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Nutritional Status Assessment for displaced children in Dibagah shelter

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ABSTRACT

In developing nations, especially those with unstable security, malnutrition is one of the most pressing public health issues. This research study aimed to identify malnutrition biomarkers (Hemoglobin) and the nutritional status of children under 5 years old. Who was displaced and survived in the dibagah shelter northern part of Iraq. The nutritional status was used for sixty of children, (33) male and (27) female. 12 to 59 months is the age of the children. An interviewer-administered structured questionnaire was used to collect data. Anthropometric measurements were calculated for weight-for-age, height-for-age, and Head-circumference. Therefore, the nutritional status of children compared to the standard growth of children was published by World Health Organization (WHO) in 2006. For the hematological test, Hemoglobin level (Hb) was measured. The findings indicated a high prevalence of nutritional status. Our study indicated that the nutritional status of children was slightly poor, the growth rate of males from 12-24 months was 11.56 g/day but for females were 7.45 g/day. Mostly the results for all groups were plotted under the 50 percentiles. To the results of the

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hematological test of children, hemoglobin level was not significant differences ($p>0.05$) among the sexes and ages of the periods.

1. Introduction

The best indication of a child's well-being and, consequently, the well-being of the community is their nutritional status. The primary determinants affecting nutrition in underdeveloped nations and countries include feeding practices that are frequently insufficient and at odds with the World Health Organization (WHO) recommendations, which are the key causes influencing the child's development both mentally and physically. Dietary deficiencies in young children can also have an impact on adult health (Mukuku *et al*., 2019).

Socioeconomic and sociocultural issues pertaining to diet and nutrition have an impact on young children's nutrition that is below five. Inadequate nutrition throughout the first five years of life causes irreparable disruptions in the development of the body, mind, and brain. The measure of success in fulfilling nutrition is nutritional status (Octasila and Dariyani, 2021).

According to Ghosh (2020), malnutrition, which can manifest as either undernutrition or overnutrition, is the imbalance between the nutrients the body requires and the nutrients it gains. Chuc *et al.,* (2019) also state that Malnutrition, which is highly common in children under the age of 5, poses a serious public health issue in poor nations. Ferhatoglu *et al.* (2021) also found out that Worldwide, one-third of kids under the age of five are undernourished. Fifty two million children underweight and 155 million stunted children under the age of five were reported by the United Nations Children's Fund in 2018. Moreover, protein energy malnutrition or a lack of certain micronutrients is the two main causes of undernutrition (Ghosh, 2020).

Löser (2010) refers to something else as the primary contributing factor that is the patient's illness (disease-related malnutrition), which can prevent the body from properly absorbing and metabolizing food through a several of mechanisms, including infection-dependent changes in metabolism, appetite loss, disorders of absorption or digestion, disease-specific catabolism, etc. A person's inability to buy or prepare food

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is one of the many significant causes, along with poor dental health, poorly-fitting dentures, social isolation, gastrointestinal symptoms, addictions, poverty/lack of money, mental illness (such as depression, dementia), swallowing disorders, changes in taste perception, complex medications and poverty.

Fatimah *et al*. (2021) highlight that one of the aspects that can impact a toddler's nutritional condition is the mother's awareness of the appropriate diet for toddlers. Toddler food choices attitudes and behaviors are influenced by mothers' knowledge of nutrition. Additionally, socioeconomic factors like income, type of employment, and education level can have an impact on how mother's parent and their knowledge of nutrition, which in turn has an impact on how well-nourished children under the age of five are. Poverty is the primary cause of dietary issues in many regions of the world, particularly developing nations.

Since healthy nutritional intake is essential for growth and development, malnutrition in children must be identified, addressed, and treated early in life (Mushta *et al*., 2021). Measurements of a child's anthropometry (height, weight), as well as tests for biochemical and clinical indicators, are frequently used to detect undernutrition (Akombi *et al*., 2017). A thorough dietary history, physical examination, anthropometric measures using the right reference standards, including the WHO and CDC standard growth charts, and basic laboratory indices, if possible, are all components of an adequate nutritional assessment. Even though no single lab test can provide an in-depth analysis of the nutritional status, laboratory results complement one another in this process. Malnutrition brought on by illness is frequently accompanied by an inflammatory state that encourages a catabolic effect on muscle protein and free fat body mass.

