ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Simple Screening Procedures for Evaluation of Some Health Problems in Children Living at Remote Areas.

Yamamah GA[1], Abdelhamid EN[1], Farid TM[1]*, Salah MM[1], and Hasan NS[2]

[1]Department of Pediatrics, National Research Centre,33 El-Bohouthst. (former El-Tahrirst.) Dokki- **Giza-** Egypt. Postal code: 12622.
[2]Department of Clinical and Chemical Pathology, National Research Centre, 33 El-Bohouthst. (former El-Tahrirst.) Dokki- **Giza-** Egypt. Postal code: 12622.

ABSTRACT

South Sinai is an arid governorate at northern east of Egypt. Inhabitant of this area have unique pattern of life due to ecological, social and cultural conditions. Evaluation of children health status could be the base for further development of this community.Aim of the study is screening for some health problems among south Sinai children living in remote areas by using simple and easy techniques.The study included 5609 children living at south Sinai. They were 2911 males and 2698 females aging 4-12 years. All were subjected to history taking for age, residence, history of chronic diseases as rheumatic heart disease, diabetes mellitus and epilepsy. Urine analysis for 1918 children and stool analysis for 687 children were performed. Serum calcium, phosphorus, magnesium and Vitamin D were assessed for 79 children. Results showed that rheumatic heart lesions and epilepsy were the most prevalent accounting 0.37% and 0.3% respectively, followed by Diabetes Mellitusand surgical condition. Urine analysis detected pyuria,glycosuria and Ketonuriain 2.29%, 0.73% and0.36%respectively inthe examined urine samples. Stool analysis showed intestinal parasite infestation in 24.16% of examined children. Serum Vitamin D was belownormal in 29.09% of examined children, among them 15.19%showed serious deficiency. We concluded that there was many health problems in children living at South Sinai due to insufficient health services supply or/and unhealthy habits. Most of these health problems could be prevented through simple and easy procedures.

Keywords: Screening procedures, Health Problems, Children, Sinai

***Corresponding author**

ISSN: 0975-8585

INTRODUCTION

South Sinai is an arid governorate at the north east corner of Egypt with internationally recognized coasts, coral reefs and many protected desert landscapes [1]. Inhabitants of South Sinai have unique patterns of life which are far different from other Egyptian communities. Population is only 2 per square km of total area. Dry weather, low income, limited dietary resources, lack of water supply, illiteracy and inadequate health services have their effect on health status of the population [2]. The settled population in South Sinai cities is engaged in agriculture, land reclamation, and pastoralism and in the petroleum, mining, fishery, and tourism industries. The nomadic Bedouin tribes migrate in search of water resources and pasturage but are increasingly attracted to industry and agriculture. Evaluation of children health status could be the base for further development of this community to our knowledge there was no comprehensive health study for children in South Sinai till this now. We aimed to use simple and easy medical procedures for screening of some health problems among children living at remote areas as South Sinai.

SUBJECTS AND METHODS

Study area: Six cities in South Sinai were included in our study. Five of these cities are coastal lying on the Gulf of Seuez (Ras-Sedr, Abu-Zneema, Abu-Redees and El-Tour cities) and the Gulf of Aqaba (Nuweeba). The sixth city (Saint Catherine) is in the mountainous desert area of South Sinai (Figure 1).

Figure 1: A map showing cities of Sinai Peninsula: 1: Ras-Sedr, 2: Abu-Redees, 3: Abu-Zneema, 4: Al-Tour, 5: Saint-Katherine, 6: Nuweeba.

Study design: A descriptive cross sectional study was conducted on sample of children.

Sampling and sample size: A multistage stratified random sampling technique was used to select a sample of children attending governmental schools and nurseries in 6 districts including cities and surrounding Bedouin settlements in South Sinai governorate. Stratified selection of children was mediated taking in consideration age, gender, site and ethnic variations in South Sinai as shown in table[1]. The representative sample size was calculated using the automated method that depends on the population size, desired confidence level and confidence interval [3]. The formula used was:

$$\text{Sample Size} = \frac{(Z2) * (P) * (1-P)}{C2}$$

Where:
Z = Z value (standard value 1.96 for 95% confidence level);
P = percentage picking a choice, expressed as decimal (0.5 used for sample size needed);

C = confidence interval, expressed as decimal (2.2 in this study).

