ORIGINAL ARTICLE

The Appearances of Benign Breast Diseases on Ultrasound

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ABSTRACT

Background: *Benign breast diseases are common and Ultrasound is a very useful tool in examining benign breast diseases especially in distinguishing solid from cystic masses. This study aims to determine the sonographic pattern of benign breast diseases in a Nigerian population and to compare this pattern with that which has been previously reported in other environments.*

Methods: *This a prospective study of Ninety-four patients with breast disease scanned between 1997 and 2001 on request from the breast clinic of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife. A total of forty-four patients with histologicaly confirmed benign breast diseases were selected for this study. Their ultrasonographic features were evaluated and compared with those previously described.*

Result: *Fibroadenoma was the commonest disease, occurring in 62.2% of the patients, with a mean age of 29.1 years, an age higher than that previously reported. Other diseases which were expected to occur commonly (breast abscess, cyst) were rarely seen.*

Conclusion: *While it was discovered that the sonographic pattern of most of the diseases in this study conformed to that already described in literature despite late presentation, only one sonographic appearance of galactocele, out of the three reported, was noted in this study. In addition, despite the nonspecificity of ultrasound appearances in fibrocystic disease, an attempt has been made to match these appearances with the different histological types already described in literature.*

KEYWORDS: Ultrasonography; Benign Breast Disease.

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INTRODUCTION

Benign breast diseases are common, and tend to affect a relatively younger age group than malignancies[1,2]. Ultrasound is very useful in examining benign breast diseases, distinguishing solid from cystic masses[3, 4], and in assessing the radiologically dense breast[3], where it has an advantage over mammography in this regard[3,6,7]. It can also be used as a guide in the aspiration of non palpable lesions, and it complements x-ray mammography, providing an accurate diagnosis where mammography alone is unable to do this[6]. This is in addition to the general advantages of ultrasound viz: it is non invasive, safe, cheap and readily available.

Children and adolescents are also susceptible to benign breast diseases, and breast masses in this group consist mainly of normal breast tissue (premature thelarche), cysts and fibroadenomas[9]. Other causes of breast masses in this group include gynaecomastia, lymph nodes, galactoceles, duct ectasia and infection[10]. Ultrasound is a safe investigative modality in this group of patients. This is appreciated more where children and adolescents are concerned because the low incidence of breast malignancy does not justify the exposure to radiation that mammography causes; it is in fact contraindicated in this age group[9]. When a breast mass is discovered on mammography, the nature of the mass can be ascertained by ultrasound, and confirming the presence of a cyst precludes the need for a biopsy[11].

This study aims to determine the sonographic pattern of benign breast diseases in a Nigerian population and to compare this pattern with that which has been previously reported in other environments, bearing in mind the late presentation pattern our patients are characterized with.

MATERIALS AND METHODS

Ninety-four patients with breast disease were scanned between 1997 and 2001 on request from the breast clinic of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife. Of these, all the patients who were confirmed to have benign breast disease by histology were included in this study while those with a histological diagnosis of breast malignancy were excluded. Based on these criteria, a total of forty-four patients were selected for this study.

Real time breast ultrasound was performed on them after recording their age, sex and presenting complaints, and after manually palpating the breasts of the patients. They were placed supine on an examination couch and scanning gel was applied to the exposed breasts. Using a stand-off for better visualization, a 7.5MHz transducer was placed on the breasts, scanning systematically, and using the contralateral breast as control. The general echotexture

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of the breasts was determined, and specific lesions were looked for. Where these were identified, their outlines, echogenicity, homogeneity or otherwise, shape and size where relevant, were all recorded. Other features which were looked for include posterior enhancement and the presence of internal echoes. The scanning equipment used was the Concept D Dynamic Imaging machine, which is equipped with Doppler facilities.

RESULTS

The ages of the forty-four patients selected for this study ranged between 16 and 60 years, with a mean of 31.3 ± 9. 31 years. The peak age incidence was between 21 and 30 years, with 20 patients (45.5%) in this age group (Table I). All the 44 patients (100%) were female.

The benign breast diseases identified are as shown on Table II. 28 patients (62.2%) were diagnosed with fibroadenoma. Fibrocystic disease occurred in 9 patients, constituting 20.5%. 2 patients each were diagnosed as having galactocele and breast cyst, constituting 4.4% each. One patient each (2.3%) had breast abscess, chronic mastitis and intraductal papilloma.

