ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Association Between The Age Of Subjects And Length Of The Vermiform Appendix In South Indian Population.

P Venkatesh[1], Geetha Jayachandran[2], and Umesan KG[3]*.

[1]Assistant Professor, Department of Anatomy, Government Medical College, Kozhikode, Kerala, India.
[2]Associate Professor, Department of Anatomy, Government Medical College, Thiruvananthapuram, Kerala, India.
[3]Associate Professor, Department of Anatomy, Government Medical College, Thiruvananthapuram, Kerala, India.

ABSTRACT

The length of the vermiform appendix showcases substantial variability, spanning from less than an inch to over a foot. The existing literature lacks sufficient information on the anthropometric values of the vermiform appendix specifically within South Indian populations. The aim of the present study was to investigate the positions and lengths of the vermiform appendix, and their correlation with the age and sex of individuals. The study population consists of 72 specimens were obtained from deceased individuals undergoing autopsy at the Morgue, Medical College Hospital, Thiruvananthapuram. Our observation indicates that the retrocaecal position of the appendix is the most prevalent (54.2%), followed by the pelvic position (27.8 %.). A strong positive correlation was established between patient age and appendix length. The findings of the present study contribute valuable standard and baseline data on the vermiform appendix, which proves beneficial for both clinicians and anthropologists

Keywords: Correlation, Appendix length, vermiform appendix, south Indian population.

https://doi.org/10.33887/rjpbcs/2024.15.1.62

Corresponding author

ISSN: 0975-8585

INTRODUCTION

The vermiform appendix is a slender, tube-like structure resembling a worm, originating from the postero-medial wall of the caecum at a distance of 2 cm or less below the termination of the ileum [1]. The position of the appendix exhibits remarkable variability, surpassing that of any other organ in the body [2]. According to Maingot, the appendix lacks fixed anatomy and can extend to various regions of the abdomen if excessively long [3]. Despite debates questioning the medical significance of its relative position, some authors assert a notable correlation between the location of the appendix and acute appendicitis.

The signs and symptoms of appendicitis can display varying degrees of discrepancy from expected symptomatology, influenced by the appendix's position within the abdomen [4, 5]. The length of the vermiform appendix highlights its significant variability, ranging from less than an inch to over a foot. It is notably longest in childhood and gradually diminishes throughout adult life [6, 7]. Limited data exists regarding the anthropometric values of the vermiform appendix in South Indian populations [8]. To address this gap, this study aims to investigate the positions and lengths of the vermiform appendix, and their correlation with the age and sex of individuals.

MATERIAL AND METHODS

The study focused on investigating macroscopic details of the human vermiform appendix. 72 specimens, representing individuals of both genders across diverse age groups, ranging from one year old children to 87-year-old adults, were included in the research. Samples were obtained from deceased individuals undergoing autopsy at the Morgue, Medical College Hospital, Thiruvananthapuram.

Sample Size

Specimens of vermiform appendix collected

- Within six hours of death.
- Where cause of death was not abdominal injury.
- Apparently healthy foetuses.
- Freely mobile appendices.

Exclusion Criteria

The following specimens were excluded from the study

- Where post-mortem examination was done six hours after death.
- Where death occurred due to severe abdominal injury.
- Foetuses with congenital anomalies.
- Fixed appendices.

Dissection procedures followed Cunningham's manual, where the base of the appendix was located by tracing the anterior taenia coli of the caecum. Subsequent to removal, all specimens were promptly transferred to a fixative solution to prevent the onset of any post-mortem changes. This precautionary measure aimed to preserve the specimens and maintain the integrity of the observed details.

The position of each appendix was meticulously determined and documented. Various categories were assigned based on the position, including retrocaecal, subcaecal, pelvic, pre-ileal, and post-ileal. To quantify the length of the appendix, a vernier calliper was utilized, measuring from the base to the apex**.**

Statistical Analysis

The data will be recorded in an Excel spreadsheet, and all statistical analyses were carried out using SPSS (Version-16). The significance of study parameters on a continuous scale between two groups was determined using the Student "t" test. For categorical scale comparisons between two or more groups, the Chi-square test was employed. Additionally, the correlation between the age of the subjects and the length of the appendix was assessed using Pearson's correlation coefficient.

