East African Medical Journal Vol. 98 No. 6 June 2021
ACUTE APPENDICITIS- SEASONAL VARIATION IN INCIDENCE IN ABA, SOUTHEAST NIGERIA
Ndukauba Eleweke, MBBS; FMCS. Department Of Surgery, Abia State University, P.M.B 2000, Uturu, 441107 Abia State, Nigeria. Samuel Chidi Ekpemo, MBB; MRCS; FWASC. Department of Surgery, Abia State University, P.M.B 2000 Uturu, 441107 Abia State, Nigeria. Isaiah Oji Abali, MBBS; FWACS. Department Of Surgery, Abia State University, P.M.B 2000 Uturu, 441107, Abia State, Nigeria. Awa Ukonye Offiah, BSc, MBBS; FMC Path. Department Of Anatomical Pathology, Abia State University, P.M.B 2000 Uturu,441107 Abia State, Nigeria. Uwadinachi Iweha, MB, BCh; FRCS, Department of Surgery, Abia State University, P.M.B 2000 Uturu,441107 Abia State, Nigeria. Jude Onwuka Ehiemere, MBBS; FMCFM, Living Word Mission Hospital, Aba, 450272. Nigeria

Corresponding uthor: Ndukauba Eleweke. MBBS; FMCS. Department of Surgery, Abia State University, P.M.B 2000, Uturu, 441107 Abia State, Nigeria. Email: n.eleweke@Abiastateuniversity.edu.ng

ACUTE APPENDICITIS- SEASONAL VARIATION IN INCIDENCE IN ABA, SOUTHEAST NIGERIA

N. Eleweke, S. C. Ekpemo, I. O. Abali, A. U. Offiah, U. Iweha, J. O. Ehiemere

ABSTRACT

***Background*: Acute Appendicitis is one of the commonest surgical emergencies worldwide. The incidence in age, sex and relation to seasons of the year show wide variations globally.**

***Objective*: to ascertain if there is a seasonal variation in the incidence of acute appendicitis in Aba, Southeast Nigeria, using 3 Hospitals.**

***Design*: Prospective study.**

***Setting*: Abia State University Teaching Hospital, Jonex Hospital, Living Word Mission Hospital- all in Aba, Southeast Nigeria.**

***Subjects*: patients with clinical and histological diagnosis of acute appendicitis at the Abia State University Teaching Hospital, Aba, Living Word Mission Hospital and Jonex Hospital in Aba, Southeast Nigeria. These patients were recruited into this 5- year prospective study which spanned from January 2014 to December 2018. The date of admission, biodata, clinical diagnosis and histological diagnosis were captured in a proforma designed for the study. Results were analyzed using SPSS Programme Version 21 and presented in tables and figure.**

***Results*: Three hundred and twenty-one cases of acute appendicitis were seen during this period. 55% were males. There was a steady increase in the incidence of acute appendicitis over the years. In each of the years, the highest incidence was between November and March.**

***Conclusion*: This study shows a monthly variation in the incidence of appendicitis in Aba, with higher incidence in the warm and dry months of the year and lower incidence in the wet and humid months of the year.**

INTRODUCTION

Acute appendicitis with a global prevalence rate of 28.6% (1) is a common non traumatic surgical emergency. In most series it is the commonest cause of surgical emergency (2, 3). In Nigeria, the incidence of acute appendicitis is said to range from 22.1 to 49.8 new cases per 100,000 persons.

In the first three years of life the incidence of appendicitis is low. It peaks in the late teens, declining slowly, so that in the elderly it is rare (5,6). The gender incidence varies from one study to another, but the incidence appears to be more common in males after puberty (7,8,9).

Many factors have been implicated in the aetiology of acute appendicitis. These include familial predisposition, appendiceal luminal obstruction, air pollution, allergens, poor fibre diets, and gastrointestinal infections and infestations by viruses, bacteria and parasites (10,11,12,13,14,15). Low fibre diet encourages the formation of faecolith by reducing faecal viscosity which leads to reduced bowel transit time (6,13). The incidence of acute appendicitis has been reported to be lower in vegetarians than in non vegetarians because of the higher content of fibre in the diet of the former (6,13).

Researchers have found that although acute appendicitis occurs throughout the year, the incidence varies with the seasons of the year, as is found in some other diseases (16, 17). Most workers have found higher incidence of acute appendicitis in the warm summer months (18, 19, 20, 21,22). Oguntola AS et al (23) studied the epidemiological pattern of appendicitis in Southwest Nigeria and found the incidence to be higher between April and September. Dondyi-Manuel A et al, in Port Harcourt, South South Nigeria, found the peak incidence of acute appendicitis to be in July (24). Ahmed SA et al in Northern Nigeria did not observe any significant change in the incidence of acute appendicitis with the seasons (11).

