A REVIEW OF THE PATHOPHYSIOLOGY OF CYSTS DISEASES AND THEIR THERAPEUTIC STRATEGIES

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Abstract
The cyst is a closed sac, with a distinct membrane and division over adjacent tissue. It may contain air, liquids, or semi-solid. In this review, we will highlight the types and causes of cysts, while presenting some of the currently approved treatment strategies. Ultrasonography (USG), computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) CT represent the conventional imaging modalities employed for the diagnosis of cysts.There are many studies that point to many reasons that may lead to polycystic diseases, including hormonal disorders, various inflammations, and some diseases of the immune system, without neglecting these studies the role of unbalanced nutrition in causing these cysts. There is also an effective role for oxidative stress in the occurrence of such cysts. Modern management of cysts has been classified into minimally invasive, non-surgical, and advanced surgery. In addition many traditional and herbal remedies report clinical or preclinical success in cyst related conditions. Finally, we point out that cysts are the result of disorders in the body that can be benign without effects and others with pathogenic effects that reach the occurrence of some cancers. Accordingly, with the presence of treatments, prevention remains the best way to prevent their occurrence

Key words: Cysts, hormonal disorders, inflammation, oxidative stress, treatment strategy

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1. Introduction

Cysts are fluid-filled sacs that can develop in tissues in any part of the body. They are relatively common, and there are many different types. Cysts are holes in tissue, either lined by epithelium (true cysts) or surrounded by granulation tissue and/or compressed connective tissue (pseudocysts). There are two possible fillings for the cavity: liquid or semi-solid content [1]**.** In the general population, hepatic cysts are common (2.5% to 18%), generally accidental and asymptomatic diseases. These are distinct, fluid-filled lesions that may or may not have an epithelial lining. The cystic component may consist of bilious, serous, mucinous, necrotic, hemorrhagic, proteinaceous, or mixed fluid, depending on the nature of the lesion [2]. Depending on where they are located, cysts in the human body can cause a variety of problems. Infections from liver cysts may necessitate aspiration, antibiotics, or even liver transplants as therapies [3,4].Hydatid cysts are frequently discovered in the liver and lungs. They can induce serious problems such intraperitoneal rupture, biliary system rupture, secondary infection, or propagation to other organs. Often, these symptoms call for rapid surgical intervention [5]. Thyroid nodules are extremely frequent incidental discoveries; ultrasonography may identify them in up to 67% of the general population, and 15% to 25% of thyroid nodules are cystic [6]. Approximately 12 million individuals worldwide suffer with autosomal-dominant polycystic kidney disease (ADPKD), which is the most prevalent genetic renal illness and the fourth major cause of kidney failure at the moment [7]. The term "sebaceous cyst" is commonly applied to any superficial mass that is believed to have a cystic character. True sebaceous cysts are really less prevalent. They are present on every part of the body that bears hair and contain sebum. Steatocystomas, pilar cysts (sometimes called astrichilemmal cysts), and epidermal inclusion cysts are further histologic forms [8]. Based on odontogenesis, oral cysts can be classified as either non-odontogenic cysts (non-OCs) or odontogenic cysts (OCs). Anatomical factors, histological resemblances to odontogenic structures, and particular odontogenic markers define the first category. The second category consists of cysts that come from certain organs or regions of the mouth, such as nasolabial cysts, salivary cysts, and naso-palatine duct/mid-palatine cysts. This category also includes several cysts that are found all over the body, such aneurysmal bone cysts, lymphoepithelial cysts, and dermoid cysts [9]. Pineal cysts (PCs) are frequently discovered by incidental findings during intracranial imaging, in clinical neurology when MRI is used extensively. Cyst prevalence in adults is thought to range between 1.3% and 4.3% [10]. The cysts are composed of an exterior fibrous capsule, a middle layer of pineal tissue, and an inner layer of glial tissue, according to immunohistochemistry [11]. The growth and development of cysts require the activation of immune response through the interaction of antigens, microorganisms, fibroblasts, and growth factors, leading to the release of diverse cytokines and subsequent rapid cell proliferation [12]. Furthermore, the necrotic and deteriorating cells located within the cyst cavity release an excessive quantity of molecular substances, consequently increasing the osmotic pressure within the cyst void. This leads to the movement of fluid from surrounding tissues into the cyst lumen. As a result, there is an increased pressure within the cyst, which may lead to bone resorption by osteoclasts and ultimately enlargement of the cyst [13]. Oxidative damage due to free radicals is associated with vascular disease[14]Moreover, a disparity in the levels of oxidants and antioxidants, a hallmark of oxidative stress, has been linked to the formation of cysts [15]. Cyst problems underscore the significance of timely detection and suitable therapy approaches in preventing severe outcomes [16]. The objective of this review is highlight the types and causes of cysts, while presenting some of the currently approved treatment strategies focusing to underscores the complex interplay between oxidative stress and cyst genesis, underscoring the significance of comprehending and addressing oxidative stress in conditions related to the cysts.

