International Journal of Anatomy and Research,
Int J Anat Res 2019, Vol 7(4.1):7051-55. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2019.304

Original Research Article

PREVALENCE OF ANATOMICAL VARIATIONS OF THE POSITION OF APPENDIX IN ACUTE APPENDICITIS BY CT SCAN

Azhagiri R *[1], M. Anitha [2], Hemapriya J [3].

[*1] Assistant Professor Department of Anatomy, ESIC Medical College & PGIMSR, KK Nagar, Chennai, Tamil Nadu 600078 Dr. MGR Medical University, Chennai, India.

[2] Lecturer, Department of Microbiology, Shri Sathya Sai Medical College & Research Institute, Ammapettai, Tamil Nadu 603108, India.

[3] Tutor, Department of Anatomy, ESIC Medical College & PGIMSR, KK Nagar, Chennai, Tamil Nadu 600078 Dr. MGR Medical University, Chennai, India.

ABSTRACT

Background: The present study aims to find out age and gender prevalence of different anatomical positions of appendix in acute appendicitis in a tertiary care hospital in chennai. Appendix may be placed in different positions, but the base of appendix is connected to the cecum. Based on the variations in the positions, appendix is classified into six types: retrocecal, pelvic, subcecal, paraileal, retroileal and subhepatic.

Materials and methods: This study was done over a period of 1 year from June 2018 to June 2019 in 75 patients. Anatomical location of appendix was studied in acute appendicitis in different age groups and gender populations.

Result: This study was conducted on 75 cases consisting of 40 (53%) males and 35(47%) females. Males were more in number than females. Clinically diagnosed acute appendicitis cases were subjected to CT abdomen. Anatomical locations of the appendix were as follows: Retrocecal position was most commonly seen in 32 individuals (43%), Pelvic in 25 individuals (33%), Subcecal in 10 individuals (13%), Postileal in 6 individuals (8%) and preileal in 2 individuals (3%). The incidence was more common in the age group of 31 to 40 years(33%).

Conclusion: Retrocecal position is the most common location in our patients. CT is a good diagnostic indicator for acute appendicitis. As appendix is the most variable organ in the abdomen these findings are helpful for surgeon to operate during appendicitis.

KEY WORDS: Appendix, Acute Appendicitis, Ct Scan, Variable Organ.

Corresponding Author: Dr. Azhagiri R, Assistant Professor Department of Anatomy, ESIC Medical College & PGIMSR, KK Nagar, Chennai, Tamil Nadu 600078 Dr. MGR Medical University, Chennai, India. **E-Mail:** drazhagirir@gmail.com

Access this Article online	Journal Information
Quick Response code	**International Journal of Anatomy and Research**
	ICV for 2016 90.30
	ISSN (E) 2321-4287 | ISSN (P) 2321-8967
	https://www.ijmhr.org/ijar.htm
	DOI-Prefix: https://dx.doi.org/10.16965/ijar
DOI: 10.16965/ijar.2019.304	**Article Information**
	Received: 28 Aug 2019 | Accepted: 12 Sep 2019
	Peer Review: 29 Aug 2019 | Published (O): 05 Oct 2019
	Revised: None | Published (P): 05 Oct 2019

INTRODUCTION

The vermiform appendix is located in the right lower quadrant of abdomen appearing as a narrow, worm-shaped tube, arising from the posteromedial caecal wall, 2 cm or less below the end of the ileum. The appendix is usually located at the junction of the three taenia, found on the surface of the cecum. The length of appendix varies from 7 to 9 cm [1].

The attachment of the base of the appendix to the cecum remains constant, whereas the tip can be placed in different situations. The variation in the situations is classified into six locations: retrocecal, pelvic, subcecal, paraileal,

retroileal, and subhepatic [2]. The structure that develops into the cecum and appendix is called the cecal diverticulum or the 'bud of the cecum'. This structure lies in the distal segment of the umbilical loop.

The appendix appears as a distinct structure and becomes visible only in the eighth week of gestation. The embryonic gut undergoes rotations that bring the duodenal curve to its classic "C" shape and a rotation that brings the early cecum to the right. As a result of these morphological movements, the cecal diverticulum comes to occupy a region in the right half of the abdominal cavity [3].

