



A COMPARATIVE STUDY OF DETECTION OF *CRYPTOSPORIDIUM PARVUM* IN STOOL SAMPLES OF IMMUNOCOMPROMISED PATIENTS(HIV INFECTED) BY ICT/RAPID CARD AND MODIFIED ZN STAINING TECHNIQUE AT A TERTIARY CARE HOSPITAL IN KANPUR.

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Abstract

Introduction: Intestinal parasitic infections like *Giardia intestinalis*, *Entamoeba histolytica*, and coccidian parasites such as *Cryptosporidium parvum* are parasites causes diarrhoea in immunocompromised individuals, and cause morbidity and mortality worldwide. The various diagnostic modalities for detection of *Cryptosporidium parvum* are microscopy, ICT, ELISA and PCR.

Objective: To detect *Cryptosporidium parvum* in stool samples of immunocompromised patients (HIV infection) by ICT and modified ZN staining techniques.

Material & Methods: The study was conducted in the Department of Microbiology & Medicine from July 2022 to April 2023 in RMCH&RC, Kanpur. Total 50 stool samples were collected from the symptomatic patients (HIV) to detect *Cryptosporidium parvum* samples were stained with modified ZN staining and ICT.

Result: Out of the total 50 stool samples of HIV patients 31(62%) were males and 19(38%) females. 6(12%) were positive for *Cryptosporidium parvum* in which age group of (31-40 years) were detected by ICT, only 4(66.66%) were positive by modified ZN staining. The sensitivity was found to be (66.7%), specificity(95.6%), PPV(66.7%) and NPV(95.6%) of modified ZN staining. The sensitivity was found to be (99.0%), specificity(100%), PPV(99.0%) and NPV(100%) of ICT.

Conclusion: In this study the incidence of *Cryptosporidium parvum* was found to be 12%. ICT being more effective than modified ZN staining. Therefore, the new ICT kit being rapid and relevant method for detection of *Cryptosporidium*.

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INTRODUCTION

Intestinal parasitic infections are one of the most common causes of morbidity and mortality worldwide, especially among immune-compromised individuals. In developed country, there was an increase in the number of immunosuppressed individuals because of the use of aggressive immunosuppressive drugs and improvement in transplant procedure [1]. Intestinal parasites such as *Giardia intestinalis*, *Entamoeba histolytica*, and *Strongyloides stercoralis* and coccidian parasites such as *Cryptosporidium*, *Cystoisospora*, *Cyclospora*, and *Microsporidia* are the common causes of diarrhea in immune compromised individuals [2]. These enteric parasites were encountered in 30%–60% of HIV positives in developed countries and 90% in developing countries. The individuals with CD4 count <200 cells/ μ l are at risk of acquiring the opportunistic infection. The mode of transmission is through contaminated food and water. *Cryptosporidium* was listed as a category B pathogen by CDC and the National Institute of Health because of its threat to cause water contamination [3]. A low infective dose of 10 oocysts can initiate the infection. Nearly 22 species of *Cryptosporidium* have been reported worldwide [4]. Among these, *Cryptosporidium parvum* and *Cryptosporidium hominis* are the most common species infecting humans. In India, Cryptosporidiosis is an important cause of morbidity in HIV-infected individuals, resulting in chronic diarrhea [5]. There are many diagnostic modalities such as microscopy, antigen detection by immunochromatographic test (ICT), ELISA, and polymerase chain reaction (PCR). This study was conducted to study the *Cryptosporidium* in immunocompromised patients(HIV) and to assess the diagnostic accuracy of the ICT using Crypto

CARD TEST kit and modified ZN staining in detecting *Cryptosporidium parvum* at a tertiary care centre in Kanpur.

MATERIAL & METHODS

The present study was the observational prospective study conducted in the Department of Microbiology & Medicine in Rama Medical College Hospital & Research Centre, Kanpur (RMCH&RC) from July 2022 to April 2023 after getting approval from the Institute Research and Ethical Committee. Total 50 stool samples of HIV positive patients were collected. This study compared the modified ZN Staining and immunochromatography by rapid card test.

