision and chemoprevention for high-risk cases [20]. This review aims to provide a detailed exploration of the spectrum and clinical profile of BBD in females, synthesizing evidence from recent studies to guide clinical practice. It addresses epidemiology, classification, clinical features, diagnostic modalities, management approaches, and malignancy risks, highlighting the need for personalized strategies to improve outcomes and reduce patient distress.

EPIDEMIOLOGY

Benign breast diseases (BBD) are among the most common breast conditions, accounting for approximately 75-90% of breast biopsy diagnoses and a significant proportion of clinical consultations [3,11]. In the United States, an estimated one million women receive a BBD diagnosis annually, reflecting its substantial public health impact [11]. Globally, BBD predominates in clinical breast presentations, with only 3-6% of cases attributed to malignancy, yet the overlap in symptoms drives extensive diagnostic evaluations [13]. The prevalence of BBD varies by age, hormonal status, and geographic region, influenced by screening practices and lifestyle factors [14].
Age is a critical determinant of BBD epidemiology, with peak incidence during reproductive years (20-50 years), coinciding with cyclical hormonal changes [12]. Cohort studies report a mean age of 46-51 years at benign biopsy, with subsequent breast cancer diagnoses occurring around 56 years, suggesting a latency period for malignant transformation in high-risk cases [8]. Adolescents and perimenopausal women are also affected, with fibroadenomas prevalent in younger groups and cysts more common in older women approaching menopause [18]. The menopausal transition enhances detection due to increased screening mammography and hormonal shifts that exacerbate lesion formation [10].
Specific BBD subtypes exhibit distinct prevalence patterns. Fibrocystic changes, characterized by cysts, fibrosis, and hyperplasia, affect over 50% of women over 30, making it the most common benign condition [13]. Fibroadenomas, the most frequent benign tumor, are reported in up to 25% of women, with higher incidence in younger populations [14]. Mastalgia affects approximately 50% of women, often linked to hormonal cycles, while inflammatory conditions like nonpuerperal mastitis occur in 5-9% of cases, particularly among smokers [5,15]. In a retrospective cohort of 4,819 women with percutaneous biopsies, nonproliferative lesions (NP) were the most common, followed by proliferative lesions without atypia (PDWA) and atypical hyperplasia (AH), with a median follow-up of 10.9 years [8].
Risk factors for BBD include hormonal, genetic, and lifestyle elements. Family history of breast cancer, particularly in first-degree relatives, increases the likelihood of proliferative lesions [17]. Mammographic density, especially ≥25% fibroglandular tissue, is associated with a doubled risk of biopsy-proven BBD (odds ratio [OR] 1.91) [9]. Reproductive factors, such as nulliparity and later age at first birth, are linked to higher rates of proliferative disease [17]. A systematic review of 67 studies found positive associations between BBD risk and age at biopsy, family history, and mammographic density, but no consistent links with body mass index (BMI), alcohol consumption, smoking, age at menarche, or hormonal contraceptive use [17]. In contrast, smoking is a strong risk factor for inflammatory BBD, such as periductal mastitis, due to its impact on ductal epithelium [15].
Regional variations highlight the influence of healthcare access and cultural factors. In India, studies report fibroadenomas comprising 40-60% of BBD cases, with a younger age distribution (20-30 years) compared to Western populations [14]. In Saudi Arabia, benign lesions dominate in females aged 11-60, reflecting similar age trends but differences in lesion type due to screening disparities [4]. Racial and socioeconomic disparities also exist, with higher BBD

rates in certain populations, though data are inconsistent due to underreporting and variable diagnostic criteria [16].

Long-term cohort studies have established BBD as a marker for increased breast cancer risk, with incidence rates 2.1 times higher than the general population [7]. In modern cohorts, standardized incidence ratios (SIR) for breast cancer are 1.95 overall, rising to 3.10 for ductal carcinoma in situ (DCIS) [8]. Lesion multiplicity amplifies risk, with SIRs reaching 5.29 for women with three or more foci of atypical hyperplasia [8]. Ten-year cumulative breast cancer incidence is 4.3% for nonproliferative lesions, 6.6% for proliferative lesions without atypia, and 14.6% for atypical hyperplasia, compared to 2.9% expected in the general population [8]. These data underscore the importance of subtype-specific epidemiology in guiding surveillance.

The heterogeneity in BBD definitions complicates epidemiological studies, as clinical and histological criteria vary across regions [17]. Biopsy-confirmed cases provide the most robust data, but population-based studies are limited by reliance on symptomatic presentations [9]. Future research should focus on subtype-specific incidence rates, modifiable risk factors, and the impact of screening programs to inform prevention strategies and reduce the burden of BBD-related healthcare utilization.