To the best of our knowledge there is no previous work on the seasonal variation of the incidence of acute appendicitis in Aba, Southeast Nigeria, hence the need for this work.

Our aim of undertaking this work was to find if there is any seasonal variation in the incidence of acute appendicitis in Aba, Abia State, Southeast Nigeria, and to identify any inciting factors. If any significant relationship is found, it would help in adopting measures that could lead to a decrease in the incidence of acute appendicitis in Aba.

MATERIALS AND METHODS

After Institutional Review Board approval, consenting patients with clinical features of acute appendicitis from January 1, 2014, to December 31, 2018, were included in the study. All the patients had the required clinical, laboratory and radiological evaluations as appropriate on diagnosis of acute appendicitis. The patients were worked up for appendicectomy. The surgeries were carried out by consultants or senior surgical residents. All the specimen of vermiform appendix were sent for histopathological examination at the Pathology Department of Abia State University Teaching Hospital, Aba.

Jonex Hospital is a 24-bed general surgical centre while Living World mission hospital is a 100-bed faith-based Hospital. These are where patients are likely to go for surgical care when there is disruption of services at the Abia State University Teaching Hospital.

Patients whose histological diagnosis was confirmed to be acute appendicitis were recruited into the study, while unconfirmed cases were excluded from the study.

Patients' bio data, clinical findings, laboratory and radiological reports, where appropriate, treatment, histological diagnosis and post operative complications were entered into a proforma prepared for the study.

Analysis was done using SSP 21 and presented in tables and figures.

RESULT

Three hundred and twenty-one patients were included in this study. There were 174(55%) males and 147 (45%) females, giving a male: female ratio of 1.2:1. The age range was from 3years to 72years.The majority of the patients were in the age group 20-29years followed by 30-39 years (Table 1). The mean age was 20.7± 15yrs.

Table 1

Age Incidence of Acute Appendicitis in Aba

AGE GROUP	MALE (%)	FEMALE	TOTAL
0 – 9	15(8.6)	16(10.9)	31 (19.5)
10 – 19	24(13.8)	23(15.6)	47 (47)
20 – 29	54(31.0)	45(30.6)	99 (61.6)
30 – 39	40(23)	31(20.1)	71 (43.1)
40 – 49	21(12.1)	15(10.2)	36 (22.3)
50 – 59	11(6.3)	10(6.8)	21 (13.1)
60 – 69	5(2.9)	5(3.4)	10 (6.3)
70 AND ABOVE	4(2.3)	2(1.4)	6 (3.7)
TOTAL	174(55%)	147(45)	321(100)

We also observed that most of the cases were cases were recorded between November and March each year (Table 2) during the period of study. 212(65.9%) of the cases were recorded during this period. The least number of cases were seen between June and October each year.

Table 2
Seasonal variation of appendicitis in Aba

	2014(%)	2015(%)	2016 (%)	2017 (%)	2018 (%)
JANUARY	9(20)	9(16.1)	8(12.9)	11(15.7)	12(15.2)
FEBRUARY	8(17.8)	10(17.9)	13(21)	12(17.1)	13(16.5)
MARCH	9(20)	10(17.9)	13(21)	13(18.6)	16(20.3)
APRIL	3(6.7)	4(7.1)	5(4.8)	7(7.1)	9(6.3)
MAY	2(4.4)	4(7.1)	2(3.22)	3(4.3)	3(3.8)
JUNE	1(2.2)	3(5.4)	3(4.8)	3(4.3)	2(2.5)
JULY	1(2.2)	3(5.4)	2(3.2)	3(4.3)	2(2.5)
AUGUST	2(4.4)	0	2(3.2)	4(5.7)	2(2.5)
SEPTEMBER	1(2.2)	4(7.1)	3(4.8)	2(2.9)	2(2.5)
OCTOBER	2(4.4)	2(3.6)	1(1.6)	1(1.4)	4(5.1)
NOVEMBER	3(6.7)	1(1.8)	6(9.2)	6(8.6)	7(8.9)
DECEMBER	5(11.1)	6(10.7)	6(9.2)	7(11.0)	11(13.9)
TOTAL	46(100)	56(100)	64(100)	79(100)	83(100)

There was a progressive increase in the incidence of acute appendicitis from 2014 to 2018