Sample collection: Stool samples were collected in sterile containers, and stored in the refrigerators. Detection of *cryptosporidium* in stool samples are done by using two methods. The modified ZN staining was done by using 1% concentrated sulfuric acid. ICT Crypto Card test was used for the qualitative detection of *Cryptosporidium parvum*.

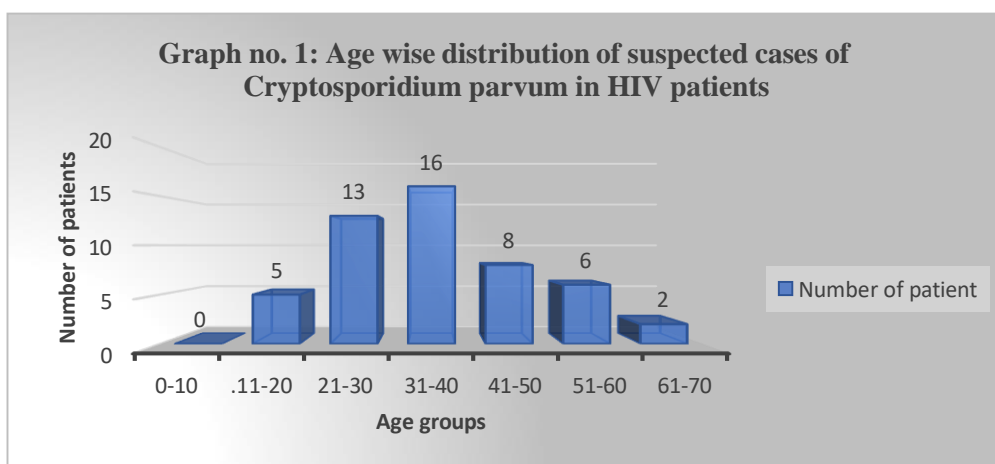
Statistical analysis:

Data recorded on the case report from and structured proforma were subsequently entered and into a spreadsheet. Date management and analysis were performed using Microsoft excel.

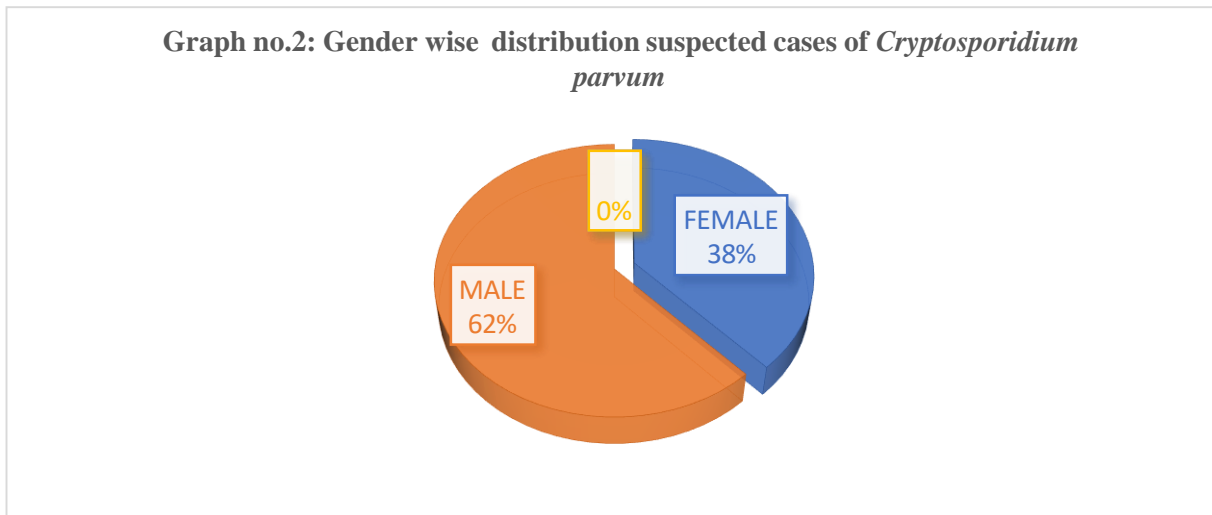
RESULTS

A total of 50 stool samples were collected from positive HIV patients attending RMCH&RC. The samples were collected after obtaining written informed consent.