CLASSIFICATION

The classification of benign breast diseases (BBD) is critical for risk stratification, guiding clinical management, and informing patients about their breast cancer risk [2]. The most widely adopted histological classification system, developed from cohort studies and meta-analyses, categorizes BBD into three main groups based on their association with breast cancer risk: nonproliferative lesions (NP), proliferative lesions without atypia (PDWA), and proliferative lesions with atypia (atypical hyperplasia, AH) [2,8].

NONPROLIFERATIVE LESIONS

Nonproliferative lesions are the most common and carry minimal to no increased risk of breast cancer (relative risk [RR] 1.17-1.27) [2]. These include simple cysts, duct ectasia, mild hyperplasia (less than fourfold epithelial proliferation), and apocrine metaplasia [18]. Simple cysts, often detected in perimenopausal women, are fluid-filled sacs that may cause tenderness but are benign [13]. Duct ectasia results from ductal dilatation and inspissated secretions, sometimes leading to nipple discharge [18]. Fibroadenomas, though sometimes classified separately as fibroepithelial tumors, are typically included here when simple, with low malignancy risk unless complex features (e.g., cysts, sclerosing adenosis) are present [13]. These lesions are often incidental findings on imaging or biopsy and require minimal intervention unless symptomatic [19].

PROLIFERATIVE LESIONS WITHOUT ATYPIA

Proliferative lesions without atypia involve increased epithelial cell proliferation but lack cytologic abnormalities, conferring a moderate breast cancer risk (RR 1.76-1.88) [2]. This category includes usual ductal hyperplasia (UDH), sclerosing adenosis, radial scars, and intraductal papillomas [9]. UDH is characterized by benign epithelial proliferation within ducts, while sclerosing adenosis involves lobular proliferation and fibrosis, often mimicking malignancy on imaging [9]. Radial scars and complex sclerosing lesions present as stellate masses, requiring biopsy due to their radiographic similarity to carcinoma [9]. Intraductal papillomas, often associated with nipple discharge, are benign tumors within ducts but may harbor atypical features, increasing risk [18]. These lesions warrant closer monitoring, particularly when multiple or associated with other risk factors [8].

PROLIFERATIVE LESIONS WITH ATYPIA

Proliferative lesions with atypia, including atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH), are considered high-risk precursors to breast cancer, with an RR of 3.93-4.24 [2]. ADH shares histological features with ductal carcinoma in situ (DCIS), such as atypical epithelial cells filling ducts, but is limited in extent [20]. ALH involves atypical cells in lobules, resembling lobular carcinoma in situ (LCIS) [20]. Variants like flat epithelial atypia (FEA) and lobular neoplasia are increasingly recognized as risk markers [9]. These lesions are often detected on biopsy for suspicious imaging findings and require surgical excision due to a significant risk of upgrade to malignancy (up to 30% for ADH) [20]. Lesion multiplicity further amplifies risk, with three or more foci of AH associated with a SIR of 5.29 for breast cancer [8].

ALTERNATIVE CLASSIFICATIONS

Alternative classification systems exist, such as the Page system, which emphasizes epithelial hyperplasia as a premalignant feature, categorizing lesions by degree of proliferation and atypia [16]. Clinically, BBD is sometimes grouped into cysts (managed by aspiration) and solid lesions (requiring biopsy) for practical purposes [16]. Fibrocystic disease, a broad term, encompasses cysts, fibrosis, and hyperplasia, though its use has declined due to lack of specificity [7]. Imaging-based classifications, such as the Breast Imaging-Reporting and Data System (BI-RADS), categorize findings from 0 (incomplete) to 5 (highly suggestive of malignancy), guiding diagnostic workup [20]. Biopsy results are further classified as B1 (normal), B2 (benign), B3 (uncertain malignant

potential), B4 (suspicious), or B5 (malignant), with B3 lesions often requiring excision due to upgraded risk [13].

OTHER SUBTYPES

Distinct entities include phyllodes tumours, which range from benign to malignant, requiring wide surgical margins due to recurrence risk (0.1-16.7%) [20]. Pseudoangiomatous stromal hyperplasia (PASH) presents as a benign stromal proliferation, often incidental, while mucocele-like lesions may mimic malignancy [9]. Inflammatory BBD, such as mastitis and abscesses, is classified separately due to its infectious or autoimmune aetiology [18]. Hamartomas and lipomas are rare benign tumours with low malignant potential [13].

