XEROPHTHALMIA IN PRIMARY SCHOOL CHILDREN IN HADRAMOUTE COAST-YEMEN

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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 (1.64%, 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, while dropped to (0%) in the private primary schools which were included by students of mid & high socioeconomic levels.
The prevalence of Bitots spots is 1.45%, 78 cases (1.22%, 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\(^1\) 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\(^2\). These problems can extend through school age and adolescent years into adulthood\(^3\).

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\(^4\).

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 vitamine 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 habits that forbidden the meeting of the mother in absence of the father & this need long program for each family, 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\textsuperscript{1 2 3 4 5 6 7}.

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\textsuperscript{8 9 10}, I prepared a simple questionnaire dealing with 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\textsuperscript{11}.& by using my special portable slit lamp & ophthalmoscope to assess the studied children for conjunctival, corneal & retinal signs of xerophthalmia which represent the leading cause of childhood blindness in Asia and the world that
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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 1,2,3. So 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 in a selected 18 primary schools of which 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).
Table (1) involves name of school, geographical zone, city & number of screened children & type of school:

<table>
<thead>
<tr>
<th>School name</th>
<th>Geographical zone</th>
<th>City</th>
<th>Number of screened Males</th>
<th>Number of screened Females</th>
<th>Total number of screened cases</th>
<th>Type of the school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aisha</td>
<td>Al koula</td>
<td>Mukalla</td>
<td>0</td>
<td>138</td>
<td>138</td>
<td>G</td>
</tr>
<tr>
<td>Estiglal</td>
<td>Jol-shifa</td>
<td>Mukalla</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>G</td>
</tr>
<tr>
<td>October</td>
<td>Al dees</td>
<td>Mukalla</td>
<td>328</td>
<td>0</td>
<td>328</td>
<td>G</td>
</tr>
<tr>
<td>Khama</td>
<td>Ba abood</td>
<td>Mukalla</td>
<td>330</td>
<td>0</td>
<td>330</td>
<td>G</td>
</tr>
<tr>
<td>22 may</td>
<td>Al salam</td>
<td>Mukalla</td>
<td>14</td>
<td>200</td>
<td>343</td>
<td>G</td>
</tr>
<tr>
<td>Mallah</td>
<td>Shihir</td>
<td>Mukalla</td>
<td>0</td>
<td>229</td>
<td>229</td>
<td>G</td>
</tr>
<tr>
<td>Al lima</td>
<td>Jol-mashka</td>
<td>Mukalla</td>
<td>122</td>
<td>240</td>
<td>362</td>
<td>G</td>
</tr>
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<td>Semyja</td>
<td>Al shariq</td>
<td>Mukalla</td>
<td>75</td>
<td>245</td>
<td>320</td>
<td>G</td>
</tr>
<tr>
<td>Al saeed</td>
<td>Al dees</td>
<td>Mukalla</td>
<td>240</td>
<td>28</td>
<td>268</td>
<td>G</td>
</tr>
<tr>
<td>Bin khaldoon</td>
<td>Al shahid</td>
<td>Mukalla</td>
<td>59</td>
<td>370</td>
<td>429</td>
<td>G</td>
</tr>
<tr>
<td>Al gala</td>
<td>Shihir</td>
<td>Shihir</td>
<td>255</td>
<td>256</td>
<td>511</td>
<td>G</td>
</tr>
<tr>
<td>Bin rushed</td>
<td>Shihir</td>
<td>Shihir</td>
<td>35</td>
<td>400</td>
<td>435</td>
<td>G</td>
</tr>
<tr>
<td>Al Zahra</td>
<td>Al mugamma</td>
<td>Mukalla</td>
<td>46</td>
<td>240</td>
<td>286</td>
<td>G</td>
</tr>
<tr>
<td>Khoulia</td>
<td>Al gabal</td>
<td>Mukalla</td>
<td>0</td>
<td>460</td>
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<td>G</td>
</tr>
<tr>
<td>Al sadiq</td>
<td>Al masakin</td>
<td>Mukalla</td>
<td>12</td>
<td>228</td>
<td>240</td>
<td>G</td>
</tr>
<tr>
<td>Al noor</td>
<td>Al myiah</td>
<td>Mukalla</td>
<td>78</td>
<td>78</td>
<td>156</td>
<td>G</td>
</tr>
<tr>
<td>Al ahfad</td>
<td>Al ghwatry</td>
<td>Mukalla</td>
<td>143</td>
<td>66</td>
<td>209</td>
<td>P</td>
</tr>
<tr>
<td>Ganadeel</td>
<td>Al myihah</td>
<td>Mukalla</td>
<td>66</td>
<td>50</td>
<td>166</td>
<td>P</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2032</td>
<td>3334</td>
<td>5366</td>
<td></td>
</tr>
</tbody>
</table>

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.

**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 supervisor then to the school director who 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 signs of xerophthalmia were done for all cases have positive history of night blindness by 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, scarring 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. All results were 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 (1.64%) & 48 boys (2.36%), this prevalence according to WHO criteria for the health significance of the prevalence of night blindness exceeded the minimal criterion for public health significance of night blindness (1.91 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 shihir schools, we found moderate prevalence of night blindness in al mallahy governmental primary school 1.74%, because no private schools in shihir 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 shihir 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.

**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 1.22% & 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 alzahra 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 conenal changes related to xerophthalmia were reported as corneal xerosis, ulceration scaring or keratomalcia in all screened students.

**Retinal changes of xerophthalmia:**
No case detected
The prevalence of xerophthalmia in hadramoute was shown in the 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.

<table>
<thead>
<tr>
<th>School name</th>
<th>Number of screened cases</th>
<th>Number of XN cases / %</th>
<th>Number of X1A&amp;X1B cases / %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Aisha</td>
<td>138</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Estiglal</td>
<td>200</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>October</td>
<td>328</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Khansa</td>
<td>330</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>22 may</td>
<td>343</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mallahi</td>
<td>229</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Al huda</td>
<td>362</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Somyia</td>
<td>320</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Al saed</td>
<td>268</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Bin khaldoon</td>
<td>429</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Al gala</td>
<td>511</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Bin rushed</td>
<td>435</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Al Zahra</td>
<td>286</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Koula</td>
<td>460</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Al sadiq</td>
<td>240</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Al noor</td>
<td>159</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Al ahfad</td>
<td>209</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ganadeel</td>
<td>166</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>5366</td>
<td>48(2.32%)</td>
<td>55(1.62%)</td>
</tr>
</tbody>
</table>

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

**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 & Africa¹.

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 1.91% & 1.45% respectively, while the prevalence of night blindness & Bitots spots in Mali were 1.95% & 1.10 % respectively in age group under 10 years².

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\textsuperscript{1}.
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 the implementation of the preventable & prophylactic programs against the dietary diseases\textsuperscript{2}.
Wedner et al., reported the prevalence of night blindness as 5.3% and bitot's 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\textsuperscript{3}.
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\textsuperscript{4}.

**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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