The ultrasonographic features of these diseases were then analyzed and are presented below.

Fibroadenomas (n=28): The outlines of the lesion were smooth in 23 (82.1%) patients while lobulated outlines were demonstrated in 5 (17.9%) patients. The lesions were homogenous and hypoechoic in all the patients (100%). Single lesions occurred in 22 patients, constituting 78.6%, while multiple lesions were seen in 6 patients (21.4%). Both breasts were involved in only 2 (7.1%) patients. While one of the patients was 60 years old, another patient had multiple lesions, with multiple fibroadenomata in the left breast and a right breast cyst. Some of these features are demonstrated on Fig.1.

Fibrocystic disease (n=9): Various appearances were recognized. Of the 9 patients with fibrocystic disease, 3 (30.0%) had an echogenic mass. The outlines of the lesion were ill-defined in 2 of these patients while the third had a well-marginated lesion. All three were heterogenous in appearance, varying from having a definite cystic area (seen in one patient) to having multiple widespread cystic areas, also seen in one patient. The third patient had multiple hypoechoic thick-walled structures of varying sizes.

Three patients (33.3%) had isoechoic lesions, and all 3 had a heterogenous appearance. The outlines were ill-defined in two patients while it was well-defined in one patient. One patient had echogenic areas interspersed within the lesion while the other two had sonolucencies within the lesion. In one of these two patients, the sonolucencies were few and irregular while one patient showed definite rounded and tubular sonolucencies.

The last three patients had hypoechoic lesions. One patient had a homogenous mass that was ill-defined. Another had a huge, multi-loculated cystic mass with regular outlines. The third patient had a diffuse mass with a widespread multicystic pattern, looking glandular in appearance. Fig. 2a and b show two varying appearances of fibrocystic disease.

Galactocele (n=2): Both patients (100%) had anechoic masses which were uniformly sonolucent and rounded in shape. They both showed strong posterior enhancement. They were similar in appearance and characteristics to cysts (Fig.3).

Cyst (n=2): 1 patient (50%) had a well circumscribed anechoic mass that showed strong posterior enhancement. The other patient (50%) had a lesion with a similar echogenicity to that of the surrounding breast tissue due to infection. The sonographic appearances of cysts are shown on Fig. 4.

Abscess (n=1): This patient had an anechoic mass with an irregular shape and outline. It contained short, linear, medium-level echoes, as is shown on Fig.5.

Chronic Mastitis (n=1): This patient had a heterogenous, ill-defined, echogenic mass. It was well rounded, and had hyperechoic areas within it (Fig. 6).

Intraductal Papilloma (n=1): An elongated sonoluscency with an echogenic structure within it was identified. The lesion had irregular outlines (Fig.7).

Table I. Age Distribution

Age (Years)	Patients No	%
11 – 20	3	6.8
21 – 30	20	45.5
31 – 40	14	31.8
41 – 50	4	9.1
51 – 60	3	6. 8
Total	44	100

Table II. Frequency of Occurrence of Benign breast diseases

Type of Disease	Patients No.	(%)
Fibroadenoma	28	62.2
Fibrocystic disease	9	20.5
Galactocele	2	4.5
Breast Cyst	2	4.5
Breast Abscess	1	2.3
Chronic Mastitis	1	2.3
Intraductal Papilloma	1	2.3
Total	44	100

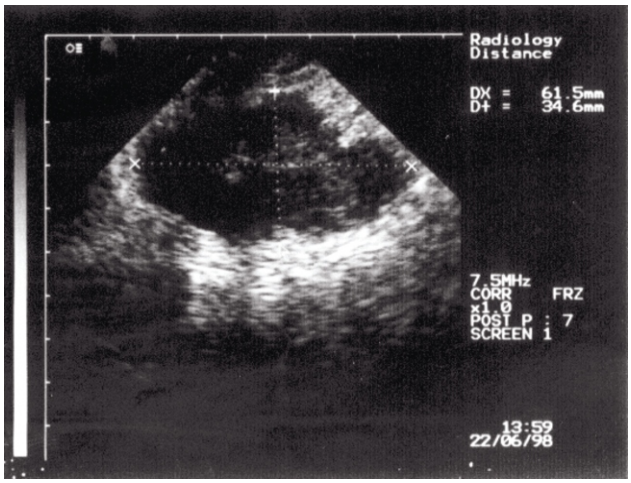

Fig.1: A fibroadenoma is shown as a huge, homogenously hypoechoic mass with lobulated outlines.

