Patterns of Sonographic Findings in Patients with Lower Abdominal Pains in Nnewi Metropolis, Anambra State, Nigeria

Hyacienth Uche Chiegwu [1], Michael Promise Ogolodom [1], Daniel Chimuanya Ugwuanyi [1], Joseph Chukwuemaka Eze [1], Nneamaka Stephanie Offor [1], Awajimijan Nathaniel Mbaba [2], Clement Ugochukwu Nyenke [3], and Sharonrose Ogochukwu Nwadike [1]

[1]*Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.* [2]*Department of Radiology, Rivers State University Teaching Hospital Port Harcourt Nigeria.* [3] *Department of Medical Laboratory Sciences, PAMO University of Medical Sciences, Port Harcourt, Nigeria*

ABSTRACT

Objectives: This study aimed to determine the patterns of sonographic findings in patients with lower abdominal pain in Nnewi metropolis, Anambra State, Nigeria. **Materials and Methods**: This was a retrospective cross-sectional study, which involved 381(267 males, 114 females) conveniently selected sonographic examinations done due to lower abdominal pain at Waves Diagnostic Centre in Nnewi metropolis, Anambra State, Nigeria from January 2018 to August 2021. Data on age, gender, clinical indications and sonographic imaging findings were collected from the archives and analyzed using both percentage and Pearson's correlation test. The level of statistical significance was set at $p < 0.05$. **Results:** Out of 381 cases 175 (45.94%) had normal sonographic findings. Abnormal findings accounted for 206(54.06%) as follows: pelvic inflammatory disease,45(11.8%) uterine myoma 37(11.6%), caecal cancer, tubo-ovarian abscess, mucinous cystadenoma, hernia, cervical cancer, polmetra,1(.3%) each. Out of 175 normal sonographic findings, 160(91.43%) were females while males accounted for 15(8.57%). There were positive, non-significant correlations between normal findings with gender ($r= 0.112$, $p = 0.93$), age ($r= 1.21$, $p= 0.99$) and indications ($r= 0.335$, $p= 0.051$). There was a negative non-significant correlation between pathological findings with gender ($r= - 0.05$, $p= 0.65$). Positive significant correlation existed between pathological findings and age($r= 0.163$, $p= 0.001$), and clinical indication ($r= 0.282$, $p= 0.000$). **Conclusion:** The most affected were females especially those within the age group of 51-60 years. Pelvic inflammatory disease was the commonest pathology.

Keywords: Lower abdominal pains, Pattern, Patients, Sonographic findings, Nnewi, Anambra State

INTRODUCTION

Lower abdominal pain usually originates from below the umbilicus to the lower border of the symphysis pubis. Most individuals globally visit the hospital due to abdominal pain which usually predisposes them to serious disease and subsequently leads to their hospitalization or surgical intervention.[1,2] Lower abdominal pain can be a sign that there is a problem with one of the organs

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***Correspondence:**
Michael Promise Ogolodom. Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria
Tel: *+2348039697393.*
Email:
mp.ogolodom@unizik.edu.ng

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in the lower abdominal region such as the uterus, ovaries, prostate, fallopian tube, cervix or vagina, appendix etc. Acute abdominal pain accounts for the major reasons of visits to gynaecologic emergency departments (EDs) [3] and may indicate a life-threatening emergency. Although several causes of lower abdominal Pain (LAP) exist LAP is mostly caused by acute appendicitis.[4] Each entity responsible for the pain in the lower abdomen has its distinctive causation, manifestation and pattern of pain. Based on the frequency of individual causes of LAP and its characteristics, it is possible to calculate the appropriate sample probability of possible causes of pain.[4] The most experienced abdominal surgeons and gynaecologists can not accurately determine the exact pain aetiology. In some cases, the pain stops spontaneously, although it was not determined why it occurred. Given that the most common cause of pain in the lower abdomen is acute appendicitis it is logical to assume that the symptoms, which are common to several diseases, are probably caused by acute appendicitis.[4]