CHALLENGES AND ADVANCES

The heterogeneity of BBD complicates classification, as histological features may overlap, and interobserver variability among pathologists can affect risk assessment [17]. Lesion multiplicity, size, and associated calcifications influence categorization and prognosis [8]. Emerging protocols for systematic reviews aim to standardize subtype-specific risk estimates, while molecular markers, such as Ki-67 expression or genetic alterations, hold promise for refining classifications beyond histology [15]. Integrating these advances could enhance precision in identifying high-risk patients for targeted surveillance.

CLINICAL PRESENTATION

The clinical presentation of benign breast diseases (BBD) is diverse, often mimicking malignancy, which poses diagnostic challenges and contributes to patient anxiety [5]. Common symptoms include mastalgia, palpable masses, nipple discharge, inflammatory changes, and incidental imaging findings, with variations by age, hormonal status, and lesion subtype [18].

MASTALGIA

Mastalgia, or breast pain, is the most common symptom, affecting over 50% of women at some point, with cyclic pain accounting for two-thirds of cases [13]. Cyclic mastalgia is linked to hormonal fluctuations, peaking premenstrually and often affecting both breasts diffusely [19]. It significantly impairs quality of life in 30-40% of women, interfering with daily activities, sleep, and sexual function [19]. Noncyclic mastalgia, less common, is typically unilateral and associated with specific lesions like cysts, sclerosing adenosis, or inflammatory conditions [18]. In a cohort study, mastalgia was the primary complaint in 45% of BBD consultations, underscoring its prevalence [4].

PALPABLE MASSES

Palpable masses are a frequent presentation, particularly in younger women, with fibroadenomas being the most common aetiology [14]. Fibroadenomas are smooth, mobile, rubbery lumps, typically 1-3 cm, and are often asymptomatic unless large or painful [13]. In perimenopausal women, cysts present as tender, fluctuant masses, sometimes multiple, and are associated with fibrocystic changes [18]. Complex masses, such as radial scars or phyllodes tumors, may cause architectural distortion or skin changes, mimicking malignancy [9]. In adolescents, breast masses or asymmetry are common, often related to normal development or juvenile fibroadenomas [19]. Approximately 70% of palpable masses in women under 40 are benign, but thorough evaluation is critical [3].

NIPPLE DISCHARGE

Nipple discharge is a concerning symptom, particularly when pathologic (spontaneous, unilateral, or bloody), as it is associated with malignancy in 5-21% of cases [19]. Benign causes include intraductal papillomas (50% of cases), duct ectasia (25-35%), and fibrocystic changes [18]. Physiologic discharge, often bilateral and multi-ductal, is triggered by breast stimulation or hormonal changes [19]. Galactorrhea, linked to hyperprolactinemia, is distinct and requires endocrine evaluation [18]. In a study of 1,000 women with nipple discharge, benign etiology was confirmed in 85%, but persistent or bloody discharge necessitated further investigation [4].

INFLAMMATORY CONDITIONS

Inflammatory presentations include mastitis and abscesses, with puerperal mastitis occurring in 2-50% of breastfeeding women, presenting with pain, redness, and fever [15]. Nonpuerperal mastitis, affecting 5-9% of women, is often linked to smoking and may progress to abscess formation [15]. Granulomatous mastitis, a rare autoimmune condition, mimics carcinoma with painful masses and skin changes [18]. These conditions require prompt diagnosis to differentiate from inflammatory breast cancer [5].

OTHER PRESENTATIONS

Skin changes, such as dimpling, erythema, or peau d'orange, are rare in BBD but may occur with radial scars or inflammatory lesions, necessitating careful evaluation [5]. Incidental findings on screening mammography, such as microcalcifications or nonpalpable masses, are increasingly common, with 70-80% of biopsies confirming benign aetiology [20].

Bilateral symptoms are more suggestive of benignity, while unilateral, fixed, or irregular masses raise concern for malignancy [7]. Lesion size, multiplicity, and associated features like calcifications influence presentation and diagnostic urgency [8].

PSYCHOLOGICAL IMPACT

The psychological impact of BBD is significant, as fear of breast cancer drives many consultations [6]. Studies report that 60% of women with BBD experience anxiety related to diagnostic uncertainty, emphasising the need for clear communication and reassurance [6]. A thorough history, including symptom duration, cyclicity, and risk factors (e.g., family history, hormonal therapy), is essential for guiding evaluation and alleviating distress [19].