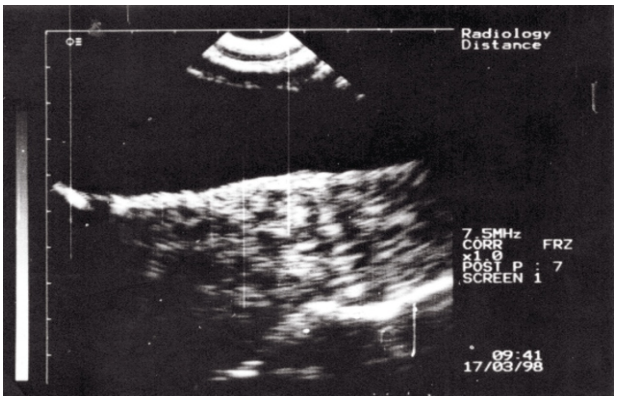

Fig. 2a. A widespread glandular appearance of fibrocystic disease

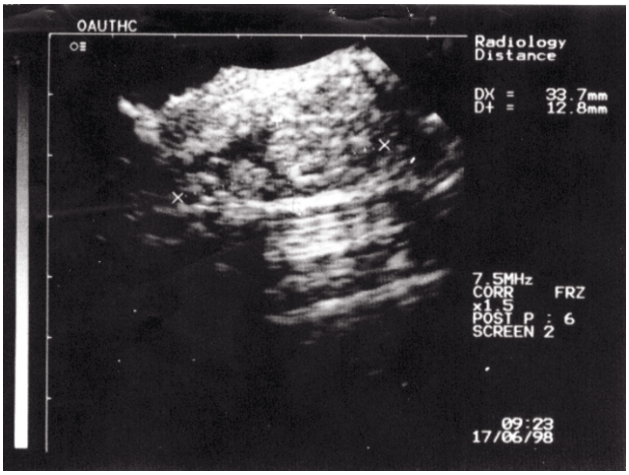

Fig. 2b. An ill-defined, heterogenously echogenic mass with an irregular sonolucent area within it due to fibrocystic disease

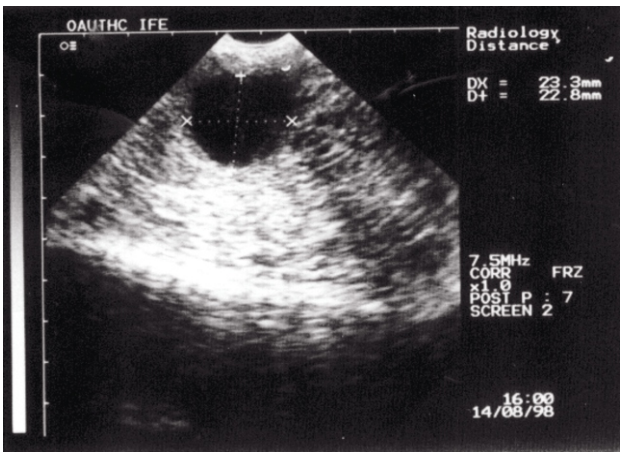

Fig. 3. A well-defined, rounded cystic lesion with a strong posterior enchancement due to a galactocele

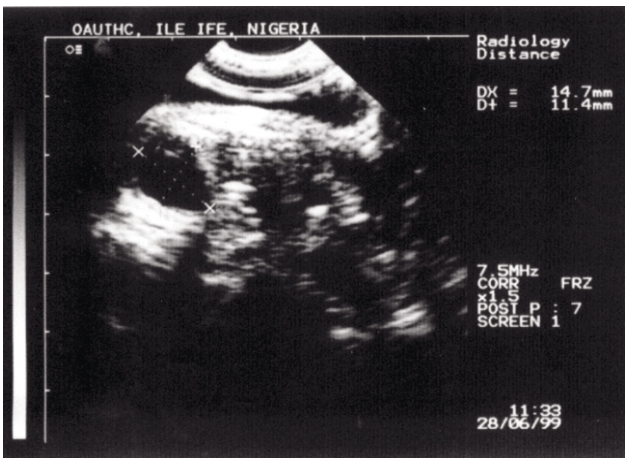

Fig. 4. An oval-shaped sonolucency with strong posterior enhancement due to a galactocele