The present study aimed to studying, examining and evaluating the nutritional status of displaced children who were living in camp between the ages of 12-59 months: The most often used indices to determine nutritional status are anthropometric measurements and characteristics (Malnutrition and degree of Malnutrition). Additionally, the relationship between children's nutritional status and biochemical evaluations (hematological tests) will be examined, as well.

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2. Materials and Methods

2.1 Study location and cases

The location is Dibagah shelter located in the Dibagah sub-district in northern Iraq. In this study, sixty displaced children (males and females) were randomly chosen who aged between 12 to 59 months. The study data was collected by interviewing the mother or family of the child. Different basic pieces of information were gathered like: the name of the children, age, and gender. Due to the war the people left their places just to survive and stay safe. Then, those people stayed at Dibagah camp in poor shelters, lived under Kurdistan's protection and authority, and with the help of the UNICEF fund took the responsibility of providing humanitarian and developmental aid to children there. Each family has more than six children, with no sufficient food available. According to the research study from (the winter to summer) seasons, the families' children got different diseases in toddler's classes, especially coughing, fevers and inflammations. Lack of education and serving those children adequately leads the spread of the diseases among the children of that community.

2.2 Growth rate

The growth rate for (both sexes) during the research study for Three months calculated according to Hoffmann and Poorter (2002) as the following:

$$\text{Growth rate g/day} = \frac{\text{final weight(g)} - \text{initial weight(g)}}{\text{period(day)}}$$

2.3 Anthropometric Measurements

To assess different body positions of children (Weight, height and Head circumference), every forty-five days by using the standard techniques of WHO and CDC chart growth calculator. The weight of children is measured with wearing minimal clothes and shoes less by electronic weighing scale designed in Germany, model: 874 1021658. The scale was calibrated at the time of each measurement. To measure the recumbent length, children under 2 years who were not able to stand measured by sliding board UNICEF manufacturer, by the way of measuring height for the older children who can stand were using stand measuring board UNICEF (range 132 cm) to the nearest 0.1 cm. For Head circumference measuring, the non-elastic

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and stretchable tape was used, above 1 to 2 fingers the child eyebrows, to the nearest 0.1cm (1mm), and then recorded (Aguiar *et al*., 2022).

Figure (1): Case height measurement

2.4 Blood Sampling and hematological analysis

For hematological evaluation, blood samples were collected in the early morning from the selected cases. Two (ml) of blood sample transferred to Ethylene Diamine Tetra Acetate (EDTA) tube (figure 3 for measuring CBC tests (Hb) and gently mixed to avoid of blood clotting, an anticoagulant matter covered in it. After collecting, the blood samples were stored at 2-degree Celsius for transferring samples in the ice box to the Medline-Medical laboratory with the aim of analyzing blood samples on Medonic M-series M32S BD AR (figure 2) for hematological tests, with the Boule Cleaning Kit, Witch manufactured in Sweden (Chowdhury and Ghosh, 2013).

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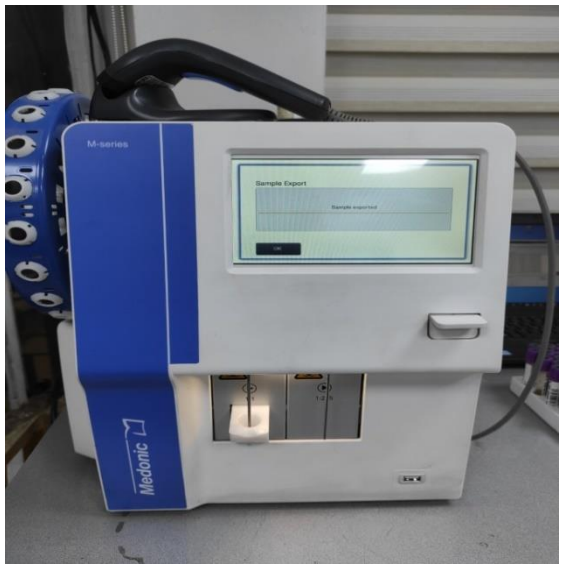

Figure (2): Medonic M-series instrument for hematological tests

Figure (3): Ethylene Diamine Tetra Acetate (EDTA) tubes for storing blood sample

2.5 Data analysis

Data entry was done using a statistical package for social science (IBM SPSS Version 22).To analyze of the data, Paired- Sample T Test was used to compare of means for the initial and final data's with the different age groups and genders.