A good knowledge of the normal anatomy of the abdomen and pelvis in both genders, viz-a-viz site of pain, as well as familiarity with known sonographic features of various abdomino-pelvic pathologies are all relevant for abdominal and pelvic ultrasound scanning and diagnosis. Differential diagnosis of pain in the right lower quadrant of the lower abdomen includes appendicitis, colitis, inflammatory bowel disease(IBD), ectopic pregnancy, fibroids, ovarian mass, torsion, pelvic inflammatory disease(PID), nephrolithiasis, pyelonephritis while at the left lower quadrant, the conditions that could cause lower abdominal pain could include colitis, diverticulitis, irritable bowel disease, irritable bowel syndrome, ectopic pregnancy, fibroids, ovarian mass, torsion, pelvic inflammatory disease as well as nephrolithiasis and pyelonephritis.[5]

Diagnosis of abdominal pain is primarily determined by imaging techniques, such as abdominal ultrasonography (US), computed tomography (CT) and magnetic resonance imaging (MRI).[6] Ultrasound is a non-invasive procedure, which is readily available at most hospitals and may be performed at the bedside of the patients.[6] It is also an indispensable tool for the diagnosis of many diseases other than appendicitis in patients with abdominal symptoms including acute cholangitis, acute cholecystitis and acute pancreatitis.[4,6,8,9] In numerous cases, patients are diagnosed by a combination of laboratory data and diagnostic imaging findings based on symptoms and physical examination. [6] With regards to diagnostic imaging, Computed tomography has given positive outcomes in term of effective technique in treatment management of acute abdominal pains.[10] However, CT is not readily available in majority of the hospitals. In these cases, abdominal ultrasound (US) is the first-line procedure performed.

Given that pain is not the only symptom of the disease itself hence the interpretation of pain is related to the overall clinical signs and laboratory findings, we hypothesize that categorizing the clinical data and ultrasound findings will improve diagnosis and management of cases as well as directing more research efforts towards the problematic cases among the findings. Several studies have been done to evaluate the ultrasound findings of patients with upper abdominal pain. This study aimed to evaluate the patterns of sonographic findings in patients with lower abdominal pain.

MATERIALS AND METHODS

This was a retrospective cross-sectional study, which involved all records of sonographic examinations done due to lower abdominal pain at Waves Diagnostic Centre in Nnewi metropolis, Anambra State, Nigeria from January 2018 to August 2021. Ethical approval was obtained from the Human Research and Ethics Committee of the Faculty of Health Sciences and Technology, Nnamdi Azikiwe University, Nigeria. The retrieved information were held in strict confidence and used only for the purpose of this study. The inclusion criteria include ultrasound reports with lower abdominal pain as the clinical indication, cases done from January 2018 to August 2021 and reports with complete patient's information such as age and gender. This study lasted for three months (December 2021 to February 2022).

The sample size for this study was determined using Yamane formula for a known population cited in Ogolodom *et al* [11] and Ukaji *et al* [12] studies.

$n = N/1+N(e^{x})^{2}$

n = desired sample size

N = the target population = 8114

e = the margin error (0.05)

1 = a constant

n = 8114/(1+ 8114(0.05)2

n = 8114/ ((1+ (8114 (0.0025))

n = 8114/(1 + 20.285)

n = 8114/21.285 = 381.2074

n = 381.

Therefore, a total of 381 ultrasound reports were conveniently selected based on the inclusion criteria set for this study.

The ultrasound examinations were performed with patients lying supine on the couch using General Electric Medical System ultrasound machine with multiple adjustable transducer's frequency between 6-10 MHz (GE Healthcare, Model: GEVIVID-T8, India, 2019). Scanning was done in both transverse and longitudinal planes after the applying gel on the surface of the lower abdomen.

Names and ultrasound numbers of patients that had abdominal sonography scans were collected from the register of the radiology unit and used to trace the request forms. Those that met the inclusion criteria were retrieved and the necessary information such as age, gender, clinical indication and ultrasound findings were obtained and entered into a note book. The retrieved information were then entered into excel word spreadsheet for analysis. Data were categorized according to age group, gender and clinical indication. Statistical package for social science (SPSS) version 20.0(IBM Corp, Amornk, NY, 2011) was used to analyse the data. Descriptive statistics such as mean, frequency and percentage was used to summarize the data. Inferential statistics such as Pearson correlation test was used to determine the relationship of the sonographic findings with age, gender and clinical indication. A p-value less than 0.05 was considered as statistical significant.

