

Pattern of Findings for Adult Patients undergoing Abdominal CT scan in Aminu Kano Teaching Hospital, Nigeria

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Abstract

Computed tomography is proven to be an essential imaging modality in tumour staging and differentiation as well as finding the cause of an unexplained abdominal pain and an acute abdominal pain. This study was aimed at evaluating the pattern of findings among patients that underwent abdominal CT scan. This study was retrospectively conducted in the Department of Radiology Aminu Kano Teaching Hospital, Kano from March 2020 to September 2020. A total of 664 Radiology request forms and CT report were retrieved from the archive of the department. The sex, age, and clinical indications were obtained from the patient's request forms and recorded in the data capture sheet. The CT findings were obtained from radiologist's report and recorded in the data capture sheet. Request forms with no age or indication and all pediatric patients are excluded from the study. Only descriptive statistics was employed in the data analysis; mean, standard deviation, frequency and range were obtained. The data was analyzed using Statistical Package for Social Sciences (IBM SPSS) Version 22.0. Jaundice was the most frequent indication 44 (12.9%) and 39 (9.5%) for males and females respectively, followed by abdominal mass 27 (7.9%) and abdominal swelling 26 (7.6%) for males, while abdominal swelling 34 (10.5%), abdominal mass and abdominal pain 26 (8.0%) for females. Normal study was the most frequent CT finding 23 (6.8%) and 19 (5.8%) for male and female subjects respectively. Pancreatic head tumour with cholestasis 17 (5.0%) and 16 (4.9%) for male and female respectively, and pancreatic head tumour with biliary tract obstruction for male and female 10 (3.0%) and 7 (2.1%) respectively. In this study jaundice was the most frequent clinical indication, followed by abdominal swelling and then abdominal mass. Pancreatic lesions were the most frequent among all other lesions involving abdominal organs followed by hepatobiliary lesions. Hence, the study would serve as a guide to practitioners as well as a reference for government and/or health management to take necessary action toward knowing the real etiology of pancreatic tumor and its high prevalence.

Keywords: Computed tomography, Patterns, Findings, Pancreatic head tumour

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Introduction

Computed tomography (CT) is a medical imaging procedure that uses computer - processed combination of many x-ray measurements taken from different angles to produce cross-sectional images of an object or volumetric data sets (Practice Parameter, 2016). Computed tomography has become an important tool in the detection and characterization of many diseases especially with the development of multi-detector CT (MDCT) scanners (Filippone *et al.*, 2015).

Indications for abdominal CT scan include; evaluation of urinary calculi, renal mass, diffuse liver disease, known or suspected pelvic mass and collection, evaluation of primary or metastatic malignancies, post-operative investigation, congenital anomalies, evaluation of bowel obstruction, perforation, appendicitis and gastrointestinal bleeding. There are no absolute contraindications for abdominal CT scan; however, the relative contraindication includes history of reaction to contrast, pregnancy or potentially pregnant patients and patients with unjustified request (Practice Parameter, 2016).

There are other imaging modalities for abdominal imaging such as Plain Film Radiography, Ultrasonography (US), Magnetic resonance imaging (MRI) and Nuclear Imaging. Despite better visualization of soft tissue details in MRI, however, CT can be used even in patients with metallic implant, claustrophobic patients and it is more available and cost effective (Hodler *et al.*, 2018). Despite the cost effectiveness and readily availability of ultrasound, CT gives large field of view which demonstrates organs and their relation with each other and has a higher sensitivity in detection of almost all stone and calcifications and staging of tumours (Aklan & Mikhlafy, 2018). Computed tomography is more readily available, less expensive, fast examination time, higher special resolution and lesion detectability and does not require intravenous injection of radiopharmaceuticals in comparison to nuclear imaging (Hodler *et al.*, 2018). Based on standard practices, every facility is expected to document patterns of findings of the procedures performed on patients, which could serve as a guide for practitioners and for policy making by the management. However, empirical study shows that, pattern of findings among adult patients undergoing abdominal CT scan in Aminu Kano Teaching Hospital has not been documented. The study will serve as a guide to the clinical practitioners toward diagnostic workup and treatment of patients with various forms of abdominal abnormalities as well as serving as a reference toward activation of multi-dimensional studies aiming at finding the etiology of most prevalent pathologies in this region of the country. This study was therefore aimed at evaluating the pattern of findings among adult patients that underwent abdominal CT scan.

Materials and Methods

This study was retrospectively conducted in the Department of Radiology Aminu Kano Teaching Hospital, Kano from March 2020 to September 2020. The ethical approval to conduct the study was obtained from the Human Research and Ethical Committee of Aminu Kano Teaching Hospital, Nigeria. A total of 664 Radiology request forms and CT report were retrieved from the archive of the department. The sex, age, and clinical indications were obtained from the patient's request forms and recorded in the data capture sheet. The CT findings were obtained from radiologist's report and recorded in the data capture sheet. Request forms with no age or indication and all pediatric patients are excluded from the study. Only descriptive statistics was employed in the data analysis; mean, standard deviation,

frequency and range were obtained. The data was analyzed using Statistical package for Social Sciences (IBM SPSS) Version 22.0.

Results

Six hundred and sixty-four request forms and CT reports were retrieved from the archive of Radiology Department of Aminu Kano Teaching Hospital, Kano, out of which 338 (50.9%) were males and 326 (49.1%) were females. The mean age, standard deviation and range for total was 50.45 ± 15.65 (18 - 102) years, for males and females were 51.03 ± 15.89 (18 - 88) years, 50.01 ± 15.51 (18 - 102) years respectively.

