



while dropped to (0%) in the private primary schools which were included by students of middle & high socioeconomic levels.

The prevalence of Bitots spots is 1.45%, 78 cases (1.23%, 41 girls & 182%, 37 boys) where it was highest in the poorest area as aisha school (11.6%) in al koda zone & the lowest prevalence (0%) in the private schools.

## **CONCLUSION:**

The association of xerophthalmia in my society with the socioeconomic status & the dietary habits of the population give a signal to whom in concern, the governmental & nongovernmental organizations in the country to implement screening, prevention & therapeutic programs periodically for the preventable ocular diseases through the governmental health care centers.

## **INTRODUCTION:**

The night blindness is considered to be one of the earliest and milder symptoms of vitamin A deficiency<sup>1</sup> which represent the major public health nutritional problem in the developing world affecting the young children by causing xerophthalmia which leads to blindness, limit growth, weaken innate, acquired host defenses, exacerbate infection and increase the risk of death<sup>2</sup>. These problems can extend through school age and adolescent years into adulthood<sup>3</sup>.

the children in the school-going age group (6-16 years) represent 25% of the population in the developing countries where they offer a significantly representative material as they fall best in the preventable blindness age group, they are a controlled population i.e., they belong to a certain age group & they are easily accessible. Also the schools are the best forum for imparting health education to the children & one of the best centers for effectively implementing the comprehensive eye healthcare programs<sup>4</sup>.

According to Unicef assessment for the under five mortality rate which reached  $\geq 70$  deaths per 1000 live births in 2004 & my country is reported as one of 62 countries of high mortality rate in the world which were considered a priority countries for vitamin A supplementation. This situation pushed me to think about screening for xerophthalmia in hadramoute coast primary school children aged 5-12 years due to easy accessibility of school aged children & the difficulty to reach easily to under five years children in the houses due to social

# **XEROPHTHALMIA IN PRIMARY SCHOOL CHILDREN IN HADRAMOUTE COAST-YEMEN**

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**Key words:** prevalence, xerophthalmia. Hadramout coast, primary school children. Governmental, private, night blindness, Bitots spots,

## **ABSTRACT:**

### **OBJECTIVES:**

To identify the prevalence of xerophthalmia in hadramout governorate coast-Yemen by study 18 primary schools.

### **METHODS:**

5366 children aged 5-12 years (3334 girls & 2032 boys) were randomly selected from 18 primary schools in hadramout coast (15 governmental & 3 private). All the selected children were assessed for symptoms & signs of xerophthalmia by history taking & eye examination.

### **RESULT:**

The prevalence of night blindness in hadramout primary school children is 1.92%, 103 cases (1.65%, 55 girls & 2.36% 48 boys). The prevalence is different from geographical area to another in the same city, where it is highest in the poorest area as aisha school (15.94%) in al koda zone which is resided by low socioeconomic somalian peoples,

**Table (1) involves name of school, geographical zone, city & number of screened children & type of school:**

School name	Geographical zone	City	Number of screened Males	Number of screened Females	Total number of screened cases	Type of school
Aisha	Al koda	Mukalla	0	138	138	G
Estiglal	Jol-shifa	Mukalla	100	100	200	G
October	Al dees	Mukalla	328	0	328	G
Khansa	Ba abood	Mukalla	330	0	330	G
22 may	Al salam	Mukalla	14	200	343	G
Mallahi	Shihir	Mukalla	0	229	229	G
Al huda	Jol-masha	Mukalla	122	240	362	G
Somyia	Al sharq	Mukalla	75	245	320	G
Al saeed	Al dees	Mukalla	240	28	268	G
Bin khaldoon	Al shahid	Mukalla	59	370	429	G
Al gala	Shihir	Shihir	255	256	511	G
Bin rushed	Shihir	Shihir	35	400	435	G
Al Zahra	Al mugamma	Mukalla	46	240	286	G
Khoula	Al gabal	Mukalla	0	460	460	G
Al sadiq	Al masakin	Mukalla	12	228	240	G
Al noor	Al myiah	Mukalla	78	78	159	P
Al ahfad	Al ghwaizy	Mukalla	143	66	209	P
Ganadeel	Al myiah	Mukalla	66	50	166	P
Total			2032	3334	5366	

G= governmental, p = private

The table (1) included the name of the studied schools, the geographical area, total number of the screened students is 5366 ( 2032 boys & 3334 girls) divided into 18 groups-aged 5-12 years, each was randomly selected from each school by the school director regardless the sex, the years of age within the studied age & the total number of children in that school. So to determine the prevalence of xerophthalmia in hadramout, I divided the study into two steps:

- Step-1 (history of night blindness).
- Step-2 (anterior & posterior segment examination for signs of xerophthalmia).