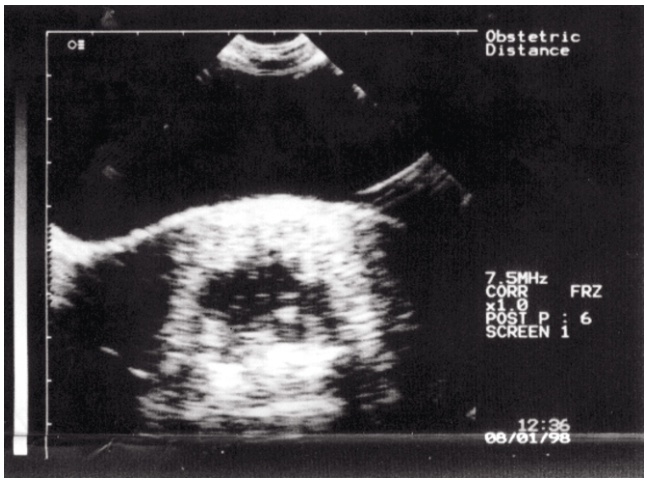

Fig. 5. An irregularly marginated sonolucent lesion with short, linear, medium-level echoes within it due to a breast abscess

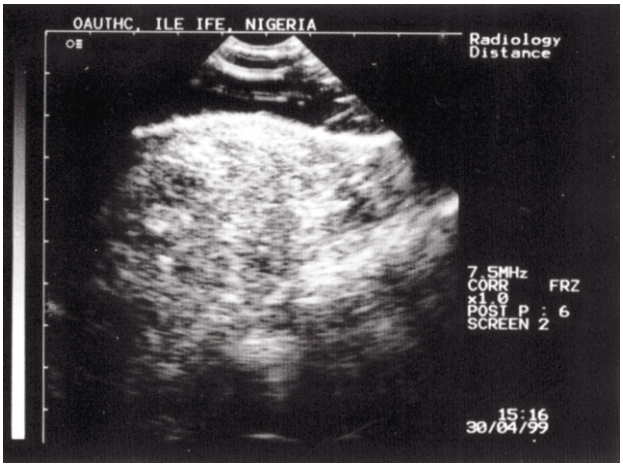

Fig. 6. Chronic Mastitis shown as an ill-defined, heterogenous echogenic mass lesion

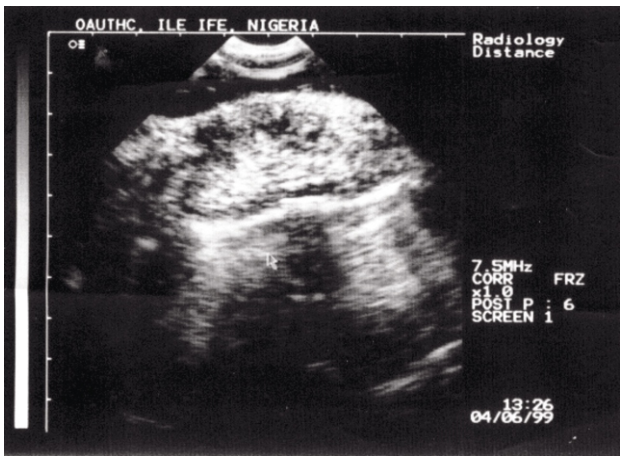

Fig. 7. Intraductal papilloma An elongated echogenic mass is seen within a confining, smooth echogenic wall. The mass is surrounded by a sonolucent layer