Table 1 shows jaundice was the most frequent indication 44 (12.9%) and 39 (9.5%) for males and females respectively, followed by abdominal mass 27 (7.9%) and abdominal swelling 26 (7.6%) for males, while abdominal swelling 34 (10.5%), abdominal mass and abdominal pain 26 (8.0%) for females. However, primary liver cell carcinoma, ascites and pseudo pancreatic cyst are among the less frequent clinical indication each has frequency of one and percentage of 0.3%. The row of others constituted the total number of less frequent clinical indication found in the study 26 (7.7%) and 22 (6.7%) for males and females respectively.

Table 1: Clinical history/indication among adult patients.

S/N	Indication	Male	Female
		F (%)	F (%)
1.	? Anorectal tumours	1 (0.3)	2 (0.6)
2.	? Abdominal tuberculosis	5 (1.5)	3 (0.9)
3.	? Colonic cancer	10 (3.0)	10 (3.1)
4.	? chronic liver disease	10 (3.0)	3 (0.9)
5.	? Gastric tumours	12 (3.6)	5 (1.5)
6.	? Hepatocellular carcinoma	5 (1.5)	1 (0.3)
7.	? Hepatic mass	20 (6.0)	3 (0.9)
8.	? Hepatoma	2 (0.6)	3 (0.9)
9.	? Pheochromocytoma	1 (0.3)	2 (0.6)
10.	? Pancreatic head tumours	8 (2.4)	5 (1.5)
11.	? Primary liver cell carcinoma	1 (0.3)	1 (0.3)
12.	? Pancreatic tumours	3 (0.9)	-
13.	? Renal cell carcinoma	9 (2.7)	1 (0.3)
14.	? Renal tumours	4 (1.2)	5 (1.5)
15.	? Urinary bladder tumours	9 (2.7)	2 (0.6)
16.	? Uterine Fibroid	-	3 (0.9)
17.	Ascites	1 (0.3)	1 (0.3)
18.	Anterior abdominal wall mass	-	2 (0.6)
19.	Adenocarcinoma	4 (1.2)	2 (0.6)
20.	Abdominal mass	27 (7.9)	26 (8.0)
21.	Abdominal pain	30 (8.8)	26 (8.0)
22.	Abdominal swelling	26 (7.6)	34 (10.5)
23.	Abdominal swelling and pain	8 (2.4)	9 (2.8)
24.	Benign prostatic hyperplasia	5 (1.5)	-
25.	Prostate cancer	3 (0.9)	-
26.	Colorectal tumours	2 (0.6)	3 (0.9)
27.	Diabetic Meletus	2 (0.6)	2 (0.6)
28.	Epigastric mass	1 (0.3)	4 (1.2)
29.	Epigastric pain	9 (2.6)	7 (2.2)
30.	Flank pain	4 (1.2)	9 (2.8)
31.	Gall bladder mass	3 (0.9)	-
32.	Haemoptysis	1 (0.3)	3 (0.9)
33.	Hepatic cyst	2 (0.6)	2 (0.6)

34. Hepatomegaly	3 (0.9)	2 (0.6)
35. Hypertension	2 (0.6)	-
36. Jaundice	44 (12.9)	39 (9.5)
37. Jaundice ? pancreatic head tumours	15 (4.4)	9 (2.8)
38. Left renal calculi	2 (0.6)	1 (0.3)
39. Metastatic liver deposit	2 (0.6)	1 (0.3)
40. Pancreatic cancer	2 (0.6)	6 (1.8)
41. Post chemo follow up	4 (1.2)	2 (0.6)
42. Poly cystic kidney	2 (0.6)	2 (0.6)
43. Pseudo pancreatic cyst	1 (0.3)	1 (0.3)
44. Post-surgery follow up	3 (0.9)	2 (0.6)
45. Right renal cyst	2 (0.6)	1 (0.3)
46. Rectal adenocarcinoma	1 (0.3)	4 (1.2)
47. Rectal tumours	2 (0.6)	3 (0.9)
48. ? Endometrial cancer	-	10 (3.1)
49. ? Ovarian cancer	-	12 (3.7)
50. ? Ovarian tumours	-	15 (4.6)
51. Cervical cancer	-	6 (1.8)
52. Pelvic mass	-	9 (2.8)
53. Others	26 (7.7%)	22 (6.7%)
Total	338 (100%)	326 (100%)

F= Frequency

Table 2 shows normal study (NS) was found to be more frequent CT finding 23 (6.8%) and 19 (5.8%) for male and female subjects respectively, followed by pancreatic head tumours with cholestasis 17 (5.0%) and 16 (4.9%) for male and female respectively, and pancreatic head tumours with biliary tract obstruction 10 (3.0%) and 7 (2.1%) also for male and female respectively. However, non-obstructive bilateral renal calculi, cholangiocarcinoma and hepatic hemangioma are among the less frequent abdominal CT findings each has frequency of one and percentage of 0.3%. The row of others in table constituted the total number of less frequent abdominal CT findings found in the study 121 (35.7%) and 143 (43.9%) for males and females respectively.

Table 2: Distribution of computed tomography (CT) findings among adult patients.