**step-1: ( history of night blindness):**

a simple night blindness screening questionnaire was given by the class supervisors to the screened student & to be answered by one of the parents.

habits that forbidden the meeting of the mother in absence of the father. Although in the developed countries the screenings for the preventable eye diseases in preschool/school children were done routinely even though there is active debate about its value and cost effectiveness<sup>5-10</sup>

## **METHODS:**

The low facility in our governmental hospitals in hadramout, as the absence of retinol test which represents the biochemical base for diagnosis of vitamine A deficiency, so acting on the base of the night blind women can be expected biochemically vitamine A deficient<sup>11-13</sup>.

I prepared a simple questionnaire dealing with the history of night blindness which is considered a failure to adapt to dim light or to dark with good vision at bright day<sup>14</sup>.

By using my special portable slit lamp & ophthalmoscope, I assessed the studied children for conjunctival, corneal & retinal signs of xerophthalmia.

The xerophthalmia represents the leading cause of childhood blindness in Asia and the world that should be treated with vitamin A by the regimen of periodic prophylactic supplementation with large doses of vitamin A, fortification with vitamin A, and dietary modification recommended by the world health organization to treat xerophthalmia<sup>15-17</sup>.

Between march 2005 to march 2006 I decided with the help of hadramout educational office to screen for xerophthalmia among hadramout primary school children aged between 5-12 year in mukalla & shihir towns.

The selected 18 primary schools are 3 private & 15 governmental (1-2 governmental schools from each geographical zone) to include all the socioeconomic levels of the society in the studied cities as shown in table (1)

exceeded the minimal criterion for public health significance of night blindness (1.92% vs. 1%).

The prevalence of night blindness reaching maximum in aisha school (15.94 %) which was included mostly the arrived somalian students of low socioeconomic level residing al koda zone which is the poorest area in al mukalla city while the minimum prevalence (0%) were found in Al- noor, Al- ahfad& Al- ganadeel Private schools which were included by students from middle & high socio-economic status whom got admission.

In the governmental schools where the school fees are minimal, the students from all the socioeconomic strata got admission & because the socio-economic levels differ for zone to zone in the same city & from the poor zones al koda & joul shifa which are resided mostly by low socioeconomic peoples while from the modern zones al masakin & mogamma zones which are resided mostly by peoples of middle to high socioeconomic levels, so the result differs from school to another as seen in the table (2), where the higher prevalence was seen in aisha primary school (15.94 %) & al estiglal primary school (5.5%) which included by students mostly from the poorest al mukalla zones(al koda & gol al shifa zones) respectively, while the lowest prevalence was seen in al saddiq school (0.4 %) in al masakin zone which was included mostly by students from middle & high socio-economic levels.

By looking to shiher schools, we found moderate prevalence of night blindness in al mallahy governmental primary school 1.74%, because no private schools in shiher present at the time of the study, so all the society levels were represented in the governmental schools & due to decreased number of the poor somalian arrivals in shiher city opposite to al mukalla city where they occupied nearly a complete zones as in akoda zone.

By looking to the table (2) from the sex point of view, we found the total prevalence is higher among the boys than the girls, but the look differs for each school alone where the prevalence was highest in aisha girls school (15.94%) while the prevalence in al khansa boy school about (3.96%) in the same zone, so the difference in the prevalence of night blindness according to the sex is not fixed but it is surely dependant on the socioeconomic status of the population including the male dominancy & the unhealthy dietary habits for the residents of rural origin as in October school (3.63%) in Al-dees zone which is resided mostly by peoples of rural origin.

### **The screening questionnaire:**

It is a paper contains the following information:

- the personal data for the student (name, age & sex) & school name.
- small letter to the parents about the importance of the survey for health of their children, family, the society & the importance of the treatment of the eye diseases at this critical stage of the child development.
- three simple questions related to night blindness that should be answered by the parents. ( 1- Does your child complain of poor vision at dim light? 2- Does your child complain of photosensitivity? 3- Have any other member in the family complaining poor vision at night? ).
- signature of the father or the mother.
- my (name, qualification, work place& tel. No).

The answered questionnaires were collected by the class supervisors to the school directors whom phoned me after receiving the last answered questionnaire to start the next step.

### **step-2 ( assessment for ocular signs of xerophthalmia ):**

The anterior segment examination for the signs of xerophthalmia is done by using portable slit lamp to all cases have positive history of night blindness by using portable slit lamp.

