Original Article

A study of the variations of positions of vermiform appendix in appendicitis patients in Northern Ethiopia

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Abstract

Background: Vermiform appendix is a narrow, worm-shaped tube on the posteromedial side of the cecum near ileocecal junction. It has immunological function and shows a variation in position and length in individual from different countries. Knowledge of these variations is important during surgical interventions. **Objectives:** To assess the positions of appendix and its associations with age and sex of the patients. **Materials and Methods:** Cross-sectional study was conducted from 2013 to 2014 on 154 patients who underwent appendectomy in the University of Gondar; College of Medicine and Health Sciences Referral Hospital and Felege Hiwot Referral Hospital; Bahir Dar. The data obtained were analyzed using SPSS version 16 and $P < 0.05$ was considered as statistically significant. **Result:** Retrocecal appendix was found to be the most common (72.73%), followed by pelvic (11.69%), preileal (10.39%), and subcecal (5.19%). Postileal position was not observed in this study. The association between age of the patients and the occurrence of appendicitis was statistically significant ($P < 0.05$) while the association between sex and position of appendix was not. **Conclusion:** This study noted the retrocecal position of the appendix to be the most common position. While statistically significant association was noted between age of the patients and the occurrence of appendicitis none was established between sex and position of appendix.

Key words: Appendicitis, position, vermiform appendix

INTRODUCTION

Vermiform appendix is a narrow, vermian, worm-shaped tube, arising from posteromedial cecal wall, 2 cm or less below the end of the ileocecal junction (Moore *et al*., 2010). It has an immunological function. Its tip is variable in position as well as its length. Its function is similar to that of a tonsil as it guards the small intestine from bacteria present in the large intestine. The position is closely related to the development of cecum (Uttam *et al*., 2009). It is larger in children and may atrophy or diminish after a mid-adult life. The canal of appendix is small and opens into the cecum by an orifice lying below and a little behind the ileocecal opening.

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Access this article online	
Quick Response Code:	Website: www.jecajournal.com

How to cite: Abegaz, B. A., Woldeyes, D. H., Awoke, D. G., & Kiros, M. D. (2016). A study of the variations of positions of vermiform appendix in appendicitis patients in Northern Ethiopia. J Exp Clin Anat, 15(2), 73-76.

Vermiform appendix shows variation in length and sex and racial groups (Golalipour *et al*., 2003; Bakheit and Warille, 1999). The position of appendix is variable but is usually retrocecal. The anatomical position of the appendix determines the symptoms and the site of muscular spasm and tenderness when the appendix is inflamed (Moore *et al*., 2010). Vermiform appendix is connected to short mesoappendix to the lower part of ileal mesentery. Failure of mesoappendix to reach the tip of the appendix probably reduces the vascularization of the tip of the organ; making it more liable to become gangrenous, hence easy perforation during inflammation (Golalipour *et al*., 2003).

The appendix has a narrow lumen which is lined with colonic epithelium. It has lymphoid follicles in the submucosal layer at birth that proliferates to peak at the age of 17–20 years coinciding with the peak incidence age of acute appendicitis. The narrow lumen of the appendix makes it prone to obstruction by fecolith, intestinal helminths, or foreign body resulting in inflammation (Ashindoitiang and Ibrahim, 2012).

The position of vermiform appendix varies with age, sex, geographical difference, and race. Knowledge of these variations is important for any surgical approaches related to the vermiform appendix. Moreover as far as we know, there has been no study in relation to the positions of the vermiform appendix in Ethiopia. Therefore, this work was designed to study the positions of vermiform appendix and its relations with age and sex among appendicitis patients in Northern Ethiopia.

MATERIALS AND METHODS

The cross-sectional study design was conducted to assess the positions of vermiform appendix, and its possible relations with age and sex among appendicitis patients in Northern Ethiopia. Subjects were patients who underwent appendectomy at the University of Gondar; College of Medicine and Health Sciences, Hospital and Felege Hiwot Referral Hospital; Bahir Dar, operation rooms from 2013 and 2014. Patients for whom appendectomy was done over the specified period of time were observed, and the positions of the appendix were inspected and recorded on the checklist (data collection form).