Variations in length of appendix is very important for surgeons and radiologist as it may be associated with diagnostic uncertainty by virtue of its inflamed tip not reaching up to the average length and delay can lead to early perforation and gangrene.

Acute appendicitis is mainly diagnosed by medical examination and clinical evaluation. Knowing the length of appendix helps on time diagnosis of acute appendicitis. Variable lengths of the appendix may mislead clinicians to make a wrong decision or diagnosis of other diseases.

Delayed diagnosis of acute appendicitis may lead to its perforation and subsequent abscess or peritonitis. So, accurate information about the anatomical location of appendix can improve prognosis of the disease [4]. Hence there is a need for the study of the various positions of appendix in patients with appendicitis

The success of CT is due largely to its ability to visualise the appendix [5]. CT has become increasingly popular as an effective cross sectional imaging technique for diagnosing and staging acute appendicitis. It is a quick and accurate examination that is operator independent, also relatively easy to perform and provides images that are easy to interpret [6].

MATERIALS AND METHODS

This study was carried out in a Tertiary hospital in Chennai, for a period of one year from June 2018 to June 2019. Informed Consent form and Patient information sheet was obtained. This study was conducted on total 75 cases of patients presenting with acute appendicitis. All patients were subjected to CT examination by a qualified Radiologist and their anatomical position of the appendix was identified, data was collected and were recorded accordingly.

Inclusion Criteria:

· Patients of all age groups and both sexes

· Patients with acute appendicitis

Exclusion Criteria:

· Patients who were not willing to participate in this study.

· Patients with chronic appendicitis

Patients having appendicular adhesions, perforations or gangrene

RESULTS

Table 1: Distribution of patients in Gender wise.

Gender	No of patients	% of patients
Male	40	53%
Female	35	47%
Total	75	100%

Table 2: Distribution of patients in Age wise.

Age	Frequency	Percentage
01-10	4	5%
11-20	14	19%
21-30	21	28%
31-40	25	33%
41-50	5	7%
51-60	3	4%
61-70	2	3%
71-80	1	1%
Total	75	100%

Table 3: Distribution of appendix position in Acute Appendicitis.

Position Of Appendix	No of patients	% of patients
Retrocecal	32	43%
Pelvic	25	33%
Subcecal	10	13%
Post- Ileal	6	8%
Pre- Ileal	2	3%
Total	75	100%

Table 4: Gender distribution of the position of Appendix.

Position Of Appendix	Gender	
	Male	Female
Retrocecal	20(50%)	12(34%)
Pelvic	10(25%)	15(43%)
Subcecal	7(18%)	3(9%)
Post- Ileal	2(5%)	4(11%)
Pre- Ileal	1(3%)	1(3%)

Fig. 1: Anatomical Position of appendix. (Source of Image Internet Achieves)

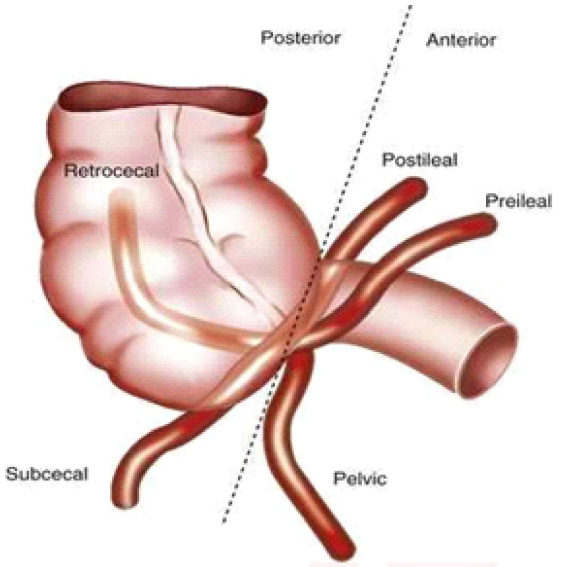


Fig. 2: Photograph showing the Retrocecal position of appendix.

Fig. 3: Photograph showing the Post- Ileal position of appendix and its relation with ileocecum.

Fig. 4: Sex distribution in appendicitis.

