CAUSES OF CHILDHOOD BLINDNESS IN SOUTHERN GHANA - A BLIND SCHOOL SURVEY

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SUMMARY

Examination of 129 inmates of Akropong School for the Blind revealed 80% of them were blind. Corneal scars or phthisis bulbi, cataracts, glaucoma, and chorioretinal disease were the major causes of blindness, being responsible for blindness in 43%, 18%, 16% and 12% respectively of children aged 15 years and below.

Congenital rubella syndrome is probably more common in Southern Ghana than in the North and this may explain the relatively greater importance of cataracts and glaucoma in childhood blindness in the South compared with the North.

Key Words: Childhood Blindness, Blind School Survey.

INTRODUCTION

The aetiological factors in childhood blindness vary from genetic factors at conception; intrauterine infections, infestations and toxicities; acquired factors operating either in the neonatal period or later in infancy and childhood1. In places such as Western Europe and North America where the acquired factors are either prevented or adequately treated, genetic factors play a major role in the causation of childhood blindness. The genetic factors are greatly enhanced among the Greek communities of Cyprus2, in Saudi Arabia3 and in Lebanon4, where consanguineous marriages are common. In less developed areas, acquired factors such as ophthalmia neonatorum, vitamin A deficiency, measles and external eye infection play a predominant role.

In this study, we attempted to determine the causes of childhood blindness among Southern Ghanaian children by examining the inmates of the Akropong School for the Blind (A.S.B.)

SUBJECTS AND METHODS

One hundred and twenty nine inmates aged between 4 and 65 years of the A.S.B. were examined in March 1989 at the school premises. This school gives first cycle education to blind children from the Southern half of Ghana. It also gives craft instruction to these children as well as to some of those who have completed their primary education at the Wa School for the Blind which caters for blind children from the Northern half of the country. Some blind adults also go to the A.S.B. to learn Braille.

Ophthalmologic Examination

The clinical histories were obtained from the inmates and their best corrected visual acuities (VA) were determined using the Snellen Chart. External eye examinations were made using a good torchlight and where necessary a portable slitlamp. Direct ophthalmoscopy and intraocular pressure measurement using the Perkins Hand Held Applanation Tonometer were carried out as appropriate. Anatomic diagnosis only were made. The data were analysed for the group as well as for those who are blind by the WHO definition of blindness (Table 1)5. The major causes of blindness of children aged 15 years or less were compared with those from the Northern half of the country who attend the Wa School for the Blind.
TABLE 1: CLASSIFICATION OF VISUAL DISABILITY: WHO RECOMMENDATION [5]

VISUAL ACUITY (VA) IN THE BETTER EYE

<table>
<thead>
<tr>
<th>GRADE</th>
<th>VA MAXIMUM LESS THAN</th>
<th>VA MINIMUM BETTER THAN</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6/18</td>
<td>6/60</td>
<td>Moderate visual disability</td>
</tr>
<tr>
<td>2</td>
<td>6/60</td>
<td>3/60</td>
<td>As in grade 1</td>
</tr>
<tr>
<td>3</td>
<td>3/60 (CF 3m)</td>
<td>1/60 (CF 1m)</td>
<td>Blind</td>
</tr>
<tr>
<td>4</td>
<td>1/60</td>
<td>Light perception</td>
<td>Blind</td>
</tr>
<tr>
<td>5</td>
<td>No light perception</td>
<td></td>
<td>Blind</td>
</tr>
</tbody>
</table>

TABLE 2: AGE–SEX DISTRIBUTION OF INMATES OF THE A.S.B.

AGE (YEARS)

<table>
<thead>
<tr>
<th></th>
<th>0–5</th>
<th>6–10</th>
<th>11–15</th>
<th>16–20</th>
<th>21–25</th>
<th>26–30</th>
<th>31+</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>—</td>
<td>14</td>
<td>22</td>
<td>24</td>
<td>12</td>
<td>7</td>
<td>3</td>
<td>82</td>
</tr>
<tr>
<td>FEMALE</td>
<td>2</td>
<td>9</td>
<td>22</td>
<td>12</td>
<td>2</td>
<td>—</td>
<td>—</td>
<td>47</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>23</td>
<td>44</td>
<td>36</td>
<td>14</td>
<td>7</td>
<td>3</td>
<td>129</td>
</tr>
</tbody>
</table>
### TABLE 3: AGE AT ONSET OF VISUAL DISABILITIES OF INMATES OF THE A.S.B.

<table>
<thead>
<tr>
<th>YEARS</th>
<th>ALL AGES</th>
<th></th>
<th>0 – 15 YEARS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>% of 129</td>
<td>No.</td>
<td>% of 69</td>
</tr>
<tr>
<td>0 – 28/365</td>
<td>57</td>
<td>44</td>
<td>41</td>
<td>59</td>
</tr>
<tr>
<td>29/365 – 5</td>
<td>34</td>
<td>26</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>6 – 15</td>
<td>25</td>
<td>19</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>16+</td>
<td>11</td>
<td>9</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### TABLE 4: VISUAL ACUITY BY CAUSES OF VISUAL DISABILITY OF INMATES OF THE A.S.B.