2. Research Methodology

This review gathered, examined, and summarized the literature on cysts diseasepathophysiology, mechanism of disease, and treatment mechanism. PubMed, ScienceDirect, SpringerLink, Web of Science, Scopus, Wiley Online, Science, and Google Scholar, as well as numerous patient offices, use scientific search engines such as PubMed, ScienceDirect, SpringerLink, Web of Science, Scopus, Wiley Online, Science, and Google Scholar (e.g., WIPO, CIPO, USPTO) were used to collect all published articles about this disease. The term cysts disease' is frequently used, either alone or in combination with the terms ‘inflammation, ‘Ovary polycystic syndrome, Oxidative stress, Hormones and ‘treatment strategy.' There were no language limitations. The titles, abstracts, and contents of the collected data were used to identify and manipulate them. The reference lists of the retrieved papers were also looked at to see if there were any other papers that were relevant.

3. Diagnostic methods for cystic diseases

Ultrasonography (USG), computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) CT represent the conventional imaging modalities employed for the diagnosis of cysts. USG has great sensitivity and accuracy (95%) for nasolabial cysts [17]**.**CT improves spatial resolution but has worse soft tissue differentiation and needs ionizing radiation. However, MRI provides greater soft tissue contrast and characterization at a higher cost. PET CT provides functional information; but with poorer spatial resolution for cystic mediastinal masses [18].

Furthermore, endoscopic mammocystoscopy (EMCS) and X-ray pneumocystography (RPCG) are employed to diagnose complicated breast cysts, with EMCS giving direct visual contact with neoplasms and facilitating biopsy navigation [19]. Current diagnostic methods for liver cysts include abdominal imaging techniques like ultrasonography, computed tomography, and magnetic resonance imaging, which are crucial for detecting hepatic cysts, especially incidental findings [20]. However, the literature highlights the challenges in accurately diagnosing liver cysts due to definitional variations, with different types of cysts being identified, such as ductal plate malformation related, neoplastic,
Infectious/inflammatory, congenital, and

miscellaneous [21]. Minimally invasive surgical techniques, such as drainage guided by ultrasound and laparoscopic drainage with video assistance, have demonstrated encouraging outcomes in the management of non-parasitic liver cysts, thereby improving patient recovery and overall results [22].
Biomarkers are of significant importance in the early detection of liver cysts as they play a critical role in identifying specific proteins and nucleic acids that serve as indicators for the presence of these cysts. [23]. _Additionally, the use of mass spectrometry for multiplex detection of nucleic acids and proteins, such as miRNA 223 and alpha-fetoprotein (AFP), can provide high sensitivity in complex serum samples, facilitating rapid screening for liver cancers, including cysts [24]. Biomarkers are important for the timely identification of hepatocellular carcinoma (HCC), a possible complication of liver cysts. In this context, promising investigational biomarkers such as miRNA are currently under investigation for potential clinical application [25]. Diagnosis of hydatid cysts is a challenging endeavour owing to the heterogeneous clinical manifestations they exhibit, alongside the potential for misinterpretation as other medical pathologies. Various diagnostic methodologies including radiological imaging, serological tests, and fine needle aspiration cytology have been deliberated [26,27].
Overall each modality possesses unique strengths and limitations[17].

