



Original Research

SOME IMMUNOLOGICAL, HAEMATOLOGICAL AND NUTRITIONAL INDICES OF LESS PRIVILEGED CHILDREN (ALMAJIRIS) IN SOKOTO METROPOLIS**¹Hassan U, ²Nasir RI, ³Oduola T, ²Shehu B, ²Dallatu MK, ⁴Alo MN, ⁵Yahaya M****How to cite:**

Hassan U, Nasir RI, Oduola T, Shehu B, Dallatu MK, Alo MN, Yahaya M. Some immunological, haematological and nutritional indices of less privileged children (Almajiris) in Sokoto Metropolis. Afr J H Sci. 2024;1(1):17-22

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Background: Malnutrition is still highly prevalent in developing countries. Furthermore, less privileged children, often lacking parental care, sources of livelihood, and adequate shelter, may be at high nutritional risk.

Aim: This study aims to assess the nutritional status of less privileged children (almajiris) in Sokoto.

Methodology: Blood samples were collected from 100 apparently healthy elites' children and 200 less privileged children. Body mass index was calculated as weight in kilograms divided by the square of height in meters (kg/m²). Using Agappe reagent kits, serum total protein was determined by Biuret, albumin by Bromocresol Green (BCG) and total cholesterol by enzymatic methods. Full blood counts and CD4 cell counts were determined using standard techniques.

Results: The mean $\pm$ standard deviation (S.D) values for the test and control groups, respectively, were: body mass index (kg/m²) 16.90 $\pm$ 2.55 and 18.67 $\pm$ 2.76; serum total protein (mg/dl) 7.43 $\pm$ 1.27 and 7.18 $\pm$ 1.40; serum albumin (mg/dl) 2.60 $\pm$ 0.63 and 3.68 $\pm$ 0.63 total cholesterol (mg/dl) 151.88 $\pm$ 43.91 and 163.40 $\pm$ 48.21. The packed cell volume, haemoglobin, total leucocyte count, neutrophil, lymphocyte, basophil, eosinophil, CD4 cells were 37.19 $\pm$ 8.71 and 39.48 $\pm$ 5.91; 12.41 $\pm$ 2.92 and 13.16 $\pm$ 1.94; 4034.67 $\pm$ 2154.39 and 8475.00 $\pm$ 3103.01; 44.17 $\pm$ 9.97 and 51.84 $\pm$ 9.93; 48.01 $\pm$ 11.97 and 44.26 $\pm$ 10.21; 0.00 $\pm$ 0.00 and 0.01 $\pm$ 0.12; 3.72 $\pm$ 3.55 and 8.02 $\pm$ 6.96; 540.00 $\pm$ 833.24; 212.95 $\pm$ 452.90 respectively.

Conclusion: Body Mass Index, albumin and haemoglobin values in less privileged children were significantly lower than those in elite children, indicating poor nutritional status. In conclusion, it was established from this study that there is malnutrition among the less privileged children living in Sokoto, as most of the children are underweight, and from physically stunted and thinned.

Keywords: Less privileged children, malnutrition; immunological, CD4 cells count, alms

INTRODUCTION

Less privileged children (Almajiris) are the children in local schools. They came from their different villages to cities to stay with their Malams (teachers). Almajiris are seen and identified with some unique features of destitution and seen as constituting a nuisance to others in the community [1]. The real meaning of the word Almajiri emanated from the Arabic word Almajirun meaning the emigrant. In Hausa land of northern Nigeria Almajiri can be described as a person who primarily is a pupil in a Qur'anic school and who begs for assistance on the street and from house to house in order to cater for his daily subsistence [1]. There are a lot of problems faced by less privileged. They are forced to beg on road, some children wash cars and clothes, forced to make fireworks for money. Every child is special and he or she deserves to achieve his growth

and dreams in a healthy surrounding. Those children may be deficient in their immune system due to lack or poor nutrition [2].

Nutrients are the nutritional components in foods that an organism utilizes to survive and grow. Macronutrients provide the bulk energy for an organism's metabolic system to function, while micronutrients provide the necessary cofactors for metabolism to be carried out. Both types of nutrients can be acquired from the environment [3]. They are used to build and repair tissues, regulate body processes, and are converted to and used for energy. Organic nutrients include carbohydrates, fats, proteins (or their building blocks, amino acid), and vitamins. Inorganic chemical compounds such as dietary minerals, water and oxygen may also be considered nutrients [4]. It is an **essential nutrient** if it must be obtained from an external source, either because the organism cannot synthesize it or produces insufficient quantities. Nutrients needed in very small amounts are **micronutrients** and those that are needed in larger quantities are called macronutrients. The effects of nutrients are **dose-dependent** and shortages are called deficiencies [5].

