A STUDY OF CAUSES OF BLINDNESS IN OVER 12,000 CASES IN CANADA*

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IN this paper data on 12,652 blind persons in Canada has been coded in accordance with the standard classification of the Committee on Statistics of the Blind. Our information in each case was obtained from the ophthalmologists' reports in the files of the Canadian National Institute for the Blind covering all Canada.

Among this blind population the visual acuity varies from no perception of light, which is the ophthalmologist's conception of blindness, to 6/60, which defines the upper limit for economical blindness accepted by the pension authority. There are now 6,777 persons in Canada receiving this pension, which amounts to an expenditure of somewhat over $2,000,000.00 per year.

In Table I, classification is carried out on the basis of topography and type of disease. The numbers in column A are those with no

*Read before the Canadian Ophthalmological Society, Montreal, June, 1945.

TABLE I.

TOPOGRAPHICAL CLASSIFICATION

	A	*B*	*C*	*1 - 20*	*21 - 40*	*41 - 60*	*60+*	*Total*
Eyeball								
Glaucoma	570	775	131	—	97	614	765	1,476
Myopia	20	795	247	118	278	554	112	1,062
Congenital anomalies	78	336	109	443	38	32	10	523
Anophthalmos	89	—	—	26	28	24	11	89
Phthisis bulbi	379	—	—	136	129	80	34	379
	1,136	1,906	487	723	570	1,304	932	3,529
Cornea								
Interstitial keratitis	4	80	20	54	30	16	4	104
Phlyctenula	—	12	5	8	6	3	—	17
Corneal ulcer	12	79	17	29	27	34	18	108
Corneal scars	104	656	124	246	180	339	119	884
Other affections	10	104	24	26	44	52	16	138
	130	931	190	363	287	444	157	1,251
Uveal tract and retina								
Iridocyclitis	136	422	56	65	175	256	118	614
Sympathetic ophthalmia	105	171	23	102	64	96	37	299
Chorio retinitis	63	843	182	104	169	419	396	1,088
Detached retina	41	143	12	14	49	96	37	196
Retinitis pigmentosa	35	335	68	79	177	166	16	438
Central choroiditis	4	81	22	12	17	29	49	107
	384	1,995	363	376	651	1,062	653	2,742
Optic nerve								
Optic atrophy	438	1,236	190	292	472	779	321	1,864
Lebers	4	47	5	31	13	11	1	56
Retro bulbar neuritis	7	45	10	6	18	27	11	62
Other	1	22	1	1	5	14	4	24
	450	1,350	206	330	508	831	337	2,006
Crystalline lens *Cataract*								
Congenital	24	463	90	577	—	—	—	577
Juvenile	—	4	4	—	7	1	—	8
Senile	34	1,792	217	—	43	623	1,377	2,043
Traumatic	1	47	6	5	21	18	10	54
Complicated	63	277	30	14	47	168	141	370
Aphakia	1	25	15	4	2	16	19	41
Dislocated lens	1	22	8	22	3	2	4	31
	124	2,630	370	622	123	828	1,551	3,124
Grand total	2,224	8,812	1,616	2,414	2,139	4,469	3,630	12,652

light perception, those in column B have visual acuity up to and including 3/60 and in column C over 3/60 up to and including 6/60. The next four columns show the age at which blindness occurred, while the last column shows the total number of cases of each condition diagnosed.

Among the diseases of the eyeball in general we find glaucoma with the largest number, showing the necessity for early diagnosis, research to discover its causes and further investigation to show the best methods of treatment in the different types of the disease.

Myopia is the next largest group. Our conservation of vision classes with guidance in the selection of a vocation have been helpful, but here, also, the real solution would seem to be research resulting eventually in the discovery of the cause.

Congenital anomalies include nystagmus, microphthalmos, buphthalmos, colobomas and other conditions such as optic atrophy, corneal scars, chorioretinitis, etc., which were reported by the examining ophthalmologist as having been present at birth.

In the large group due to corneal conditions, 884 were diagnosed as corneal scars with infection or trauma as their etiology. We can assume that most of these were the result of corneal ulcer.

Preventive measures could almost eliminate the 104 cases due to interstitial keratitis and if every inflamed or injured eye were referred to the ophthalmologist in its earliest stage I believe blindness, due to corneal ulcer, would occur in only a few cases.

Under diseases of the uveal tract we see 299 cases due to sympathetic ophthalmia. This is another sharp reminder of the urgency of immediate attention by the ophthalmologist for all eye injuries. In 33 of 196 detached retinas, trauma was given as a probable cause and in nearly all, myopia was mentioned. In over 100 of the 438 cases of retinitis pigmentosa we had sufficient family history to prove heredity as the cause. In the remainder this etiology was assumed.