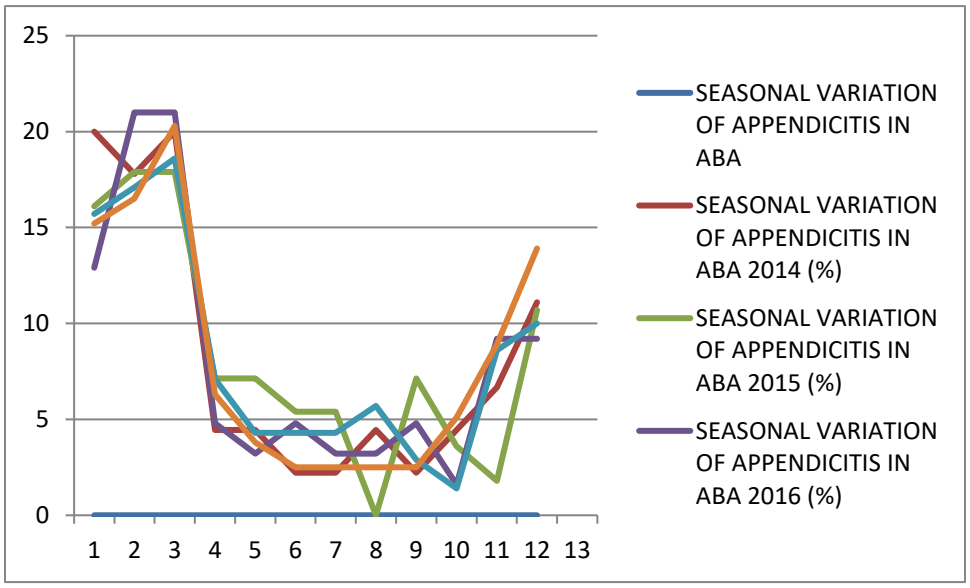

Figure 1. Yearly Incidence of Acute Appendicitis in Aba, Southeast Nigeria

DISCUSSION

Acute appendicitis is a surgical emergency (1). Globally it is one of the major causes of acute abdomen (2, 3). The cause is still not well understood. If not diagnosed and treated appropriately, acute appendicitis could lead to severe complications like perforation, peritonitis and even death.

Although the aetiology of acute appendicitis is still not very clear, various studies have found seasonal variation in the incidence of acute appendicitis. In this work for the period of 5years, a total of 321 cases of acute appendicitis were seen. 231 (65.9%) cases

presented between November and March during the period under study. This corresponds to the periods of high temperature with low humidity and scarcity of fruits and vegetables which provide fibre in the diet. Wages Ahmed et al in Pakistan (17), Ilives et al in Finland (19), Gallerani M et al(20), Rai et al(21) Mohammed Al-Omrah et al(22), in their series also found the incidence of appendicitis to be highest in the warm summer months. Oguntola AS, et al (23) in Southwest, Nigeria found the peak incidence of appendicitis to be between June and September while Dodiyi-Manuel A, et al (24) in Port Harcourt, South South Nigeria, found the peak incidence of acute appendicitis to be in July. Lohar et al (6) in India found the incidence of appendicitis to be highest between March and May,

Possible reasons for increased incidence of appendicitis in the warm months include dehydration, reduced dietary fibre with reduced bowel movement, infections or allergens with reaction of the lymphoid tissues in the appendix, decreased humidity, changes in atmospheric pressure, and air pollution [18,19].

In this study the male: female ratio was 1.2:1. Some series have shown male preponderance, others have shown no difference, and few have shown female preponderance (10). The incidence of appendicitis was highest in the age group 20-29 years in both male and females. Other workers have reported the peak incidence of appendicitis to be between 15 to 29years (7,8,9,11).

Unlike the experience of Lohar HP et al (6), who reported a steady decline in the incidence of appendicitis over 3 years in India, our work shows annual increase in the cases of acute appendicitis in Aba. This is also in contrast to falling incidence in the Western World (25,26). Reasons adduced for the increasing incidence of acute appendicitis includes adoption of western diet with reduced dietary fibre predisposing to decreased intestinal transit time which predisposes to the formation of faecoliths in the appendiceal lumen. Faecaliths cause appendiceal luminal obstruction which predisposes to acute appendicitis (7, 27).

CONCLUSION

We observed higher incidence of appendicitis in Aba, Southeast Nigeria. The higher incidence was recorded in the warm, dry, dusty months of the year when humidity is low. During this period too, there is scarcity of fruits and vegetables making the diet low in fibres.

RECOMMENDATION

The three Centres used for this study may not have captured all the cases of appendicitis during the period of this study. There is therefore the need to do a multicenter study.

REFERENCES:

1. Ferris M, Quan S, Kaplan B, Molodecky N, Ball C, Chernoff G, Bhala N, Ghosh S, Dixon E, Kaplan G. The Global Incidence of Appendicitis: A Systematic Review of Population based Studies. Ann Surg. 2017;266(2): 237-41.
2. Ajao OG. Appendicitis in a Tropical African population. J Natl Med Assoc. 1979; 71:997-9.
3. Nshuti R, K ruger D, Luvhengo T. Clinical presentation of acute appendicitis in adults at the Chris Hani Baragwanath academic Hospital. Int J Emerg Med. 2014; 7:12. Doi10.1186/1865-1308-7-12
4. Duduyemi BM. Clinicopathological review of surgically removed appendix in Central Nigeria. Alex J Med 2015; 51:207-11
5. Lohar HP, Asger Calcuttawala MA. Nirhale DS, Athavale VS, Malhotta M, Priyadarshi N. Epidemiological aspects of appendicitis in a rural setup. Med J DY Patil univ 2014;7: 753-7.