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3. Results and Discussions

3.1. Growth rate

Is an indicator of growth and determine to development of children. The term growth is used in a purely physical sense. It generally refers to an increase in size, weight and height.

Table (1) and Figure (4) shows the growth rate (g/day) of children, in which composed of 60 cases with the different age groups, that classified to male and female respectively.

All the age groups of male, the results of growth rate were show as a normal status. The growing of males had been normal in the age 12-24 months, clearly (11.56 g/day) increased during the study. Where the age became to two for three years 25-36 age group, lowered to the (9.56 g/day) which is normal to this age according to the normal range (Lee and Nieman,2003).Therefore to the continues of the same sex, the growth became to (9.22) for age months group 37-48. Finally, the age group became older, the growth rate of 49-58 months, was decreased to (7.33 g/day) it is normal state and the best result for growth rate of children. Overall, the growth rate of children was inverse relationship with age groups respectively. Therefore the data for growth rate decreased with increasing of the children age, because during the early age of children were get the high amount of feeding with a high macronutrient sources, have a lower physical activity, and lesser to get a diseases due to have a good immune system and the foods more controlled by the family across to the older age groups.

On the other hand, the growth rate of female group from (7.45) was become to (13 g/day), so it means this was not normal to growth .Then, lowered the growth rate to (9.11) of female age group 37-48 months. Lastly, the growth rate sharply decreased to (1.11g/day), it was lowered with the bad result growth rate of females it was maybe due to get a high level of inflammation and low food gain .Along with the lack of food consumption, infectious diseases leads to a decrease in children's appetite. Therefore, children often reject to eat, causing in a lack of nutrients being taken in and causing in underweight (Purba *et al*., 2020). To conclude, the results of growth rate of female age groups were changeable, not stable.

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Table (1): Results of Growth rate of displaced children during the period (1 February-2 May)

Cases	Age (Month)	Gender	Initial average weight kg	Final average weight kg	Growth rate g/day
19	12-24	10 M	10.55	11.59	11.56
		9 F	10.10	10.77	7.45
18	25-36	12 M	13.69	14.55	9.56
		6 F	12.47	13.64	13.00
15	37-48	6 M	13.80	14.63	9.22
		9 F	14.47	15.29	9.11
8	49-58	5 M	15.88	16.54	7.33
		3 F	14.83	14.93	1.11

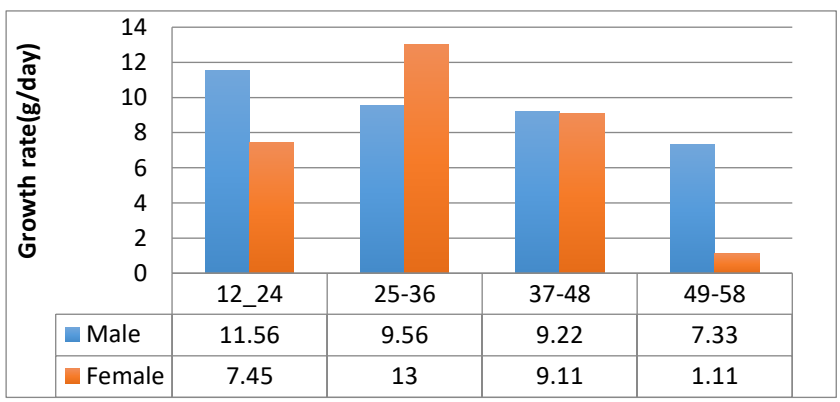

Figure (4): Histogram of growth rate for displaced children

3.2 Weight for age measurements

Figures (5. a and b) indicated the percentiles of weight for age charts for male and female. For males result from figure (5.a). The line for initial weight, for the all age groups were plotted under 50th percentile, but another line showed for final weight plotted on the line 50th percentiles, then lowered at the older age groups respectively. The causes of those children with a low nutritional status, with that of status the government of Kurdistan with the help UNHCR had given the food to them,