A total of 154 cases were studied using purposive sampling method during the study period 2014–2015. One hundred and four of the subjects were male, and fifty were female.

Raw data were checked for clarity, consistency, accuracy, completeness, and entered and analyzed using SPSS version 16 (IBM, Chicago, USA). The results were presented using tables, figures, and graphs. Associations between age of the patients and the occurrence of appendicitis, association between sex and positions of appendix were analyzed using Chi-square and $P < 0.05$ was considered as statistically significant.

Ethical approval was obtained from the Ethical Review board of University of Gondar. Official letters were submitted to the hospitals' surgery departments, explaining the purpose and the importance of the study and permission was obtained from each. Confidentiality was maintained at all levels of the study.

RESULTS

In this study, 104 (67.5%) males, and 50 (32.5%) females were studied. The mean age of these patients was 24 ± 10.

Retrocecal position was found to be the most common with 72.73% followed by pelvic 11.69%, preileal 10.39%, and the subcecal with 5.19%, no case of other positions was recorded [Figure 1].

Age

The most common age group affected by appendicitis was from 15 to 24 followed by 25 to 34 years. The association between age of the patients and occurrence of appendicitis in relation to position was statistically significant [$P < 0.05$, Table 1].

Sex

The most common position in both male and female patients was retrocecal followed by preileal in male and pelvic in females. No statistical significant association was found between sex and position of appendix [Table 2].

Table 1: Position of appendix in relation to age

Position	Age (in years)						Total	Chi-square	P value
	0-4	5-14	15-24	25-34	35-44	45-64			
Retrocaecal	3 (2.6%)	19 (16.9%)	40 (35.7%)	32 (28.6)	15 (13.4%)	3 (2.6%)	112 (72.73%)	123.4	0.001
Pelvic	0 (0%)	3 (16.7%)	8 (44.4%)	5 (27.8)	0 (0%)	2 (11.1%)	18 (11.69%)		
Subcaecal	0 (0%)	0 (0%)	2 (25%)	4 (50%)	1 (12.5)	1 (12%)	8 (10.39%)		
Preileal	0 (0%)	5 (31.3%)	5 (31%)	4 (25%)	1 (6.3%)	1 (6.3%)	16 (5.19%)		
Total	3 (1.9%)	27 (17.5%)	55 (35.7%)	45 (29%)	17 (11%)	7 (4.5%)	154 (100%)		

DISCUSSION

The position of the appendix is of great interest not only because of its evolutionary significance but also because of its pathological and surgical importance. The position of the appendix is important in the pathogenesis, presentation, surgical approach, and prognosis of the disease (Ashindoitiang and Ibrahim, 2012; Philip *et al*., 2014).

In this study, a retrocecal appendix is dominant with 72.73% of subjects; this is similar to studies done in Bangladesh (Uttam *et al*., 2009), Pakistan (Wakely, 1933), and Sudan (Bakheit and Warille, 1999) and different from studies in the United Kingdom (Irfan *et al*., 2007), Pakistan (Wakely, 1933), and Iran (Nilesh *et al*., 2014) [Table 3].

