

Research article

Effects of infection with *Entamoeba histolytica* on blood parameters in cancer patients (malignancy and leukaemia)

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ABSTRACT

Cancer and cancer therapy result in complications that reduce the ability of the immune system to resist infections. The present study was conducted in patients with malignant cancer and leukaemia from Basrah specialist children's hospital auditors of children infected with *E. histolytica*. Total white blood cell (WBC) count, haemoglobin (Hb) concentration, packed cell volume (PCV) and platelet (thrombocyte) count were examined; these parameters were shown to be lower in patients with cancer than in those infected with *E. histolytica* and healthy children. Patients with cancer had chronic or repeated infections with *E. histolytica*. Reduction in WBC count, Hb concentration, PCV and thrombocyte count in patients with cancer, particularly leukaemia, was a result of cancer and chemotherapy side effects that results in severe deficiencies in blood parameters of the treated patients with cancer.

Keywords: Cancer; Chemotherapy; Blood parameters ; Children; Infection.

INTRODUCTION

Cancer and its treatments reduce the immune system's ability to resist infections. Since the infection with some parasites lead to a symptomatic complications and decrease the success chances of treatment by interference with it, infection is a life-threatening complication for patients with cancer and who receive cancer therapy (American Cancer Society) Protozoan and parasitic infections are a problem worldwide. In particular, infection with intestinal parasites, such as *E. histolytica* and *G. lamblia*, can cause considerable public health issues, primarily in developing countries (Al saqur et.al. 2017) Both *E. histolytica* and *G. lamblia* are epidemics in Iraq (Bazzaz et.al 2017) , but *E. histolytica* being more prevalent (Al saqur et.al. 2017). *E. histolytica* causes amoebiasis (Sehgal and Bhattacharya 1996), and is responsible for about 100,000 annual deaths worldwide (Shirly et.al. 2019). Clinically, amoebiasis ranges from mostly asymptomatic infection to invasive peritonitis and extra-intestinal amoebiasis (WHO 2019). Infection with *E. histolytica* may cause significant abnormalities in the levels of some blood parameters (Obaid 2014). The current study aimed to compare blood parameters between cancer patients and non-cancer patients with *E. histolytica* infection. These parameters included total WBC count, (Hb) concentration, PCV and Platelet (thrombocyte) count.

MATERIALS AND METHODS

This study was carried out in Basrah specialist children's hospital in Basrah province in Iraq from June to December in 2018. Patients of hospital auditors (1-18 years old) of both sexes submitted samples for stool examination in the parasitology unit of the hospital. Only patients infected with *E. histolytica* were chosen for haematological study. Samples were divided into 4 groups: parasitic malignant patients, parasitic leukemic patients, non- cancer patients infected with parasite and healthy children. Total WBC count, Hb concentration, PCV and platelet (thrombocyte) count of study patients and healthy individual were provided from the haematology unit of the same hospital, estimated and statically analysed by chi-square test.

RESULT AND DISCUSSION

Of 375 patients who submitted to stool examination, 76 patients (20.26%) were infected with *E. histolytica*. Nine patients (11.84%) were repeated cases from the same patients resulting in a total number of 366 patients with 68 (12.5%) infected with *E. histolytica* (Fig. 1). There was no significant difference between the number of male patients (n = 37, 54.4%) and female patients (n = 31, 45.6%) (Fig. 2). Twenty-four of the 68 patients (35.29%) had cancer (Fig. 3). Ten cancer patients

(41.6%) had leukaemia and the remaining 14 cases (58.3%) had malignant tumours (Fig. 4). These results are similar to those reported by (Uysal et al. 2017), who found that

parasitic infection was more frequent in patients with malignant cancer.