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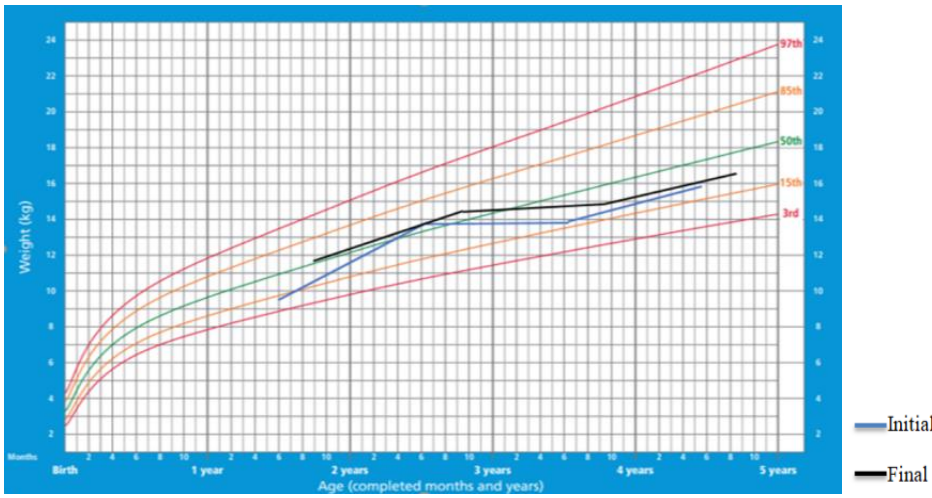
but it was not enough to them, because the number of children in the family is a heavy burden on their families especially on the reducing of food.

Lafta *et al*. (2017) was agreed with our finding, which results of a chronic unfavorable condition. Provided there is no severe food shortage, the prevalence of underweight in poor countries.



Cases age (Months)	12-24	25-36	37-48	49-58
Initial average wt. kg.	10.55	13.69	13.80	15.88
Final average wt. kg.	11.59	14.55	14.63	16.54

Figure (5): a. Results of weight for (male) age percentile

On the other hand, for females result from figure (5.b), shows the weight for age measurement, the line for initial weight, for the all age groups were plotted under 50th percentile, but another line showed for final weight plotted on the line 50th percentiles for the younger age group 12-24 months, then the final line for weight of female older age groups lowered to the near of 5th percentile respectively.

Weight loss it will due to the weather changes to become warm from the environment at their places, it was affected to the children to become easy sick (Fatimah *et al*., 2021).

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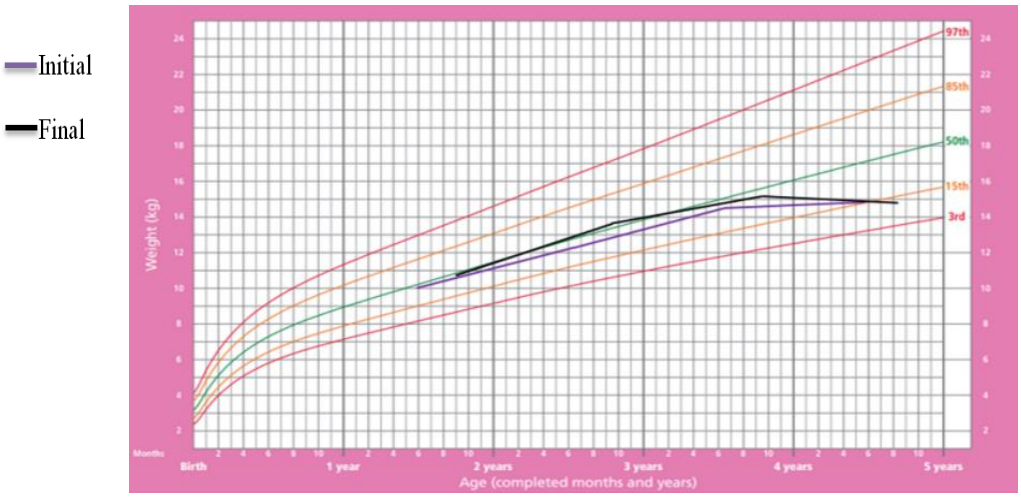

