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ORIGINAL RESEARCH

Pathophysiology of juvenile gastrointestinal polyps and the role of stromal eosinophilic infiltration

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ABSTRACT

Background: In children, intestinal polyps are often observed; the most prevalent kind, found in about 90% of individuals, are juvenile polyps. In young polyps, mucosal eosinophilia is very important. A thorough understanding of these conditions is essential to guarantee proper care and follow-up. **Aim**: The objective of this study was to determine the location and histology of intestinal polyps as well as the role that stromal eosinophilia plays in the pathophysiology of juvenile polyps. **Methods**: Eighty-four children with gastrointestinal polyps were evaluated in this study. Each subject's polyp location, quantity, and size were evaluated. Also, the correlation between size/age and stromal eosinophilia was examined in participants with juvenile polyps. The data obtained were examined statistically. **Results:** The current study findings demonstrate that out of 84 participants6, 6, 4, and 8 participants are with inflammatory polyps, Peutz Jeghers polyp, juvenile polyposis coli, and solitary juvenile polyps, respectively, had eosinophilic infiltration of less than 20/HPF and 0, 0, 0, and 60 individuals with Peutz Jeghers polyp, juvenile polyposis coli, inflammatory polyps, and isolated juvenile polyps, respectively, had eosinophilic infiltration of >20/HPF. The research participants' mean age was 6.5 years, and the rectum was the most often found location for polyps. There was a negative association between the age of juvenile polyps and eosinophilic infiltration and a positive correlation with polyp size. **Conclusion**: The current study finds that single juvenile polyps account for the bulk of the gastrointestinal polyps seen in the kid patients. The potential involvement of allergies in the etiopathogenesis of juvenile polyps may be illustrated by large eosinophilic infiltration of gastrointestinal polyps.

Keywords: Eosinophilic infiltration, gastrointestinal polyps, juvenile polyps, pediatric polyps, child subjects.

INTRODUCTION

The Greek word describing polypus, which means numerous feet, is where the name "polyp" from. Any growth or excrescence that is observed sticking out above the mucosal membrane is called a polyp. Most of the polyps observed in the kid participants are typically juvenile polyps that are solitary. It is unclear what the precise cause and pathophysiology of the gastrointestinal polyps in the kid participants are.1.

Data from the literature currently in publication indicates that people with juvenile polyps had a higher incidence of stromal eosinophilia. Furthermore, little information is currently available in the literature on the evaluation of the function of eosinophilic infiltration in pediatric patients with juvenile gastrointestinal polyps.[2,3]

MATERIALS AND METHODS

The current study sought to determine if eosinophilic infiltration may play a part in the etiopathogenesis of gastrointestinal juvenile polyps, given the presence of eosinophils in children with juvenile polyps. Additionally, the study evaluated several polypoidal lesions in pediatric individuals. The goal of the current clinical evaluation research was to determine if eosinophilic infiltration may have contributed to the etiopathogenesis of juvenile polyps in the gastrointestinal tract. Additionally, the study evaluated several polypoidal lesions in pediatric individuals. Once the relevant Institutional Ethical committee gave its approval, the study was conducted from January to December of 2024. The Institute's Department of Pathology provided the research participants from Delhi NCR region. Prior to research participation,

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informed permission was obtained from each participant both verbally and in writing.

84 participants, both male and female, having verified clinical diagnosis of gastrointestinal polyps were evaluated for the research. Both intestinal resection and polypectomy specimens were evaluated in the research. The location, quantity, and presentation style of the polyps as well as demographic information were evaluated in each of the subjects who were enrolled. Regular procedures were followed to treat and stain histopathological specimens and samples utilizing hematoxylin and eosin staining.

The polyps under investigation were divided into three groups according to their sizes: less than one centimeter, one to two centimeters, and more than two centimeters. When more than 20 eosinophils per high-power field were seen in the polyp's lamina propria, it was considered significant eosinophilic infiltration.

The data gathered were analyzed statistically using SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk. NY, USA) for assessment of descriptive measures, Student t-test, ANOVA (analysis of variance), and Chi-square test. The results were expressed as mean and standard deviation and frequency and percentages.

RESULTS

The goal of the current clinical investigation was to evaluate the potential contribution of eosinophilic infiltration to the etiopathogenesis of various polypoidal lesions and juvenile gastrointestinal polyps in pediatric individuals. In this study, 84 children with gastrointestinal polyps were evaluated. The location, quantity, and size of the polyps were evaluated in each participant. Of the 84 participants evaluated for the study, 45.24% (n=38) were female and 54.76% (n=46) were male. With a mean age of 6.5 years, the age range was 2–12 years. Mass per rectum, painless, and intermittent rectal polyps were the presenting modes. Anaemia, persistent rectal bleeding, and abdominal discomfort were symptoms of more proximally located polyps. Intussusception resulting in intestinal blockage was seen in four of the individuals.