- The temporal & nasal bulbar conjunctiva were examined for the presence of conjunctival xerosis & Bitots spots.
- The cornea is assessed for corneal xerosis, ulceration, scaring or keratomalacia.

The Posterior segment examination were done for all cases had a positive history of night blindness or anterior segment signs of xerophthalmia by ophthalmoscope to assess for retinal xerosis.

The result is reported for the studied patients in each school alone.

## **THE RESULT:**

### **Prevalence of night blindness:**

The number of night blind cases among the primary school children were displayed for each studied school alone in table (2) with the total number of the screened students 5366 ( 2032 boys & 3334 girls) of whom 103 cases (1.92%) had positive history of night blindness ( 55 girls (1.65%) & 48 boys ( 2.36%), this prevalence according to WHO criteria for the health significance of the prevalence of night blindness

## DISCUSSION:

The population in hadramout largest cities as al mukalla & al shihir is mixture of urban & rural populations where the urban population mostly residing the old zones that consist of variable socioeconomic levels as al salam, al shaheed, al ommal zones while the newly established zones, some of which resided mostly by population coming from different hadramout rural areas of different socioeconomic levels as october zone & other newly established zones were established in specific circumstances as al koda zone which is resided mostly by the arrived poor somalian peoples of nearly the same low socioeconomic level. Some newly established zones with modern buildings as al masakin & al mogamma zones mostly resided by population of mid to high socioeconomic levels. So this complicated structure make us to think in the present study about the prevalence of xerophthalmia in hadramout was determined mostly by the socioeconomic level & the dietary habits of the population in the studied zone.

For the comparative study & due to lack of the local & the regional studies about xerophthalmia, I supported my survey by xerophthalmia screening data from India, south-eastern Asia & the countries in south Africa which have intervening factors with hadramout society like, the similarity in many social habits particularly the dietary habits due to old hadramian peoples immigrations to these countries, additionally to high prevalence of Vitamine A deficiency in Asia & Africa<sup>18</sup>

The prevalence of night blindness & Bitots spots & conjunctival xerosis in the present study in the urban districts of hadramout coast in school aged children from 5-12 years is 1.92% & 1.45% respectively are in agreement with the prevalence of night blindness & Bitots spots in Mali where the prevalence is 1.95% & 1.10% respectively in age group under 10 years<sup>19</sup>.

Arissa in Ethiopia where the studied for the prevalence of xerophthalmia including preschool & school aged children with resulting in high prevalence of night blindness & Bitots spots in school aged children than preschool where the prevalence is 7.2% & 2.2% respectively, this higher prevalence either due to wide range of the study among the school aged children or low socioeconomic status of this country<sup>20</sup>.

Hyderabad study ( in India ) where the prevalence of night blindness in the school aged children about 0.33%, the low prevalence in Hyderabad might be due to the difference in the recent cultural & socioeconomic status between hadramout & Hyderabad urban population in addition to



### **Bitots spots & conjunctival xerosis:**

As shown in the table (2) the prevalence of Bitots spots & conjunctival xerosis in hadramout coast schools is 78 cases 1.45% (41 girls 1.23% & 37 boys 1.82%).

In the governmental schools the maximum prevalence of Bitots spots was found in aisha school (11.59%) in alkoda zone & the minimum prevalence of Bitots spots was found in alzhara school (0.34%) in al mogamma zone which is resided mostly by high & middle socio-economic levels.

In the private schools the prevalence of Bitots spots & conjunctival xerosis was 0 %. So the main determinant for the prevalence of Bitots spots & conjunctival xerosis is the socioeconomic status of the population.

### **The corneal signs of xerophthalmia:**

No corneal changes related to xerophthalmia were reported as corneal xerosis, ulceration scaring or keratomalacia in all screened students.