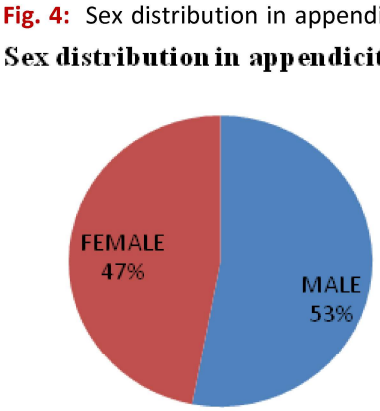


Fig. 5: Age distribution in appendicitis.

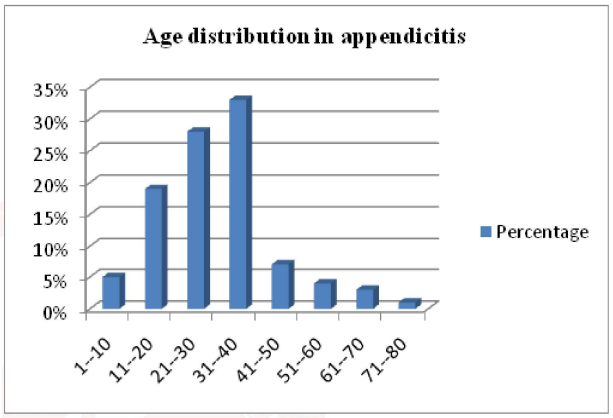


Fig. 6: Various positions of appendix.

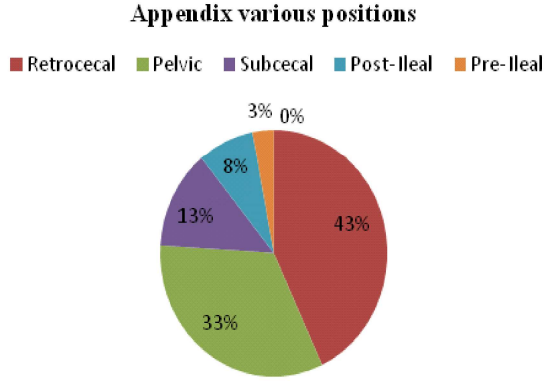
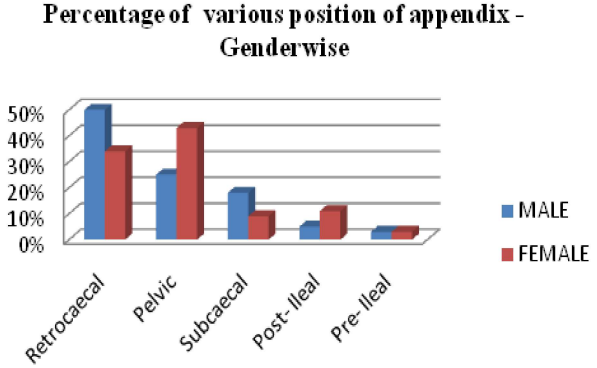


Fig. 7: Various positions of appendix in Gender wise.



All patients included in this study were subjected for CT scan by experienced Radiologist. Anatomical position of appendix was noted on the basis of Visualization.

Out of 75 patients in the study; 40 (53%) cases of acute appendicitis were male and 35(47%) were female, there was male predominance as shown in the **Table 1 and figure 4**.

This study shows that the highest incidence of acute appendicitis occurs between the ages of 31 to 40 years(33%) followed by 21 to 30 years(28%), 11 to 20(19%), 41-50(7%), 1 to 10(5%), 51 to 60(4%), 61 to 70(3%), 71 to 80(1%)years. **(Table 2 and Figure 5)**

Table 3 and Figure 1 & 6 showed the percentages of different positions of the appendix were as follows Retrocecal position was found to be the most common anatomical position of appendix with 43 % followed by pelvic 33%, subcecal 13%, post ileal 8% and the pre- ileal with 3%.

Retrocecal(50%) is most prevalent in male patients followed by subcecal(18%) whereas in females pelvic 43%and post ileal(11%) were common. The pre ileal 1% was found to be of equal percentage in both male and female patients given in **Table 4 and Figure 7**.