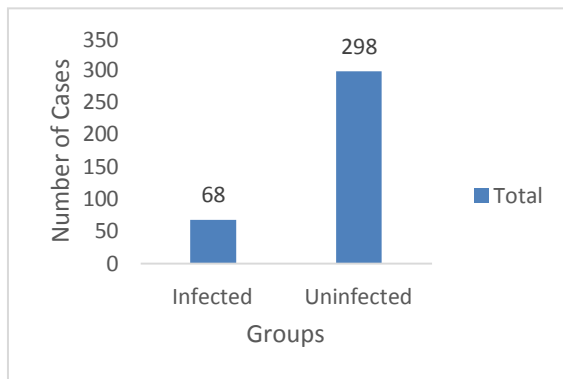


Fig.1: Number of infected and non infected cases with *E.histolytica*

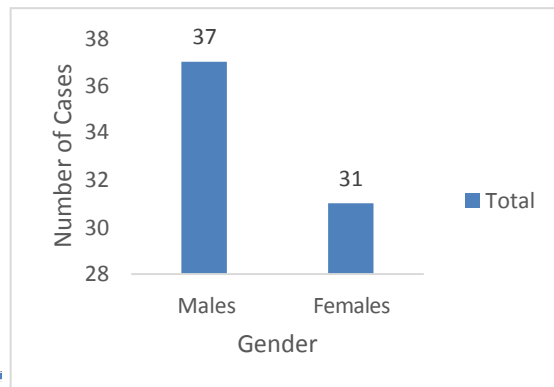


Fig.2: Number of males and females infected with *E. histolytica*

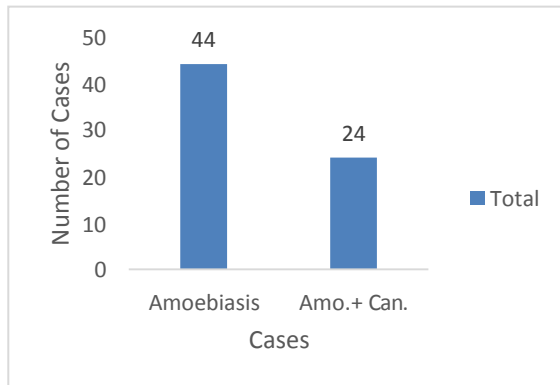


Fig.3: Number of patients infected with *E.histolytica* and patients infected with *E.histolytica* + cancer

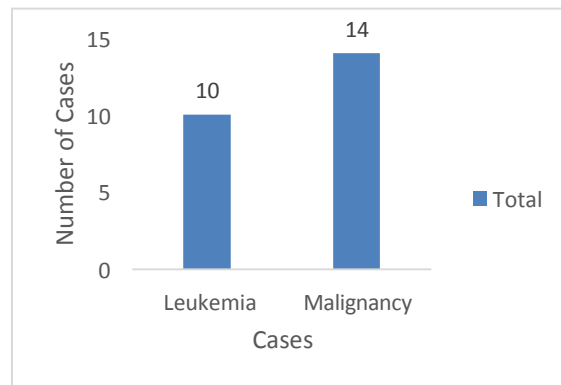


Fig.4: Number of malignant and leukemic patients infected with *E.histolytica*

The comparative results among the four sample groups demonstrated a significant increase in WBC count in the patients with parasitic infection (11.89 ± 4.87) over WBC count in healthy children (7.4 ± 2.10), parasitic leukemic patients (1.53 ± 1.36) and malignant patients (2.86 ± 1.72) (Fig. 5). The increased WBC count in patients with parasitic infection is indicative of a normal immune response against parasites (Obaid 2014), but the decrease in the WBC count in cancer patients may be a result of cancer and chemotherapy toxicity that reduced normal WBC count (Ils.org.www.Ils.org)

Children with cancer are immunosuppressive because of cancer treatment, resulting in a constant risk of infection from germs and pathogens (Steele 2012). Repeated or chronic infection in some patients with *E. histolytica* in the

present study is consistent with the high risk in cancer patients. The WBC count in parasitic malignant patients was higher than the parasitic leukemic patients. This may be due to leukaemia's effect on bone marrow to produce large numbers of immature and abnormal WBCs, decreasing the function of WBCs and reducing the patient immunity (Al-abdallah 2012).

Hb concentration in parasitic leukemic patients (9.24 ± 2.16), parasitic malignant patients (8.75 ± 2.21) and parasitic infected patients (10.57 ± 2.03) was lower than healthy children (12.77 ± 1.70), with no significant differences among them (Fig. 6). The same pattern was seen with respect to PCV. The mean in the healthy children (35.33 ± 4.33) was higher than parasitic leukemic patients (28.01 ± 5.56), parasitic

malignant patients (26.11 ± 7) and parasitic infected patients (31.99 ± 5.58) (Fig. 7). Decreased Hb concentration and PCV in all parasitic patients is due to iron deficiency anaemia caused by *E. histolytica* [7]. The lower Hb concentration and PCV in leukemic patients may be due to the effect of leukaemia on bone marrow as well as on the lymphatic system causing increase in the number of cancer cells and preventing bone marrow from producing enough normal cells. This, in turn, affects the differentiation and function of these cells (Al-abdallah 2012). In parasitic malignant patients Hb concentration and PCV were lower than parasitic leukemic patients because of chemotherapy which result in decrease in Hb

concentration and other parameters as well as due to partial oxygen pressure reduction in cancer patients (Younis et.al. 2014).