S/N	CT Findings	Male	Female
		F (%)	F (%)
1. NS		23 (6.8)	19 (5.8)
2. A		-	2 (0.6)
3. A-Pts		2 (0.6)	-
4. AAWT		-	3 (0.9)
5. ABD TB		6 (1.8)	2 (0.6)
6. BPKD		2 (0.6)	1 (0.3)
7. BSRCt		1 (0.3)	2 (0.6)
8. BWT, A ? ABD TB		2 (0.6)	-
9. CBDC/C		4 (1.2)	-
10. CgCa		1 (0.3)	1 (0.3)
11. CIAM		-	5 (1.5)
12. CLD		4 (1.2)	-
13. CLD, A, BPE		-	2 (0.6)
14. CLD/MT		10 (3.0)	1 (0.3)
15. CT/BOU		-	4 (1.2)
16. Eca		-	6 (1.8)
17. EHBC 2° CBDO		-	2 (0.6)
18. GbS		-	2 (0.6)
19. GT		9 (2.7)	4 (1.2)

20. GT/M-L1	3 (0.9)	2 (0.6)
21. GWT D. GT	4 (0.9)	-
22. H	9 (2.7)	5 (1.5)
23. HA	2 (0.6)	-
24. HCC	8 (2.4)	5 (1.5)
25. HeM	3 (0.9)	1 (0.3)
26. HH	1 (0.3)	1 (0.3)
27. HM ? Cause	4 (1.2)	2 (0.6)
28. HM, A ? ABD TB	-	2 (0.6)
29. HT	-	3 (0.9)
30. IAC	-	2 (0.6)
31. L	2 (0.6)	1 (0.3)
32. LA	1 (0.3)	2 (0.6)
33. LBT	7 (2.1)	5 (1.5)
34. LBT/M-L1	5 (1.5)	-
35. LRCC	-	2 (0.6)
36. LRT	3 (0.9)	-
37. LRT/M-L1	2 (0.6)	-
38. LS	3 (0.9)	3 (0.9)
39. LSRCt2 (0.6)	3 (0.9)	-
40. M-SHC	-	2 (0.6)
41. MIAM	2 (0.6)	-
42. MIM ? HCC	9 (3.0)	1 (0.3)
43. N-BRC	1 (0.3)	1 (0.3)
44. OT	-	3 (0.9)
45. OT, A, RPE,	-	2 (0.6)
46. P	3 (0.9)	-
47. P/ROU, LS	2 (0.6)	-
48. PAT/C	6 (1.8)	3 (0.6)
49. PBT/M-L1	1 (0.3)	1 (0.3)
50. PcE ? Pts	2 (0.6)	-
51. PHT	5 (1.5)	3 (0.9)
52. PHT/BTO	10 (3.0)	7 (2.1)
53. PHT/M-L1	3 (0.9)	-
54. PHT/C	17 (5.0)	16 (4.9)
55. PKD	2 (0.6)	3 (0.9)
56. PLCC	2 (0.6)	2 (0.6)
57. PLCC/M-L2	1 (0.3)	3 (0.9)
58. PLCC/PAL	2 (0.6)	-
59. PPC	2 (0.6)	1 (0.3)
60. PT/C	6 (1.8)	5 (1.5)
61. RAT, A	-	6 (1.8)
62. RCAC	-	2 (0.6)
63. RcT2	(0.6)	2 (0.6)
64. RRT	3 (0.9)	4 (1.2)
65. RRT/M-L1	-	2 (0.6)
66. RST	1 (0.3)	3 (0.9)
67. RSRc4	(1.2)	-
68. SBO 2° SBT	3 (0.9)	-
69. SCoT/M-L1	2 (0.6)	-
70. SCoT/OU	-	2 (0.6)
71. SHC	-	4 (1.2)
72. UF	-	6 (1.8)
73. UM/OU	-	4 (1.2)
74. UBT/BOU	4 (1.2)	-
75. Others	121 (35.7%)	143 (43.9%)
Total	339 (100%)	326 (100%)

F= Frequency (/) = With

Keys: NS=Normal Study, A=Ascites, A-Pts=Acute Pancreatitis, AAWT=Anterior Abdominal Wall Tumours, ABD TB=Abdominal Tuberculosis, BPKD=Bilateral Polycystic Kidney, BSRCt=Bilateral Simple Renal Cyst, BOU=Bilateral Obstructive Uropathy, BPE=Bilateral Pleural Effusion, BRC=Bilateral Renal Calculi, N-BRC=Non-obstructive BRC, BTO=Biliary Tract Obstruction, BWT=Bowel Thickening, C=Cholestasis, CgCa=Cholangiocarcinoma, CIAM=Cystic Intra-Abdominal Mass, CLD=Chronic Liver Disease, CLD/MT=CLD with Malignant Transformation, CBDC=Common Bile Duct Calculi, CBDO=Common Bile Duct Obstruction, D=Differential, ECa=Endometrial cancer, EHBC=Extra-hepatic Biliary Cholestasis, GbS=Gall Bladder Stone, GT=Gastric Tumours, H=Hepatoma, HA=Hepatic Adenoma, CC=Hepatocellular Carcinoma, HeM=Hepatic Mass, HH=Hepatic Hemangioma, HM=Hepatomegaly, HT=Hepatic Tumours, IAC=Intra-Abdominal Cyst, IAM=Intra-Abdominal Mass, L=Lymphoma, LA=Liver Abscess, LBT=Large Bowel Tumor, LRCC=Left Renal Cell Carcinoma, LRT=Left Renal Tumours, LS=Lumber Spondylosis, LSRCt=Left Simple Renal Cyst, MIM=Multiple Intra-hepatic Masses, MC=Mesenteric M-L1=Metastasis to Liver, M-L2=Metastasis to Lungs, M-L3=Metastasis to Vertebrae, M-L4=Metastasis to Body, M-L4=Metastasis to Peritoneum, OT=Ovarian Tumours, OU=Obstructive Uropathy, P=Prostatomegaly, PAL=Para-Aortic Lymphadenopathies, PAT=Peri-Ampullary Tumours, PBT=Pancreatic Body Tumours, PcE=Pancreatic Enlargement, PHT=Pancreatic Head Tumours, PKD=Polycystic Kidney Disease, PLCC=Primary Liver Cell Carcinoma, PPC=Pancreatic Pseudocyst, PT=Pancreatic Tumours, RAT=Right Adnexal Tumours, RCAC=Right Complex Adnexal Cyst, RcT=Rectal Tumours, RRT=Right Renal Tumours, RSRCt=Right Simple Renal Cyst, RST=Rectosigmoid Tumours, ROU=Right Obstructive Uropathy, SCoT=Sigmoid Colon Tumours HB=Hepatoblastoma, SHC=Simple Hepatic Cyst, M-SHC=Multiple SHC, SBO=Small Bowel Obstruction, SBT=Small Bowel Tumours, UBT=Urinary Bladder Tumours, UF=Uterine Fibroid, UM=Uterine Mass