4. Pathophysiology of Cyst

4.1. Role of Hormonal disorders

The cyst is a closed sac, with a distinct membrane and division over adjacent tissue. It may contain air, liquids, or semi-solids. It may be single or multiple, single-spaced, or a large area may be separated by barriers. Most cysts in the body are benign (dysfunctional) tumors, the result of blockage of ducts or other natural body outlets for secretions[28]. The formation of these cysts can be linked to hormonal and metabolic changes that lead to their appearance in various parts of the body, whether internally or externally. A study by Jakubowska et al. 2002 To find out the cause of breast cyst formation. It is believed that the relative imbalance between estrogen and progesterone levels plays a role here. The estrogen level tends to be normal, but there is usually a deficiency of progesterone in the second part of the cycle, which is often the result of atelectasis of the corpus luteum. A relative increase in estrogen causes proliferation of epithelial and interstitial cells of connective tissue and milk duct tissue. As a result of obstruction and accumulation of effusions, abscesses are formed [29]. The relationship between sex hormones and breast tumors has been known for a long time and has been confirmed in experimental biological models [30].

In another study byBiscegliaet all. (2006) to investigate how cystic kidney disease occurs. They found that a decreased androgen/estrogen ratio and an increased estrogen value could be responsible for the effect of estrogen receptors on tubular epithelial cell proliferation, an event that is further enhanced by the action of regulatory peptides such as epidermal growth factor (EGF). Epithelial stimulation is more pronounced in men because male tissues are less adapted than female tissues to high estrogen values. Moreover, low androgen, which is more pronounced in male patients than in females, is responsible for EGF-R upregulation. Therefore, hormones and growth factors, through their specific receptors in renal tissue (homologous to the c-erb A and c-erb B oncogenes), may be responsible for the development of ACKD [31].and This study was based onFrancisco et al. Regarding the relationship between hormonal stimulation and exacerbation/recurrence of symptoms of cystic lung disease, the results have been controversial. Because LAM is a female disease thought to be accelerated by estrogen, new promising therapeutic strategies have been introduced.

This is due recently to the discovery of the genetic and molecular mechanisms of LAM. Mutations in TSC genes[32], after a study conducted byMarynicket all. 1983 For patients with long-standing cystic acne refractory to conventional treatment. They had higher levels of DHEA, testosterone, and luteinizing hormone and lower levels of sex hormone binding globulin compared to controls, concluding that most patients with treatment-resistant cystic acne have androgen excess and that lowering the elevation of DHEA leads to improvement or resolution of acne. Cystic youth[33]‹Aroraet all.2011 also found in his study to clarify the role of endogenous hormones such as testosterone, progesterone, estrogen, insulin-like growth factor, insulin, and glucocorticoids in a common skin condition such as acne, that they increase in patients suffering from acne, and progesterone levels in the blood are low. It is concluded that various internal hormones play an important role in causing this condition. Therefore, in clinical practice, it is important to evaluate the blood levels of these hormones and patients should be treated accordingly to avoid serious endocrine disorders at an early age[34]. In a study conducted by J calissendrffet all.2023 on patients with benign adrenal cysts (excluding patients with malignant tumors and pheochromocytoma), an increase in the adrenal hormone cortisol was described accompanying most patients. Some patients had a positive test for primary aldosteronism and an abnormal test for dexamethasone suppression. In this study none of the patients reported had confirmatory testing for primary aldosteronism[35].The formation of some ovarian cysts is a direct result of endocrine disorders, and primary hypothyroidism is a common endocrine disorder with thyroid hormone deficiency that is characterized by slow metabolism, leading to multiple system dysfunction. Hypothyroidism may also cause reproductive endocrine disorders. Occasionally, associated ovarian cyst formation is reported as Van Wyk and Grumbach syndrome (VWGS) in juvenile primary hypothyroidism. Failure to recognize hypothyroidism as the etiology of ovarian cysts can lead to inadvertent oophorectomy. Hormone testing shows on the day of referral, the genital tract had high levels of FSH and PRL as well as significantly low levels of LH and T. Abdominal ultrasound revealed mild ascites and enlargement of the right ovary with multiple cysts divided by the septum. Serum CA-125 level was normal. Given the endocrine abnormality, further examinations were performed, and the results were consistent with severe autoimmune hypothyroidism. Biochemical testing revealed an unusually high TSH level and markedly low T3 and T4 levels. Both thyroid peroxidase antibodies and immunoglobulin antibodies were positive. Ultrasound of the thyroid gland revealed that both lobes had an irregular shape and rough texture [36].