### **Retinal changes of xerophthalmia:**

No case detected

The prevalence of xerophthalmia in hadramoute was shown in table(2):

***Table (2) involves the total number of screened children with total number & prevalence of night blindness ,conjunctival xerosis & Bitots spots in male & female children.***

School name	Number of screened cases	Number of XN cases / %				Number of X1A&X1B cases / %			
		Male	Female	Total	%	Male	Female	Total	%
Aisha	138	0	22	22	15.9%	0	16	16	11.6%
Estiglal	200	6	5	11	5.5%	5	4	9	4.5%
October	328	13	0	13	3.96%	10	0	10	3%
Khansa	330	12	0	12	3.63%	10	0	10	3%
22 may	343	3	3	6	1.74%	3	3	6	1.74%
Mallahi	229	0	4	4	1.74%	0	3	3	1.3%
Al huda	362	2	4	6	1.65%	1	3	4	1%
Somyia	320	2	3	5	1.56%	1	2	3	0.9%
Al saeed	268	4	0	4	1.49%	3	0	3	1.1%
Bin khaldoon	429	3	3	6	1.4%	2	3	5	1.16%
Al gala	511	3	2	5	0.98%	2	1	3	0.58%
Bin khaldoon	435	0	4	4	0.9%	0	2	2	0.45%
Al Zahra	286	0	2	2	0.69%	0	1	1	0.34%
Khoulala	460	0	2	2	0.43%	0	2	2	0.43%
Al sadiq	240	0	1	1	0.4%	0	1	1	0.4%
Al noor	159	0	0	0	0%	0	0	0	0%
Al ahfad	209	0	0	0	0%	0	0	0	0%
Ganadeel	166	0	0	0	0%	0	0	0	0%
Total	5366	48 (2.36%)	55 (1.65%)	103	1.92%	37 (1.82%)	41 (1.23%)	78	1.45%

XN=night blindness, X1A=conjunctival xerosis, X1B=Bitots spots.

- 7- Dixit, D. T. (1966) Night-blindness in third trimester of pregnancy Indian J. Med. Res. 54: 791–795
- 8-Mandal, G. S., Nanda, K. N. & Bose, J. (1969) Night blindness in pregnancy. J. Obstet. Gynecol. India 19: 453–458.
- 9- Donald M, age specific xerophthalmia rate among displaced Ethiopian. Arch Dis Child 1987 62: 539-540.
- 10-Sinha DP, Bang FB. The effect of massive doses of vitamin A on the signs of vitamin A deficiency in preschool children. AmJ Clin Nutr. 1976;110-115.
11. Sommer A. Vitamin A Deficiency and Its Consequences:Field Guide to Their Detection and Control. 3rd ed. Geneva:World Health Organization; 1994.
12. Sommer A, West KP Jr. Vitamin A Deficiency: Health, Survival and Vision. New York: Oxford University Press; 1995.
13. Foster A. Childhood blindness. Eye. 1988;2:S27-S36.
14. Kagame K, Schwab L. Childhood blindness: Dateline Africa. Ophthalmic Surg. 1989;20:128-131.
15. Thylefors B, Negrel AD, Pararajasegaram R. Epidemiologic aspects of global blindness prevention. Curr Opin Ophthalmol. 1992; 3:824-834.
16. Control of Vitamin A Deficiency. Technical Report Series 672. Geneva: World Health Organization; 1982.
17. West KP, Sommer A. Periodic, Large Oral Doses of Vitamin A for the Prevention of Vitamin A Deficiency and Xerophthalmia. Washington DC: International Vitamin A Consultative Group; 1984.
18. West, K. P. (2002) Extent of Vitamin A Deficiency among Preschool Children and Women of Reproductive Age. J. Nutr. 132: 2857S-2866S.
19. Jean-Francois Schémann, Denis Malvy, Germain Zefack, Lamine Traoré, Doulaye Sacko, Bamani Sanoussi, Albert A. Banou, Omar Boré, Sidi Coulibaly and Mohamed el Moutchaidine. Mapping Xerophthalmia in Mali: Results of a National Survey on Regional Distribution and Related Risk Factors. journal of the American College of Nutrition, Vol. 26, No. 6, 630-638 (2007).
20. Asrat YT, Omwega AM, Muita JW. prevalence of vitamin A deficiency among pre-school & school aged children in Arssi zone, Ethiopia. East African Medical Journal, 2002 Jul;79(7):355-359.
21. Uzma, Nazia (N); Kumar, B Santhosh (BS); Khaja Mohinuddin Salar, B M (BM); Zafar, Mohammed Atheshm (MA); Reddy, V Devender (VD); a comparatived clinical survey of the prevalence of refractive error & eye diseases in rural & urban school children. (Can J Ophthalmol)2009-Jun; vol 44 (issue 3) : pp 328-33
22. Wedner SH, Ross DA, Balira R, Kaji L, Foster A. Prevalence of eye diseases in primary school children in a rural area of Tanzania. Br J Ophthalmol 2000;84:1291-7.
23. Datta A, Choudhury N & Kundu K, epidemiological study of ocular condition among primary school children of Calcutta corporation: indian j. ophthalmol 1983; 31: 505-510.

the implementation of the preventable & prophylactic programs against the dietary diseases<sup>21</sup>.