Table 3 shows pancreatic head tumor 73 (11.0%) was the most frequent CT finding followed by simple renal cyst 52 (7.8%), normal study 42 (6.3%), hepatocellular carcinoma 36 (5.4%) and gastric tumor 30 (4.5%).

Table 3: Most frequent pathologies base on organs of origin.

Organs	CT Findings	Frequency	Percentage (%)
Pancreas	Normal Study	42	6.3
	Pancreatic head tumours	73	11.0
	Pancreatic tumours	15	2.3
Liver	Peri-ampullary tumours	12	1.8
	Hepatocellular carcinoma	36	5.4
	Hepatomegaly	29	4.4
	Chronic liver disease	22	3.3
	Multiple intra-hepatic masses	18	2.7
GIT	Simple hepatic cyst	18	2.7
	Gastric tumours	30	4.5
	Colonic tumours	26	3.9
	Bowel obstruction	11	1.7
	Rectal tumours	6	0.9
Urinary Tract	Recto-sigmoid tumours	5	0.8
	Simple renal cyst	52	7.8
	Renal tumours	18	2.7
	Urinary bladder tumours	10	1.5
Prostate	Renal cell carcinoma	7	1.1
	Benign prostatic hyperplasia	29	4.4
Gynecological Disease	Prostate cancer	4	0.6
	Adnexal tumours	20	3.0
	Uterine fibroid	19	2.9
	Uterine mass	7	1.1
	Cervical tumours	6	0.9
	Endometrial cancer	6	0.9
	Ovarian tumours	3	0.5

Discussion

Recent advances in computed tomographic (CT) technology, including the introduction of multidetector row CT and the development of real time three-dimensional (3D) imaging systems, have sparked renewed interest in CT utilization in the evaluation of various abdominal organs. Computed tomography is proven to be an essential imaging modality in tumours staging and differentiation as well as finding the cause of an unexplained abdominal pain and an acute abdominal pain (Chin *et al.*, 2012; Kessner *et al.*, 2017).

The findings of the current study reported mean age and range of 50.45 and (18 - 102) years. This is similar to the previous study conducted by Chin *et al.* (2012) that reported mean and age range of 55 years and (14 - 95)years. This similarity might be due to the fact that, most non-traumatic pathological processes occurs at 4th to 7th decade of life such as colorectal Tumours, gastric Tumours, prostatic cancer, cervical and endometrial carcinomas (Rahman, 2010; Hallinan and Venkatesh, 2013). However, the findings of current study are contrary to the findings of study conducted by Rahman, (2010) who reported mean age and age range of 46.8 year and (20 - 75)years respectively, this disparity might be because, the researcher consider only subjects presenting with colorectal cancer only.

Furthermore, the current study found that jaundice was the most frequent clinical indication 16.1% (107), followed by abdominal swelling 9.0% (60), abdominal pain 8.4% (56) and abdominal mass 8.0% (53) as indicated in Table 1. This is contrary to the study conducted by Kessner *et al.* (2017) that reported vomiting or nausea to be the most frequent clinical indication 28.2% (98),

followed by abdominal operation 27.0% (94) and change in bowel habit 13.2% (46). The differences were because, current study involved wide range of disease spectrum while on the other hand the study by Kessner *et al.*, (2017) was tailored to involved only patients with history of acute non-traumatic abdominal pain.

This study reported that, 6.3% (42) of the patients had normal CT findings, which was quite different from report by Chin *et al.* (2012) who reported 25.8% (31) patients had normal CT findings. The possible reason for these differences might be that the current study involved subjects with a wide range of clinical background and a very large sample size was used, however, the study by Chin *et al.* (2012) was conducted on only patients with acute non-traumatic abdominal pain and it involved 120 subjects only.

