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# **Blood Values and Factors Associated with Intestinal Parasites and Head Lice infestation among Children in Baquba City**

**A Thesis**

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## Chapter one Introduction

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### Introduction

Parasitic infections are one of health and environmental problems that affect the vitality and activity of children and appear in the form of skin or intestinal disorders. The accompanying complications of these infections has been the motivated reasons for many studies to investigate the predisposing causes and consequences of the disease (Long *et al.*, 1995). Endo-parasite infection is a major health problem worldwide. It causes serious diarrhea, gastroenteritis, and malnutrition in different age groups and (Nematian *et al.*,2004) populations. The WHO (2012; 2020) indicated that children and poor peoples are the most vulnerable groups to infect with intestinal parasites since they are more susceptible to contaminated soil in their lives than others. Symptoms of intestinal parasite infection range from diarrhea to abdominal pain, and the more severe symptoms appear among immunocompromised and malnourished people (Mathews *et al.*, 2014). It was mentioned by Unicef,( 2009) that intestinal parasites are among the most common causes of diarrhea, it is the leading cause of mortality and morbidity for under five years old children. In the same respect Nematian *et al.*,(2004) and Long *et al.*, (1995) mentioned that the age of the patient is an associated factor related to the individual's immunological status and behavioral patterns that contributed to a high prevalence of intestinal parasites among children than in adults.

Intestinal parasitic infections are also responsible for iron deficiency (anemia), (WHO, 2012). More than that, inadequate intake of selected micronutrients can cause immune deficiency and increase susceptibility to microbial infection (Althomali *et al.*, 2015).

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Ectoparasites are most prevalence in developing countries, particularly in crowded places with poor socio-economic and hygiene conditions (Amanzongahence *et al.*, 2020). The high level of infection with these parasites such as head lice is induce by their direct transmission, i.e., head-to-head contact, or through contact with other personal objects combs for infected people (Ali *et al.*, 2007). In extreme circumstances, a person with head lice may face serious health issues, such as anemia, insomnia, itching, irritation, and skin infections (Frankowski *et al.*, 2002; Yadav *et al.*, 2017; Ali and hama , 2018). Due to a hypersensitive reaction to the lice's injected saliva during blood-feeding, itchy papules may form (Miller, 2002). Head lice feed on human blood, so severe chronic injury among children may lead to anemia, which is reflected in fatigue (Norman, 1997; Nordin *et al.*, 2006).

It was mentioned by many studies (Zahra,2017 and Alvaro *et al.*,2017) that the specific immune response to parasites leads to the production of antibody. Infection by protozoan parasites is associated with the production of Ig classes IgE is produced in response to intestinal protozoa, in addition to these specific T-dependent responses, a non-specific hypergammaglobulinaemia is present in many parasitic infections. When an individual's immune system creates IgE antibodies in response to a foreign antigen, an allergic reaction takes place, IgE molecules bind tightly to the surface of the mast cells and the basophil cells. High serum levels of IgE, particularly in those with intestinal parasite infections, induced the production of histamine and other intermediates, which resulted in an acute hypersensitive reaction that destroyed the parasites (Al-Mozan *et al.*,2017 ; Amâncio *et al.*, 2012 ; ALmaamory, 2015).

Micronutrients with immune-modulating properties, such as vitamin A, vitamin B12, vitamin C, alpha-carotene, riboflavin, zinc, selenium, and iron, can

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affect how an infection develops, a laboratory study has demonstrated that vitamin deficiencies can result in parasitic infections (Cunningham-Rundles *et al.*, 2005). The presence of antibodies points to a potential relationship between vitamin deficiencies and the vulnerability to parasite infections (Reilly *et al.* , 2012 ; Nga *et al.* , 2011; Heald and Gong ., 1999 ; Yones *et al.*, 2015 reviewed that malnutrition makes children are more susceptible to micronutrient deficiency and therefore more affected by parasitic infection. Malnutrition is thought to potentiate the IL-4-dependent polyclonal stimulation of IgE by parasites, and high total serum IgE levels result in decreased resistance because of low levels of specific antiparasite IgE (Shetty and shetty1993).