Cases age (Months)	12-24	25-36	37-48	49-58
Initial average wt. kg.	10.10	12.47	14.47	14.83
Final average wt. kg.	10.77	13.64	15.29	14.93

Figure (5): b. Results of weight for (female) age percentile

3.3 Height for age measurements

Figures (6.a and b) indicated the percentiles of height for age groups for different gender. For the male result from figure (6.a), shows the height for age measurement, for initial and final average height were plotted on the 15th percentiles, the two of height growth line lowered to the under 3rd percentiles, then increased to the under of 50th percentile, it means changeable .The older age group increased height with increasing age, therefore it is better to the lines stayed above the 50th percentile to be a normal statue. The results were in low status nutrition for height for age group, it will be due to meat consumption is prohibited in the camp, resulting in a diet lacking in protein, and repeated infections, as well as inadequate nutrient intake by children under 5 years, were found to have a negative influence on their nutritional status (Chang et al., 1994).

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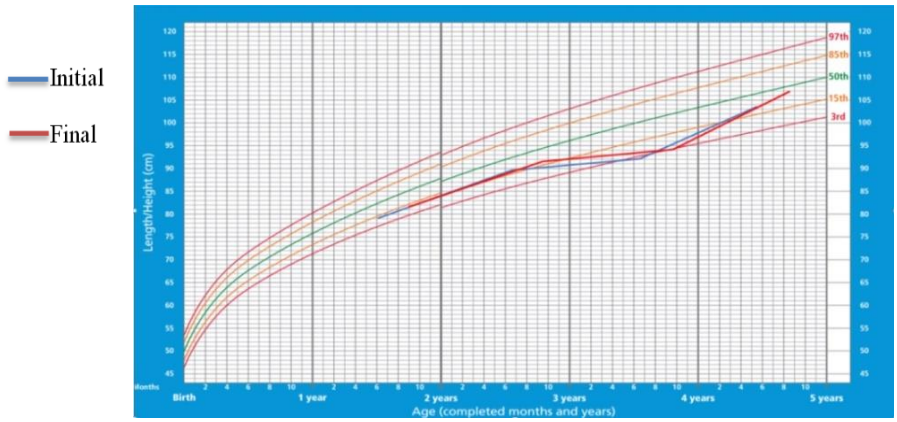

Cases age (Months)	12-24	25-36	37-48	49-58
Initial average height cm.	79.2	89.54	92.25	103.8
Final average height cm.	81.65	91.64	94.63	107

Figure (6): a.Results of height for (male) age percentile

On the other hand, in the figure (6.b) shows the height for age measurement for initial and final average height growth of different age groups. Two of lines were stayed between 5^{th} and 15^{th} percentiles, and then the line would going to the 15^{th} percentiles, and finally lowered to near of 5^{th} percentiles respectively. It is not normal for height growth of female average groups in the study period respectively. This may be of low height status as frequently associated with poor overall economic conditions agree with (Chakraborty, 2011).

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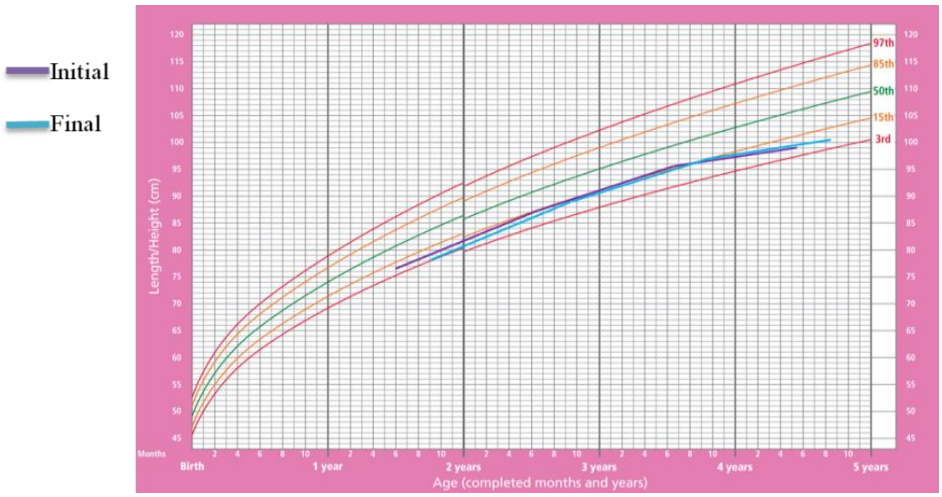

