

Anemia among preschool children

Assistant instructor. Khamees Bandar Al-Sa'idi

Prof. Dr. Eqbal Ghanim Ma'ala

الخلاصة:

الهدف: تهدف الدراسة إلى الكشف عن فقر الدم بين الأطفال قبل المدرسة ومعرفة العلاقة بين بعض المتغيرات مثل (جنس الطفل، عدد الأطفال في الأسرة، ترتيب الطفل في العائلة، المستوى التعليمي للوالدين، وظيفة الأم، نوع الأسرة، وزن وطول الطفل، انتظام تناول الاكل، الإصابة بالديدان، الوحم (القطا)، وظيفة الأب ودخل العائلة الشهري) مع فقر الدم.

المنهجية: دراسة مقطعية متقاطعة وصفية أجريت في مراكز الرعاية الصحية الأولية في مدينة الصدر للفترة من الأول من حزيران ٢٠١١ ولغاية الأول من تشرين الأول ٢٠١١. تم اختيار عينة غرضية غير الاحتمالية ل(١٤٠) طفل والذين يراجعون المراكز الصحية الأولية في مدينة الصدر. جمعت المعلومات من خلال استخدام استبانته مصممة ومكونة من جزئين، الجزء الأول يتضمن المعلومات الديموغرافية للطفل صممت تملأ بطريقة المقابلة والجزء الثاني يتكون من مستوى الهيموغلوبين في الدم. تم تحديد الثبات للاستبانة من خلال الدراسة الاستطلاعية وحددت مصداقيتها من الخبراء. تم تحليل البيانات من خلال استخدام الإحصاء الوصفي الذي تضمن التكرارات والنسب المئوية وكذلك استخدام الإحصاء الاستنبائي الذي شمل معامل ارتباط بيرسون ومربع كاي.

النتائج: أشارت نتائج الدراسة أن (٦٦ ٪) من الأطفال يعانون من فقر الدم و(٦٤ ٪) من الأطفال لديهم نسبة فقر دم من خفيفة الى متوسطة. علاوة على ذلك، ليس هناك علاقة معنوية بين فقر الدم في الأطفال قبل سن المدرسة مع (جنس الطفل، عدد الأطفال في الأسرة، ترتيب الطفل في العائلة، المستوى التعليمي للوالدين، وظيفة الأم، نوع الأسرة، وزن وطول الطفل، انتظام تناول الاكل، ولكن تم العثور على علاقة ذات دلالة بين الاطفال المصابين بفقر الدم ووظيفة الأب ودخل الأسرة الشهري والإصابة بالديدان

التوصيات: تطبيق برنامج تحري عن فقر الدم وخاصة من هم بعمر قبل المدرسة وزيادة توعية المجتمع عن مخاطر فقر الدم عند الاطفال

Summary

Objective: study aims to detect anemia among preschool children and find out the relationship between some variables like (child gender, number of children in the family, ordinal position of the child in the family, parent's education level, mother's occupation, type

of the family, child's weight and height, regular diet in take, hookworm, pica, father's job and family monthly income) with anemia

Methodology: A descriptive cross sectional study was conducted at the primary health care centers in Al-Sadder city for the period of 1st July 2011 to the 1st November 2011.

Non probability (purposive) sample of (140) children who aged preschool and who attended to primary health care centers of Al-Sadder city. The data were collected through using special constructed questionnaire designed, which comprises two parts. Part one consists of child's demographic characteristics filled by using interview technique and part of two consist hemoglobin level.

The reliability of the questionnaire was determined through a pilot study and the validity through a panel of experts.

The data were analyzed through the application of descriptive statistic frequency, percentage, and the application of inferential statistical procedures, which include Pearson correlation coefficient and chi-square.

Results: The results of the study indicated that (66%) of children have anemia and (64%) of them have mild to moderate anemia.

Moreover, there is no significant association between anemia in preschool children and their (child's gender, number of children in family, ordinal position of children, parent's education level, mother's occupation, type of the family, child's weight and height, regular diet in take, and pica and drug intake. However, significant relationship is found between anemic child and their father's job, hookworm infection and family monthly income

Recommendations:

application of screening program for anemia, especially children at pre-school age and increase community awareness about the dangers of anemia in children

Keywords: Anemia, Preschool, Children.