Wedner et al., reported the prevalence of night blindness as 5.3% and bitots spots as 0.6% among school children aged 7-19 years in rural Tanzania, where children belonged to low socioeconomic status and had poor nutritional status, prevalence of vitamin A deficiency was high<sup>22</sup>.

The prevalence of xerophthalmia in Calcutta in school aged children 6-13 years of Calcutta corporation coming from low socioeconomic levels is 9%, this highest prevalence might be because the study include only the poor students while in the present study all socioeconomic levels were included<sup>23</sup>.

## **CONCLUSION:**

The association of xerophthalmia in my society with the socioeconomic status & the dietary habits of the population give a signal to whom in concern, the governmental & nongovernmental organizations in the country to implement screening, prevention & therapeutic programs periodically for the preventable ocular diseases through the governmental health care centers.

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## **REFERENCE:**

- 1-Sommer A, Tarwotjo I, Hussaini G. Incidence, prevalence and the scale of blinding malnutrition. *Lancet*.1981; 1:1407-1408.
- 2-Sommer A, and Keith P. West With James A. Olson and A. Catherine Ross, Vitamin A Deficiency Health, Survival, and Vision, text book published in 1996, pages (464).
- 3- sommer A. xerophthalmia, keratomalacia & nutritional blindness. *International ophthalmology* 14: 195-199. 1990.
- 4-Madhu Gupta, Bhupinder P Gupta<sup>1</sup>, Anil Chauhan<sup>2</sup>, Ashok Bhardwaj<sup>3</sup>. Ocular morbidity prevalence among school children in Shimla, Himachal, North India. *Indian J Ophthalmol*: 2009;57:133-138
- 5-Rahi JS, Dezateux C. The future of preschool vision screening services in Britain. *BMJ* 1997;315:1247-8.
- 6-Christian, P., West, K. P., Jr., Khatri, S. K., Katz, J., Shrestha, S. R., Pradhan, E. K., LeClerq, S. C. & Pokhrel, R. P. (1998) Night blindness of pregnancy in rural Nepal—nutritional and health risks. *Int. J. Epidemiol.* 27:231 –237.

## Introduction:

The children are priority in vision in 2020. To reach to this purpose, the world health organization (WHO) recently launched global initiative for preventing the avoidable visual impairment by year of 2020.

The impairment of vision in the early childhood has profound impact on the child development in addition to restriction to his participation in physical, educational & social activities. Many childhood visual disorders have genetic components which may affect the next children, as occur with myopia, hypermetropia & astigmatism<sup>3,4</sup>. So to minimize the negative effect of the visual disorders as strabismus & refractive error, the screening studies for the school aged children started since about century<sup>5</sup>.

There are many researchers described strabismus suppression as a visual field scotoma of the deviated eye which represents visual disability sequela<sup>6-10</sup> prevents any binocular facility interactions<sup>11</sup>, due to strabismus amblyopia.

The human strabismus amblyopia as in the strabismus cat is caused by constant inhibitions to the ocular neuronal dominant columns receiving input from the deviated eye by ocular neuronal columns receiving input from fixating eye result in the strabismus suppression & the amblyopia<sup>12</sup>.

Now in the developed countries the screening to eye diseases in preschool & school aged children are done routinely & mainly directed to identifying the refractive errors, strabismus & amblyopia in children<sup>13,14</sup>, because the early diagnosis & treatment of the vision disorders in children has positive effect on the outcome & the result of the treatment<sup>15</sup>.

It is important to implement the screening programs for the assessment of visual disorders in preschool & school aged children as a routine in the health care centers with helping of the international programs as blindness prevention programs to prevent or to decrease the incidence of amblyopia.

The amblyopia is the most common cause of vision disability in about (5 – 7 %) of school aged children<sup>16</sup>.

To avoid sensory – motor dysfunction due to strabismus suppression, amblyopia & to enhance a better stereo-acuity will obtained by early detection & treatment of the infantile esotropia during the first year of life<sup>17-22</sup>.

The aim of this study is to identify the prevalence of strabismus in hadramout governorate to build a health care system to minimize the health & the social sequelae of strabismus.

# **PREVALENCE OF STRABISMUS IN HADRAMOUT PRIMARY SCHOOL CHILDREN**

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**Key words:** screening, strabismus, prevalence, primary school, children, Hadramout.

## **ABSTRACT:**

### **Background:**

The aim of this cross sectional study is to identify the prevalence of strabismus in Hadramout primary school children.