Sample was calculated at 95% confidence level and confidence interval=2.2. The study included 5609 child representing all the 6 areas of South Sinai. We considered site and population number for stratification. Number of children in each site was as follows; Al-Tour (9,655), Abu-Redees (3,778), Abu-Zneema (2,690), Ras-Sedr (5,838), Saint-Katherine(2,071) and Nuweeba (4,012). Population data are available in South Sinai website (1).The parents of the children enrolled in the study were informed about the purpose of the study and the name of the research institute before agreeing to participate. Assurance was given that their cooperation was voluntary and that no negative consequences would result to those who decided not to participate in the study. Also, the parents were informed that they could skip any question they did not want to answer. Study protocol was approved by the Ethical Committee of National Research Centre.5609 children living at South Sinai were recruited for the study. They were 2911 males and 2698 females, aging 4-12 years, living at 6 districts. Included children were subjected to the following:

1. History taking including:
    a. Birth date, origin (Bedouin or urban) and residence.
    b. History of Rheumatic heart disease **(**RHD) including onset of diseases, echo, long acting penicillin and prophylactic therapy.
    c. History of Diabetes Mellitus **(**DM) including onset, HBA1C levels, insulin dose
    d. History of epilepsy including onset, therapy, EEG.

2. Thorough clinical examination to confirm cardiac valvular lesion for RHD and to diagnose conditions that need surgical intervention as hydrocele, undescended testis and inguinal hernia.
3. Urine analysis including; microscopic examination to detect pus cells and red blood cells and testing for glucose and ketones for 1918 children [4].

Random urine sample was collected in 50 ml cup. A sample of the well-mixed urine (10 ml) was centrifuged in a centrifuge test tube at 2000-3000 rpm for three to five minutes until a precipitate was produced at the bottom of the tube. The supernatant was decanted and the sediment was re-suspended in the remaining supernatant by flicking the bottom of the tube several times. A drop of the re-suspended sediment was transferred to a glass slide for examination. The sediment was first examined under low power to identify most crystals, casts, epithelial cells and large objects. Next, examination was carried out at high power to described as the number of each type found per average high power field (HPF) [eg: 1-5 WBC/HPF]. While the samples were centrifuged, fresh samples were examined macroscopically for their color and appearance followed by dipstick examination (combur- test strips) for specific gravity, pH, protein, glucose, ketones, bilirubin, blood and nitrite.

4. Stool analysis for; parasitic infestation for 687 children.

Stool samples were collected after urine collection in 50 ml cup. Each sample was examined physically for quantity, consistency and form, color, odor, blood and mucus. Microscopic examination was done without delay to each sample using the wet mount technique in which a drop of saline is placed on a slide and a small amount of stool (taken by wooden stick) was mixed with it and covered by a cover slip and examined under microscope for helminths ova, protozoacysts, pus cells, RBCs, starch, vegetable fibers, mucus and yeast [5].

5. Assessment of calcium, phosphorus, magnesium and vitamin D for 79 children.

Three ml of venous blood samples were withdrawnon plain vacutainer from each subject. Blood was centrifuged at 4000 rpm and serum was used for measuringcalcium, magnesium and phosphorus; all serum samples were performed on Olympus AU 400 chemistry analyzer according to the manual instruction.Serum samples were used for measuring 25(OH) D, using ELISA kit, Cat. No.: REA300/96 (Biovendor products, Germany)

RESULTS

Table (2) presents the prevalence of studied chronic diseases among South Sinai children. The table shows that rheumatic heart and epilepsy were the most common by 0.37% and 0.3 % respectively, followed by

diabetes mellitus 0.2% and conditions that need surgical intervention as inguinal hernia was the most common one by 0.18% then undescended testis 0.12% and hydrocele 0.08%.Table (3) shows data of urine analysis of the studied populations and the table shows that pyuria was the most common one 2.29% then glycosuria 0.73% and Ketonuria 0.36%.Table (4) shows the parasitic infestation in the studied populations and shows that infested child's were 166(24.16%). *Giardia lamblia* showed the highest prevalence (12.52%) in south Sinai children followed by *Entamoebahistolytica*(11.1%), *Enterobiusvermicularis* (0.29%), *Cyclosporacayetanensis*(0.15%) and *Hymenolepis nana* (0.15%).Table (5) shows vitamin D level among studied populations and shows that deficiency was Serum Vitamin D was below normal in 29.09% of examined children, among them 15.19% showed serious deficiency.

Table 1: Demographic data of study subjects

Site	Age (years)			Gender		Total population number at studied areas within the same age group
	No.	Mean	SD	Male	Female	
Al-Tour	1759	8.5	4.30	892	867	9655
Ab-Redees	503	8.6	2.10	271	232	3778
Abu-Zneema	608	8.5	4.20	309	299	2690
Ras-Sedr	908	9.0	3.43	460	448	5838
Saint-Katherine	883	8.3	3.27	480	403	2071
Nuweeba	948	8.8	4.10	499	449	4012
ALL	5609	8.6	4.18	2911	2698	28044

The table shows description of demographic data of studied populations

Table 2: Prevalence of studied chronic diseases among South Sinai children

Diseases	Number	%
Chronic Diseases		
RHD	21	0.37
DM	11	0.2
Epilepsy	17	0.3
Surgicalconditions		
Hydrocele	2	0.08
undescended test	3	0.12
Inguinalhernia	10	0.18
Others		
Gynaecomastia	4	0.07

