

**Prevalence of intestinal parasite among patients in the
Ho Teaching Hospital: a retrospective study**

ABSTRACT

Aim: To assess the prevalence of intestinal parasite infections among patients who visit the Ho Teaching Hospital for stool examination from 2012 to 2016.

Study design: Retrospective study.

Place and Duration of Study: Ho Teaching Hospital, August 2017 to January 2018.

Methodology: The hospital's laboratory records were reviewed. Patients' data were recorded using a well-designed data collection tool. Data was analyzed with Statistical Package for Social Science (SPSS) version 20.0.

Results: A total of 7045 patients visited the Ho Teaching Hospital laboratory for routine stool examination within the five-year period. From the 7045 patients, 703 of them were infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasite infection for the five-year period was 10.0%. Intestinal flagellates (90.0%) were the most predominant intestinal parasites, and *Entamoeba histolytica* recorded 5.7%. Hookworm (0.9%) was the most prevailing soil-transmitted helminth. *Ascaris lumbricoides* (0.1%) and *Schistosoma mansoni* (0.1%) were the least recorded parasites. Highest infection was among patients within age group 20 to 29 years. However, age groups below 10 years recorded low infection. This study showed that age was a risk factor for acquiring intestinal parasite infection ($P \leq 0.001$).

Conclusion: Intestinal parasitic infections were recorded among patients who visited the Ho Teaching Hospital. However, most of the patients were infected with intestinal flagellates. Various stakeholders should provide advance techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Sensitization of the public about the dangers of intestinal parasites should also be undertaken by the stakeholders.

Keywords: Parasitaemia, intestine, stool sample, prevalence

12 1. INTRODUCTION

13 Intestinal parasites cause significant morbidity and mortality in the world, especially in low-income
14 countries in the tropic and sub-tropical regions due to persistent shortage of clean drinking water, lack of
15 proper sewage system and other unhygienic and poor living condition [1]. Despite their wide occurrence,
16 some intestinal parasitic diseases are considered neglected by the World Health Organization, largely
17 due to inadequate studies in many countries [2].

18 Globally, it is estimated that 3.5 billion people are infected and 450 million are ill as a result of these
19 infections with the majority being children. These may include: *Ascaris lumbricoides*, *Blastocystis hominis*,
20 *Entamoeba coli*, *Entamoeba histolytica*, hookworm, flagellates, *Schistosoma mansoni* and *Strongyloides*
21 *stercoralis* [3]. The diseases are also common in poor countries and accounts for approximately 200,000
22 deaths per year [4]. In sub-Saharan Africa, estimates show that about 31.4% of the population in West
23 Africa, are affected [5]. In Ghana, a spatio-temporal analysis of small area with intestinal parasite
24 infection conducted between 2010 and 2014 showed an annual incident rate of 1.55% to 3.30% with an
25 average annual incident rate of 2.53% [6].

26 Locally, a cross sectional study conducted in Volta Region among 5 primary schools in 3 of its districts
27 revealed a low prevalence of helminth infection with *A. lumbricoides* (1.27%) as the prevailing parasite
28 [7]. Moreover, intestinal parasite infections (IPIs) is a major problem, especially in children and pregnant
29 women from developing countries [8]. The morbidity of IPIs is greatest among school going children and
30 may have adverse effect on their growth [9]. It causes nutritional deficiencies, growth retardation, low
31 pregnancy weight, intra uterine weight gain, and anemia among the population infected [9]. The most
32 common effect of IPIs on the health of people is their normal physical development that is, the failure to
33 achieve genetic potential for growth especially in children and having clinical consequences of iron
34 deficiency anemia and other nutritional deficiencies also among pregnant women [10]. The health
35 problems associated with IPIs suggests the need for more research to be done. Additionally, the study
36 involves reviewing laboratory records of hospital patients for a good representation of clinical cases of
37 IPIs. The study aimed to assess the prevalence of intestinal parasite infection among patients who visit
38 the Ho Teaching Hospital's laboratory for routine stool examination from 2012 to 2016.