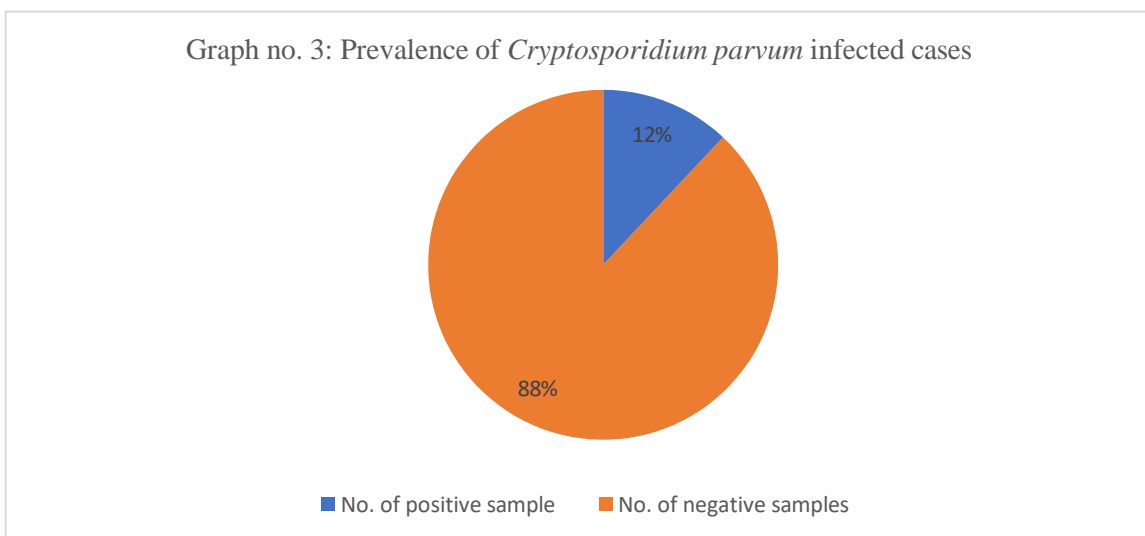
Age wise distribution of *Cryptosporidium parvum* infected cases in which maximum number was found in age group of 31-40 year as shown in Graph no.1.



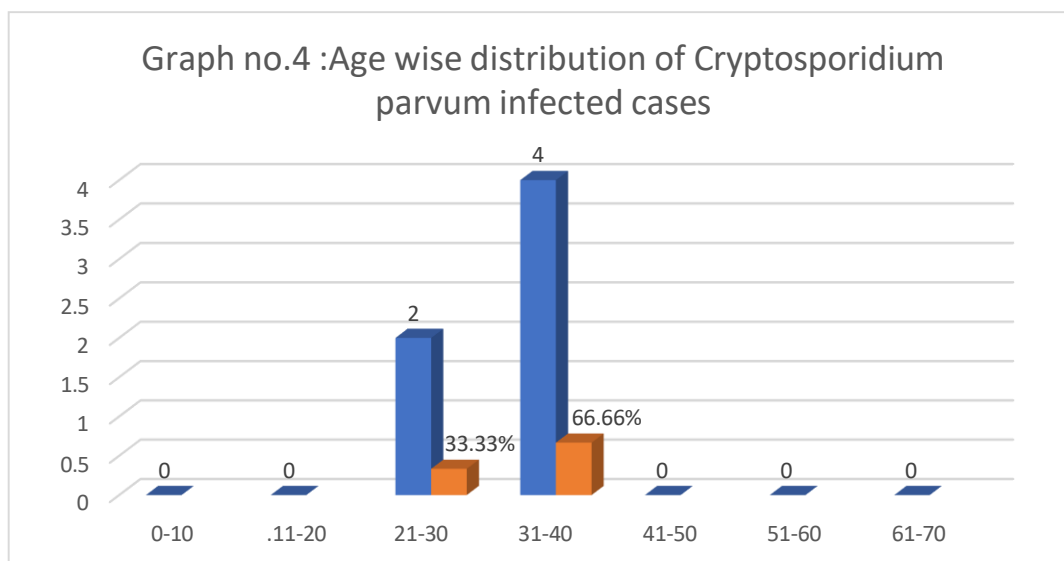
It was observed that male were more than female (62.0% and 38.0% respectively) in suspected cases as shown in Graph no 2.