RHD: Rheumatic heart disease **DM:** Diabetes Mellitus

Table 3: data of urines analysis of South Sinai children

Test	(No=1918).	Percentage
Glucose	14	0.73%
Ketones	7	0.36%
Pus / HPF	44	2.29%
10-19	29	1.51%
20-99	12	0.62%
≥100	3	0.16%

Table 4: Parasitic infestation in South Sinai children

Intestinal parasites	(No=687)	%
Infested:		
-Giardia lamblia	86	12.52%
-Entamoeba histolytica	76	11.1%
-Enterobius vermicularis	2	0.29%
-Cyclospora cayetanensis	1	0.15%
-Hymenolepis nana	1	0.15%
Total infested	166	24.16%
Non infested	521	75.84%
Total	687	100%

Table 5: Vitamin D levels among South Sinai children.

	Vitamin D	No.	Percentage
Adequate	>75nmol/L	56	70.89%
Deficiency	30-75nmol/L	11	13.92%
Serious Deficiency	<30 nmol/L	12	15.19%

DISCUSSION

Data base about prevalent health problems is lacking. The need of non-sophisticated medical procedures for such a remote area drew attention for the present screening program.The present study showed that the prevalence of RHD in south Sinai was 0.37% which is higher than the reported values of 0.1% in other Egyptian communities [6]. The mentioned prevalence above is greater than the prevalence in India of 0.1%. This may be due to the lack of healthy life habits, lack of adequate health services,and bad compliance during treatment from streptococcal infection or different genetic background for disease susceptibility.

Histories taking showed that 0.2% of examined children have manifest DM.The present value is greater than the estimated range of other places in Egypt [7]. This value is far higher than Indian children living at urban communities of 10.5/100,000 population [8]. In Karnataka state T1DM registry listed an incidence of 3.7/100,000 in boys and 4.0/100,000 in girls over 13 years of data collection [**9].** At Karnal, in Haryana, the prevalence of T1DM is 26.6/100,000 in urban and 4.27/100,000 in rural areas of the district, leading to an average prevalence of 10.20/100,000 population. Karnal city has a relatively high prevalence of T1DM (31.9/100,000) [10].In Bangladesh the estimated incidence rate of Type 1 diabetes in age 0-14 years is 4.2/100,000 per year [11]. This difference may be due to the increase of consanguinity or consanguineous marriage in the S. Sinai within closed community which led to an increase in type1 DM in children.

Epilepsy prevalence in South Sinai was 0.3% which is higher than the approximate figure across Egypt like Al Quseir Red Sea which has a prevalence of 9/10000 [12]. And in Indian rural areas,the percentage of epilepsy was0.01% in children below 10 years [13]. This high prevalence needs to be studied deeply to assess causative factors and genetic background.

Regarding children complaining of conditions in need of surgical intervention as hydrocele, undescended testis and inguinal hernia, their prevalence among South Sinai children were 0.18% for inguinal hernia, 0.12% for undescended testis and 0.08% for hydrocele; they need early diagnosis and early interference. These problems, if neglected or treated lately, may lead to dangerous complications in the form of malignant transformationof testis, intestinal obstruction and intestinal gangrene. In order to avoid any complications, health care, diagnosis and early treatment are needed.

Urine analysis declared that 2.3% of examined urine samples have pyuria without other urinary manifestations. This means chronic or subclinical urinary tract infection. The subsequent renal complications are more likely to occur especially at dry hot weather and lack of water regarding quantity and quality.Glycosuria was present in 0.73% of examined urine samples and Ketonuria was present in 0.36% children. This value was much higher than that of children treated for DM. Those children are in need for

further investigations regarding glucose tolerance and glycosylated hemoglobin to confirm DM diagnosis. They may be pre diabetics to guard against occurrence of diabetic comas and begin diet control.

Stool analysis has shown that the prevalence in parasitic infestation was 24% in south Sinai. This figure is within average comparable to Egypt's prevalence of 27% for parasitic infestation [14]. However, it is higher than the international figure represented by 15.19% in India [15]. Lack of personal hygiene, inadequate water and unhealthy latrines are possible causes for such high values.

Serum Vitamin D was below normal in 29.09% of examined children, among them 15.19% showed serious deficiency. This value was higher than India's figure of 10.8% in children. Not only that, but also greater than Egypt's prevalence figure of 10% [16]**.** However, the UK has also decreased by 35% making it higher than south Sinai.This can be caused by the lack of vitamin D intake and sun exposure.Vitamin D intake in the studied community was far below requirements, intake ranged from 0.27-1.18 µg/d. These intakes equal 5.86-36.22% of the recommend dietary allowances [17].

CONCLUSION

- Screening for evaluation of some health problems in children living at remote areas should be simple and applicable.
- South Sinai children complain of RHD, D.M and epilepsy more than other areas in Egypt.
- Many hidden diseases could be exposed as urinary tract infections, DM, parasitic infestations and Vitamin D deficiency.
- Most discovered problems are preventable.

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