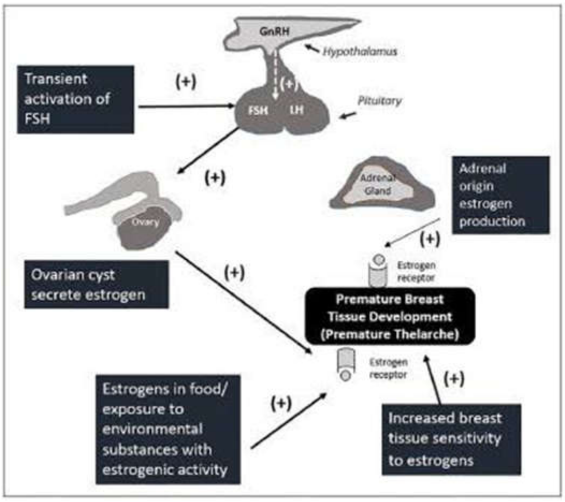

Figure 1: Hormonal disorders and the formation of ovarian and breast cysts[37]**.**

4.2. Role of inflammation and immune system

-Inflammatory Response

When a cyst forms, it can trigger an immune response, leading to inflammation in the surrounding area (Figure 2). This response involves several processes:

1. IncreasedBlood Flow (Vasodilation):

- When a cyst develops, local immune cells recognize it as a potential threat. This triggers a cascade of events.
- Blood vessels near the cyst dilate (vasodilation), allowing more blood to flow to the cystic site.
- Increased blood flow serves several purposes:

- Delivery of Immune Cells: The bloodstream carries immune cells (such as neutrophils and macrophages) to the site. These cells are essential for defense and tissue repair.
- Nutrient Supply: Nutrients and oxygen are delivered to support immune cell function and tissue healing[38, 39]**.**

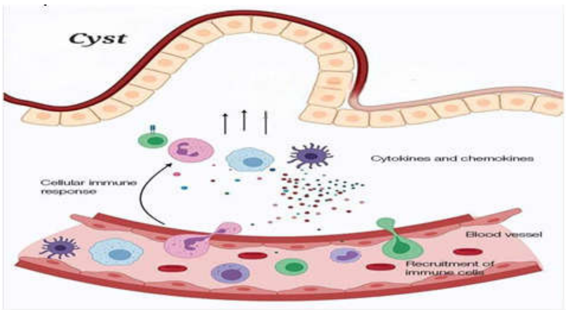

Figure 2. Inflammatory Response[40]

-Immune Cell Activation

- Neutrophils and macrophages are key players in the immune response.
- Neutrophils are the first responders. They are attracted by chemical signals (chemotaxis) and migrate to the cystic site [41].Macrophages arrive later and play a more sustained role. They phagocytose (engulf and digest) cellular debris, pathogens, and cystic contents [42]. finally, these immune cells recognize foreign substances associated with the cyst (e.g., bacteria, damaged tissue) and work to eliminate them.

A-Release of Inflammatory Molecules (Cytokines)

- Immune cells release signaling molecules called cytokines.
- Cytokines have diverse effects:
- Recruitment: They attract more immune cells to the site.
- Activation: They stimulate immune cell activity.
- Inflammation Regulation: Some cytokines promote inflammation, while others help resolve it[43].

Certain cytokines, including interleukins (ILs), tumor necrosis factor (TNF), and interferons, aid in tissue healing and regeneration [44].

B **- Destruction of the Cyst**

1. Neutrophils: When cystic material (such as pathogens or debris) is detected, neutrophils rapidly migrate to the site of infection or inflammation, they recognize the cystic material as foreign and engulf it through phagocytosis, neutrophils contain granules with antimicrobial proteins and enzymes that help break down the engulfed material. Their primary goal is containment and preventing the spread of infection. Neutrophils are short-lived and are eventually cleared from the site[38].

2.** Macrophages**: are also phagocytic immune cells, but they have a more sustained impact. Unlike neutrophils, macrophages arrive later at the site of inflammation, they phagocytose cystic material, dead cells, and debris. Macrophages are involved in tissue repair and remodeling. Additionally, they play a crucial role in adaptive immunity by presenting antigens to other immune cells (such as T cells), Macrophages can be either M1 (pro-inflammatory) or M2 (anti-inflammatory), depending on the context. Their long lifespan allows them to contribute to the resolution of inflammation and tissue healing [38].