Introduction and importance of the study:

Anemia is defined as a hemoglobin level of less than the 5th percentage for age. It's causes vary by age. Most children with anemia are asymptomatic, and the condition is detected on screening laboratory evaluation ⁽¹⁾.

Abnormal hemoglobin or hematocrit levels on routine screening appear clear. Infrequently, a child with anemia may appear pale, fatigue and have jaundice but may or may not be critically ill. Key historical points and findings on physical examination can reveal the underlying cause of the anemia ⁽²⁾.

High prevalence of anemia and its consequences for children's health, and especially for their growth and development, have made anemia an important public

health problem and given the difficulty task in implementing effective measures for controlling it. Many factors play part in the etiology of anemia such as socioeconomic, nutritional, biological, environmental and cultural characteristics, and the actions required encompass pertinent and relevant matters within the context of public health ⁽³⁾⁽⁴⁾. Thus, the investigation of determinants of anemia among children under the age of five years is backed by recommendations from the World Health Organization (WHO) ⁽⁴⁾.

Anemia is the world's second leading cause of disability and thus, it is one of the most serious global public health problems. It affects over half of pre-school children and pregnant women in developing countries and at least 30-40% in industrialized countries ^{(5) (6)}.

In children anemia leads to increased morbidity and mortality and has adverse health effects which includes impaired psychomotor development, poor cognitive performance and mental retardation ⁽⁷⁾.

According to the classification of anemia as a problem of public health significance, Iraq considered as complaining of sever public health problem table 1 ⁽⁸⁾.

Table 1: classification of anemia as a problem of public health significance ⁽⁸⁾.

Category of public health significance	Prevalence of anemia (%)
No public health problem	0-4.9
Mild public health problem	5.0-19.9
Moderate public health problem	20.0-39.9
Sever public health problem	≥ 40.0

Appropriate screening and subsequent diagnostic testing will allow the family and the physician to appropriately diagnose most cases of anemia in children. Hematology referral is always appropriate for complicated or less defined cases ⁽²⁾.

Methodology

A descriptive cross sectional study was conducted at the primary health care centers in Al-Sadder city for the period of the 1st July 2011 to the 1st November 2011.

Non probability (purposive) sample of (140) child were selected from primary health care centers of Al-Sadder city. The reliability of the questionnaire was determined through a pilot study and the validity through a panel of experts. The data

were analyzed through the application of descriptive statistic frequency, percentage, and the application of inferential statistical procedures, which includes chi-square.

After extensive review of available literature and related studies a questionnaire format constructed. The questionnaire format consists of two parts, which include:

Part one: Demographic Characteristics

This part includes demographic characteristics related to the children and their family such as child's gender, number of children in the family, ordinal position of the child in the family, parent's education level, mother's occupation, father's job, type of the family, child's weight and height, regular diet intake, hookworm infection , pica and family monthly income.

Part two: laboratory test

This part includes hemoglobin concentration for diagnosis of anemia. According of WHO cut-off point children age 6 months to 6 years who has hemoglobin value less than 11 g/dl is considered a diagnostic anemia ⁽⁹⁾Capillary blood was collected from the child's finger, blood samples were taken to determine hemoglobin concentrations, Hb estimation by using hemoglobinmeter. Hemoglobin measurement in the peripheral blood was obtained by finger prick and readings were made in a portable hemoglobinometer which was calibrated daily as per the manufacturer's specifications. Hemoglobin concentration was expressed in g/dL and those children with hemoglobin concentration below 11 g/dL¹⁸ were classified as anemic.

Data analyzed by descriptive statistics (frequency, percentage, and the application of inferential statistical procedures, which includes chi-square).