### **Methods:**

Random cross sectional sample of 1906 students 5-12 years of age of 17 primary schools in Hadramout coast (Al Mukalla & Al Shihir cities) were screened for the strabismus prevalence.

### **Results:**

The prevalence of the strabismus in the studied 1906 children 5-12 years of age of 17 primary schools in hadramout governorate is 3.36% (64 squints) regardless of the sex.

### **Conclusion:**

The recorded prevalence of strabismus (3.36%) in the studied primary schools imposed a national duty for the Ministry of Health to initiate well equipped ophthalmic pediatric clinic driven by proper professionals to assess routinely the preschool & school children for early diagnosis & treatment of the preventable vision disorders as strabismus to prevent the sequelae.

the importance of their positive participation to avoid the strabismus dangerous sequelae.

- Table of simple questions to be answered by the parents (yes or no) if their child has any of the written signs & symptoms of the strabismus.
- My signature, degree, address & tel. numbers.

This sheet is given for the screened child through the supervisor teacher who asked him to bring back the sheet after parents answer.

### **Stage- 5 ( data collection ) :**

The response rate for the distributed questionnaire sheets in the screened schools was (100%) & The collected answers were brought by the medical team.

The time which is spent in distribution & collection of the data from the studied primary schools about 6 months.

### **Survey regions:**

My screening survey was done in 17 selected primary schools of which 14 governmental & 3 private in Al Mukalla, Al Shihir cities, one to tow schools from each zone regardless the sex.

I selected these tow cities specifically because the population of these cities is mixture of families came from different areas of Hadramout governorate (coast, valley, mountains) in addition to the others came from other governorates.

### **Participant selection :**

In my country the primary school registration start nearly from age of 6-7 year & we know that the first 12 years of life is a critical period in development of visual system so any undetected or / & untreated eye problems as refractive error or strabismus may lead to amblyopia which is the common cause of visual disability in school aged children.

In my screening survey, A randomly cross sectional group (100-162 students aged between 5-12 years) was selected from each screened primary school. The total number of children included in the survey is 1906 students (100%) participation regardless the sex, as in table (1).

## **Methods:**

The strabismus screening survey was divided into five stages as the following:

### **Stage-1 (connection with the educational office):**

Preparing for strabismus screening survey:

In October 2006, the idea of strabismus screening survey was explained to the officer of Hadramout educational office as its importance in early detection of the strabismus to prevent or minimize its personal & social sequelae by early intervention & proper follow to the qualified specialist<sup>23</sup>.

### **Stage-2 (medical team training):**

Two weeks were spent in scholastic medical team training by explanation idea & stages of the survey with symptoms, signs, sequelae, benefits of early detection & treatment of strabismus.

### **Stage- 3 (pre-distribution stage):**

The director of Al Mukalla radio station was informed about the idea & the importance of the strabismus screening survey who ordered by three consecutive radio meetings in three consecutive weeks for clarification of the importance of the strabismus screening program for early diagnosis & treatment strabismus to minimize the incidence of visual disability.

### **Stage- 4 (distribution stage ):**

The distribution of strabismus screening questionnaire sheet which consists of:

- The title: (the strabismus screening survey in Hadramout coast primary school children).
- Name, age & school of the child.
- Small litter: a small letter for the father & mother was directed, about the importance of strabismus screening survey in early diagnosis & treatment of this visually disabling disease particularly in the critical period of visual system development from the birth up to 10-12 years age &

**Table (2) include the screened hadramout primary schools , no. of screened children in each school, number of strabismic school children, % in each school , the total number of screened & strabismic children & the prevalence of strabismus in Hadramout coast primary schools.**

School name	City name	No. of screened children	No. of strabismus children	(%)
Al gala	Al Shihir	100	10	10%
Al zahra	Al mukalla	100	0	0%
Al saddiq	Al mukalla	100	0	0%
Al ahfad	Al mukalla	100	0	0%
22 may	Al mukalla	100	6	6%
Bin Rushid	Al mukalla	100	4	4%
October	Al mukalla	98	2	2.04%
Al estiqlal	Al mukalla	104	6	5.77%
Al anadeel	Al mukalla	114	1	1.75%
Al mallahi	Al Shihir	142	1	2.8% <sup>2</sup>
Al noor	Al mukalla	100	4	4%
Al huda	Al mukalla	162	4	2.47%
Bin Khaldoon	Al mukalla	136	2	1.4% <sup>7</sup>
Khoulala	Al mukalla	98	0	0%
Somaya	Al mukalla	118	4	3.39%
Aisha	Al mukalla	136	16	11.76%
Al saeed	Al mukalla	98	4	4.08%
Total		1906	64	3.36%

## **Discussion:**

The result of the strabismus prevalence in Hadramout is not so far from many international prevalence of strabismus in other nations which will be discussed next as shown in table 3.