3. DendriticCells (DCs): are professional antigen-presenting cells (APCs). They capture antigens from the cystic material and present them to T cells, and they play a crucial role in initiating adaptive immune responses against cystic structures [45].

4.T Cells:

-CD4+ T cells (helper T cells) and CD8+ T cells (cytotoxic T cells) are involved.

- CD4+ T cells help orchestrate immune responses by activating other immune cells and CD8+ T cells directly target and kill infected or abnormal cells, including cystic cells [46].

5. Natural Killer (NK) cells: recognize and eliminate cystic cells without prior sensitization. They play a role in early defense against cysts[47].

6 .B Cells and Antibodies: B cells produce antibodies against cystic antigens, and Antibodies can neutralize cystic contents and enhance phagocytosis by immune cells [48].

7. *Granulocytes (Eosinophils):* release toxic granules that can damage cystic structures [49].In Figure 3 an example of a type of cyst (Amoeba cyst)

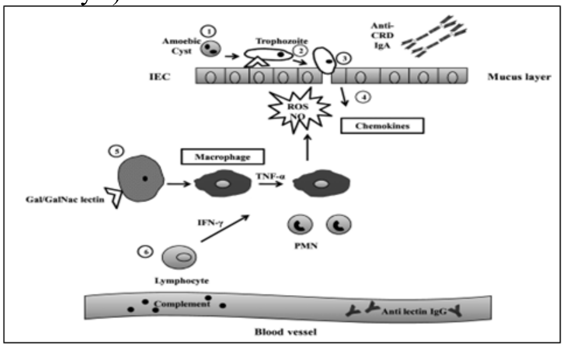

Figure 3. Activity of Amoeba cyst in Host Immune Response [50].

In figure 3 Amoebic cysts are highly resistant and easily invade the intestinal first line of defense(1). Mucin, a glycoprotein submucosal glands and protective mucus layer.Trophozoites attach to the host tissue surface via Gal/GalNAclectin (2). Amebae secretes cysteine proteases, which disrupt the mucus layer and promote tissue invasion (3). Damaged intestinal epithelial cells release potent chemokines to raise immune cells to the site of invasion (4). Activated macrophages release tumor necrosis factor-alpha a, stimulating polymorphonuclear leukocytes and macrophages to release reactive oxygen species and nitric oxide, which kill the parasite (5) interferon-gamma released by lymphocytes activates macrophages and polymorphonuclears**[**50**].**

C- ***Enzymatic Breakdown and Regression***

In some cases, the inflammatory response triggered by the presence of a cyst may lead to the release of specific enzymes that can break down the cyst wall. These enzymes produced by the body's immune cells or surrounding tissues, help weaken the structure of the cyst, promoting its regression and eventual resolution.

1. Proteases: These enzymes break down the proteins that are a major structural component of the cyst wall. By degrading these proteins, proteases can disrupt the integrity of the cyst wall.
2. Collagenases: These enzymes specifically target and break down collagen, which is another important structural protein found in the cyst wall. Degradation of collagen weakens the overall structure of the cyst.
3. Hyaluronidases: These enzymes degrade hyaluronic acid, a polysaccharide that is present in the cyst wall. Breaking down hyaluronic acidcontributes to the breakdown of the cyst's structural components.

The release of these enzymes, often as part of the body's inflammatory response to the presence of the cyst, can promote the regression and eventual resolution of the cyst. As the cyst wall is weakened by the enzymatic breakdown, the contents of the cyst are more easily resorbed by the body[51].