DIAGNOSIS

Accurate diagnosis of benign breast diseases (BBD) is critical to exclude malignancy and guide management, relying on a multimodal approach known as the triple test: clinical breast examination (CBE), imaging, and biopsy when indicated [19]. This strategy achieves high sensitivity and specificity, minimising missed diagnoses [10].

CLINICAL BREAST EXAMINATION

CBE is the cornerstone of initial assessment, evaluating for palpable masses, asymmetry, skin changes, nipple discharge, and lymphadenopathy [19]. A detailed history assesses symptom characteristics (e.g., cyclicity of pain, discharge nature), risk factors (family history, hormonal therapy), and reproductive history [18]. CBE is particularly effective in younger women with dense breasts, where imaging may be less sensitive [20].

IMAGING

Imaging modalities are tailored by age and presentation. Ultrasound is the preferred initial modality for women under 35 due to its high sensitivity in dense breasts and ability to differentiate cystic from solid masses [20]. Mammography, particularly digital, is recommended for women over 35, detecting microcalcifications and architectural distortion [9]. Magnetic resonance imaging (MRI) is reserved for high-risk patients, dense breasts, or discordant findings, offering superior sensitivity for complex lesions [20]. The BI-RADS system categorizes imaging findings from 0 (incomplete) to 5 (highly suggestive of malignancy), guiding further workup [20]. For example, BI-RADS 3 lesions (probably benign) have a <2% malignancy risk and are monitored, while BI-RADS 4 or 5 require biopsy [20].

BIOPSY AND CYTOLOGY

Core needle biopsy (CNB) is the gold standard for suspicious lesions, providing histological confirmation with high accuracy [9]. Vacuum-assisted biopsy (VAB) is used for microcalcifications or small lesions, improving sampling [9]. Fine needle aspiration (FNA) is less common but useful for cyst aspiration or palpable masses in resource-limited settings [18]. Cytology for nipple discharge has low sensitivity (35-47%) but can identify malignant cells [19]. Galactography or ductoscopy may be used for pathologic discharge to localise intraductal lesions [19]. Radiologic-pathologic concordance is critical, with multidisciplinary review ensuring accuracy, particularly for B3 lesions (uncertain malignant potential) [9].

FOLLOW-UP

Following a benign biopsy, short-term imaging follow-up (6, 12, 24 months) is recommended to detect interval changes, with 13% of cases requiring re-biopsy due to progression [10]. High-risk lesions like atypical hyperplasia often necessitate surgical excision due to a 15-30% upgrade rate to malignancy [20]. Advances in molecular diagnostics, such as immunohistochemistry for proliferation markers, are emerging to enhance risk stratification [15].

CHALLENGES

Diagnostic challenges include interobserver variability in pathology, overlapping imaging features, and patient anxiety [17]. Multidisciplinary discussion, involving radiologists, pathologists, and surgeons, is essential for complex cases [9]. Emerging technologies, such as artificial intelligence in mammography interpretation, hold promise for improving diagnostic accuracy [10].

MANAGEMENT

Management of benign breast diseases (BBD) focuses on symptom relief, exclusion of malignancy, and risk reduction for high-risk lesions, tailored to the specific subtype and patient preferences [10]. Strategies range from conservative observation to surgical intervention, with patient education playing a critical role in reducing anxiety [6].

MASTALGIA

For mastalgia, non-pharmacologic interventions are first-line, including well-fitted supportive bras, dietary modifications (e.g., reducing caffeine), and exercise, which achieve symptom relief in up to 85% of cases [19]. Pharmacologic options include topical nonsteroidal anti-inflammatory drugs (NSAIDs) like diclofenac gel, which reduce pain by 60% in trials [19]. Flaxseed supplementation (25 g/day) has shown efficacy in cyclic mastalgia [19]. Off-label use of

tamoxifen (10 mg/day) or danazol is reserved for severe, refractory cases due to side effects, with tamoxifen reducing pain in 70% of patients [19]. Evening primrose oil, once popular, lacks consistent evidence [18].

PALPABLE MASSES

Simple fibroadenomas in young women are often observed if <2 cm, stable, and confirmed benign by biopsy, with spontaneous regression in 10-15% of cases [13]. Excision is indicated for growth, size >2 cm, patient preference, or atypical features [20]. Complex fibroadenomas or phyllodes tumors require surgical excision with wide margins due to recurrence risk (0.1-16.7% for phyllodes) [20]. Cysts are managed by aspiration if symptomatic, with fluid analysis if bloody [18]. Radial scars and sclerosing lesions typically require excision due to malignancy risk (7-10%) [9].