39 2. MATERIALS AND METHODS

40 2.1. Study design and setting

41 The study was a retrospective study. Data was reviewed from the routine stool examination record books
42 from 2012 to 2016 at the Ho Teaching Hospital's laboratory based on prior permission from the
43 administration officials of the hospital. The study was conducted from August 2017 to January 2018. The

44 Hospital was the main referral health facility in the Volta Region with more than three hundred bed
45 capacity. Six general clinics (Medicine, Urology, Orthopedics, General Surgery, Pediatrics, Obstetrics and
46 Gynecology) and laboratory services were located in the Hospital. The average Out Patient Department
47 (OPD) attendance was more than one hundred thousand annually.

48 2.2. Data Analysis

49 The data obtained from the stool examination record books were entered into Microsoft Excel 2016
50 version and validated for double entry errors. The data were then exported to Statistical Package for
51 Social Sciences (SPSS) version 20.0 to determine the frequency, percentages and rate of infection with
52 respect to the intestinal parasite infection among age and sex. However, the data were graphically
53 presented using the Microsoft Excel 2016 version. Chi-square test was used to find the association
54 between intestinal parasite infection and patient's demographic characteristics (age and sex).

55

56 3. RESULTS

57 3.1 Distribution of Intestinal Parasite Infection

58 As shown in Table 1, there were about 7045 patients tested for intestinal parasite infection at the Ho
59 Teaching Hospital from 2012 to 2016. Seven hundred and three (703) out of the 7045 patients were
60 infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasites was
61 (10.0%). Highest infection was recorded in 2013 with prevalence of (16.2%) and lowest infection rate was
62 in 2015 (7.2%). Also, infection was prevalent in females than in males with a total rate of 8.9% and 1.1%
63 respectively. There was no significant relation between the sex of patients and intestinal parasite infection
64 (P -value=0.22; CI = 95%). Thus, being a male or female had no influence on the risk of infection. In
65 Figure 1, about 8 categories of intestinal parasites were found in the stool examination record books. The
66 most prevalent intestinal parasites within the five-year period were intestinal flagellates (90.0%) and the
67 least intestinal parasites recorded were *A. lumbricoides* (0.1%) and *S. mansoni* (0.1%).

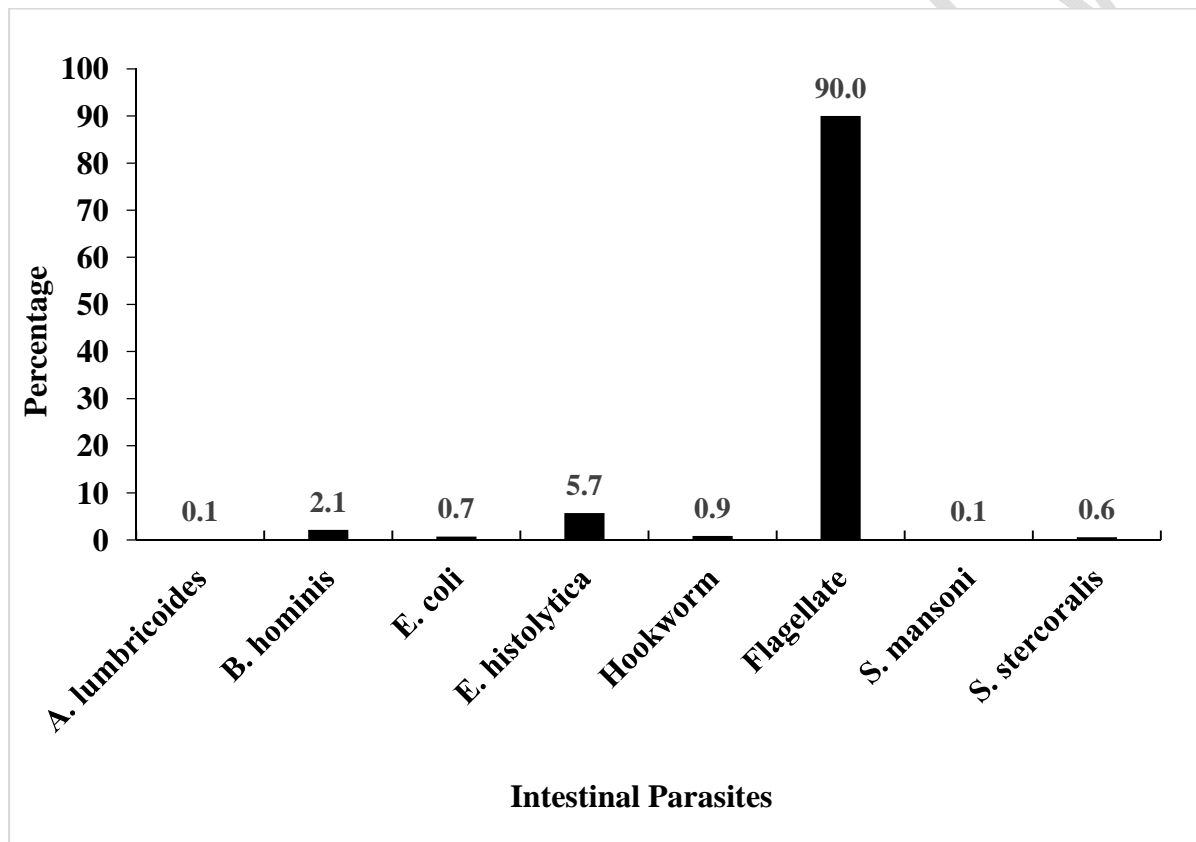
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69 **Table 1: Distribution of Intestinal Parasite Infection by sex from 2012 to 2016**