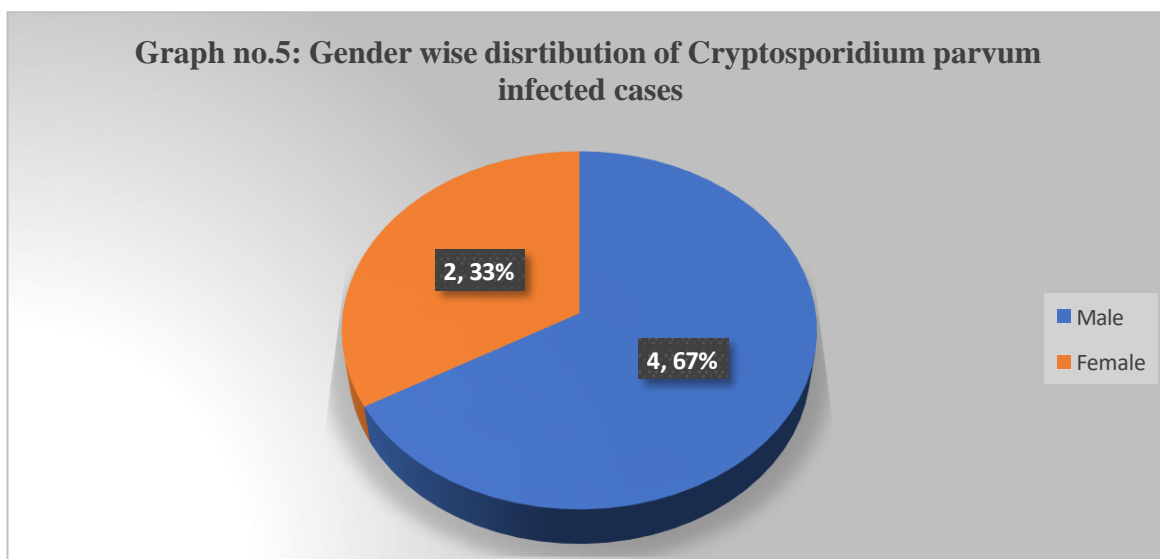
The prevalence of *Cryptosporidium parvum* was found to be 6(12%) as shown in Graph no.3.