4.3. Role of Diet

The nutritional composition of our lifestyle, which includes high fat products, is the factor that causes the incidence of metabolic disorders[52]. In contemporary times, there has been a proposition posited indicating that lifestyle choices could play a crucial role in influencing the progression of diseases [53]. Lifestyle choices comprise a variety of behaviours and practices, such as diet [54]. Nutrient deficiency can have a significant impact on one's health and vice versa. Gene-nutrient interactions play a crucial role in maintaining good health and preventing diseases. Proper nutrition can affect gene expression and increase resistance to diseases, including cancer, through various pathways [55]. Nutrition plays a significant role in impacting the liver function and ovarian follicles by influencing the levels of insulin-like growth factor 1 (IGF-I), insulin hormone, and insulin-like growth factor binding proteins (IGFBPs). This can lead to reduced responsiveness of the follicles to luteinizing hormones (LH) and ultimately results in decreased production of follicular oestradiol. Additionally, nutrition can also affect ovarian function indirectly by altering the secretion patterns of LH and follicle-stimulating hormones, as well as the generator of gonadotropin-releasing hormone (GnRH) pulses [56]. The role of diet is of utmost importance in both the prevention and management of polycystic ovary syndrome (PCOS) [57]. A research study revealed that inflammation stands out as a paramount yet frequently disregarded risk factor for (PCOS), with enhanced intake of high-protein foods and increased muscle mass being identified as effective strategies for ameliorating the inflammatory condition within the body [58].The meta-analysis at hand supports earlier findings, indicating that a diet low in calories and rich in nutrients is helpful in managing PCOS. The majority of the studies included in the analysis showed a carbohydrate intake of less than 20 grams in the ketogenic diet (KD), which enhances insulin sensitivity by decreasing carbohydrates and calories. KD therapy also customizes protein intake to preserve lean muscle mass for lasting outcomes [59**]**.Dietary interventions play a pivotal role in the management of chronic kidney disease (CKD), as evidenced by their ability to retard the advancement of CKD, diminish the build-up of metabolic byproducts, alleviate symptoms of uremia and metabolic acidosis, and decrease phosphate concentrations [60]. There are various therapies for polycystic kidney disease (PKD), such as weight management, blood pressure control, the use of medications like Tenormin, the Dietary Approaches to Stop Hypertension (DASH) diet, and substituting cumin and ajwain for salt [61]. Dietary sodium, protein, acid precursors, and water have been associated with the proliferation of cysts in Polycystic Kidney Disease (PKD) [62]. Glucose is transported into the renal interstitium through cysts, which detach from tubules to facilitate expansion. In human organoids, this process can contribute to the growth of PKD cysts [63]. Multiple liver cysts may also constitute a component of the complex of polycystic diseases [64]. Malnutrition represents the most formidable complication associated with polycystic liver disease (PLD) and serves as a clear indication necessitating referral for liver transplantation [65].

4.4. Role of Oxidative Stress

Oxidative stress (OS) is characterized by an imbalance between pro-oxidants and antioxidants that favors the pro-oxidants [66]. OS arises when there are more reactive species (RS) than animal cells can use as antioxidants [67]. The body continuously generates reactive oxygen species (ROS) as a byproduct of normal metabolism [68]. These substancesare extremely reactive and have the ability to change a wide range of important macromolecules in biology [69]. These occurrences cause OS and oxidative damage, which result in the emergence of different metabolic dysfunctions [70].Oxidative metabolism is also an essential intraovarian regulator of folliculogenesis. This process is controlled by an increase in ROS and inhibited by antioxidants, while antioxidants support the progression of meiosis II [71]. ROS play a vital role in ovarian physiological activity as a secondary messenger for cellular signaling and are involved in the regulation of the ovarian cycle, including in meiosis, ovulation, corpus luteum maintenance, and regression [72]. PCOS is associated with decreased antioxidant concentration. It is one of the states with increased OS, leading to disturbance in the cycle of ovarian follicular and luteal phases [73]. Vale-Fernandes*et al.* reported that, regarding LPO, although we found a tendency for MDA levels to be higher in the Follicular fluid of women with PCOS [74]. Several studies have reported TAC levels in patients with PCOS. A meta-analysis showed no significant difference in TAC between patients with PCOS and controls [75].Renal oxidative stress at a very early stage of PKD, reflected by increased renal immunoreactivity of 8-OHdG, that aggravated with disease progression. This is consistent with previous studies in rodent models of PKD that have shown significant increases in 8-OHdG expression in kidney cyst-lining cells [76]. Interestingly, we found that this increase in renal 8-OHdG levels was not limited to the cyst-lining TECs and was also present in non-cystic tubules, suggesting that the non-cystic parenchyma is also a contributor to renal oxidative stress[77].