DISCUSSION

According to many authors, the vermiform appendix is the only organ in the human body which has multiple definitive anatomical positions. Its position varies from individual to individual. The position of the vermiform appendix was of great interest, not only because of its evolutionary significance but also because of its pathological and surgical importance. Appendicitis was a common medical problem in man and woman at all ages from childhood to old age. The position of the organ was important in the clinical presentation, surgical approach and prognosis of the appendix related diseases [7].

In present study, 75 patients had CT proven appendicitis, out of which 32 were retrocecal, 25 were pelvic, 10 subcecal, 6 post-ileal and 2 pre-ileal. The highest prevalence of acute appendicitis was found in the age group of 31 to 40 years age group. In this study the incidence of retrocecal position of appendix was highest accounting for 43%.This result was similar to other studies by Bakheit and Warille (1999) [8], Ajmani (1983) [9], Solanke (1970) [10], Wakely 1932 [11], Purushothaman et al., (2016)[12] in which retrocecal position was the commonest. In all these studies the retrocecal position varies from 32.5% to 65%.

Our results did not coincide with those reported in other studies, such as Katzurski et al., (1979) [13] in which they have reported the incidence of pelvic position of appendix was the commonest position(43%), followed by Golalipour et al (2003) [14] who reported (33.3%), Ahmed et al, (2007) [15] (51.2%)and Ashindoitiang et al(2012) [16](41.3%).

Retrocecal appendix was also the commonest position in males and pelvic position was the commonest position in females. This outcome is comparable with Chaudhari et al (2018) [17] in which retrocecal appendix was the commonest position in males and Ashindoitiang et al(2012) [16] who showed pelvic was commonest position in females.

In our findings preileal position is the least prevalent position seen in 1 % of the patients. The same holds true for both the genders. This finding is correlate with the similar study of Ashindoitiang et al(2012) [16] where they have showed least position was preileal with 5%.

This research showed the higher percentage of post ileal appendix in females than in males which is in contrast to the study of Jayasree et al., (2018) [18] done on cadavers. The prevalence of subcecal position of appendix was greater in males than in females. This finding is in agreement with findings by other authors Chaudhari Manisha et al. (2013) [19], Mian Azhar et al., (2017) [20] in which the subcecal position was greater in males than in females.

Yashwant et al.,(2018) [21] who observed appendix is the only organ in our body which has no constant anatomical position. Various positions of vermiform appendix are useful to understand the location of site of occurrence of pain during appendicitis. Retrocecal appendix has symptoms of upper urinary tract infection due to irritation of the adjacent ureter. In pelvic position pain may be felt when the thigh is flexed and medially rotated, because the obturator internus is stretched.

Pelvic appendix may irritate the bladder or rectum causing suprapubic pain, pain with urination or feeling the need to defecate. Postileal position in some males can irritate the

ureter and cause testicular pain.

Rao et al, (1998) [22] Terasawa et al, (2004) [23] have estimated that CT has an accuracy between 93% and 98% which is superior to that of ultrasonography in cases of suspected acute appendicitis.

CONCLUSION

In patients presenting with acute appendicitis in our hospital, retrocecal position of the appendix was the most common among males and pelvic position was most prevalent among females for which CT is a very sensitive investigation in diagnosing and it can also work effectively in routine cases. Hence, we conclude that this study with the help of CT imaging in detecting various position of the appendix, will guide the clinicians in diagnosing the disease earlier and in giving better treatment for the patients with acute appendicitis.

ACKNOWLEDGEMENTS

Thanks to the technical staffs of the internal department and the Department of Radiology who assisted with the data collections.

Conflicts of Interests: None

REFERENCES

[1]. Sabiston DC, Courtney MT. Sabiston's Textbook of Surgery, the Biological Basis of Modern Surgical Practice. In: Appendix. 16th ed., Vol. 2. Philadelphia: W.B. Saunders Company 2001; p. 918.

[2]. Chaurassia's Human Anatomy, Regional and Applied. 3rd ed., Vol. 2. New Delhi: CBS Publishers and Distributors 1999; p. 223-5.

[3]. Kozar RA, Roslyn JL. The appendix. In: Principles of Surgery. 7th International bedition, Seymour I Schwartz, (ed); McGraw-Hill Health Profession Division 1999, pp 1383-94.

[4]. Uttam Kumar Paul et al., (2009).Position of Vermiform Appendix: A Postmortem Study. Bangladesh Journal of Anatomy 2009;7(1):34-36.