RESULTS

The female accounted for 267 (70.0%) of the total population when compared to their male counterparts 114(30.0%) (Figure 1).

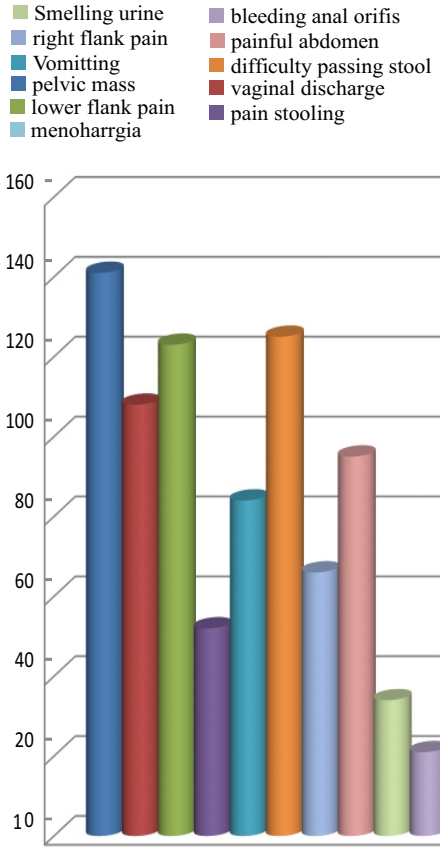

Figure 1: showing the 3D bar chart of clinical Indication.

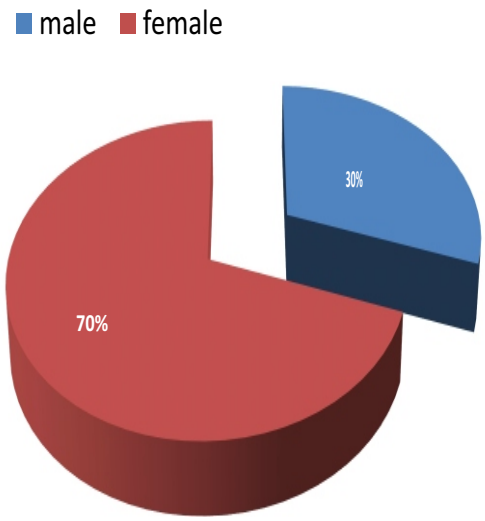

Figure 2: Pie chart of gender of distribution of the cases

The greater number 246 (64.57%) of the cases were within the age bracket of 51-60years, followed by age group 61-70 years, 178 (46.72%) and the least 46 (12.07%) were in the age group of < 20 years (Figure 2). Majority 140 (37.75%) of the patients had clinical indications as pelvic mass and the least 17 (4.46%) had bleeding anal orifice (Figure 3).

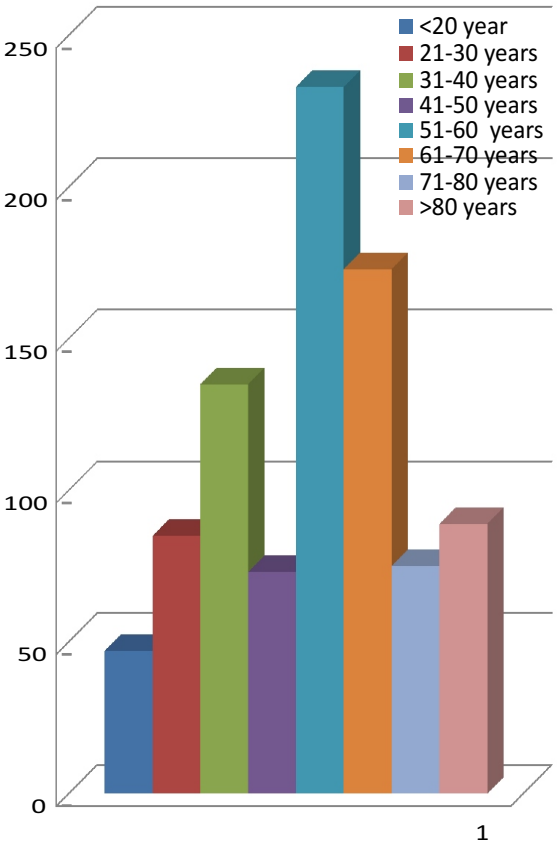

Figure 3: Bar chart of age groups.