Thechronic airway inflammation noticed in patients with cystic fibrosis induced by the infiltration of neutrophils, macrophages, and other immune cells, leads to the release of excessive [78]**.** Amounts of reactive oxygen species (ROS) as part of the inflammatory response Vital tissue damage can be induced by ROS-increased production secondary to neutrophilsImplications [79]. CFTR dysfunction leads to impaired glutathione transport, reducing its availability andcompromising the antioxidant defenses of CF cells [80]. CFTR dysfunction leads to impaired glutathione transport, reducing its availability and compromising the antioxidant defenses of CF cells. Iron accumulation is another mechanism leading to oxidative stress in CF. The excess iron can participate in the Fenton reaction, generating highly reactive hydroxyl radical [81]**.**

5.Therapeutic strategies

5.1. Modern Medical Management of Cysts

Today, management of cysts has been classified into minimally invasive, non-surgical, and advanced surgery. For example, with skin cysts such as epidermoid cysts, if they are not painful, nothing more may be required than observation. Where inflammation or swelling is present, steroid injection (such as triamcinolone) may be given to reduce the swelling, or antibacterial medication maybe given where infection is present. This is followed by small surgery where the cyst and its entire wall are removed in an effort to reduce recurrence[82].In certain anatomical locations, such as the Bartholin's gland, a surgical procedure such as marsupialization is preferred to open the cyst and facilitate continuous drainage. In other cases, the gland may be completely removed if the inflammation recurs. A comparative study found that the recurrence rate after Marsupialization was approximately 8.3%, compared to 18.8% using Word catheter (p=0.034) **[**83**]**.When it comes to parasitic liver cysts (hydatid cysts), invasive treatment using the PAIR technique (ultrasound penetration, fluid aspiration, parasiticide injection, and re-aspiration) with albendazole as an adjunctive treatment achieves 100% technical success and 96.1% clinical success, with low recurrence rates (3.9%), making it an effective and safe option even for patients who are not candidates for surgery **[**84**]**.For bone cysts (such as unicameral or aneurysmal bone cysts), combining cyst curettage with autologous bone grafting, ESIN, or sclerotherapy has shown excellent results, with studies demonstrating high cure rates and significant functional improvement[85**]**.Even in modern treatments for thyroid cysts, albendazole is used. Alcohol injection (PEI) under ultrasound guidance has been shown to be highly effective and safe in reducing cyst size by more than 90% in most patients, with good long-term results[86**]**.

5.2. Traditional and Herbal Approaches to Cyst Management

According to reports, the active substances in medicinal plants that give them their pharmacological potentials are their phytochemicals [87**]**. Phenolic and flavonoids compounds found in plant secondary metabolites have pharmacological effects[88**]** such as anti-allergic, antibacterial, antiviral, anti-inflammatory, antioxidant, anti-diabetic, anticancer and neurodegenerative effect [89**]**.

Parallel to what we see in pharmaceutical approaches, many traditional and herbal remedies report clinical or preclinical success in cyst related conditions. Vitexagnus-castus (chasteberry) is the most studied of the botanicals which we see to do better in random controlled trials than placebos and certain conventional treatments for premenstrual syndrome, luteal phase defects and mild hyperprolactinemia which it does by what is called the modulation of the dopaminergic inhibition of prolactin release[90**]**. In terms of endometriotic ovarian cysts a meta-analysis of 1,938 patients reports that Chinese herbal medicine – which we see to do best when used in addition to surgery – did better in reducing cyst recurrence and in improving pain and fertility outcomes when compared to Western medicine alone[91**]**.Other phytochemicals like curcumin, resveratrol, and epigallocatechingallate (EGCG) have reported in preclinical models to put forth anti cyst growth and anti-inflammatory results via modification of NF-κB, MAPK, and ERK signal transduction pathways[92**]**. In PCOS we see that cinnamon improved insulin sensitivity in clinical studies[93**]**. In addition, chamomile (*Matricariachamomilla*) has been reported to promote follicular development and regulate hormonal balance in women with polycystic ovary syndrome[94**]**.In kidney cysts which include those from polycystic kidney disease in vitro and in vivo studies have reported that curcumin has anti-inflammatory and cyst growth inhibiting actions – as seen in renal epithelial cell culture and in a mouse model of the disease[92**]**. Although herbal therapies are for the most part well tolerated their use should be put into practice under medical supervision because of variation in product quality and also possible herb – drug interactions.

6. Conclusion

Cysts are fluid-filled sacs that can develop in tissues in any part of the body. They are relatively common, and there are many different types.Cysts are the result of disorders of hormonal, immune system, oxidative stress or diet in the body that can be benign without effects and others with pathogenic effects that reach the occurrence of some cancers. Accordingly, with the presence of treatments, prevention remains the best way to prevent their occurrence.

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