The thrombocyte count in the parasitic infected patients (371.25 ± 139.35) was higher than healthy children (261.26 ± 134.86), parasitic leukemic patients (130.46 ± 102.7) and parasitic malignant patients (201.5 ± 107.03) (Fig.8). Infection with *E. histolytica*, which results in iron deficiency anaemia, is thought to be the cause of higher thrombocyte counts in parasitic patients (www.thrombocyte.com). The decreased thrombocyte count in parasitic leukemic patients may be due to thrombocytopenia caused by leukaemia

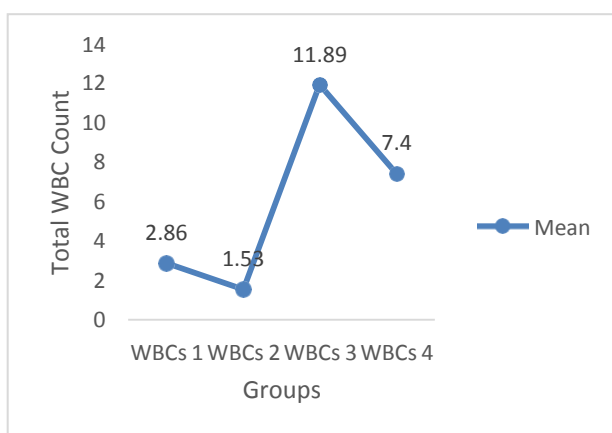


Fig.5: Total white blood cells count WBCs
WBCs1= parasitic malignant patients, WBCs2: parasitic leukemic patients, WBCs3= non- cancer patients infected with parasite, WBCs4= healthy children

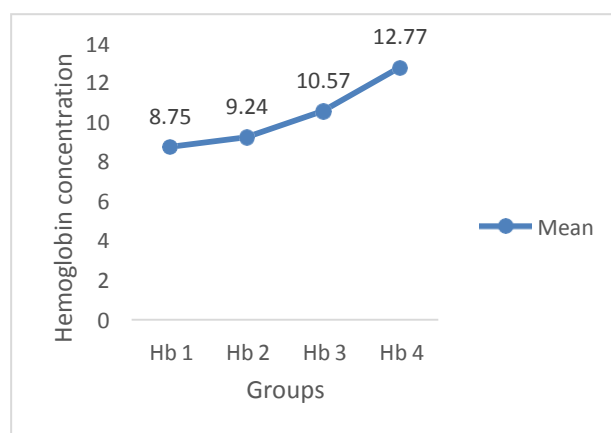


Fig.6: Hemoglobin concentration Hb. Hb1= parasitic malignant patients, Hb2: parasitic leukemic patients, Hb3= non- cancer patients infected with parasite, Hb4= healthy children

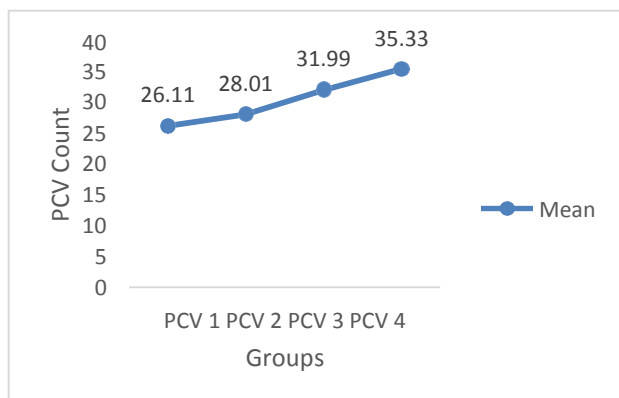


Fig.7: PCV values. PCV1= parasitic malignant patients, PCV2: parasitic leukemic patients, PCV3= non- cancer patients infected with parasite, PCV4= healthy children.

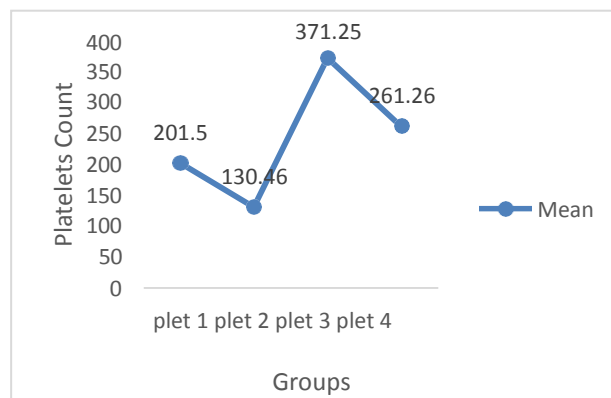


Fig.8: Platelet (thrombocyte) count. Plet1= parasitic malignant patients, Plet2: parasitic leukemic patients, Plet3= non- cancer patients infected with parasite, Plet4= healthy children

CONCLUSION

Children with cancer are treated with chemotherapy and are under the risk of infection with parasites and other germs due to lowered immunity resulting from chemotherapy. The results of current study confirmed that no resistance from cancer patients against infection as a result to chemotherapy. Therefore, it is necessary to find alternative treatments for cancer that are more effective and safer than chemotherapy.

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