The findings of the current study as shown in Table 3 above revealed that, pancreatic Tumours 15.1% (100) was the most frequent pancreatic pathology and as well the most frequent CT finding in this study. This may be the reason why jaundice was found to be the most frequent clinical indication, meaning that, higher percentage of jaundice observed in this study was likely obstructive jaundice. This was more evident from Table 2 above which shows that, 33 (5.0%) patients had CT findings of pancreatic head Tumours with cholestasis and 17 (2.6%) had pancreatic head Tumours with biliary tract obstruction. This was contrary to the study conducted by Chin *et al.* (2012) which reported only 3.3% (4) patients with pancreatic disease. Epidemiologically, pancreatic cancer is arising as a thirteenth cancer worldwide and is the fourth most lethal malignant neoplasm across the world (Ilic and Ilic, 2016; Zhang *et al.*, 2016). It is one of the leading causes of cancer mortality in developed country. It has the highest incidence rate in North America and West Europe, while the lowest rate in Middle Africa and South-Central Asia (Ilic and Ilic, 2016; Zhang *et al.*, 2016). According to the recent statistics, it is the seventh most common cancer diagnosis in men and the fourteenth in women and the sixth leading cause of cancer deaths in men and eighth in women (Zhang *et al.*, 2016). In Nigeria, Morounke *et al.* (2017) reported that pancreatic cancer was the fifth leading cancer in men. This was contrary to the findings of the current study, in which 42 out of 73 subjects with pancreatic head Tumours were men.

The current study reported that hepatocellular carcinoma (HCC) 5.4% (36) was the most common liver pathology, followed by hepatomegaly 4.4% (29), chronic liver disease 3.3% (22), as well as multiple intra-hepatic masses and simple hepatic cyst 2.7% (18) each. This result corroborates reports by Henedige & Venkatesh, (2012) and Kim *et al.* (2019) who reported that, HCC is the most common primary liver malignancy and mostly caused by chronic liver disease. On the other hand, Chin *et al.* (2012) also reported that, only 5.8% (7) had hepatobiliary disease. Epidemiologically, HCC ranks sixth in cancer incidence and third in cancer mortality worldwide with chronic hepatitis B viral infection being the leading cause of HCC in most Asian and African countries and hepatitis C viral infection predominates in some southern European countries (Henedige & Venkatesh, 2012). However, majority of HCC cases (83% in 2012) occurred in East Asia and Mid Africa. HCC is two to four times more prevalent in men (Nowicki *et al.*, 2017). In Nigeria, Morounke *et al.* (2017) reported that liver cancer is the second most prevalent cancer similar with the present study showing that, HCC ranked second after pancreatic Tumours.

Furthermore, gastric Tumours 4.5% (30) was found to be the most frequent gastrointestinal tract (GIT) pathology shown in Table 3, followed by colonic Tumours 3.9% (26) and bowel obstruction 1.7% (11), only 0.9% (6) and 0.8% (5) had rectal Tumours and rectosigmoid Tumours respectively. Contrary to the current study was the previous study by Chin *et al.* (2012) that reported small bowel obstruction 8.3% (10) and large bowel obstruction 8.3% (10) as the most frequent GIT disease followed by bowel perforation 7.5% (9), Colitis 6.7% (8) and acute appendicitis 5.0% (6). The difference may be because previous study conducted their research on only patients with non-traumatic acute abdominal pain.

The findings of the current study reported that, 61 (9.2%) female patients had gynecological abnormalities, and this was contrary to the findings by Chin *et al.* (2012) who reported that only 4 (3.3%) had gynecological abnormality, the possible reason may be because only few or non-significant number of patients came up with acute abdominal pain as a result of gynecological abnormalities. Hence, Chin *et al.* (2012) based their study on only patients with non-traumatic acute abdominal pain. Furthermore, as shown in Table 3, 5.7% (38) of gynecological abnormality were of uterine origin (uterine fibroid; 2.9% (19), cervical tumor; 0.9% (6), uterine mass; 1.1% (7), and endometrial carcinoma; 0.9% (6)), meanwhile, 3.5% (23) were of adnexal origin out of which only 0.5% (3) were of ovarian origin (right ovarian Tumours; 0.3% (2) and bilateral ovarian Tumours; 0.2% (1)). Contrary to the current study was the previous study by Suppiah *et al.* (2017) who reported that 67.2% (n=43) cases of gynecological abnormality were of ovarian origin, while 32.8% (21) were of uterine origin, the simple reason for these differences may be that, previous study did not use only CT features in the characterization of gynecological abnormalities but also used the histological reports of each patient for further characterization and differentiation of adnexal Tumours.

Conclusion

In this study jaundice was the most frequent clinical indication, followed by abdominal swelling and abdominal mass, while pancreatic lesions were the most frequent among all other lesions involving abdominal organs, and this was followed by hepatobiliary lesions. Hence, this study would serve as a guide to practitioners as well as a reference for government and/or health management to take necessary action toward knowing the real etiology of pancreatic tumor and its high prevalence.

Recommendation

As reported in literatures that, pancreatic cancer is one of the leading causes of cancer mortality in developed countries, however, its high frequency in this current study as compared to other organ specific cancers serve as an alarm to hospital management or government to focus more effort in finding its etiology in Nigeria, most especially in North Western region.

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List of less frequent clinical indications and Abdominal CT scan findings that are classified as others in Table 1, 2, and 3 respectively

The following are indications for consecutive male adult patients classified as others in Table 1, each has frequency of one (1) and percentage of 0.3% with a total 26 (7.7%).

?Lymphoma; ?Peri-ampulatory tumours; ?Pancreatitis; Biliary duct dilatation; Bowel perforation; Bilateral pleural effusion; Bilateral renal calculi; Biliary tract obstruction; Caecal adenocarcinoma; Chronic hepatitis; Change in bowel habit; Constipation; Cholecystitis; Decompensated CVD; Flank pain 2° RTA; Gall bladder stone; Hepatic adenoma; HIV; Intestinal obstruction; Known rectal cancer; Liver abscess; Low back pain; Nephroblastoma; Spinal adenocarcinoma; Soft tissue sarcoma; Soft tissue tumours; Renal abscess; ? Rhabdomyosarcoma.