Year	Number Tested (%)		Total Tested (%)	Number Infected		Total Infected (%)
	F	M		F (%)	M (%)	
2012	1397	384	1781 (25.3)	181 (10.2)	48 (2.7)	229 (12.9)

2013	896	64	960 (13.6)	150 (15.6)	6 (0.6)	156 (16.2)
2014	1252	168	1420 (20.2)	89 (6.3)	4 (0.3)	93 (6.5)
2015	1309	119	1428 (20.3)	95 (6.7)	8 (0.6)	103 (7.2)
2016	1348	108	1456 (20.7)	114 (7.8)	8 (0.5)	122 (8.4)
Total	6202 (88.0)	843 (12.0)	7045 (100.0)	629 (8.9)	74 (1.1)	703 (10.0)

70 *Chi-square (χ^2) = 1.536, P-value=0.22, M = Males, F = Females



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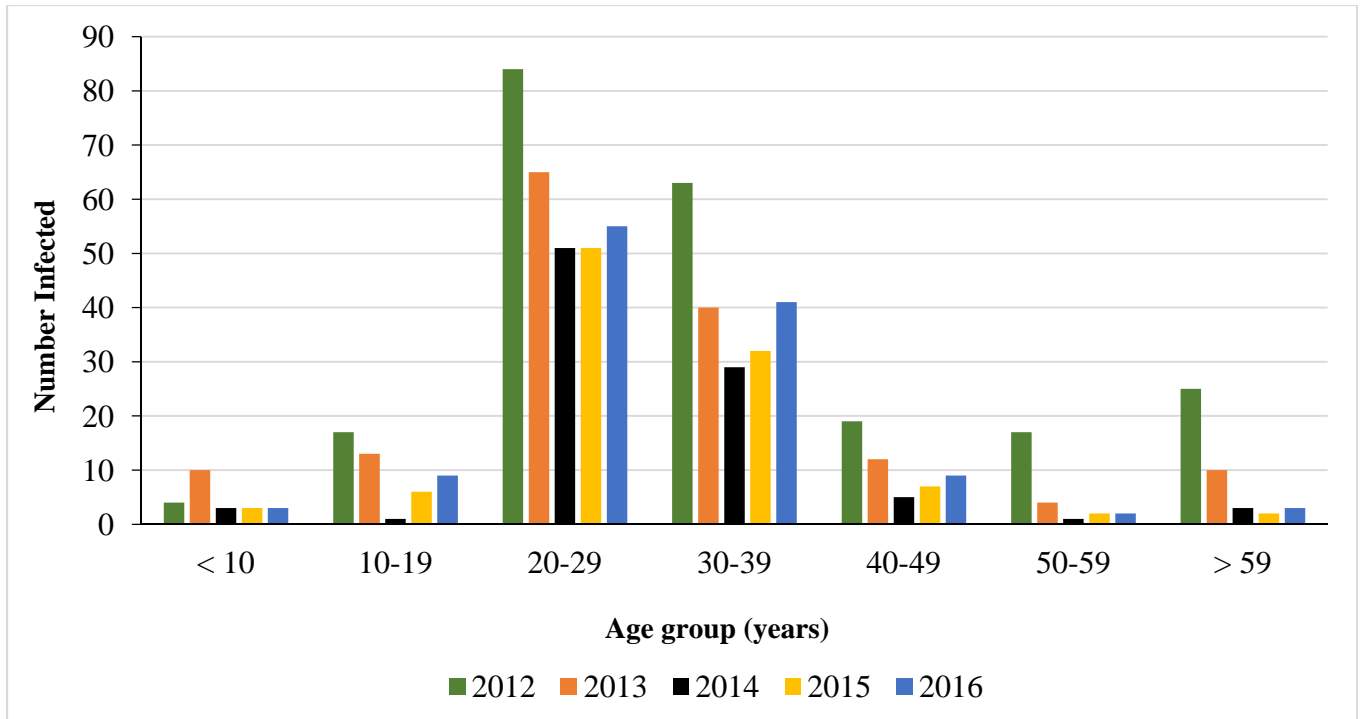
72 **Figure 1: Percentage Distribution of Intestinal Parasites from 2012 to 2016.**