NIPPLE DISCHARGE

Pathologic nipple discharge, particularly if bloody or unilateral, warrants investigation with imaging and possible duct excision [19]. Intraductal papillomas are excised if atypical or incompletely removed by biopsy, as 16% may upgrade to malignancy [19]. Physiologic discharge is managed conservatively with reassurance [18].

INFLAMMATORY CONDITIONS

Puerperal mastitis is treated with antibiotics (e.g., dicloxacillin) and continued breastfeeding, while nonpuerperal mastitis may require broader-spectrum antibiotics or steroids for granulomatous cases [15]. Abscesses necessitate ultrasound-guided drainage or surgical intervention [15]. Smoking cessation is critical for recurrent nonpuerperal mastitis [15].

HIGH-RISK LESIONS

Atypical hyperplasia (ADH, ALH) requires surgical excision due to a 15-30% upgrade rate to DCIS or invasive cancer [20]. Chemoprevention with tamoxifen or raloxifene reduces breast cancer risk by 38% in high-risk patients, though uptake is low due to side effects [2]. Enhanced surveillance with annual mammography and MRI is recommended for AH [10]. Hormone therapy (e.g., estrogen-alone) may reduce BBD risk, but combined estrogen-progestin therapy increases risk and requires cautious use [10].

FOLLOW-UP AND EDUCATION

Follow-up involves imaging and CBE at 6, 12, and 24 months for benign lesions, with more frequent monitoring for high-risk cases [10]. Patient education on self-examination, risk factors, and benign nature of most lesions reduces anxiety and improves compliance [6]. Lifestyle modifications, such as weight management and smoking cessation, are encouraged to mitigate risk [17].

RISK OF MALIGNANCY

Benign breast diseases (BBD) confer a spectrum of breast cancer risks, with an overall relative risk (RR) of 1.56, persisting for up to 25 years post-diagnosis [2]. Risk varies by histological subtype, with nonproliferative lesions (NP) at RR 1.27, proliferative lesions without atypia (PDWA) at RR 1.88, and atypical hyperplasia (AH) at RR 3.93-4.24 [2]. Lesion multiplicity amplifies risk, with standardized incidence ratios (SIR) reaching 5.29 for three or more foci of AH [8].

Specific subtypes carry elevated risks. Complex cysts have a 23-31% malignancy rate, intraductal papillomas 16%, and radial scars 7-10% [13]. Atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH) are premalignant, with 15-30% upgrading to DCIS or invasive cancer on excision [20]. Flat epithelial atypia and lobular neoplasia also increase risk, though to a lesser extent [9].

Risk factors amplifying malignancy include family history (1.93-fold increased risk), older age at biopsy, nulliparity, and high mammographic density (up to 5.3-fold) [17]. Calcifications, particularly in proliferative lesions, further elevate risk [9]. Historical cohorts from 1940-1975 showed fibrocystic disease with hyperplasia as a strong precursor, with modern studies confirming these findings [7].

Post-benign biopsy, the cumulative breast cancer incidence at 10 years is 4.3% for NP, 6.6% for PDWA, and 14.6% for AH, compared to 2.9% expected [8]. Within two years of a benign biopsy, 1.9% of women develop cancer, emphasizing the need for vigilant follow-up [10]. All BBD subtypes increase risk to some degree, with proliferative lesions requiring the most aggressive surveillance [15].

Emerging molecular markers, such as Ki-67 and estrogen receptor expression, may refine risk prediction, while lifestyle interventions (e.g., weight loss, smoking cessation) could mitigate progression [17]. Personalized risk models integrating histology, imaging, and genetic factors are needed to optimize prevention strategies [15].

CONCLUSION

Benign breast diseases (BBD) represent a diverse spectrum of conditions, ranging from innocuous fibrocystic changes to high-risk proliferative lesions, with clinical presentations including mastalgia, masses, nipple discharge, and inflammatory changes. The high prevalence, affecting millions annually, underscores their public health significance, particularly in reproductive-age women. Accurate diagnosis via the triple test (clinical examination, imaging, biopsy) is

essential to differentiate BBD from malignancy, while management strategies balance symptom relief, risk stratification, and patient reassurance. Nonproliferative lesions require minimal intervention, while atypical hyperplasia necessitates surgical excision and chemoprevention due to significant cancer risk. Advances in imaging, biopsy techniques, and molecular diagnostics hold promise for improving precision in diagnosis and risk assessment. Future research should focus on personalized prevention strategies, including lifestyle interventions and targeted therapies for high-risk subgroups, to reduce breast cancer incidence and alleviate the psychological burden of BBD. Multidisciplinary care and patient education remain pivotal in optimizing outcomes and enhancing quality of life.

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