Results and discussion of the Study:

Table 2: Distribution of Children and Their Demographic Characteristics

Variables		F	%
Child's Gender	Male	65	46.4
	Female	75	53.6
	Total	140	100
Father education	Illiterate	24	17.1
	Read and write	28	20.0
	Primary school	44	31.4
	Intermediate	28	20.0
	secondary	8	5.7
	Institute	7	5.0
	College & more	1	0.7
	Total	140	100
Mother education	Illiterate	29	20.7
	Read and write	36	25.7

	Primary school	34	24.3
	Intermediate	23	16.4
	secondary	9	6.4
	Institute	3	2.1
	College & more	6	4.3
	Total	140	100
Mother job	Official	2	1.4
	House wife	137	97.9
	Free work	1	0.7
	Total	140	100
Father job	Official	56	40.0
	unemployed	3	2.1
	Free works	79	56.4
	Pensioner	2	1.4
	Total	140	100
Family income	adequate	7	5.0
	To some adequate	72	51.4
	not adequate	61	43.6
	Total	140	100
Number of children in the family	1-3	93	66.5
	4-6	36	25.7
	7 & more	11	7.8
	Total	140	100
Recent child's weight	Normal	103	73.6
	Under weight	37	26.4
	Total	140	100
Recent child's height	Normal	121	86.4
	Short stature	19	13.6
	Total	140	100
Regular diet intake	Yes	99	70.7
	No	41	29.3
	Total	140	100
Family type	Nuclear	39	27.9
	Extended	101	72.1
	Total	140	100
History with hookworm	Yes	71	50.7
	No	69	49.3
	Total	140	100

This table indicates that more than half of the sample (53.6%) are female, (31.4.0%) , (24.3) of their father and their mother respectively have primary school education ,(97.9) of child's mother are house wife while (56.4) of their father are free work job,(66.5) of their family have 1-3 child ,about (26.4) of children are under weight and (86.4) are normal height ,(70.7) of children take diet in regular time ,(72.1) of children live in extended family,(50.7) and (28.6) of children have experienced with hookworm and using drug respectively.

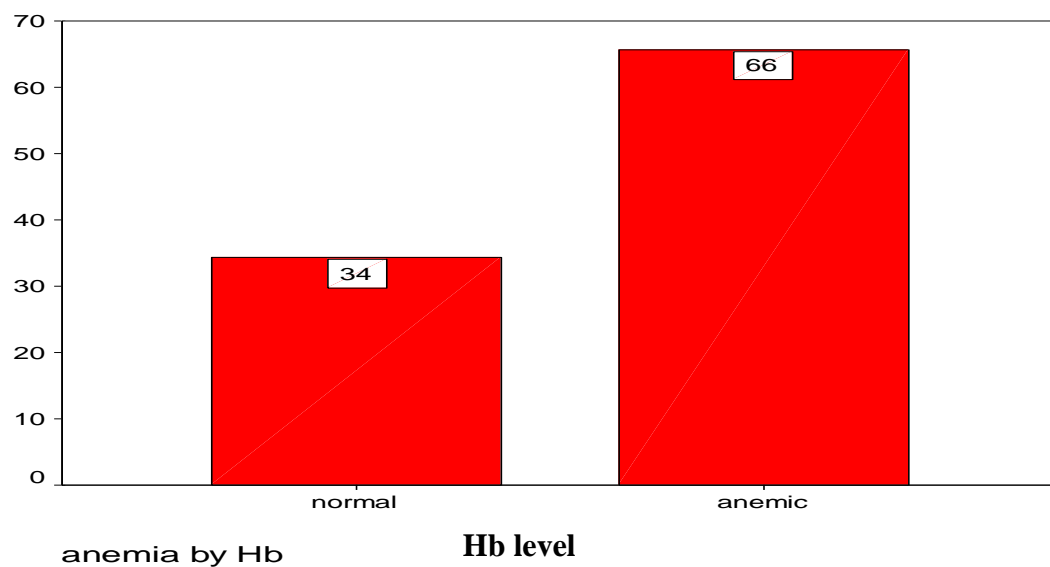


Figure I: distribution of children anemia by Hb, this figure indicates that (66.0%) of children are anemic.