[5]. Friedland JA, Siegel MJ. CT appearance of acute appendicitis in childhood. AJR American Journal of Roentgenology 1997;168:439-442.

[6]. Raptopoulos V, Katsou G, Rosen MP, Siewert B, Goldberg SN, and Kruskal JB. Acute Appendicitis: Effect of Increased Use of CT on Selecting Patients Earlier. Radiology 2003;226:521-526.

[7]. Rahman MM, Khalil M, Rahman H, et al. Anatomical positions of vermiform appendix in Bangladeshi people. J Bangladesh Soc Physiol 2006;(1):5-9.

[8]. Bakheit MA, Warille AA (1999) Anomalies of the vermiform appendix and Prevalence of acute appendicitis in Khartoum East Afr med. j., 1999;16:336-340.

[9]. Ajmani ML, Ajmani K. The position length and arterial supply of vermiform appendix. Anatomisecher Anzeiger 1983;153(4):369-374.

[10]. Solanke TF. The position, length- and contents of vermiform appendix in Nigerians.Br J.Surg., 1970;57:100-102.

[11]. Wakely CPS. The position of the vermiform appendix as described by analysis of 10,000 cases j. anat., 1933;67:272.

[12]. Dr. R. Purushothaman, M. S. and Dr. R. AlagarSamy M.S.(2016). A study on anatomical variations of the position of appendix in acute appendicitis in India,international journal of current research, 2016;8(8):36209-36210.

[13]. Katzurskj MM, Gopal-Rao UK, Brady K. Blood supply and position of vermiform appendix in Zambians: Med. J. Zambia 1979;13(2) 32-34.

[14]. Golalipour MJ, Arya B, Azarhoosh R, Johanshahl M. Anatomical variations of vermiform appendix in south east Caspian sea. J. Anat. soc. India 2003;52(2) 141-142.

[15]. Ahmed Iran Asgeirssonkristfan. Becking I.AM. LanLeboi. Surgical and Radiologic anatomy 2007; pp.165-168.

[16]. Ashindoitiang J.A and Ibrahim N.A. Anatomical variations of Appendix in Patients with Acute Appendicitis among two major tribes in Lagos Nigeria. Int. J. Med.Med.Sci.2012;2(3):072-076.

[17]. Chaudhari ML, Kanani S. Anatomical variations of vermiform appendix in Gujarat, India. Int J Anat Res 2018, Vol 6(1.1):4815-18. ISSN 2321-4287.

[18]. Ch Jayasree , C Kishan Reddy, (2018) A Study of Anatomical Positions of Vermiform Appendix in Human Cadaver in India, J Cont Med A Dent. 2018;6(1).

[19]. ChaudhariManisha L, KapadiaDivyesh M, Kanani Sanjay D, Patel Jitendra P, Shah Ritesh K, Nirvan Ashok B. A study of morphology of vermifrom appendix in 200 cases, Int J Med Res Health Sci. 2013;2(4):780-785.

[20]. MianAzhar Ahmad, Muhammad Tahir Ali, Nasibullah Zarkoon, Nawab Mohammad Khan. Variations in the Position and Length of the Vermiform Appendix in Pakistani Population, P J M H S 2017;11(1).

[21]. Yashwant R. Lamture, BalajiSalunke. Anatomical variations related to position of appendix in India, J. Evolution Med. Dent. Sci.2018;7(46):5030-5033.

[22]. Rao PM, Rhea JT, Novelline RA et al. Effect of computed tomography of the appendix on treatment of patients and use of hospital resources. New England Journal of Medicine, 1998;338:141-6.

[23]. Terasawa T, Blackmore CC, Bent S et al. Systematic review: computed tomographyand ultrasonography to detect acute appendicitis in adults and adolescents. Annalsof Internal Medicine 2004;141(7):537-46.

How to cite this article: Azhagiri R, M. Anitha, Hemapriya J. PREVALENCE OF ANATOMICAL VARIATIONS OF THE POSITION OF APPENDIX IN ACUTE APPENDICITIS BY CT SCAN. Int J Anat Res 2019;7(4.1):7051-7055. **DOI:** 10.16965/ijar.2019.304