Vitamin D3 can be obtained from the diet or can be synthesized endogenously from a cholesterol precursor (7-dehydrocholesterol) through the incidence of sun-UVB rays on the skin (Baeke *et al.*, 2010; Bikle, 2011). Vitamin D3 is necessary for calcium homeostasis, cell growth, differentiation, and function in many tissues, including the immune system, and so for immune defense mechanism against infections, including parasitic types. Although many studies investigated head lice infection, most of these studies focused on its prevalence and its relationship with some socioeconomic factors e.g., poor hygiene, low education, and other factors (Alberfkani *et al.*, 2020). Therefore, the present study proposed to investigate the relationship between head lice infection and intestinal parasitic infections to some immunological, blood parameters, vitamin D, Zn, and IgE.

#### **Aim of the study:**

1. Investigate the prevalence of head lice and intestinal parasite infections among children, who attended Al-Batool Maternity Teaching Hospital (AL-BMTH), and health centers in Bauba city.

## الخلاصة

لوحظ على مدى العقدين الماضيين أن العديد من الأطفال في سن المدرسة وما دون ، يعانون من ضعف عام في الجسم، شحوب المظهر، اضطرابات في الجهاز الهضمي والإسهال ، بالإضافة إلى التهابات جلدية مختلفة.

شملت الدراسة الحالية على فحص 300 عينة عشوائية من الأطفال الذين يعانون من المراجعين لمستشفى البتول التعليمي، بعقوبة ، محافظة ديالى. تراوحت أعمار الأطفال بين 1 و 15 سنة. كذلك تم جمع تسعين عينة دم من الأطفال ، تضمنت 60 عينة من الاطفال المصابين و 30 عينة أخرى من اطفال اصحاء كمجموعة ضابطة.

فحصت العينات المأخوذة من براز الأطفال باستخدام طريقة المسحة المبللة المباشرة ، وتم فحص الإصابة بقمل الرأس عن طريق الفحص البصري الدقيق للرأس بالكامل (الرقبة والأذنين والشعر)، وتم تصنيف الإصابة بالموجبة عند وجود على الأقل طور واحد (البيضة ، الحورية ، وبالباغة) من قمل الرأس *Pediculus humanus capitis*، بما في ذلك بقايا الصئبان والتي يمكن رؤيتها بواسطة العين المجردة. كذلك تم أخذ عينات كشط الجلد من الأطفال المشتبه باصابتهم لفحصها مجهريًا.

قسمت عينات الدم إلى قسمين: القسم الاول و الذي تم اعتماده لإجراء اختبارات (CBC) لملاحظة التغيرات في الدم ، والتي أشملت مستوى الهيموجلوبين (Hb) ، (PCV) ، (RBC) ، (WBC) : القسم الثاني من عينة الدم و الذي تم استخدامه لاختبار مستويات فيتامين D3 والزنك Zn ومستويات IgE.

كانت نتائج الطفيليات المعوية المشخصة مجهريا لمرضى الإسهال 68.6 % للأوليات و 10.3% للطفيليات الأخرى من إجمالي مرضى الإسهال ، وكانت نسبة العدوى المعوية أعلى عند الذكور 61% منها في الإناث 38.9%. كما وجد أن الفئة العمرية 1-5 سجلت أعلى معدل إصابة بين الفئات العمرية الأخرى حيث كانت نسب الاصابة من 1-5 سنوات 49.3% ، 6-10 سنوات 35.7% و 11-15 سنة 15% على التوالي. كما أظهرت النتائج أن معدلات الإصابة بالقمل عند الإناث 91.1% أعلى منها في الذكور 8.9%.

أظهرت بعض مؤشرات الدم ، بما في ذلك WBC و HGB و MCV و MCH و PLT ، أهمية الفروق. ( $p < 0.05$ ) بين مجموعتي الدراسة والمرضى والضوابط. كان لدى المرضى قيم أكبر لـ WBC و 10.573.02 PLT جم / لتر و 370.6784.92 جم / لتر على التوالي من الضوابط. كانت قيم HGB و

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2. Examining the relationship between head lice and intestinal parasitic infections with some blood parameters A-(CBC, WBC count, HB), B-Vitamin D, Zinc and to the C-level of IgE parameter.