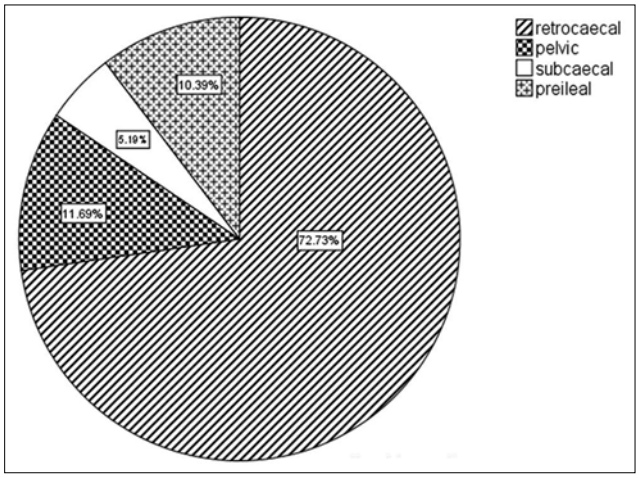

Figure 1: Percentile of positions of the appendix among appendicitis patients

Table 2: Position of appendix in relation to sex

Position of Appendix	Sex(%)		Total	Chi square	*P* value
	Male	Female			
Retrocaecal	75 (48.7)	37 (24)	112 (72.7)	3.056	0.383
Pelvic	10 (6.5)	8 (5.2)	18 (11.7)		
Subcaecal	7 (4.5)	1 (0.6)	8 (5.2)		
Preilial	12 (7.8)	4 (2.6)	16 (10.4)		
Total	104 (67.5)	50 (37.5)	154 (100)		

Pelvic position of appendix was 11.69% in this study, which is similar to a study done in Pakistan (Wakely, 1933), far from studies done in and in the United Kingdom (Irfan *et al*., 2007), Sudan (Bakheit and Warille, 1999), and Iran (Golalipour *et al*., 2003) [Table 3].

Preilial position of appendix was 10.39%, the United Kingdom (Irfan *et al*., 2007) which is very far from the results done in Pakistan (Wakely, 1933) and near to the result done in India (Ahmad *et al*., 2014) [Table 3].

Subcecal position of appendix was 5.19% similar to studies done in Kenya, the United Kingdom (Irfan *et al*., 2007), Pakistan (Wakely, 1933), Kenya (Philip *et al*., 2014), and India (Das *et al*., 2014).

No case of other positions was found in this study [Table 3].

In this study, the association between age of the patients and occurrence of appendicitis in relation to position was statistically significant ($P < 0.05$); the most common age group affected by appendicitis was from 15 to 24 followed by 25 to 34 years [Tables 1 and 2]. This is similar with studies done in Nigeria; 36.25% of the appendicitis patients were aged from 21 to 30 (Ashindoitiang and Ibrahim, 2012).

No statistically significant association was found between sex and position of appendix ($P = 0.383$); the most common position in both male and female patients was retrocecal followed by preileal in male and pelvic in females. This is similar to studies done in the United Kingdom (Irfan *et al*., 2007), India (Das *et al*., 2014), and Iran (Nilesh *et al*., 2014).

CONCLUSION AND RECOMMENDATION

This study determined retrocecal position is the most common followed by pelvic. There was no association between sex of the individual and position of appendix,

Table 3: Positions of appendix in different areas of the world

Study area	Positions					Ectopic
	Retrocaecal	Pelvic	Postileal	Preileal	Subcaecal	
Pakistan[7]	65.28%	31.01%	0.4%	1%	2.26%	0.05%
Sudan[4]	58.3%	21.7%	---	---	11.7%	---
Iran [3], 2003	32.4%	33.3%	2.6%	18.8%	12.8%	---
United kingdom[8]	20.1%	51.2%,	22.1%	3%	3.6%	---
Bangladesh [2]	65%	31.7%	3.3%	0%	0%	---
Nigeria[5]	23.7%	41.3%	17.5%	5.%	12:5%	---
India[11], Das NK	51.14%	42.29%	0.8%	0.51%	5.23%	0.03%
India[10] Ahmad G	56.67%	25%	3.33%	15%	---	---
Iran[9], 2014	7%	55.8%	12.5%	1.5%	19%	4.2%
Kenya [6]	27%	25%	18.8%	18.8%	4.8%	---
This study (Ethiopia)	72.73%	11.69%	0%	10.39%	5.19%	---

there is a significant association between age of the individual and the occurrence of appendicitis. Further studies need to be carried out throughout the country so that generalization will be possible.

Financial Support and Sponsorship
Nil.

Conflicts of Interest
There are no conflicts of interest.

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