According to the study's findings, six individuals had rectal polyps, six had jejunal polyps, eight had colonic polyps, and four had ileal polyps among those with eosinophilic infiltration of less than 20/HPF. The study's polyps were categorized according to their histology. Six, six, four, and eight participants with inflammatory polyps, Peutz Jeghers polyp, juvenile polyposis coli, and solitary juvenile polyps, respectively, had eosinophilic infiltration of less than 20/HPF. For 0, 0, 0, and 60 individuals with Peutz Jeghers polyp, juvenile polyposis coli, inflammatory polyps, and isolated juvenile polyps, respectively, eosinophilic infiltration of >20/HPF was seen (Table 1).

In 80.9% (n=68) of the individuals, isolated juvenile polyps were seen. Additionally, there were polypoidal grey-white masses between 0.5 and 1.5 cm. Several cystically dilated glands were seen in an oedematous and inflamed lamina propria with an inflammatory infiltration consisting of histiocytes, plasma cells, eosinophils, lymphocytes, and neutrophils, according to the histological evaluation. In four cases, or 4.8%, multiple juvenile polyposis was seen. Polyps were seen all over the colon and ranged in number from 10 to 15. Histopathologically, they resembled isolated juvenile polyps. Peutz Jegher's polyps, which were found in the ileum and jejunum between the ages of three and five, were found in 7.1% (n=6) of the research participants. These were cauliflower-like, pedunculated lesions. According to histopathology, polyps contain smooth muscles arranged in an arborizing pattern and are lined with mucus.

7.1% of the participants (n=6) had inflammatory polyps. Histopathology showed extensive granulation tissue and inflammatory infiltrates. Of the 68 cases with single juvenile polyps and 60 subjects with juvenile polyps with four juvenile polyposis, 60 subjects exhibited a considerable infiltration of eosinophilic polyps. There was no evidence of eosinophilic infiltration in several young polyposis.

Significant eosinophilic infiltration was not seen in any of the subjects with Peutz Jeghers and inflammatory polyps. Regarding the relationship between juvenile polyp size and eosinophilic infiltration, 68 subjects with juvenile polyps between the ages of 2 and 12 were evaluated for the correlation between juvenile polyp size and eosinophilic infiltration. It was found that eosinophilic infiltration <20/HPF was observed in 12 cases with 0, 2, and 10 cases of <1, 1-2, and >2cm tumor size, respectively, while eosinophilic infiltration >20/HPF was observed in 60 subjects with 8, 38, and 14 cases of <1, 1-2, and >2cm tumor size, respectively. Among a total of 72 subjects, tumor size of cases of <1, 1-2, and >2cm respectively was seen in 8, 40, and 24 study subjects (Table 2).

On assessing the correlation of eosinophilic infiltration with age in study subjects, 0, 0, 2, 4, 6, and 12 patients in the ages of 2-4, 4-6, 6-8, 8-10, and 10-12 years, respectively, had eosinophilic infiltration <20/HPF. Eosinophilic infiltration >20/HPF was seen in 60 patients in the following age ranges: 2-4, 4-6, 6-8, 8-10, and 10-12 years, respectively (Table 3). With p=0.04, there was an inverse relationship between the eosinophilic index and growing age. Additionally, a positive correlation (p=0.02) was seen between the polyp size and the eosinophilic index.

Table 1: Classification of polyps based on the histology

Polyps type	Inflammatory	Peutz-Jeghers	Juvenile polyposis coli	Solitary juvenile
Eosinophilic infiltration <20/HPF	6	6	4	8

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Eosinophilic infiltration >20/HPF	0	0	0	60

Table 2: correlation of juvenile polyp size to eosinophilic infiltration

Polyps type	Total	<1cm	1-2 cm	>2cm
Eosinophilic infiltration <20/HPF	12	0	2	10
Eosinophilic infiltration >20/HPF	60	8	38	14
Total	72	8	40	24

Table 3: Correlation to eosinophilic infiltration with age in study subjects

Age groups	2-4	4-6	6-8	8-10	10-12	Total
Eosinophilic infiltration <20/HPF	0	0	2	4	6	12
Eosinophilic infiltration >20/HPF	12	16	16	12	4	60
Total	12	16	18	16	10	72

DISCUSSION

According to the current study's findings, six individuals had rectal polyps, six had jejunal polyps, eight had colonic polyps, and four had ileal polyps among those with eosinophilic infiltration of less than 20/HPF.