In 1987, Tongue et al, mentioned that the detection & the correction of refractive error, amblyopia & squint in infants & children is important for two reasons:

- (a) To prevent irreversible visual loss secondary to unfocused retinal images (amblyopia)
- (b) To eliminate any visual impairment detrimental to the normal function & development of child<sup>24</sup>



**Table (1) include the screened 17 hadramout primary schools & no. of screened children in each school.**

School name	City name	No. of screened children
Al gala	Al Shihir	100
Al zahra	Al mukalla	100
Al saddiq	Al mukalla	100
Al ahfad	Al mukalla	100
22 may	Al mukalla	100
Bin Rushid	Al mukalla	100
October	Al mukalla	98
Al estiqlal	Al mukalla	104
Al ganadeel	Al mukalla	114
Al mallahi	Al Shihir	142
Al noor	Al mukalla	100
Al huda	Al mukalla	162
Bin Khaldoon	Al mukalla	136
Khoula	Al mukalla	98
Somaya	Al mukalla	118
Aisha	Al mukalla	136
Al saeed	Al mukalla	98
Total		1906

## **Results:**

The prevalence of strabismus was calculated from the results of the family answers for the strabismus questions, that is the total number of the strabismus cases (64 squints) from the total number of the participants 1906 (100%) that equal about 3.36%, as shown in table (2) which might be not accurate 100% , but in my screening survey. I tried to clarifying the importance of the strabismus screening survey through Al Mukalla radio, the medical team, school directors, Teachers & by my letter to the family to reach the maximum degree of the accuracy.

***Table (3) the Prevalence of strabismus from the present study & from other international studies:***

	Hadramout	Newfoundland & Labrador	Swedish	Australian
Prevalence of strabismus	3.36%	4.3%	3.1%	3.8%
Age of screened children in years	5-12	1.6-11.6	4.5-10	0-14

### **Conclusion:**

The recorded prevalence of strabismus is 3.36% in the studied primary schools imposed a national duty of the Ministry of Health to initiate pediatric ophthalmology clinic with guidelines for the vision health care system in the governorates & to be supplied by the recent needed instruments & to introduce the preventable vision disorders as strabismus in the national & WHO health screening programs.

### **Acknowledgments:**

I am extremely grateful to all fathers & mothers for their cooperation & help in recruitment, to Al Mukalla radio team, to the director of Hadramout educational office & his colleagues, to the directors & teachers in the screened schools, to medical team who make my study easy. This study could not have been under taken without their support.

### **REFERENCES:**

- 1- thylefors b. a global initiative for the elimination of available blindness. am j ophthalmol 1998; 125:90-93.
- 2- rahi js, cumberland pm, pekham cs. does amblyopia affect educational, health & social outcomes? findings from 1958 brich cohort. bmj , doi:10. 1136/ bmj. 38751.597963.ae.
- 3- lorenz nb, genetics of isolated of syndromic strabismus: facts & prespective, strabismus 2002; 55:2-9.
- 4- hammond cj, snieder h, gilbert ce, spector td, genes & environment in refractive error; the twine eye study.invest ophthalmol vis sci

In 1987 Friendly D S, mentioned that the compliance to occlusion for treating strabismus amblyopia is easier & shorter the patching period, when the child is younger<sup>25</sup>. So I decided to screen for strabismus in Hadramout coast primary schools for the children of the critical age from 5-12 years in the absence of the population data for the preventable eye disorders as strabismus, in addition to poor health care system. So to compensate for these defects to reach to the nearly true results, I directed to the governmental sides as Al Mukalla radio to give an idea about squint & its complication & the benefits of the early diagnosis & treatment. Also I contacted with Hadramout educational office to supply me by medical workers from the scholar health center & to inform directors of the selected schools about my study to work as my request in all stages of the study.

The above mentioned plan helped in positively participation of all the staff of the screened schools & 100% participation of the participants for answering the strabismus screening questionnaire.

To proof the successfulness of the screening study, the prevalence of strabismus in my recent study (3.36%) was compared with other studies from developed countries with highly developed health care system, as Canadian studies which was done in Newfoundland & Labrador where the prevalence of strabismus in the screened children aged 2– 11.6 years was 4.3%<sup>26</sup>

In Australian studies which were done in July 2006 by Sydney university where the strabismus prevalence in children aged 0-14 years was 3.8%<sup>27</sup>.