Out of 381 cases with lower abdominal pain, 175 (45.94%) had normal sonographic findings while the abnormal findings accounted for 206(54.06%). Among the abnormal sonographic findings, greater proportion 45(11.8%) was pelvic inflammatory disease, followed by uterine myoma 37(11.6%) and the least were caecal cancer, tubo-ovarian abscess, mucinous cystadenoma,, hernia, cervical cancer, pyometra, which is 1(.3%) each(Table 1).

Table 4.2 shows the gender distribution amongst of the reviewed cases. Out of 175 normal sonographic findings, 160(91.43%) were identified in the female population while 113 (29.66%) were in males (Table 2). Pearson's correlation test results revealed that there were positive, non-significant correlation of normal findings with gender (r= 0.112, p = 0.93), age (r= 1.21, p= 0.99) and indications (r= 0.335, p=0.051). There was a negative but not statistically significant correlation of pathological cases with gender (r= - 0.05, p = 0.65).

Table I.: The patterns of sonographic findings among the reviewed cases.

	Findings	Frquency/ (%)
1	Normal	175(45.93%)
2	Ectopic pregnancy	22(5.77%)
3	Uterine myoma	37(9.71%)
4	Hydrosalpinx	15(3.94%)
5	Appendix/ appendix mass	16(4.20%)
6	Pelvic inflammatory disease	45(11.81%)
7	Endometritis	9(2.36%)
8	Benign prostatic hypertrophy	7(1.84%)
9	Caecal cancer	1(0.26%)
10	Bladder stone	10(2.62%)
11	Intestinal obstruction	4(1.05%)
12	Bowel/ colonic mass	17(4.46%)
13	Cystitis	3(0.78%)
14	Endometrial hyperplasia	2(0.52%)
15	Tubo-ovarian abscess	1(0.26%)
16	Hernia	1(0.26%)
17	Cervical cancer	1(0.26%)
18	mucinous cystoadenoma	2(0.52%)
19	Polycystic ovarian syndrome	8(2.10%)
20	Pyometria	2(0.52%)
21	Bladder mass	4(1.05%)
22	**Total**	**381(100%)**

Table II: Distribution of sonographic findings according to gender of the Reviewed cases.

Findings	Male	Female	Total
Normal	15(3.94%)	160(41.99%)	175(45.93%)
Ectopic pregnancy	0(0.0%)	22(5.77%)	22(5.77%)
Uterine myoma	0(0.0%)	37(9.71%)	37(9.71%)
Hydrosalpix	0(0.0%)	15(3.94%)	15(3.94%)
Appendix/ appendix mass	6(1.58%)	10(2.62%)	16(4.20%)
Pelvic inflammatory disease	0(0.0%)	45(11.81%)	45(11.81%)
Endometritis	0(0.0%)	9(2.36%)	9(2.36%)
Benign prostatic hypertrophy	7(1.84%)	0(0.0%)	7(1.84%)
Caecal cancer	0(0.0%)	1(0.26%)	1(0.26%)
Bladder stone	3(0.78%)	7(1.84%)	10(2.62%)
Intestinal obstruction	1(0.26%)	3(0.78%)	4(1.05%)
Bowel/ colonic mass	14(3.68%)	3(0.78%)	17(4.46%)
Cystitis	1(0.26%)	2(0.52%)	3(0.78%)
Endometrial hyperplasia	0(0.0%)	2(0.52%)	2(0.52%)
Tubo-ovarian abscess	0(0.0%)	1(0.26%)	1(0.26%)
Hernia	0(0.0%)	1(0.26%)	1(0.26%)
Cervical cancer	0(0.0%)	1(0.26%)	1(0.26%)
Mucinous cystoadenoma	0(0.0%)	2(0.52%)	2(0.52%)
Polycystic ovarian syndrome	2(0.52%)	6(1.84%)	8(2.10%)
Pyometria	1(0.26%)	1(0.26%)	2(0.52%)
Bladder mass	1(0.26%)	3(0.79%)	4(1.05%)
Total	50(13.12%)	331(86.88%)	381(100%)

A positive and statistically significant correlations existed between pathological cases and age(r= 0.163, p= 0.001) and pathology and clinical indication(r= 0.282, p= 0.000)(Table 3)

Table III: Pearson's correlation of findings with gender, Age and clinical indication.