ISSN: 0975-8585

RESULTS

Table 1: Age distribution based on gender distribution among the study population

Age Distribution	Gender Distribution		Total	P value
	Female	Female		
0-10 Years	4 (12.9%)	4 (9.8%)	8 (11.1%)	0.985
11-20 Years	2 (6.5%)	4 (9.8%)	6 (8.3%)	
21-30 Years	2 (6.5%)	4 (9.8%)	6 (8.3%)	
31-40 Years	2 (6.5%)	4 (9.8%)	6 (8.3%)	
41-50 Years	8 (25.8%)	8 (19.5%)	16 (22.2%)	
51-60 Years	3 (9.7%)	5 (12.2%)	8 (11.1%)	
61-70 Years	6 (19.4%)	8 (19.5%)	14 (19.4%)	
>70 Years	4 (12.9%)	4 (9.8%)	8 (11.1%)	
Total	31 (100.0%)	41 (100.0%)	72 (100.0%)	

* p value <0.05 is significant. Pearson Chi-square test done

Table 1 shows the age distribution among the study population. We categorized the subjects into 8 groups as 0-10 years, 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years and >70 years. The highest 16 (22.2%) were in the age group 41-50 years. The mean and standard deviation of age of Study population was 43.92 ± 21.87 years.

Table 2: Position of Appendix based on gender distribution among the study population

Position of Appendix	Gender Distribution		Total	P value
	Female	Male		
Retrocaecal	14 (45.2%)	25 (61.0%)	39 (54.2%)	0.240
Pelvic	11 (35.5%)	9 (22.0%)	20 (27.8%)	
Pre-ileal	4 (12.9%)	3 (7.3%)	7 (9.7%)	
Post-ileal	0 (.0%)	3 (7.3%)	3 (4.2%)	
Subcaecal	2 (6.5%)	1 (2.4%)	3 (4.2%)	
Total	31 (100.0%)	41 (100.0%)	72 (100.0%)	

* p value <0.05 is significant. Pearson Chi-square test done

The position of the appendix based on gender are shown in the above table. We observed that the first most common position of appendix was from the retrocaecal which accounts for 54.2% followed by Pelvic position (27.8%).

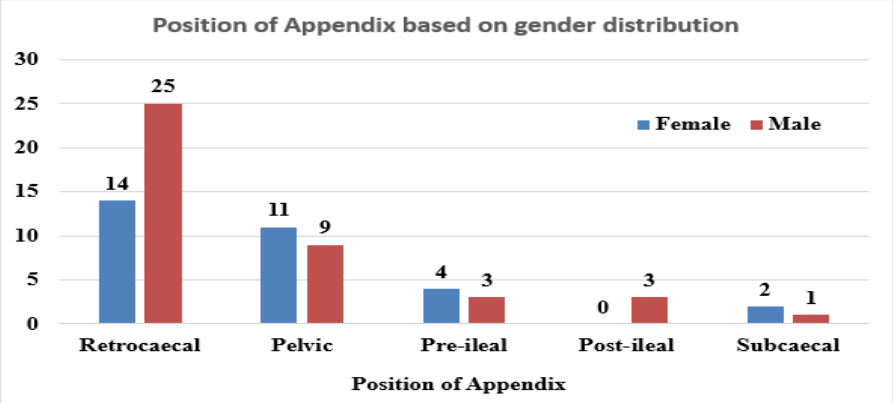

Figure 1: Position of Appendix based on gender distribution among the study population

ISSN: 0975-8585

Table 3: Mean Appendix length based on gender and age distribution among the study population