6. Sarla GS. Acute appendicitis: Age, Sex and seasonal Variation. JMSCR 2018; 6(6): 262-264
7. Ohene-Yeboh M, Abantaga FA. Incidence of acute appendicitis in Kumasi Ghana.West Afr J Med. 2009; 28(2): 122-125.
8. Fashina IB, Adesanya AA, Atoyebi OA, Osinowo OO, Atimomo CJ. Acute appendicitis in Lagos: a review of 250 cases. Niger Posgrad Med J 2009;16(4): 268-73.
9. Alatasie OI, Ogunweide T. Acute appendicitis: incidence and management in Nigeria. IFEMED J 2008;14(1):66-70.
10. Ergul E. Hereditary and familial tendency of acute appendicitis. Scand J Surg. 2007; 96:290-292
11. Ahmed SA, Makama JG, Mohammed Sanda RB, Shehu SM, Ameh EA. Epidemiology of appendicitis in Northern Nigeria: A 10-year Review. Sub Saharan Afr J Med Sci. 2004; 1: 185-90.
12. Kaplan GG, Dixon E, Panaccione R, Fong A, Chen l. Szyszkowicz M,et al Effect of ambient air pollution on the incidence of appendicitis. CMAJ 2009; 18:591-597.
13. Domanik B, Fikri E, Nasution IO. Relationship between fibre diet and appendicitis incidence in children at H Adam Malik Central Hospital, Medan, North Sumatra, Indonesia. Bal Med J. 2016; 5(2): 268-271.
14. Lal A, Hales S, French N, Baker GM. Seasonality in Human Zoonotic Enteric diseases: A Systematic Review. PLoS One 2012;7: e31883. doi: 10.137/journal.pone.0031883.
15. Manfredini R. Gallerani M. Salami R et al.: Fatal Pulmonary Embolism on Hospital subjects: evidence for a winter peak. J Int Med Res 1994; 22:85-89.
16. Cohen MC. Rohitla KM. Lavery CE.et al. Meta-analysis of the morning excess of acute myocardial infarction and sudden cardiac death. Am J Cardiol 1997; 79:1512-6
17. Ahmed W, Akhter M.S, Khan S. S easonal variation of acute appendicitis. Pak J med. Sci 2018 May-June 43(3) 564-567
18. Ilves I, Fagerstrom A, Herzig KH, Juvonen P, Miettinen P, Paajanen H. Seasonal variations of acute appendicitis and nonspecific abdominal pain in Finland. World J Gastroenterol. 2014; 20:4037- 42. Doi:10.3748/wjg. v20.i14.4037.
19. Gallerani M, Boari B, Anania G, Cavallesco G, Manfredini R. Seasonal Variation in onset of acute appendicitis. Clin Ter. 2006; 157:123-27.
20. Rai R, D'Souza RC, VV, Sudarshan SH, P.S., Pai JR, et al. An evaluation of the seasonal variation in Acute Appendicitis. J Evol Med Dental Sci. 2014; 3:257-260. Doi:10.14260/jemds/2014/1818.
21. Al-Omran M, Mamdani M, MacLeod RS. Epedemiological features of acute appendicitis in Ontario, Canada. Can J Surg 2003; 46:263-8.
22. Sanda RB, Zalloum M, El-Hossary M, Al-Rashid F, Ahmed O, Awad A, et al. Seasonal variation of appendicitis in northern Saudi Arabia. Ann Saudi Med 2008; 28:140-1.20
23. Oguntola AS, Adeoti ML, Oyemolade TA. Appendicitis: Trends in incidence, age, -sex and seasonal variations in Southwestern Nigeria. Ann Afr Med. 2010; 9:213-217. Doi:10.4103/1596-3519.70956.
24. Dodiyi-Manuel A, Koroye OF. Appendicitis In University of Port Harcourt Teaching Hospital, Nigeria. East Afr Med J. 2012;89(10):327-331.
25. Ayoade BA, Olawoye OA, Salami BA, Banjo AA. Acute appendicitis in olabisi onabanjo university teaching hospital Sagamu, a 3-yer review. Niger J Clin Pract 2006; 9:52-64
26. Addis DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of acute appendicitis and appendicectomy in the United States. Am J Epidemiol 1990; 132:910-25.
27. Burkitt DP, Walker AR, Painter NS. Effect of dietary fibre on stools and transit-times, and its role in the causation of disease. Lancet 1972; 30:1408-12