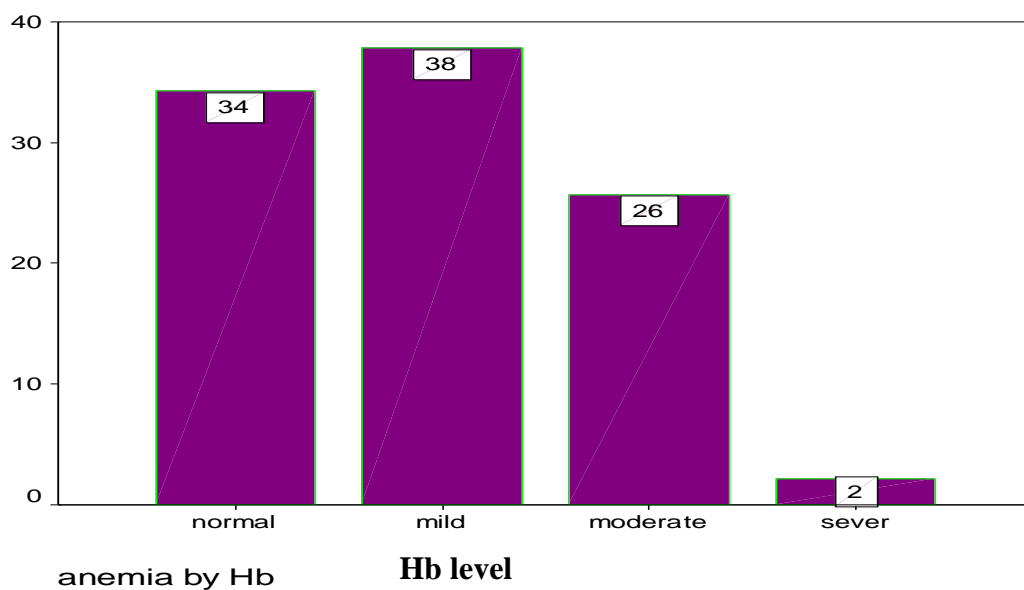


Figure II: distribution of anemia in children according to the severity of anemia, this figure indicates that (64.0%) of children has mild to moderate anemia.

Table 2: Association between anemia in children and their gender

Anemia by Hb level						
Gender		normal	mild	moderate	sever	Total
Male	F	19	28	17	1	65
	%	13.6	20.0	12.1	0.7	46.4
Female	F	29	25	19	2	75
	%	20.7	17.9	13.6	1.4	53.6
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs=1.9 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table shows there is no relationship between anemia and child's gender

Table 3: Association between anemia in children and number of children in the family

Anemia by Hb level						
Number of children		normal	mild	moderate	sever	Total
1-3	F	34	34	22	3	93
	%	24.3	24.3	15.7	2.1	66.4
4-6	F	10	15	11	0	36
	%	7.1	10.7	7.9	0	25.7
7 and more	F	4	4	3	0	11
	%	2.9	2.8	2.1	0	7.8
Total	F	48	53	36	3	1
	%	34.3	37.9	25.7	2.1	100
obs =4.7 df=9 χ^2 Crit=16.9 Significant level at $P \leq 0.05$						

This table shows there is no relationship between anemia and number of children in the family

Table 4: Association between anemia in children and their father education

Anemia by Hb level						
Father education		normal	mild	moderate	sever	Total
Illiterate	F	9	11	4	0	24
	%	6.4	7.9	2.9	0	17.1
Read and write	F	8	9	10	1	28
	%	5.7	6.4	7.1	0.7	20.0
Primary graduate	F	17	17	9	1	44
	%	12.1	12.1	6.4	0.7	31.4
Intermediate	F	10	10	8	0	28
	%	7.1	7.1	5.7	0	20.0
Secondary	F	2	5	1	0	8
	%	1.4	3.6	0.7	0	5.7
Institute	F	2	1	3	1	7
	%	1.4	0.7	2.1	0.7	5.0
College & over	F	0	0	1	0	1
	%	0	0	0.7	0	0.7
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =16.8 df=18 χ^2 Crit=21.3 Significant level at $P \leq 0.05$						

This table presented that there is no relationship between anemia in children and their father's education

Table 5: Association between anemia in children and their mother's education

Anemia by Hb level						
Mother education		normal	mild	moderate	sever	Total
Illiterate	F	11	8	9	1	29
	%	7.9	5.7	6.4	0.7	20.7
Read and write	F	10	13	12	1	36
	%	7.1	9.3	8.6	0.7	25.7
Primary graduate	F	12	11	10	1	34
	%	8.6	7.9	7.1	0.7	24.3
Intermediate	F	9	10	4	0	23
	%	6.4	7.1	2.9	0	16.4
Secondary	F	3	5	1	0	9
	%	2.1	3.6	0.7	0	6.4
Institute	F	3	0	0	0	3
	%	2.1	0	0	0	2.1
College & over	F	0	6	0	0	6
	%	0	4.3	0	0	4.3
Total		48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =22.1 df=18 χ^2 Crit=21.3 Significant level at $P \leq 0.05$						