Based on their histology, the polyps in the research were categorized. In participants with inflammatory polyps, Peutz Jeghers polyp, juvenile polyposis coli, and isolated juvenile polyps, respectively, eosinophilic infiltration of <20/HPF was seen in 6, 6, 4, and 8. 0, 0, 0, and 60 individuals with Peutz Jeghers polyp, juvenile polyposis coli, inflammatory polyps, and isolated juvenile polyps, respectively, showed eosinophilic infiltration of >20/HPF. These findings were similar to those of earlier research by Fox VL et al. (2010) and Rosty C et al. (2013), whose authors found polyp distribution in study individuals.

There were 68 individuals (80.9%) with single juvenile polyps. Additionally, there were polypoidal grey-white masses between 0.5 and 1.5 cm. In an edematous and inflamed lamina propria, the histological evaluation revealed the existence of several cystically dilated glands with an inflammatory infiltration made up of histiocytes, plasma cells, eosinophils, lymphocytes, and neutrophils. The percentage of participants with multiple juvenile polyposis was 4.8% (n=4). The number of polyps in the colon was between 10 and 15 in number. Histopathological characteristics were comparable to those of isolated juvenile polyps. According to the study, 7.1% (n=6) of the participants had Peutz Jegher's polyps, which were found in the ileum and jejunum between the ages of three and five.

These lesions resembled cauliflowers and were pedunculated. According to histopathology, polyps contain mucosal lining and smooth muscles arranged in an arborizing pattern. These results were consistent with those of Rahat N6 in 2005 and Lee BG et al. (2012), whose findings matched with the authors' reported histological features in GI polyp-afflicted participants.

7.1% (n=6) of the subjects had inflammatory polyps. Inflammatory infiltrates and a significant quantity of granulation tissue were seen in histopathology. Eosinophilic polyps were significantly infiltrated in 60 patients out of the 68 instances with single juvenile polyps and 60 subjects with juvenile polyps with four juvenile polyposis. Eosinophilic infiltration was not seen in a few of juvenile polyposis. There was no significant eosinophilic infiltration in any of the participants with inflammatory polyps and Peutz Jeghers. These findings were consistent with those of Gupta S et al. (2001) and Gurung P et al. (2014), who studied intestinal polyps in children and found findings akin to those of the current study.

Eosinophilic infiltration <20/HPF was observed in 12 cases with 0, 2, and 10 cases of <1, 1-2, and >2cm tumor size, respectively, while eosinophilic infiltration >20/HPF was observed in 60 subjects with 8, 38, and 14 cases of <1, 1-2, and >2cm tumor size, respectively. This was done in order to determine the correlation between juvenile polyp size and eosinophilic infiltration in 68 subjects with juvenile polyps who were between the ages of 2 and 12 years and had juvenile polyps. Of the 72 participants, 8 had tumor sizes of less than 1 cm, 1-2 cm, and more than 2 cm, respectively. These results were consistent with earlier research by Durno C11 in 2007 and Corredor J et al. 10 in 2001.In their research, the authors found a positive relationship between the size of the polyp and eosinophilic infiltration, which is also evident in this study.

When evaluating the relationship between eosinophilic infiltration and age in research participants, eosinophilic infiltration <20/HPF was seen in 0, 0, 2, 4, 6, and 12 people, respectively, in the age ranges of 2-4, 4-6, 6-8, 8-10, and 10-12 years. Eosinophilic infiltration >20/HPF was seen in 60 patients in the following age ranges: 2-4, 4-6, 6-8, 8-10, and 10-12 years, respectively (Table 3). With p=0.04, there was an inverse relationship between the eosinophilic index and growing age. Additionally, a positive correlation (p=0.02) was seen between the polyp size and the eosinophilic index. These findings were consistent with those of Zheng E et al. (2012) and Attard TM et al. (2013), who, like the authors of the current study, saw an inverse relationship between juvenile polyps' age and their size.

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CONCLUSIONS

Despite its limitations, this study finds that single juvenile polyps account for the bulk of gastrointestinal polyps observed in the kid participants. The potential involvement of allergies in the etiopathogenesis of juvenile polyps may be illustrated by large eosinophilic infiltration of gastrointestinal polyps. However, the study was constrained by the fact that it was only carried out at one location, with a small number of participants, and in the same area. Local and environmental variables might influence and aggravate the existence of gastrointestinal polyps in children.

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