The increased prevalence of strabismus in developed nations is might be due to highly sensitive, developed health care system, highly educated society, majority of screened children < 5 in Australian study compared with my present study where the majority of screened children were around 8 years age, the age of disappearance of mild refractive esotropia in addition to some micro-tropias might be passed unnoticed by our the parents.

Also a group of the Swedish children (4.5 – 10 year of age) were screened for strabismus with mean prevalence about 3.1%<sup>28</sup>, which is in agreement with the results of this study.

The above comparing results from the developed countries give the support for effective simple plan of the strabismus screening in Hadramout which I hope to be followed in the future to cover the other areas in Yemen.

- 22- ing mr, okino lm, outcome study of stereopsis in relation to duration of misalignment in congenital esotropia. *j aapos* 2002; 6;3-8.
- 23- alex r, rebecca l, sarah j. barrier to follow up eye care after pre-school vision screening in the primary care setting: findings from a pilot study. *jaapos*.2006;1095):476-78.
- 24- tongue ac. refractive error in children. *pediatric ophthalmology. pediatric clinic of north america* 1987; 34:1425-37.
- 25- friendly ds. amblyopia: definition, classification, diagnosis & management considerations for pediatricians, family doctors, general practitioners. *pediatric ophthalmology; pediatric clinic of north america*. 1987;34:1389-1401).
- 26- dover jr, kean pj, courage ml & adams rj 2008: prevalence of amblyopia & other vision disorders in young newfoundland & labrador children. *can j ophthalmol* 2008; 43: 89-94.
- 27- Australian Institute of Health and Welfare 2008. Eye health among Australian children. Cat. no. PHE 105. Canberra: AIHW.
- 28- gun k, peter j & gunnar l: visual screening of swedish children. *acta ophthalmol scand* 2007; 79: 240-44.

- 2001;42;1232-6.
- 5- appelboon TM, A history of vision screening. *J Sch Health*, 1985;55:138-41.
  - 6- travers t. suppression of vision in squint & its association with correspondenece & amblyopia. *br j ophthalmol* 1938;22:577-604.
  - 7- Duke-Elder S, Wybar KC. In: Duke-Elder S, ed. *System of ophthalmology*. London: Henry Kimpton, 1973.
  - 8- pratt ja., tillson g. suppression in strabismus- an update. *br j ophthalmol* 1984;68:174-8.
  - 9- jampolsky a. characteristic of suppression in srabismus. *ama arch ophthalmol* 1955; 54:683-96.
  - 10-Sireteanu R, Fronius M. Naso-temporal asymmetries in human amblyopia: consequence of long-term interocular suppression. *Vision Res* 1981; 21: 1055-63.
  - 11- holopigian k, blake r, green wald mj.clinical suppression & amblyopia. *invest ophthalmol vis isci* 1988; 29:444-51.
  - 12- sengpiel f, freeman tcb, blakemore c. interocular suppression in striate cortex is not orientation selective. *neuroreport* 1995 ; 6;2235-9.
  - 13- yang yf, cole md. visual acuity in school: what needs to be done.*bmj* 1996; 313:1053.
  - 14- preslan mw, novak a, baltimore vision screen object. *ophthalmol* 1996;103:105-9.
  - 15- william c, northstone k, harrad ra, sparrow jm, harvey i, alspace study team. amblyopia treatment outcomes after preschool screening v. school entery screening ; observational data from a prospective cohor study , *br j ophthalmol* 2003; 87:988-93.
  - 16- rubin se, nelson lb. amblyopia, diagnosis & management. *pediatr clin north am* 1993; 40: 727-35.
  - 17- parks mm. operate early for congenetal strabismus. in: bruckhurst rj, boruchoff sa, hutchinson bt, lessell s, eds. *controversy in ophthalmology*. philadelphia, pa.; wb saunders; 1977:423-30.
  - 18-birch ee, stager dr, everett me. randam dot stereoacuity following surgical correction of infantile esotropia. *j pediatr ophthalmol strabismus* 195; 32:231-5.
  - 19- costenbaderfd. infantile esotropia. *trans am ophthalmol soc* 1961; 59;397-429.
  - 20- ing mr. early surgical alignment of congenital esotropia. *trans am ophthalmol soc* 1981; 79;625-63.
  - 21- taylor md. is congenital esotropia functionally curable: *trans am opt halmol soc* 1972;70;529-76.