73 **3.2 Distribution of Intestinal Parasite by Age group**

74 As presented in Figure 2, the affected age range was from 1 month to 87 years with a median age 29
 75 years, mean 30.11 years and standard deviation 13.54 years. Patients within age group 20 to 29 years
 76 (43.81%) recorded the highest infection followed by 30 to 39 years (29.24%) in each of the years.
 77 However, patients within age group below 10 years (3.28%) recorded the lowest infection. In Figure 3,

78 intestinal flagellates were the highest intestinal parasites recorded among all age groups followed by *E.*
79 *histolytica*. However, age group 20 to 29 years had the highest recorded intestinal flagellates followed by
80 age group 30 to 39 years and 40 to 49 years.

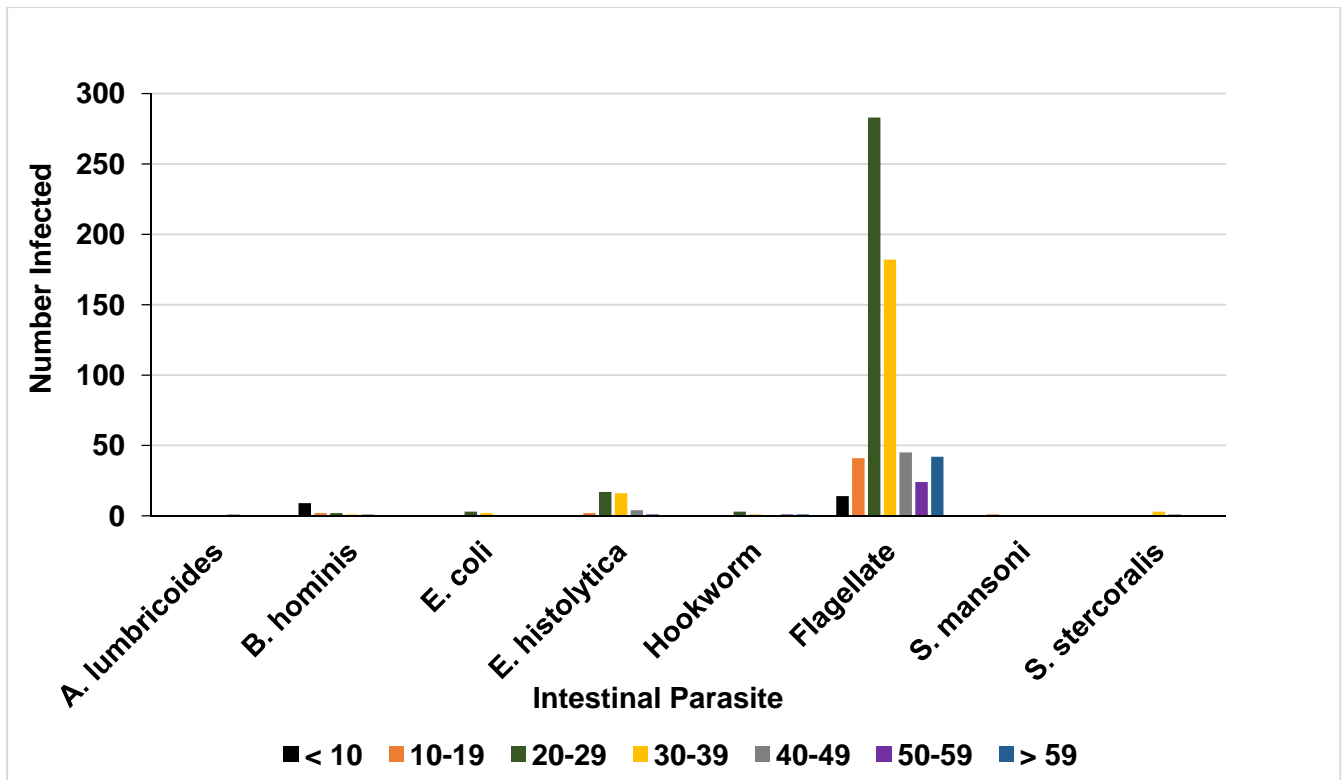
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83 **Figure 2: Distribution of Intestinal Parasite Infection by Age Group, 2012 to 2016**