Nutrients play an important role in the protection of the host against invading pathogens. Nutrient deficiencies can affect immune function, usually in a negative manner. Certain nutrients are capable of modulating the function of the immune system through a variety of mechanisms. This work will discuss the impact that nutrients have on immune function, and the effect of an immune system response on the nutritional status and needs of the animal. Nutritional status can modulate the actions of the immune system; therefore, the sciences of nutrition and immunology are tightly linked. In fact, malnutrition is the most common cause of immunodeficiency in the world [6], and chronic malnutrition is a major risk factor for global morbidity and mortality [7]. More than 800 million people are estimated to be undernourished, most in the developing world [8], but undernutrition is also a problem in industrialized nations, especially in hospitalized individuals and the elderly [9]. Poor overall nutrition can lead to inadequate intake of energy and macronutrients, as well as deficiencies in certain micronutrients that are required for proper immune function. Such nutrient deficiencies can result in immunosuppression and dysregulation of immune responses. In particular, deficiencies in certain nutrients can impair phagocytic function in innate immunity and adversely affect several aspects of adaptive immunity, including cytokine production as well as antibody- and cell-mediated immunities [10]. Over nutrition, a form of malnutrition where nutrients, specifically macronutrients, are provided in excess of dietary requirements, also negatively impacts immune system functions.

METHODS

This is a cross sectional study consisting of 200 males less privileged (Almajiris) children below the age of 18 years and 100 apparently healthy children of elites who were well fed, of the same age and sex were recruited as control for this study. Six millilitres of venous blood samples were aseptically collected from each subject, 3 mL dispensed into EDTA blood specimen bottle for CD4 cells and full blood count determination; the remaining 3mL into plain specimen bottle for estimation total protein, albumin and cholesterol. Using Spectrophotometric techniques; serum total protein was determined by Biuret, albumin by Bromocresol Green (BCG) and total cholesterol by enzymatic methods with Agappe reagent kits. CD4 cells counts was determined using flow cytometer and haematological parameters with Sysmex Haematology Autoanalyzer.

ETHICAL APPROVAL

Ethical approval was collected from Sokoto State Ministry of Health

DATA ANALYSIS

All the data obtained from this work were analyzed using SPSS version 20.0 for the mean, standard deviation and student T-test

RESULT

The mean $\pm$ standard deviation of body mass index in test and controls was found to be 16.90 ± 2.55 and 18.67 ± 2.76 respectively. The mean $\pm$ standard deviation of serum Total Protein (mg/dl) in test and controls was found to be 7.43 ± 1.27 and, 7.18 ± 1.40 respectively.

The mean $\pm$ standard deviation of serum albumin (mg/dl) in test and controls was found to be 2.60 ± 0.63 and 3.68 ± 0.63 respectively. The mean $\pm$ standard deviation of serum total cholesterol (mg/dl) in test and controls was found to be 151.88 ± 43.91 and 163.40 ± 48.21 respectively. The mean $\pm$ standard deviation of hemoglobin level (g/dl) in test and controls was found to be 12.41 ± 2.92 and 13.16 ± 1.94 respectively. The mean $\pm$ standard deviation of total lymphocyte count (%) in test and controls was found to be 48.13 ± 12.72 and 44.26 ± 10.62 respectively. The mean values of packed cell volume in test and control group were 39.48 ± 5.91 and 37.19 ± 8.71 respectively. The mean value for haemoglobin, total leucocyte count, neutrophil, monocyte, lymphocyte, basophil, eosinophil and CD4 cells of controls and tests are 13.16 ± 1.94 and 12.41 ± 2.91 ; 8475.00 ± 3103.01 and 4034.67 ± 2154.39 ; 51.84 ± 9.93 and 44.17 ± 9.97 ; 0.00 ± 0.00 and 0.00 ± 0.00 ; 44.26 ± 10.21 and 48.01 ± 11.97 ; 0.00 ± 0.00 and 0.01 ± 0.12 ; 3.72 ± 3.55 and 8.02 ± 6.96 and 540.00 ± 833.24 and 212.95 ± 452.90 respectively Table 4.2.

Statistical significant decrease ($p=0.013$) of PCV observed in almajiris compares to non almajiris controls. Significant decrease ($p=0.01$) was observed for Hb in almajiris from that of non-almajiris control. Statistical decrease ($p<0.001$) was observed for total leucocyte count in almajiris compares to non-almajiris controls. Non-statistically significant ($p=0.803$) observed for neutrophil in almajiris compares to non-almajiris control, but there is statistically significance ($p<0.001$) observed of monocyte from non-almajiris compared to almajiris and non-statistically significant ($p=0.145$) observed for lymphocyte in almajiris compares to non-almajiris controls. Non-statistically significant ($p=0.099$) was observed for basophils in almajiris compared to that of non-almajiris control. Significant increase ($p<0.001$) was observed for eosinophils in almajiris compares to non-almajiris control. Significant decrease ($p<0.05$) was observed for CD4 cells in almajiris compares to non-almajiris controls (Table 4.2).