<table>
<thead>
<tr>
<th>VISUAL ACUITY</th>
<th>NPL</th>
<th>PL -3/60-</th>
<th>3/60+</th>
<th>TOTAL</th>
<th>% of TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>4</td>
<td>20</td>
<td>14</td>
<td>38</td>
<td>29</td>
</tr>
<tr>
<td>Corneal Scar/Phthisis Bulbi</td>
<td>18</td>
<td>17</td>
<td>1</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td>Choroidretinal Diseases</td>
<td>–</td>
<td>12</td>
<td>6</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>9</td>
<td>7</td>
<td>–</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Optic Atrophy</td>
<td>2</td>
<td>4</td>
<td>–</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

NPL: no perception of light
PL: Perception of Light Only
3/60-: VA < counting fingers at 3 meters
3/60+: VA = counting fingers at 3 meters or better
### TABLE 5: CAUSES OF BLINDNESS OF INMATES OF THE A.S.B.

<table>
<thead>
<tr>
<th></th>
<th>ALL AGES</th>
<th>AGES</th>
<th>0 - 15YRS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>TOTAL</td>
</tr>
<tr>
<td>Corneal Scar/</td>
<td>8</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Phtisis Bulbi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cataract</td>
<td>17</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>13</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Chorioretinal</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optic atrophy</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

### TABLE 6: CAUSES OF BLINDNESS OF SOUTHERN VRS NORTHERN GHANAIAN CHILDREN

<table>
<thead>
<tr>
<th>BLINDING DISEASE</th>
<th>SOUTHERN GHANA</th>
<th>NORTHERN GHANA [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of 56</td>
<td>% of 65</td>
</tr>
<tr>
<td>Corneal Scar/</td>
<td>43</td>
<td>63</td>
</tr>
<tr>
<td>Phtisis bulbi</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>Cataract</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Chorioretinal</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Diseases</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

### TABLE 7: RUBELLA AB PROFILE AND RELATIVE IMPORTANCE OF CATARACT AND GLAUCOMA IN CAUSING CHILDHOOD BLINDNESS IN SOME TROPICAL AFRICAN COUNTRIES.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CATARACT [%]</th>
<th>GLAUCOMA [%]</th>
<th>RUBELLA AB % OF FEMALE 15 - 19 YRS. OLD (19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana (S)</td>
<td>18</td>
<td>16</td>
<td>75</td>
</tr>
<tr>
<td>Ghana (N)</td>
<td>5</td>
<td>8</td>
<td>?</td>
</tr>
<tr>
<td>Nigeria (S)</td>
<td>19</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Nigeria (N)</td>
<td>3</td>
<td>4</td>
<td>?</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>6</td>
<td>0</td>
<td>90</td>
</tr>
</tbody>
</table>

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Statistical Analysis

The X² TEST was used for statistical analysis of the data.

RESULTS

Age and Sex.

The age and sex distribution is shown in Table 2. The average age was 16.4 years and the male to female ratio was 1.7:1. (approx. 2:1)

Onset of Visual Disability:

Table 3 indicates that for 91 out of the total of 129 (70%) the onset of visual disability was during their pre-school years. When those aged 15 years and below are considered, the figure rises to 63 out of 69 (91%). Fifty-nine percent of this latter group had the onset of their visual handicap during their neonatal period or intra-uterine life.

Causes of Blindness:

Table 4 shows that 103 out of 129 (80%) of the inmates are blind. Whereas cataract was the leading cause of visual disability, corneal scars and ptosis bulbi are the major conditions causing blindness among the inmates accounting for 34% of the 103 who are blind and for 43% of the 56 blind children aged 15 years and below (Table 5). Other causes of the blindness are cataracts, glaucoma and chorioretinal diseases.

Thirty out of the 38 inmates with cataracts had surgery on one or both eyes but with poor visual outcome for a number of reasons. Among these are the complications of surgery such as retinal detachment and glaucoma; delayed surgery after the onset of nystagmus when no appreciable improvement in vision is to be expected; and inadequate aphakic correction leading to amblyopia. Similarly, 10 out of the 16 glaucoma cases have had surgery but with poor visual outcome.

Eleven of the 36 corneal scars/ptosis bulbi group were measles related.

Included in the miscellaneous group in Table 4 are 6 cases of whole eyes, 3 empty sockets, 2 of microphthalmos, 1 sympathetic ophalmia and 3 undiagnosed.