The following are indications for consecutive female adult patients classified as others in Table 1, each having frequency of one (1) and percentage of 0.3%; Total 22 (6.7%).

?Lymphoma; ?Peri-ampulatory tumours; ? Rhabdomyosarcoma; ?Tubo-ovarian abscess; Abnormal vaginal bleeding; Bilateral renal cyst; Cholelithiasis; Cholelithiasis; Chest wall tumours; Dermatofibrosarcoma; Fibrosarcoma; Gastric outlet obstruction; Hepatosplenomegaly; Known breast cancer; Leiomyosarcoma; Metastatic cancer; Ovarian Teratoma; Polycystic liver disease; Right adnexal mass; Right hydronephrosis; Stroke; Sacrococcygeal teratoma.

The following are CT findings for consecutive male adult patients classified as others in Table 2, each has frequency of one (1) and percentage of 0.3% with a total 121 (35.7%).

Acute pancreatitis and cholecystitis; Acute Cholecystitis; Acute pancreatitis and pancreatic pseudocyst; Acute pancreatitis and simple hepatic cyst; Anterior abdominal wall tumours with metastasis to liver and lungs; Bowel obstruction; Bilateral renal function impairment and small bowel obstruction; Biliary tract obstruction; Chronic cholecystitis; Chronic cholecystitis, gall bladder polyp and cholestasis; Chronic hepatitis and cholecystitis; Common bile duct obstruction with cholestasis, left simple renal cyst, lumbar spondylosis and prostatomegaly; Caecal pole tumours and bilateral simple renal cyst, Caecal pole tumours with metastasis to liver, left simple renal cyst and lumbar spondylosis, Cholegiocarcinoma with cholestasis, metastasis to liver and right simple renal cyst; Chronic hepatic cyst; Chronic liver disease, portal hypertension, non-obstructive left renal calculus and prostatomegaly; Chronic liver disease with malignant transformation and Colonic tumours; Colorectal tumours with bilateral obstructive uropathy and right simple renal cyst; Colorectal tumours with metastasis to the peritoneum; Duodenal mass with metastasis to lungs; Extra-hepatic biliary duct obstruction and pancreatic duct obstruction; Extensive intra-abdominal abscess; Gall bladder polyp; Gluteal mass with bladder extension and pelvic destruction; Gastric tumours with bilateral pleural effusion; Gastric tumours and left simple renal cyst; gastric tumours, pancreatic tail tumours, Left basal pulmonary fibrosis and prostatomegaly; Gastro-intestinal stromal tumours with metastasis to liver, left renal Agenesis and bilateral adrenal gland hyperplasia; Hepatoma with metastasis to lungs and right pleural effusion; Hepatocellular carcinoma, multiple left simple renal cyst and non-obstructive right renal calculus; Hepatocellular carcinoma and mesenteric cysts; Hepatocellular carcinoma, non-obstructive bilateral renal calculi, right pleural effusion and basal pneumonic consolidation; Hepatocellular carcinoma with metastasis to lungs; Hepatic echinococcal cysts rule out chronic granulomatous Disease; Hepatic hemangioma; Hepatomegaly and basal pneumonic consolidation; Hepatomegaly, biliary wall calcification

and Schistosomiasis; Hepatomegaly gastric wall thickening and right renal ectopia; Hepatomegaly with intra-hepatic cholestasis and lumber spondylosis; Hepatomegaly with non-obstructive cholestasis and prostatomegaly; intra-abdominal lymphoma with metastasis to lungs; Intra-abdominal mass; Intra-abdominal mass with metastasis to body; lymphoma and Gastro-intestinal stromal tumours; lymphoma with metastasis to lungs; colonic tumours with para-aortic lymphadenopathies and bilateral pleural effusion, colonic tumor and chrohn's colitis; Colonic tumours with metastasis to lungs and prostatomegaly; Left cystic nephroma with metastasis to body; Left hydronephrosis; Left hydronephrosis and cystic nephroma; Left renal ectopia, right basal pneumonic consolidation, Right hydrocele and lumber spondylosis; Left renal tumours with metastasis to vertebrae; Left simple renal cyst, intra-abdominal mass, left inguino-scrotal hernia and prostatomegaly; Left simple renal cyst and solitary hepatic nodule; Multiple bilateral simple renal cyst, lumber spondylosis and Prostatomegaly; Multiple bilateral simple renal cyst, right pleural effusion, Prostatomegaly and lumber spondylosis; Multiple bilateral simple renal cyst, multiple hepatic abscess; Multiple simple hepatic cyst, bilateral simple renal cyst, Prostatomegaly, lumber spondylosis and atherosclerosis; Multiple simple hepatic cyst, non-obstructive left renal calculus; Mesothelioma with metastasis to liver; Mesenteric cyst, Malignant esophageal mass with metastasis to liver and thoraco-lumber spondylosis; Multiple hepatic metastasis; Multiple Intra-abdominal masses with metastasis to liver, lungs and peritoneum, Multiple intra-hepatic masses, obstructive left renal calculus, left simple renal cyst, appendicitis and Prostatomegaly; Mesenteric tumours; Non-obstructive bilateral renal calculi, Prostatomegaly, chronic cystitis and lumber spondylosis; Obstructive cholestasis secondary to common bile duct obstruction, left simple renal cyst, Prostatomegaly and lumber spondylosis; Omental tumours; Omental with metastasis to vertebrae; Prostatomegaly, adenocarcinoma and lumber spondylosis; Prostatomegaly, adenocarcinoma and lumber spondylosis, multiple hepatic cyst and multiple bilateral simple renal cyst; Prostatomegaly with right obstructive uropathy and lumber spondylosis; Prostate cancer with metastasis to the pelvic; Para-aortic lymphadenopathies, abdominal tuberculosis and lymphoma are differential; Para-aortic lymphadenopathies and neurogenic tumours, Para-aortic lymphadenopathies, right renal cell carcinoma with metastasis to lungs; Pancreatic cyst; Pancreatic cancer; Pancreatic cancer, urinary bladder tumours and bilateral hydronephrosis; Pancreatic cancer with metastasis to body, Pancreatic cancer, urinary bladder tumours with metastasis to liver; Pheochromocytoma; Pyloric and duodenal mass with para-aortic lymphoma; Pancreatic cancer, chronic cholecystitis and left pleural effusion; Pancreatic cancer with cholestasis, hepatomegaly, Prostatomegaly, lumber spondylosis and left simple renal cyst; Pancreatic cancer with metastasis to vertebrae; Pancreatic cancer with cholestasis and bilateral simple renal cyst; Pancreatic tumours with pancreato-biliary ductal obstruction; Primary liver cell carcinoma, cholelithiasis, multiple left simple renal cyst, Prostatomegaly and spondylosis; Papillary right renal cell carcinoma with para-aortic lymphadenopathies and metastasis to liver; Pancreatic tumours with metastasis to liver and biliary tract obstruction; Pancreatic tumours with liver and lung metastasis and para-aortic lymphoma; Pott's Disease with spinal abscess and hepatosplenomegaly; Right colonic tumours with para-aortic and lung metastasis; Rectal tumours with liver and para-aortic metastasis; Rectal tumours with liver metastasis, non-obstructive bilateral renal calculi and Prostatomegaly; Rhabdomyosarcoma; Retroperitoneal cystic mass and neurogenic tumours is a differential; Right renal calculus, gall bladder stone and abdominal tuberculosis; Right renal cell carcinoma with metastasis to liver and lungs; Right renal laceration and sub-capsular hemorrhage; Right renal tumours and bilateral pleural effusion; Rectosigmoid tumours with metastasis to liver, right renal calculus and