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85 **Figure 3: Distribution of Each Intestinal Parasites by Age Group**

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87 **3.3 Association between Intestinal Parasite Infection and Patients Age group**

88 As shown in Table 2, the association between intestinal parasite infections and patient's age yielded a
 89 significant difference ($P \leq 0.001$). Therefore, intestinal parasite infection is dependent on the age of
 90 patients.

91

92

93 **Table 2: Association between Intestinal Parasite Infection and Age group**

Age Group (Years)	Presence of Intestinal Parasite		Total Tested
	No (%)	Yes (%)	
< 10	452 (95.2)	23 (4.8)	475
10 to 19	411 (89.9)	46 (10.1)	457

20 to 29	2446 (88.8)	308 (11.2)	2754
30 to 39	2114 (91.2)	205 (8.8)	2319
40 to 49	433 (89.27)	52 (10.7)	485
50 to 59	230 (89.8)	26 (10.2)	256
> 59	256 (85.6)	43 (14.4)	299
Total	6342 (90.0)	703 (10.0)	7045

94 *Chi-square (χ^2) = 28.513; P ≤ 0.001*

95

96 **4. DISCUSSION**

97 This study reviewed laboratory records within a five-year period (2012-2016) in a Teaching Hospital of the
 98 Volta Region of Ghana. The current study revealed that 10.0% of examined patients were infected with
 99 intestinal parasites. This finding is consistent with the findings of studies done in other countries such as
 100 in Saudi Arabia, 6.2% [11], 6.23% in Ethiopia [12] and 10.7% in Iran [13]. Other studies have shown a
 101 wide range of variation in the prevalence of intestinal parasites. For example, findings of a study
 102 conducted in Vietnam, 88.0% [14] and 52% in Nigeria [15]. In comparison, the low prevalence of infection
 103 in this current study could be attributed to the fact that most of the examined patients at the Ho Teaching
 104 Hospital were urban dwellers with a high socioeconomic status.

105 Intestinal protozoa infections (*B. hominis*, *E. histolytica*, *E. coli* and intestinal flagellates were prevalent
 106 than soil-transmitted helminth infection (*A. lumbricoides*, *S. stercoralis*, hookworm and *S. mansoni*). This
 107 finding is in contrast with the findings of a study conducted in Nepal [16] and Saudi Arabia [17] which
 108 revealed soil-transmitted helminth as the most predominant intestinal parasite. The low prevalence of soil-
 109 transmitted helminth infection in this study could be due to the periodic deworming exercise initiated by
 110 the regional School Health and Education Programme (SHEP) of Ghana Education Service / Ministry of
 111 Education and the Neglected Tropical Disease Control Programme (NTDCP) of the Ghana Health Service
 112 [18].