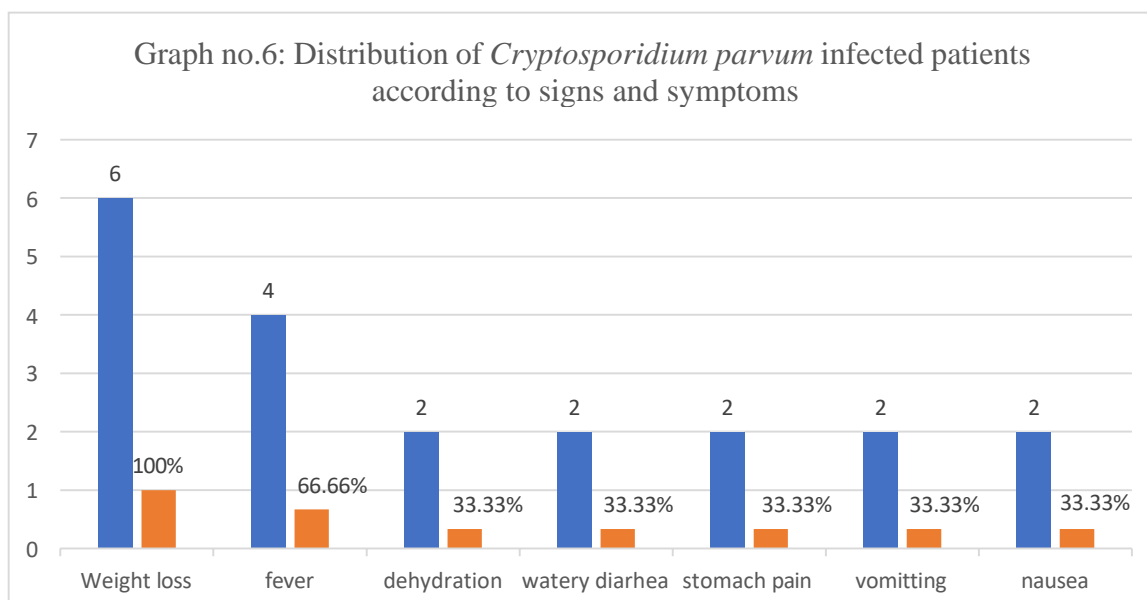
In the Age wise distribution of *Cryptosporidium parvum* infected cases was found maximum in age group of 30-40 years as shown in Graph no.4.



Gender wise distribution of *Cryptosporidium parvum* infected cases in which male were 66.66% and female were 33.33% as shown in Graph no.5.



In the Distribution of patients according to sign and symptoms in which weight loss was found to be the most common (100%) symptom followed by fever (66.66%), dehydration (33.33%) as shown in Graph no.6.



In our study out of 50 samples, 6 were positive by ICT and of these 6 were ICT positive, 4 were found to be positive by modified ZN staining as shown in Table no.1.

ICT	MODIFIED ZN STAINING		TOTAL
	POSITIVE	NEGATIVE	
POSITIVE	4	2	6
NEGATIVE	0	44	44
			50

Table 1. Comparison of result from Modified ZN staining and ICT.

The sensitivity and specificity of ICT and Modified ZN staining was found to be 99.0%, 100%; 66.7%, 95.6% respectively. The PPV and NPV of ICT and modified ZN staining was 99.0%,100%; 66.7%, 95.6% respectively and accuracy of ICT and modified ZN staining is 100% and 92.59% respectively as shown in Table no. 2.

Test methods	Sensitivity	Specificity	PPV	NPV	Accuracy
Modified ZN stain	66.7%	95.6%	66.7%	95.6%	92.59%
ICT	99.0%	100%	99.0%	100%	100%

Table 2: Comparison of the sensitivity, specificity, PPV, NPV and accuracy of three methods for *Cryptosporidium parvum*.

DISCUSSION:

In our study, most of the cases belong to the age group between 31-40 year which was not in accordance to the study conducted by K Vanathy et al[6].

In our study male (62%) was more affected than female (38%) which was similar to the study conducted by Upninder kaur et al.with male (65%) and female (35%) [7]

In our study the prevalence of *Cryptosporidium parvum* was obtained to be 12% in HIV patients. The finding was in accordance with K.Vanathy et al[6] where it showed lesser prevalence 5.4%.

The sign and symptoms observed in the present study were- weight loss(100%), fever(66.66%), dehydration (33.33%) which was comparable to the findings of Masarat S et al.[8] noted diarrhea (100%) and chronic weight loss.

In our study it was found that the ICT showed a sensitivity of 99.0% which was in support with the study by k.vanathy et al. (100%) [6].

CONCLUSION:-

The present study concluded that the ICT was more sensitive than the other methods for the detection of *Cryptosporidium parvum*. However, ICT was found to be best method for diagnosing *Cryptosporidium parvum*, and showed the highest levels of sensitivity and specificity.

ETHICAL CLEARANCE:

The ethical committee clearance certificate was taken before starting of study by Institutional medical ethical committee.

LIMITATION:

In our study, few numbers of samples were studied due to cost constraints.

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