Prostatomegaly; Renal tumours, urinary bladder tumours likely squamous cell carcinoma; Solitary hepatic nodule likely hepatic hepatoma; Superior mesenteric artery stenosis; Transvers colon tumours with liver metastasis and para-aortic lymphadenopathies; Urinary bladder tumours with metastasis to liver.

The following are CT findings for consecutive female adult patients classified as others in Table 2, each has frequency of one (1) and percentage of 0.3% with a total 143 (43.9%).

Ascites and right pleural effusion; Ascites and simple hepatic cyst; Abdominal tuberculosis, cholestasis and right simple renal cyst; Adnexal tumours with ascites and bowel obstruction; Adnexal tumor with extensive intra-abdominal abscess and uterine fibroid; Adnexal tumours with metastasis to liver and peritoneum; Bilateral adnexal cyst with bilateral obstructive uropathy and ascites; Bilateral adnexal tumours and cervical tumor; Bilateral adnexal tumours, cystic nephroma and bilateral pleural effusion; Bilateral adnexal tumours with metastasis to liver and peritoneum; Biliary duct dilatation secondary to ?periampullary tumours; Bowel obstruction secondary to rectal tumours with para-aortic lymphadenopathies; Bowel obstruction, adnexal tumours and ascites; Bilateral Ovarian tumours with extensive body metastasis; Bilateral pelvic mass with liver and peritoneum metastasis and para-umbilical hernia; Bilateral simple renal cyst, cervical tumours, multiple intra-abdominal masses; Pancreato-biliary ductal obstruction secondary to ? periampullary tumours; Complex left adnexal cyst; Complex pelvic mass; Chronic pancreatitis and non-obstructive bilateral renal calculi; Common bile duct obstruction with Intra-hepatic biliary duct dilatation; Chronic cystitis and lumbar spondylosis; Cystic intra-abdominal mass with obstructive uropathy; Lymphoma, choledocholithiasis with secondary biliary duct dilatation, left simple renal cyst and multiple intra-hepatic masses; Chronic liver disease, splenic cyst and uterine fibroid; Chronic liver disease with ascites and right ovarian cyst; Colonic tumours, appendicitis, appendiceal mass and para-aortic lymphadenopathies; Colonic tumours and right non-functional kidney; Duodenal fibrosis with gastric outlet obstruction; Dermatofibrosarcoma with metastasis to liver and vertebrae; Dynamic ileus and left simple renal cyst; Endometritis; Endometritis and complex left adnexal cyst; Gall bladder cholangiocarcinoma; Gall bladder mass with cholestasis; Gall bladder tumours with intra-hepatic cholestasis and chronic cholecystitis; Gall bladder tumours, chronic liver disease with secondary cholestasis and lumbar spondylosis; Gastric tumours with para-aortic and splenic metastasis; gastric tumours, right adnexal tumor, left hydronephrosis and lumbar spondylosis; Gastric tumours with liver metastasis, bilateral hydronephrosis and bilateral renal calculi; Gastric tumours with metastasis to lungs; Gastritis; gastric wall tumours and para-aortic lymphadenopathies; Hepatoma, non-obstructive right renal calculus and atherosclerosis; Hepatocellular carcinoma, portal hypertension, right simple renal cyst; Hepatocellular carcinoma and cholangiocarcinoma with metastasis to liver; Hepatocellular carcinoma with metastasis to body; Hepatocellular carcinoma with para-aortic lymphadenopathies; Hepatomegaly and bilateral polycystic kidney disease; hepatomegaly and chronic cystitis; Hepatomegaly and chronic cholecystitis; hepatomegaly and hepatic steatosis; Hepatomegaly, multiple intra-abdominal masses, intra-splenic mass and para-aortic lymphadenopathies; Hepatomegaly and right ovarian tumours; Hepatomegaly and right simple renal cyst; Hepatosplenomegaly and non-obstructive bilateral renal calculi; Hepatic nodule; Intra-abdominal lymphoma with gastric outlet obstruction; intra-abdominal mass with liver metastasis; Left polycystic kidney and hepatic cyst; Left adnexal tumours possibly ovarian carcinoma; Left adnexal tumours with liver metastasis and obstructive uropathy; Leiomyosarcoma and right colonic tumours; Left renal tumor; Left simple adnexal cyst; Left