DISCUSSION

The peak age incidence and the mean age of the patients in this series were 21 to 30 years and 31. 3 years respectively, figures comparable with that obtained in this environment in another series[12], and also comparable with figures obtained in other environments, while the average age of the patients in this study was much less than that involved in malignant breast disease in some series[1, 2]. The significance of this is in the need to investigate this group of patients with an imaging modality that is radiation free when possible; bearing in mind the hazards that could result from undue exposure to radiation. The mean age obtained for patients with fibroadenoma was 29.1 years while for fibrocystic disease it was 32.7 years. Although the average age of patients with fibroadenoma is lower than that of fibrocystic disease, it is still high. This was not the case in the study conducted by Adesunkanmi and Agbakwuru[12] in this environment who observed that the mean age for fibroadenoma was 24 years. The mean age obtained in their study for fibrocystic disease was however comparable with that which we obtained, being 31.6 years. Possible reasons for this variation include absconding from the ultrasound unit for further investigations after possible reassurance and drug therapy from the clinicians or not presenting in the clinic at all, assuming it is a normal phenomenon in development. Again, this finding may be contrary to the belief that fibroadenoma constitutes 50-60% of all benign breast lesions in the pediatric and adolescent population[9, 10]. With proper public enlightenment programs, the present findings may alter with younger patients with fibroadenoma presenting in the hospital.

The incidence of fibroadenoma in this study was comparable to that obtained in other studies[9, 10], although it was dissimilar to a study in this environment[12]. This could however be attributed to the unwillingness of patients to present in the hospital. Fibroadenoma is easily identified on ultrasonography as a lesion of uniform internal echogenicity which is usually lower than that of surrounding breast tissue[13, 14]. It is well circumscribed and is oval, round or macrolobulated in shape[10, 11]. All the patients with fibroadenoma in this series (100%) had this characteristic homogenously hypoechoic appearance. They can only be distinguished from circumscribed carcinoma with an accuracy of about 70%[13]. One such patient, a 60 year old lady, was diagnosed both clinically and ultrasonographically to have malignant breast disease but histologically she had fibroadenoma, a disease uncommon in this age group. On ultrasound, she had a well circumscribed, oval shaped anechoic lesion. Complementary investigations like x-ray mammography and even histology are therefore likely to be beneficial in such patients. Fibroadenomas tend to be surrounded by a halo[15] and this was convincingly demonstrated in only one patient. In addition to having lobulated outlines, irregular outlines can also sometimes be demonstrated[16]. The patients with lobulated outlines in this study were the ones with the larger tumors (Fig.1) while more patients had the classical ovoid shaped hypoechoic lesion with smooth outlines.

While the incidence of fibrocystic disease was lower than that obtained by Adesunkanmi and Agbakwuru[12], it was higher than that obtained by Oluwole *et al*[17] in another series in this environment. The latter attributed the low incidence to the unwillingness of patients to present in the hospital except for a life threatening

condition[17]. Fibrocystic disease (Benign Mammary Dysplasia) occurs more often than breast cancer, and is a common source of requests for ultrasound especially in young women[13]. Benign mammary dysplasia is made up of four types histologically and these are duct ectasia, increase in stromal fibrous tissue, cyst formation and duct epithelial hyperplasia. Apart from epithelial hyperplasia, all these types can be recognized histologically[13]. Although ultrasound in fibrocystic disease has been said to be non-specific[9], cysts and ducts in fibrocystic disease up to the size of 1-2mm can be resolved by breast ultrasound, and it is therefore the technique of choice[13, 19]. In this study, there was a wide variety in the ultrasound appearances of fibrocystic disease. These include a definite echogenic mass, sometimes with a surrounding halo, an ill defined mass with anechoic rounded and tubular portions and a cystic structure that did not show any posterior enhancement, and which histology reported as fibrocystic disease. The histology reports did not specify the type of fibrocystic disease each patient had, but based on the sonographic appearance, there is a strong likelihood that the first description (a definite echogenic mass) is due to increase in stromal fibrous tissue, the second due to duct ectasia while the third is due to cyst formation. A more specific histological pattern in fibrocystic disease may need to be identified.

Only 4.4% of the patients in this study were diagnosed as having galactoceles, and this conforms to the belief that they are uncommon breast masses that consist of a cyst containing milk and which occur commonly in lactating mothers. The main predisposing factor is obstruction of the mammary ducts in a lactating breast, either as a result of inflammation or, rarely, a tumor. The ultrasound appearances have been described as varying from a cystic lesion to a mixed solid/cystic mass to a purely solid lesion [10, 18]. In this study, only one of these ultrasound appearances was demonstrated and this was that of a well defined, oval shaped, anechoic mass with posterior enhancement, an appearance similar to that of cysts (Fig.3). This was the appearance that occurred most frequently in a series conducted in Nottingham[18]. One of our patients had multiple galactoceles. Milk was aspirated surgically in the two patients diagnosed with a galactocele in this study.