113 The predominant intestinal protozoa parasites were intestinal flagellates (90.0%), followed by *E.*
 114 *histolytica* (5.7%). This could be due to poor sanitation conditions, contamination of water and improper
 115 hygiene [17]. This finding is contrary to studies conducted in Rwanda [19] and Egypt [20] where *E.*
 116 *histolytica* was the most prevailing intestinal protozoa parasite.

117 Hookworm infection was low (0.9%). However, it was the predominant intestinal helminth infection in the
118 study. This finding agrees with the study conducted in Cape Coast Metropolis, Ghana which revealed
119 hookworm as the most common prevailing helminth [21]. On the other hand, the prevalence of *A.*
120 *lumbricoides* (0.1%), *S. stercoralis* (0.1%) and *S. mansoni* (0.6%) were low compared to the study
121 conducted in Cape Coast Metropolis, Ghana with prevalence of *A. lumbricoides* (3.0%), *S. mansoni*
122 (1.7%) and *S. stercoralis* (1.7%) [21]. This variation could be due to the different geographical location of
123 the study sites and also techniques used in the laboratory to detect these parasites. Although the
124 prevalence of these intestinal parasites was very low, their detection in the study population indicates
125 they are still being transmitted and the prevalence could surge under suitable conditions.

126 Regarding distribution of the intestinal parasites among various age groups, individuals in the age group
127 20-29 were most infected throughout the five-year period. Moreso, individuals in the age group below 10
128 recorded low infections. This is consistent with a similar finding in Nepal where most infection was among
129 age group 20-50 years [22]. The reason for the higher prevalence of the infection among individuals aged
130 20-29 years could be due their frequent exposure to the environment as majority of them are energetic,
131 hence they strive for their livelihood, and by doing so they do various types of works including farming,
132 sewage cleaning and many more. The probability of them eating and drinking improper food and water
133 during their working hours is high which could make them vulnerable to infection [22].

134 The study revealed higher rate of infection in females (9.11%) than in males (1.09%). This account is
135 similar to the findings of a study conducted in Ethiopia [23]. Moreover, females have high intestinal
136 protozoa and helminth infection, except for hookworm and *A. lumbricoides* infection that were
137 predominant in males. Such sex predominance in infections rates is likely to be a reflection of different
138 behaviour between the two groups [24]. The prevalence of intestinal parasite infection is dependent on
139 the age of the patient ($P \leq 0.001$). In contrast, intestinal parasite infection is independent of sex of an
140 individual ($P\text{-value}=0.215$). Therefore, age was a risk factor for acquiring these infections.

141 Implementation of laboratory quality management systems in the Ho Teaching Hospital Laboratory could
142 lead to the reducing prevalence of intestinal parasites from 2013. This facility was graded three-star level
143 by African Society for Laboratory Medicine (ASLM) after going through Strengthening Laboratory
144 Management Toward Accreditation (SLMTA) programme [25].

145 **5. CONCLUSION**

146 The overall prevalence of parasitic infections could be classified as low compared to other reports.
147 Among the intestinal parasites, intestinal flagellates and *Entamoeba histolytica* were found to be the most
148 prevalent during the five-year period (2012–2016). Most intestinal parasites were more prevalent among
149 individuals 20-29 years and the least infection was seen in individuals below 10 years. Although the
150 overall burden of parasites was low, the increasing trend of some parasites in the study indicates the
151 failure of maintaining good sanitation, personal hygiene, and provision of safe drinking water and health

152 education in the Ho municipality. It is recommended that, various stakeholders should provide advance
153 techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Also, the provision
154 of hygienic toilet facilities, water supply, education and regular deworming should be promoted in other to
155 help control the transmission of these parasites among the population.

156 **CONFLICTS OF INTEREST**

157 The authors declare that they have no competing interests.

158 **CONSENT**

159 Written consent and approval for the study was obtained from the Ho Teaching Hospital management to
160 use the laboratory records. The names of the individual patients were not recorded during the data
161 collection; therefore, the patients' confidentiality were kept.

162 **ETHICAL APPROVAL**

163 Ethical approval for the study was sought from the Dodowa Health Research Centre Institutional Review
164 Board [Ethic identification number: DHRC/IRB/1/09/17].

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