Table 4.1: Some nutritional parameters of less privileged children (Almajiri) in Sokoto

Parameters	Test n=200	Control n=100	P-Values
BMI (kg/m ²)	16.90 ± 2.55	18.67 ± 2.76	0.00**
TP (g/dl)	7.43 ± 1.27	7.18 ± 1.40	0.25*
ALB (g/dl)	2.60 ± 0.63	3.68 ± 0.63	0.00**
CHOL (mg/dl)	151.88 ± 43.91	163.40 ± 48.21	0.12*

Table 4.2 Some haematological and immunological parameters of less privileged children (Almajiri) in Sokoto.

Parameters	Test	Controls	P-Values
PCV	37.19 ± 8.71	39.48 ± 5.91	0.13*
Hb	12.41 ± 2.92	13.16 ± 1.94	0.01**
TLC	4034.67 ± 2154.39	8475.00 ± 3103.01	<0.001**
NEUT	44.17 ± 9.97	51.84 ± 9.93	0.80*
MONO	0.00 ± 0.00	0.00 ± 0.00	<0.001**
LYMP	48.01 ± 11.97	44.26 ± 10.21	0.14*
BASO	0.01 ± 0.12	0.00 ± 0.00	0.10*
EOSI	8.02 ± 6.96	3.72 ± 3.55	<0.001**
CD4	212.95 ± 452.90	540.00 ± 833.24	0.01**

Values are mean ($\bar{x}$) ± standard deviation (SD), PCV= Packed cell volume, Hb = Haemoglobin, TLC = Total Leucocyte count, NEUT = Neutrophil, MONO = Monocyte, LYMP = Lymphocyte, BASO = Basophil, EOSI = Eosinophil, CD4 = CD4 Cell, * = Non statistical significance, ** = Statistical significance

DISCUSSION

The health of children and youth is of fundamental importance. Malnutrition is a persisting public health issue affecting many people in most of the developing countries. It also contributes to Nigeria's current health problems (morbidity and mortality) in several ways. Under nutrition remains a devastating problem in many developing countries affecting millions of people causing more than one- half of child death [11]. Malnutrition causes a great deal of physical and emotional suffering and it is a violation of a child's human rights. Malnutrition substantially raises the risk of infant and child deaths, and increases vulnerability to a variety of diseases in later life. Children who are undernourished and under weighed are likely to be less clever than well fed children. Health of children is of great importance as rapid growth occurs during this period [12]. Good nutrition is a basic requirement for good health and a living organism is a product of nutrition [13].

From this study, the values obtained for body mass index (BMI), albumin and hemoglobin in less privileged children (Almajiris) were statistically reduced ($P < 0.05$) than those of the control subjects. This may be due to inadequate dietary intake, as these children come from low socio-economic backgrounds. Their parents, mainly fishermen, farmers, and traders, live in poor conditions with unhygienic living standards, unsafe drinking water, and unsanitary environments. This is because the less privileged children rely on people for their meals and they do not have well balanced diet. This finding is in agreement with the finding of [14] and [15]. However, the values of total protein, cholesterol and absolute lymphocyte in less privileged children were not statistically different ($P > 0.05$) from that of control individuals. This is in line with the finding carried out by Linhares *et al* [15].

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The values obtained for PCV, Hb, TLC, Neutrophils and CD4 cells in less privileged children (almajiris) were statistically reduced ($p < 0.05$) than those of the control (non-almajiris) subjects. This may be due to inadequate dietary intake, as these children come from low socio-economic backgrounds. Their parents, mainly fishermen, farmers and traders, live in poor conditions with unhygienic living standards, unsafe drinking water, and unsanitary environments. This is because the less privileged children rely on people for their meals and they do not have well balanced diet. However, the values of lymphocyte, basophils and eosinophils in less privileged children

(almajiris) were statistically increased ($p > 0.05$) than those of the control (non-almajiris) subjects. This is most often due to inadequate intake of dietary protein leading to wasting and stunting, obesity or chronic infection. There is no any published work of similarities and differences available.

CONCLUSION:

From this study, there is malnutrition among the less privileged children (Almajiris) living in Sokoto, Nigeria. Most of the children are underweight, stunted and thinned; this indicates that the consumption of foods was inadequate and essential nutrients were found to be deficient in the diets of the less privileged children.

Conflict of interest:

The authors declared no conflict of interest.

Acknowledgement:

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