Cysts are supposedly very common breast lesions[9] especially between 35 and 50 years of age[5], or in the pre-menopausal years[11], but this was not the finding in this study. Again, the unwillingness of patients to present with a painless condition cannot be ruled out, and this fact is buttressed by one of these two patients with an infected cyst who presented in the clinic with mastalgia. Cysts are usually demonstrated on ultrasound as sonoluscent or anechoic structures that are rounded or lobular in shape, with well defined contours. They may contain internal septae or isolated echoes[9]. They have a strong posterior enhancement, shown on ultrasound as an echogenic area posterior to the cyst, although they may occasionally contain echogenic fluid. One of our patients with a clinical diagnosis of a malignant mass (possibly because of her age) had the classical appearance of a sonolucent lesion with a strong posterior enhancement on ultrasound, again proving the value of ultrasound in distinguishing solid from cystic masses[3, 4]. The other patient had a sonolucent mass containing internal echoes because the cyst was infected. Infected cysts contain echogenic debris, septations, or fluid-fluid levels on ultrasound. On Doppler, they show increased vascularity peripherally[9].

Chronic abscess ultrasonographically appears as a local, poorly-defined area within the breast that contains a mixture of echoes[5, 11]. It is usually difficult to distinguish from breast cancer[14] on ultrasound, and was actually a differential diagnosis made by the clinicians in the patient with breast abscess in this study (Fig.5). Haematoma also resembles breast abscess ultrasonographically[5]. Not only is ultrasound diagnostic: it helps to guide therapeutic needle aspiration[11]. Only one patient with breast abscess was diagnosed in this study. This may however not be a true reflection of the incidence of breast abscess as some would have been treated on an out-patient basis in the accident and emergency unit[1]. The ultrasonographic appearance in this patient was classical: an irregularly marginated sonolucent mass containing short, linear, medium-level echoes. It usually occurs in lactating mothers[13] as was the case in this patient.

Only one patient was identified with chronic mastitis in this study. On ultrasound, they appear as complex or solid masses[9]. Our patient had a solid mass that was echogenic and which had ill-defined, fairly rounded, echogenic areas within it. Focal punctuate echogenic areas were also seen. The outlines of the mass were also ill-defined.

A diagnosis of intraductal papilloma was also made in only one patient. She presented clinically with bloody nipple discharge. Ultrasound showed an irregularly marginated, dilated tubular structure with a surrounding sonoluscent halo. The entire structure was surrounded by an echogenic wall. A sonographic diagnosis of

intraductal papilloma was made, and this was confirmed histologically.

Most of the patients had sonographic appearances that were similar to those previously described in literature. This was so in spite of the fact that patients in this environment present in the hospital late, and also in spite of the fact that the use of unorthodox drugs and other methods of treatment is a strong possibility by the time they present in the hospital. These unorthodox methods might have altered the sonographic picture, but it wasn't so. Another thing that may have altered the ultrasound features is the older age of the patients in this study especially in relation to child bearing and the accompanying breast changes following breastfeeding, but again this was not so.

Although most of the diseases had sonographic appearances that conformed to that described in other environments, not all these appearances were seen especially in the case of galactocele where only one of three patterns was recognized. This may again be attributed to the low number of patients presenting with this disease condition. The pattern of fibrocystic disease, the second commonest benign breast disease, varied widely in this study, and in spite of the nonspecificity of ultrasound in investigating this disease, an attempt has been made to match the histological types already described with the various ultrasound appearances observed.

In conclusion, this study has shown that although fibroadenoma was the commonest benign disease, the average age of the patients was higher than that obtained in other places, and also higher than that obtained in another study conducted in this hospital[1]. It also showed that the oldest patient with fibroadenoma was 60 years old. The number of patients presenting with fibrocystic disease, breast abscess and cyst was low. This was attributed to the unwillingness of patients to present in the hospital except with a life-threatening condition.

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