This table presented that there is relationship between anemia in children and their mother's education

Table 6: Association between anemia in children and their father's job

Anemia by Hb level						
Father job		normal	mild	moderate	sever	Total
Official officer	F	25	17	13	1	56
	%	17.9	12.1	9.3	0.7	40.0
Unemployed	F	2	0	0	1	3
	%	1.4	0	0	0.7	2.1
Free works	F	20	36	23	0	79
	%	14.3	25.7	16.4	0	56.4
Pensioner	F	1	0	0	1	2
	%	0.7	0	0	0.7	1.4
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =47.1 df=9 χ^2 Crit= 16.9 Significant level at $P \leq 0.05$						

This table shows there is no relationship between anemia in children and their father's job

Table 7: Association between anemia in children and their mother's occupation

Anemia by Hb level						
mother job		normal	mild	moderate	sever	Total
Official officer	F	1	1	0	0	2
	%	0.7	0.7	0	0	1.4
House wife	F	46	52	36	3	137
	%	32.9	37.1	25.7	2.1	97.9
Free works	F	1	0	0	0	1
	%	0.7	0	0	0	0.7
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =2.7 df=6 χ^2 Crit=12.5 Significant level at $P \leq 0.05$						

This table presented there is no relationship between anemia in children and their mother's occupation.

Table 8: Association between anemia in children and type of family

Anemia by Hb level						
Type of family		normal	mild	moderate	sever	Total
Nuclear	F	15	11	12	1	39
	%	10.7	7.9	8.6	0.7	27.9
Extended	F	33	42	24	2	101
	%	23.6	30.0	17.1	1.4	72.1
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =2.8 df=6 χ^2 Crit=12.5 Significant level at $P \leq 0.05$						

This table presented there is no relationship between anemia and their type of the family.

Table 9: Association between anemia in children and family monthly income

Anemia by Hb level						
Monthly income		normal	mild	moderate	sever	Total
Adequate	F	4	0	2	1	7
	%	2.9	0	1.4	0.7	5.0
To some Adequate	F	28	25	17	2	72
	%	20.0	17.9	12.1	1.4	51.4
Do not Adequate	F	16	28	17	0	61
	%	11.4	20.0	12.1	0	43.6
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =13.1 df=6 χ^2 Crit=12.5 Significant level at $P \leq 0.05$						

This table shows significant association between anemia in children and their family monthly income

Table 10: Association between anemia in children and their Child's weight

Anemia by Hb level						
Child weight		normal	mild	moderate	sever	Total
Yes	F	10	14	12	1	37
	%	7.1	10.0	8.6	0.7	26.4
No	F	38	39	24	2	103
	%	27.1	27.9	17.1	1.4	73.6
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =1.7 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table presented there is no relationship between anemia and child's weight now

Table 11: Association between anemia in children and their Child's height

Anemia by Hb level						
Child height		normal	mild	moderate	sever	Total
Yes	F	4	6	8	1	19
	%	2.9	4.3	5.7	0.7	13.6
No	F	44	47	28	2	121
	%	31.4	33.6	20.0	1.4	86.4
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =4.6 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table presented there is no relationship between anemia and child's length/height now.

Table 12: Association between anemia in children and regular in diet intake

Anemia by Hb level						
Diet intake		normal	mild	moderate	sever	Total
Yes	F	36	39	23	1	99
	%	25.7	27.9	16.4	0.7	70.7
No	F	12	14	13	2	41
	%	8.6	10.0	9.3	1.4	29.3
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =3.4 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table presented there is no relationship between anemia and their regular diet intake.