simple renal cyst, hepatomegaly and uterine mass; Left simple renal cyst, non-obstructive ureteric calculus, uterine fibroid; Extensive body metastasis in known breast cancer, left ureteric calculus, left hydronephrosis and left complex adnexal cyst; Multiple pelvic masses; Multiple simple hepatic cyst, bowel wall thickening and para-umbilical hernia; Multiple uterine fibroid with bilateral obstructive uropathy and para-umbilical hernia; Multiple uterine Fibroid, ascites and bilateral pleural effusion; Multiple uterine fibroid and cholecystitis; Meigs's syndrome and chrohn's colitis; Meigs's syndrome, bilateral pleural effusion and lumber spondylosis; Mesenteric Cyst, Extensive intra-abdominal abscess collection; Multiple intra-hepatic masses, primary liver cell carcinoma is a differential, multiple bilateral simple renal cysts and left renal calculus; Multiple intra-hepatic masses and adenocarcinoma; Non-obstructive cholelithiasis; Non-obstructive left ureteric calculus, atherosclerosis and lumber spondylosis; Non-obstructive right renal calculus, right ureteric calculus, multiple right simple renal cyst; Obstructive cholestasis secondary to common bile duct calculus; Omental cyst, mesenteric cyst and pancreatic pseudocyst; Omental tumours; Omental tumours multiple left simple renal cyst and lumber spondylosis; Ovarian tumours and left hydronephrosis; Ovarian tumours with liver metastasis and lymphoma; Para-aortic lymphoma with body metastasis; Periapillary tumor with cholestasis, para-aortic lymphadenopathies, gall bladder polyp and adenomyosis; Pelvic mass with right obstructive uropathy and hepatomegaly; Pelvic fluid collection likely inflammatory; Pancreatic head tumor with secondary bowel obstruction; pancreatic head tumours and bilateral pleural effusion; Pancreatic head tumours and chronic kidney disease; Pancreatic head tumours, para-aortic lymphadenopathies, chronic cholecystitis and gall bladder stone; pancreatic head tumours with cholestasis, obstructive left renal calculus and chronic liver disease; Primary liver cell carcinoma, bilateral pleural effusion and splenomegaly; Primary liver cell carcinoma and para-aortic lymphadenopathies; Polycystic liver disease; Pancreatic Mass; Peri-nephric collection likely abscess; pancreatic pseudocyst, horse shoe kidney and diaphragmatic hump; Pancreatic pseudocyst and uterine fibroid; Pancreatic tumours with extra-hepatic biliary cholestasis and liver metastasis; Pancreatic tumours with splenic metastasis; Pancreatic tail tumours; Pott's disease and para-aortic lymphoma; Pott's disease with bilateral pleural effusion and simple hepatic cyst; Para-umbilical hernia; Right colonic tumours with vertebral metastasis and para-aortic lymphadenopathies; Right adnexal tumours, ascites and bilateral pleural effusion; Right adnexal tumours and bilateral obstructive uropathy; Right adnexal tumours, simple hepatic cyst and right simple renal cyst; Right adnexal tumours, uterine mass, lumber spondylosis and spondylolisthesis; Right complex adnexal cyst; Renal cell carcinoma with metastasis to liver, lungs and peritoneum; Right complex renal cyst; Rectal tumours, pancreatic tail tumours and gastritis; Right hydronephrosis and bilateral pleural effusion; Right hydronephrosis and right renal calculus; Right ovarian cyst; Right ovarian tumours with bilateral obstructive uropathy; Retroperitoneal tumor, left obstructive uropathy; retroperitoneal tumor in known breast cancer; Right renal cell carcinoma with liver metastasis, multiple right renal calculi, left hydronephrosis, uterine fibroid and bowel wall calcification; Right simple adnexal cyst; Right simple renal cyst and ascites; Right simple renal cyst and thickened sigmoid colon wall likely due to inflammation; Small bowel obstruction and multiple uterine fibroid; Splenic cyst; Splenic cyst and left renal calculus; Splenic Cyst and right simple adnexal cyst; Simple hepatic cyst and pancreatic pseudocyst; soft tissue sarcoma and para-aortic lymphadenopathies; Type II sacrococcygeal teratoma; Type I choledochal cyst; Urinary bladder tumours with bilateral obstructive uropathy; Urinary Bladder tumours with metastasis to liver and lungs and secondary bowel obstruction; Uterine fibroid; Uterine fibroid, right basal

pulmonary consolidation and hepatomegaly; leiomyosarcoma, simple hepatic cyst and left simple adnexal cyst; Uterine mass with ascites.