DISCUSSION

Data on childhood blindness based on Blind School survey suffer from a number of limitations in that not all blind children are in Blind School nor is the blind school a sample of randomly selected blind children from a given area. Also there is cultural bias against sending girls in general and blind girls in particular to school as is revealed by the ratio 1:7:1 (approx. 2:1) boys to girls in this study. Nevertheless, blind schools do provide a convenient framework for the study of childhood blindness. The findings in this study therefore can only be regarded as approximations to the causes of childhood blindness in the Southern half of Ghana.

Table 3 indicates that 44% of the 129 inmates of the ASB had their visual disability starting either at birth or within the first 4 weeks of life. The likely causes of visual impairment in our environment in this age group are in-utero infections such as rubella presenting as congenital cataracts and toxoplasmosis presenting as bilateral chorioretinitis involving the macula, ophthalmia neonatorum and to a lesser extent familial cataracts, congenital retinal aplasia, and retinopathy of prematurity.

When we consider children 15 years and below, an even greater proportion, 59% of 69 had impaired vision during their neonatal period possibly suggesting an increase in importance of this group of diseases in recent times in causing childhood visual impairment.

Table 5 however seems to contradict the foregoing. It portrays the major blinding diseases as corneal scars/ptosis bulbi. In Ghana, the likeliest conditions leading to corneal scars/ptosis bulbi are ophthalmia neonatorum, vitamin A deficiency, measles, bacterial and fungal corneal ulcers leading to corneal perforation, trauma and application of harmful traditional eye preparations. Apart from ophthalmia neonatorum, all of these blinding conditions are more likely to occur after the neonatal period. The reason for this apparent discrepancy...
cy is seen in Table 4 which shows that a large number of cataract cases: 14 out of 38 and choroidal diseases: 6 out of 18 were not blin-
dy WHO definition while only 1 out of the 36 corneal scars/phthisis bulbi cases was non-blind-
ing. Table 6 compares the leading causes of blind-
ness in Southern Ghana with that of the North. This comparison is limited by the fact that the
definition of blindness and the age group con-
sidered might not be identical. However some
interest facts emerge. Corneal scars/phthisis bulbi are significantly more important blinding
conditions in the North than in the South (P<.01).
On the other hand cataract is a significantly more
important blinding disease in Southern Ghana than
in the North (P<.01). Incidentally this inter-
regional difference is even more strikingly present
in Nigeria. Sixty-nine percent of 104 inmates of a blind
school in Northern Nigeria compared with 22%
of 140 blind children attending an Eye
clinic in Southern Nigeria over a 5 year period
were blind from corneal scars/phthisis bulbi,5,6,7
a difference which is highly significant (P<.001).
For cataract, the respective figures are 3% in
the North of Nigeria and 19% in the South-West
(P<.01).

Oyin Olurin6 attributed the difference in relative
importance of corneal blindness between Northern
and Southern Nigeria children to the use of red oil,
rich in carotene, a precursor of vitamin A in the
South as opposed to groundnut oil, less rich in
Vitamin A in the North. However the findings of
Sandford-Smith et al7 of 14 out of 22 children with
corneal ulcers having serum retinol binding protein
levels in the normal range, and these children
having significantly higher serum retinol binding
protein levels than a group of malnourished children
without corneal ulcers indicate that the factors
responsible for corneal blindness in the
North and South of Nigeria and possibly Ghana are
more complex than simply relative vitamin A
deficiency. Whereas Moriarty8 showed that con-
genital rubella was responsible for 20 out of 42
cataract and 4 out of the 16 glaucoma blind
children in a Kingston School for the Blind in
Jamaica, it was not clear the extent to which con-
genital rubella was responsible for blinding
ataract and glaucoma among the inmates of the

ASB. Table 7 compares the rubella antibody
profiles in the populations of some Tropical
African countries with the prevalence of blindness
due to cataract and glaucoma in these areas1,9
From the figures available, one can conclude that
populations with 75% or less of the female of child
bearing age having rubella antibodies will have
cataract and glaucoma as important childhood
blinding diseases and possibly other stigmata of
congenital rubella.

Where 90% or more of the female population of
child bearing age have the antibodies, there will be
fewer cases of cataract or glaucoma blindness.
This assertion is confirmed by the fact that in The
Gambia where 100% of women of child bearing
age have the antibody, Clarke et al.10 in retrospec-
tive examination of clinical records failed to find
congenital rubella in neonates.

This study highlights the fact that more than 50% of
childhood blindness in Southern Ghana is
preventable and suggests an increasing importance
of congenital and early neonatal factors in causing
childhood visual disability. Congenital rubella is
likely to be an important cause of cataract and
glaucoma among Southern Ghanaian children.

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Josephine Amartei for Secretarial Assistance.

SPECIAL NOTE

The findings of this study formed part of a talk
given by one of the authors (A.S.K.) at the West
African Workshop on Prevention of Blindness held

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