Cases age (Months)	12-24	25-36	37-48	49-58
Initial average height cm.	76.4	87.5	95.39	99
Final average height cm.	78.17	89.13	97.06	100.7

Figure (6): b. Results of height for (female) age percentile

3.4 Head circumference measurements

Head circumference (especially in young children) can be an accurate, quick, and affordable indicator of normal brain size and growth in a clinical context with understanding of the age-dependent head circumference-to-brain volume relationship (Bartholomeusz *et al*., 2002). Figures (7.a and b) show the head circumference measurement for males and females. The changeable indicator plots point on a chart for males of two both initial and final lines for different average age groups. The head circumference results generally were increased with increasing for age, but head circumference under 50th percentile for both initial and final measurement. Children in this camp have many exposures to infectious diseases; this can make isolating the impact of any one factor, such as head growth, very difficult (Connery *et al*., 2022).

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Initial

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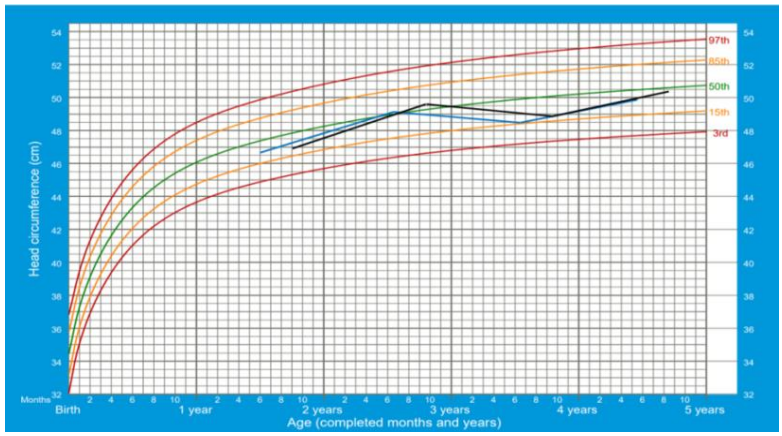

Cases age (Months)	12-24	25-36	37-48	49-58
Initial average head cm.	46.62	49.13	48.5	49.9
Final average head cm.	46.95	49.56	48.93	50.4

Figure (7): a. Results of head circumference for (male) age percentile

Finally, in figure (7.b) shows the head circumference for age measurement, for the initial of head circumference of all female cases were plotted under the 50th percentiles,but for the final one the plot of head circumference growth line shows above 50th percentiles,then the line were sharply lowered to the near of 3rd percentiles for the older age groups of female respectively. With accordance to World Health Organization (2009) it will be due to many factors that related to abnormal growth of head circumference of females (diarrhea, infected diseases, and protein energy-malnutrition) also single parent of those cases, may affected to not get an enough food gathering, all factors related to head circumference of children to be abnormal.

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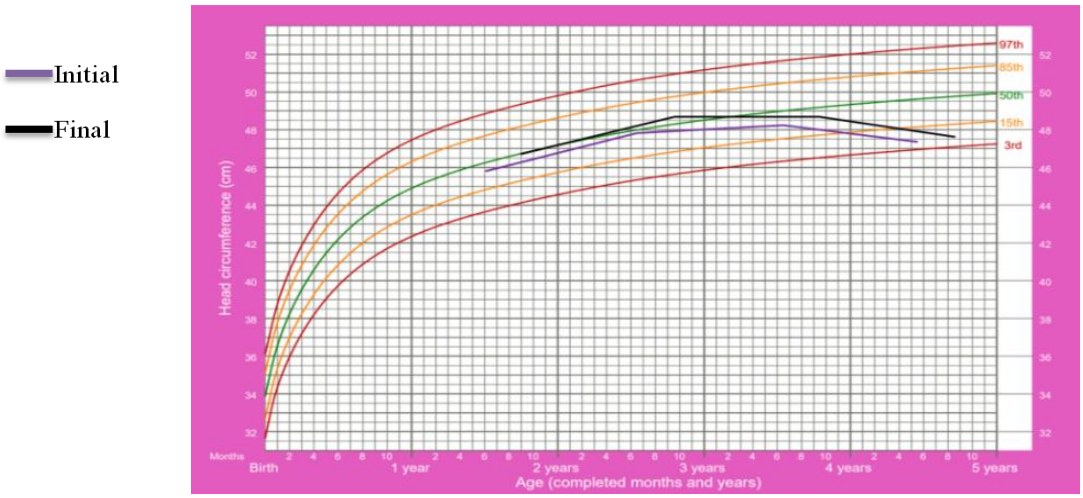