Age Distribution	Mean length of the appendix (cm)			P value
	Female (n= 31) Mean ± S.D	Male (n=41) Mean ± S.D	Total (n=72) Mean ± S.D	
0-10 Years	7.86 ± .473	7.91 ± 0.36	7.88 ± 0.39	0.170
11-20 Years	6.90 ± 2.97	9.50 ± 1.94	8.63 ± 2.41	
21-30 Years	8.51 ± 0.16	8.52 ± 4.38	8.51 ± 3.39	
31-40 Years	10.26 ± 1.35	8.61 ± 4.08	9.16 ± 3.33	
41-50 Years	9.02 ± 2.08	9.85 ± 2.11	9.44 ± 2.07	
51-60 Years	10.67 ± 2.34	10.84 ± 1.89	10.78 ± 1.90	
61-70 Years	11.28 ± 3.02	10.58 ± 3.24	10.87 ± 3.05	
>70 Years	8.86 ± 2.48	11.09 ± 4.12	9.98 ± 3.36	
Total	9.36 ± 2.38	9.76 ± 2.88	9.58 ± 2.67	0.531

The mean length of the appendix was 9.58 ± 2.67 cm, among females it was 9.36 ± 2.38 cm, and among males it was 9.76 ± 2.88 cm. There was no statistical difference found between the genders and length of the appendix.

Table 4: Correlation (r) between the length of the appendix and Age of the cases among the study population

		Age	Length of the Vermiform Appendix
Age of the cases	Pearson Correlation	1	.331**
	Sig. (2-tailed)		.004
	N	72	72
Length of the Vermiform Appendixes	Pearson Correlation	.331**	1
	Sig. (2-tailed)	.004	
	N	72	72
**. Correlation is significant at the 0.01 level (2-tailed).			

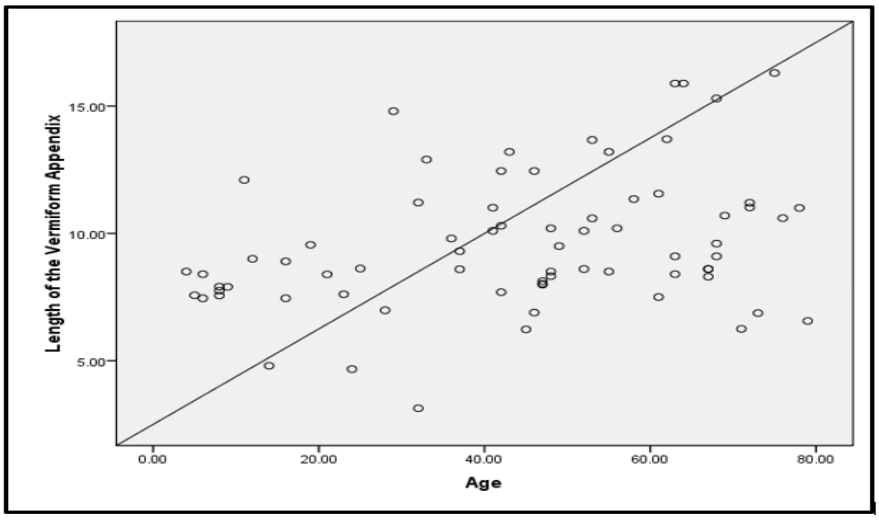

Figure 2: scatter diagram showing the correlation between length of the appendix and age of the cases

Correlation studies revealed a positive correlation between ages of the subject and length of the appendix (r=-0.331, p< 0.004).

DISCUSSION

This study consists of 72 specimens (31 females and 41 males) includes both rural and urban subjects which is almost similar to findings of Mohammedi S. et al [8] where 541 were males and 152 females' specimens and according to Balram [9], 60% were males and 40% were females. The mean age of the subjects was 43.92 ± 21.87 years (males 43.51 ± 21.49 years and females 44.45 ± 22.70 years) which is comparable to the findings of Mohammedi S. et al [8] with the mean age at presentation being 40.46 ± 20.99 years.