Table 13: Association between anemia in children and hookworm

Anemia by Hb level						
Hookworm		normal	mild	moderate	sever	Total
Yes	F	21	26	23	1	71
	%	15.0	18.6	16.4	0.7	50.7
No	F	27	27	13	2	69
	%	19.3	19.3	9.3	1.4	49.3
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =9.8 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table indicated a significant relationship between anemia and child's history of hookworm infection

Table 14: Association between anemia in children and pica

Anemia by Hb level						
Pica		normal	mild	moderate	sever	Total
Yes	F	10	9	13	2	34
	%	7.1	6.4	9.3	1.4	24.3
No	F	38	44	23	1	106
	%	27.1	31.4	16.4	0.7	75.7
Total	F	48	53	36	3	140
	%	34.3	37.9	25.7	2.1	100
χ^2 obs =7.5 df=3 χ^2 Crit=7.8 Significant level at $P \leq 0.05$						

This table indicated no relationship between anemia and child's history with pica

Discussion

Anemia is a serious problem for the health of individuals. The highest prevalence of anemia exists in the developing world where its causes are multi-factorial. In the developing world, 42% of children less than five years of age are anemic. Anemia has been related to reduce work capacity, reduced ability to execute activities of daily living, and reduced cognitive function. With limited resources and the complex, often multi-factorial nature of anemia in the developing world, combating this problem is a global public health challenge ⁽¹⁰⁾.

Present study demonstrated that anemia is still a sever problem among preschool children in Al-Sadder city. Anemia was defined by WHO as Hb<11.0 g/ dl ⁽⁶⁾ ⁽⁹⁾. About (66%) of children were found to be anemic. according to WHO classification. This study indicated that anaemia should be considered as sever health problem.

The result of the study is high when compare with near countries such as a study done by Sayyari et al in Islamic Republic of Iran the prevalence of anaemia about

(10.8 %) ⁽¹¹⁾.

The prevalence of anaemia is very much higher in Uzbekistan than in the Iraq: 84% for children under 5 years old ⁽¹²⁾. Anaemia is present in 27% of 1–6-year-old children in the Philippines, 44% in 3–5-year-old children in India, and 24% in 2–5-year-old children in Romania ⁽¹³⁾.

Present study showed that one third of the sample study had moderate anemia, and this study indicated that only father job, reduction in family income and experienced with hookworm are significant relationship with anemia in preschool age and other socio-demographic characteristics are not significant such as (gender, parent's education level, mother's job, type of the family, pica and recent child's weight and height).

The present study revealed that (43.6 %) of families do not have enough monthly income which might be impact on their children's health and put them at high risk for anemia. Tulio et al reported that children from families which suffer from excessive lack of financial resources are at greater risk to develop anemia, reflecting their actual situation of food insecurity ⁽¹⁴⁾. This result agree with studies Maria et al and Julie et al found a positive relationship between family income and anemia ^{(15) (16)}. Other study done by Hioui et al that disagree with the results. They found there was no significant relationship between the prevalence of anemia and monthly family income ⁽¹⁷⁾.

Renfu et al pointed out a strong link between parental employment and hemoglobin levels. Parental employment especially that of the father appears to be correlated with anemia rates among children. While the causality of this relationship and the mechanisms behind it cannot be determined from this analysis, one possible explanation is that parental employment is acting as a proxy for socioeconomic status, which is known to be inversely associated with anemia and general nutritional status of children. ⁽¹⁸⁾.

The present study shows that (50.7) of children had experienced hookworm infection and this factor appeared a significant association with anemia in preschool children. This result agree with Jennifer et al reported that hookworm infection has long been recognized among the major causes of anemia in poor communities and associated with lower Hb levels in children ⁽¹⁾. Study done by Mazigo et al disagree with the results and reported that there is no correlations were observed between mean of hemoglobin and hookworm infection ⁽¹⁹⁾.

Conclusion and recommendations

Anemia is common health problem during childhood. This study indicated that anemia remains a major problem in preschool children. So it should be regarded as a pediatric priority. There is a very high prevalence of anemia in preschool children about two third of the sample considered as anemic children. One third of children had moderate anemia. Father's job, family monthly income and infection hookworm are the common factors may be responsible for the high rate of anemia noticed in this study age group. Based on the results of the study the researchers recommended application of screening program for anemia, especially children at pre-school age and increase community awareness about the dangers of anemia in children

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