Cases age (Months)	12-24	25-36	37-48	49-58
Initial average head cm.	45.94	47.92	48.24	47.33
Final average head cm.	46.72	48.7	48.36	47.67

Figure (7): b. Results of head circumference for (female) age percentile

3.5 Biochemical tests

Table (2) reveals the results of biochemical parameters among males and females were taken at two different times (initial and final month). The highest mean of hemoglobin was (12.82 g/dL) in female groups and (12.66 g/dL) in male groups, while the lowest mean of hemoglobin was (11.87 g/dL) in both gender and (11.16 g/dL) in females group during the study. The level of hemoglobin is varies depending on the age groups, gender and type of nutrient was eating. There were not significant differences ($p>0.05$) among sexes and ages of the periods for Hemoglobin levels. Therefore, only the female age group of 12-24 mean value was significant to the p-value.

All children's hemoglobin level for both sexes and all the age groups were located at the normal range as the references (Higgins *et al*., 2020; Staffa *et al*., 2020).

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As an illustration of how socio-economic status influences nutritional status, a study that looked at how factors affecting children's HB and anemia were affected by socio-economic status in specific monthly income (Chowdhury and Ghosh, 2013).
Hemoglobin level was not conducted more to the malnutrition in displaced children (Thorne *et al*., 2013), but according to the Hussien and Ali (2018) suggested that low Hemoglobin level leads to lowering nutritional status of displaced families.

Table (2): Results for Hemoglobin (g/dL) level for different age groups for displaced children in both sexes

Cases	Age (Month)	Gender	Hemoglobin g/dl mean (± SD)		P-value	Standard Value g/dL
			Initial	Final		
19	12-24	10 M	11.90 ± 0.5	12.04 ± 0.3	0.75	11.0-13.5
		9 F	12.73 ± 0.4	11.16 ± 0.3	0.02	
18	25-36	12 M	12.28 ± 0.3	12.12 ± 0.3	0.57	11.0-13.7
		6 F	12.53 ± 0.4	12.27 ± 0.5	0.44	
15	37-48	6 M	11.87 ± 0.4	12.25 ± 0.4	0.60	
		9 F	12.82 ± 0.4	11.87 ± 0.4	0.08	
8	49-58	5 M	12.48 ± 0.9	12.66 ± 0.3	0.81	
		3 F	12.17 ± 1	12.00 ± 0.7	0.93	

Conclusion

The finding from this research study that nutritional status of growth rate and other assess measurements of displaced children is not well growing to the compare of standard growth of normal children also under-5 children have a low level of Hemoglobin. Furthermore, Mother education was found to be the strongest factor associated with undernourished among these children ,this leads to the children become a problem with health status, then impacted to nutritional status of children.

The children could not get a normal growth rate. In addition, nutrient consumption of displaced children was also found to be low compared to recommended daily allowance. The low socioeconomic status is associated with nutritional status and hence Hemoglobin not enough.