We categorized the subjects into 8 groups as 0-10 years, 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years and >70 years. The highest 16 (22.2%) were in the age group 41-50 years and lowest 6 (8.3%) in 11-20 years.

Table 5: Comparison of present study findings with the previous studies

Authors	No. of Specimen	Position of Appendix n(%)				
		Retrocaecal	Pelvic	Pre-ileal	Post - ileal	Subcaecal
Geethanjali HT [4] (2011)	52	17 (32.69)	19 (36.54)	6 (11.53)	5 (9.62)	3 (5.77)
Baker SM et al [10] (2013)	56	30 (53.6)	17 (30.35)	0 (0)	7 (12.5)	2 (3.57)
Salwe NA [11] (2014)	60	34 (56.67)	15 (25)	9 (15)	20 (3.33)	
Ghorbani A et al [12] (2014)	200	14 (7)	111 (55.8)	3 (1.5)	25 (12.5)	38 (19)
Souza SC et al [2] (2015)	377	164 (43.5)	35 (9.3)	9 (2.4)	22 (5.8)	92 (24.4)
EL-Amin EI et al [13] (2015)	60	36 (60)	21 (32)	2 (3.3)	1 (1.7)	0 (0)
Sheela DK et al [14] (2017)	19	3 (15.8)	7 (36.8)	1 (5.3)	2 (10.5)	1 (5.3)
Mohammadi S et al [8] (2017)	693	497 (71.7)	102 (14.7)	-	45 (6.5)	8 (1.2)
Present Study (2024)	72	39 (54.2%)	20 (27.8%)	7 (9.7%)	3 (4.2%)	3 (4.2%)

In the current investigation involving the examination of 72 cases, the retrocaecal position of the appendix was identified as the most prevalent, observed in 39 cases, constituting 54.2%. The pelvic position emerged as the second most common, observed in 20 cases, accounting for 27.8% (Table 5). These findings are in close agreement with studies conducted by Sauza SC et al[2], Mohammadi S et al [8], Salwe NA et al [11], and EL-Amin EI et al [13]. However, they contrast with the results of studies conducted by Geethanjali HT et al [4], Ghorbani A et al [12], and Sheela D et al [14], where the pelvic position was reported as the most common, followed by the retrocaecal position. This disparity with our results may be due to difference of the study populations.

In the present study, the mean length of the appendix was 9.58 ± 2.67, among males it was 9.76 ± 2.88, and among females it was 9.36 ± 2.38. The length of the vermiform appendix was found to be higher in males than in females, however this difference was not statistically significant (p value = 0.531). The investigation conducted by Sauza SC [2] et al., Mohammedi S[8] et al., and Ghorbani A [12] et al. yielded results consistent with our own findings. However, these outcomes diverge from the research by Rahman MM [15] et al., which reported that the length of the appendix in women is longer than in men.

The maximum length of the appendix was noted in 51-60 years and 61-70 years of age group. The study conducted by Ghorbani A [12] et al. document that the highest length was observed in patients of 11-19 years of age. Pearson's correlation revealed a positive correlation between ages of the subject and length of the appendix (r=-0.331, p< 0.004). The present finding revealed that length of the appendix increases along with increase in age. In the literature review, it was observed that studies conducted by Balram et al.,

Ghorbani A [12] et al., and El-Amin EI [13] et al. indicated that patients of older age tend to have a longer appendix, aligning with the present study's findings. However, these results contradicted the findings of Baker SMA[11] et al. and Mohammadi S [8] et al., who asserted that there was no correlation between age and the length of the appendix.

CONCLUSION

In conclusion, our study identified the retrocaecal position as the most prevalent, followed by the pelvic position for the appendix. Additionally, a robust positive correlation was established between patient age and appendix length. The current study contributes valuable standard data on the vermiform appendix, which proves beneficial for both clinicians and anthropologists. The findings offer insights into the morphologic variations of the appendix within the South Indian population. Nevertheless, future investigations with larger sample sizes are essential to refine decision-making processes in this regard.

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