Variables	Gender		Age		Indication	
	r	P	R	P	R	P
Normal	.112	.093	1.21	.099	.335	.051
Pathology	0.05	.065	.163	.001	.282	.000
N	381		381		381	

DISCUSSION

Diagnosis of patients with abdominal pain is primarily determined by radiographic, imaging techniques, such as abdominal ultrasonography (US), computed tomography (CT) and magnetic resonance imaging (MRI)

We found that the majority of the cases were females within the age group of the 51-60 years (mean age of 41.23 ± 4.5years). Female predominance was also reported in the studies carried out by Ezem et al [13] in Owerri South Eastern Nigeria and Emedike et al[14] in Port Harcourt, South South Nigeria, but with age group of 30-39 years, with mean age of 31.6years in each study. These results therefore, show that lower abdominal pains are truly more in females. The reasons for these needs to be investigated.

We also identified pelvic mass/pain as the most common clinical indication for the request for lower abdominal ultrasound scan in our study setting. This is in accord with the finding of the study conducted by Emedike et al [14] in Port Harcourt, Nigeria, which also reported pelvic pain as the most common indication (n=90, 45%). Inconsistent with our finding, is the results of the studies done by Ezem et al[13] and Luntsi et al [15], which documented lower abdominal pain and routine check as the commonest indications for their studies respectively.

The major pattern of sonographic imaging finding in this study was abnormal findings. This is in harmony with the findings of the study done by Lunsti et al [15], in which normal findings accounted only 16.3% of their total studied population. Although, this result is contrary to the findings of the study conducted by Ezem et al [13], which reported 111(44.4%) of their findings as normal and being the highest as against the pathological entities. This difference may be caused by the different nature of the studies and the different sample size used.

In our study, amongst the pathological entities, a greater proportion was identified as PID. This is in keeping with the findings conducted by Emedike et al [14] and Luntsi et al [15] in their independent studies, which also documented PID as the most common pathological entity. Contrary to our finding, is the result of Awoyesuku et al [16], which reported uterine fibroid as the most common pathological sonographic imaging finding. This difference in our results could be attributed to the different ages of the patients in our various studies.

This study also reviewed the relationships between the gender, age and clinical indications. It was shown by the Pearson correlation that there was no statistical relationship between clinical findings and gender of the patients as the p-value(0 .065) is higher than the alpha value(0 .05).

The Pearson's correlation test results revealed that there were positive correlation of normal findings but not statistically significant with gender, age and indications ($p > 0.05$). This implies that even though the patterns of sonographic findings may be different in gender, age group and clinical indications, the differences cannot be differentiated statistically. There was a negative but not statistically significant correlation of pathology with gender ($p> 0.05$). Positive and statistically significant correlations exist between pathology and age and pathology and clinical indication ($p< 0.05$). The age and clinical indication to a large extent can predict the pathological entities found during sonography of the lower abdomen.

The patterns of ultrasound imaging findings in patients with lower abdominal pains have been identified in this study. However, this study was conducted in only centre, which may have contributed to the discrepancies and this results cannot be generalized.

CONCLUSION

Female preponderance was noted and majority of the cases were in those within the age group of 51-60 years. Pelvic inflammatory disease was the most common pathological entity found in this study. There were positive correlations of normal findings but not statistically significant with gender, age and indications

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Author contributions

All authors have read and approved the manuscript. Each author participated sufficiently in this submission and the roles of the authors are:, HUC MPO, DCU, ONS were the main researchers, drafted the manuscript, responsible for data capturing, presentation of results, MPO, HUC, ANM, EJC, NOC and NSO carried out the interpretation of results and also gave recommendations on the review of literatures, and provide critical comments on the research work.

Data availability

The data used to support the findings of this study are available from the site publicly.

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Conflict of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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