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هەڵسەنگاندنی باری خواردنیی منداڵانی ئاوارەی پەناگەی دیبەگە

لە نەتەوە تازە پێگەیشتووەکان ، بە تایبەت ئەو ناوچانەی باری ئاساییشیان ناجێگیرە ، بەدخۆراکی یەکێکە لە کێشە هەرە ئاڵۆزەکان بۆ سەر تەندروستی گشتی ، ئامانجی ئەم توێژینەوە زانستی یە ئەوەیە بۆ دیاریکردنی ئەو نیشانانەی کە پەیوەندی هەیە بە بەدخۆراکییەوە لەگەڵ هەڵسەنگاندنی باری خواردنیی منداڵانی خوار تەمەن ٥ ساڵان ، کە ئاوارە بوون و ماونەتەوە لە پەناگەی دیبەگە لە ناوچەی باکوری عێراق ، دیاریکردنی باری خواردنیی ئەنجامدرا بۆ(٦٠) منداڵ (٣٣) کوڕ و (٢٧) کچ ، کە تەمەنیان لە (١٢) بۆ (٥٩) مانگە ، پرسیارەکان بنیادنرا لە ڕێگەی چاوپێکەوتنی کەسی لەگەڵ بەخێوکەر بۆ کۆکردنەوەی داتا. پێوانە کردنی جەستەیی ئەنجام درا وەک کێش بەپێی تەمەن ، باڵا بە پێی تەمەن , پێوانی چێوەی سەر بۆ منداڵەکان کراوە بە بەراورد کردنی کێڕڤی گەشەیی پێوانەیی منداڵان کە لە لایەن ڕێکخراوی تەندروستی جیهانی (WHO) لە ساڵی ٢٠٠٦ باڵاوکراوەتەوە.پشکنینی خوێنیان ڕێژەی هیمۆگلۆبین (Hb) ئەنجامدرا. دەرەنجامەکان نیشانیدا کە پەیوەندی هەیە بە باری خواردنیی. دەرئەنجامەکان دەریخست کە باری خواردنیی بۆ ئەو منداڵانە لاوازێکی ڕێژەییە. ئاستی ڕێژەی

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گەشەیی کوڕەکان کە تەمەنیان لە (١٢-24)مانگە (11.56) گرام/ڕۆژ بوو. بەڵام لە کچەکان (7.45) گرام/ڕۆژ بوو. دەرئەنجامەکانی پێوانەی جەستەیی کەوتبووە خوار ڕێژەی (50%) لە کێڕڤی گەشەیی پێوانەیی (WHO) دا. ئەنجامی پشکنینی خوێنی منداڵەکان ڕێژەی هیمۆگلۆبین جیاوازییەکی دیاری نەبوو بە (p>0.05) لە نێوان تەمەن و جیاوازی ڕەگەزییان لە ماوەی توێژینەوەکەدا.

تقييم الحالة التغذوية للاطفال النازحين في مخيم دیبگة

الملخص

عند الشعوب النامية وخاصة تلك التي يعانون من انعدام الضمانه الامنية ,تعتبر المعاناة من سوء التغذية واحدة من اهم ازمات الصحة العامة .البحث يهدف الى دراسة وتشخيص علامات سوء التغذية والحالة التغذوية للاطفال تحت السن الخامسة والنازحين الى مخيم ديبگة في شمال العراق .لمعرفة الحالة التغذوية ل 60 طفلا منها 33 ذكر و27 انثى باعمار 12-59 شهرا.تم جمع المعلومات عن طريقة الاستبيان والمقابله و بالتعاون مع ولي الامر. وقدرت القياسات الجسمانية من حيث علاقة الوزن بالعمر والطول بالعمر وقياس محيط الرأس وبالمقارنه مع المنحنيات القياسية المنظمة الصحة العالمية (WHO) 2006. وتم تقدير نسبة هيموگلوبين الدم Hb.النتائج تشير الى الفقر النسبي للحالة التغذوية السائدة للاطفال ,وكان المعدل النمو للاطفال الذكور من الفئة العمرية 12-24 شهرا 11.56 غم/يوم ,ولكن في الاناث معدل النمو كان اقل ولنفس الفئة العمرية حيث النتيجة كانت 7.45غم/يوم. معظم النتائج للقياسات الجسمانية كانت اقل من النسبة المئوية 50% للمنحنيات النمو القياسية ,اما نتائج نسبة الهيموگلوبين الدم لجميع الاطفال فكانت الفروقات غيرمعنوية عند مستوى (p>0.05) وللفئات العمرية ولكلا الجنسين.