Blindness was caused by disease of the optic nerve and visual pathway in 2,006 cases; in 1,864 of these it was due to optic atrophy. The 56 cases of Leber's disease were assumed to be hereditary. The 62 cases of retrobulbar neuritis were due to poisons or disseminated sclerosis and the 24 listed under other causes were due to injury or disease of the higher visual centres.

Cataract caused blindness in 3,124 cases of which number 2,043 were senile cataracts.

Of the 12,652 cases classified, 8,812 had a visual acuity from light perception up to and including 3/60, 2,224 had no light perception and 1,616 had better than 3/60 but not more than 6/60. The largest number of persons

TABLE II.
ETIOLOGIC CLASSIFICATION

Infectious diseases:	
Diphtheria	2
Gonorrhœa (including Oph. Neo.)	29
Ophthalmia neonatorum (not specified)	177
Measles	28
Meningitis	61
Scarlet fever	20
Septicæmia	1
Smallpox	14
Syphilis	518
Trachoma	176
Tuberculosis	52
Infections	863
Other	31
Total	1,972
Traumatic and chemical injuries:	
War	200
Explosions	127
Play or sport	27
Street and traffic	6
Birth injuries	9
Trauma, specified (including burns)	232
Trauma (not specified)	345
Total	946
Toxic poisoning:	
Tobacco	6
Alcohol	40
Other poisons	11
Total	57
Neoplasms	123
Systemic diseases:	
Anæmia	6
Diabetes	234
Nephritis	72
Vascular disease	392
Diseases of central nervous system	50
Other systemic diseases	20
Total	774
Congenital and hereditary:	
Congenital (includes all congenital cataracts)	1,332
Hereditary and familial (retinitis pigmentosa)	499
Total	1,831
Etiology not specified:	
Unknown to science (glaucoma, myopia, senile cataracts)	4,581
Undetermined by physician	2,368
Total	6,949
Grand total	12,652

became blind between the ages of 40 and 60, the next largest over 60, while the 1-20 group is a little larger than the 20-40.

In Table II, the etiology is shown. Gonorrhœa and ophthalmia neonatorum caused blindness in 206 cases and in 177 of these the diagnosis of ophthalmia neonatorum was given with etiology unstated. I would suppose that in a large number of these, gonorrhœal infection was present. In the group of 518 cases in which syphilis was the cause, the disease was acquired; except in the 104 cases due to interstitial keratitis. Under infections we have classified corneal ulcers, some iridocyclitis, some phthisis bulbi and some anophthalmos cases.

There had been 200 blinded Canadians from war service at the beginning of this year and of this number 65 were the result of this war. The total casualties up to February of this year in the Canadian Forces were 90,000, so that there was one blinded soldier in every 1,400 casualties. From the last war 175 cases of blindness resulted, 40 of these were not classified here as some did not return and take up residence in Canada, and, in others, blindness occurred at a later date than 1918 and was due to systemic diseases and other causes directly connected with war service. These were classified elsewhere. The total casualties in the first war were 216,000, of which number 60,000 were killed or died of wounds. If we calculate 175 as the total of blinded persons among 216,000 casualties, it amounts to 1 blinded soldier in 1,235.

Brain tumour accounts for nearly all the 123 cases of neoplasms, with only a few being due to local growths. The large group of 1,332 cases of congenital conditions includes congenital cataracts. Under "unknown to science" we have placed senile and complicated cataracts, myopia and all glaucomas except secondary.

Owing to lack of information in the ophthalmologists' reports it was necessary to place 2,368 cases in the "undetermined by physician" group, but, when we remember that in many cases the patient was seen only once and this sometimes long after blindness had occurred, the number is not unduly large. It includes many cases of optic atrophy, chorioretinitis, iridocyclitis and detachment of the retina.

Any help for these 12,652 persons can only come from measures calculated to restore vision, as the time for prevention is past. For this purpose we can offer cataract extraction in suitable cases, operation for detachment of the retina, if the case is seen early enough, and in a few cases of corneal disease the contact lens or corneal transplant. Of our total number we have about 3,500 cases from which a selection could be made for one of these procedures.

It is not within the scope of this paper to go into the various methods in use, or advised, for the prevention of blindness but I would like to suggest one method that I have never seen mentioned. I think all will agree that every individual at some time between the ages of 40 and 50 will require an eye examination and this is our opportunity. The general public is now aware that various diseases may be discovered by examination of the eyes and they are no longer satisfied with a prescription for glasses with which they can read. I suggest that in all these cases a cycloplegic should be used and the media and fundi carefully examined. I am sure if this were done some glaucomas would be discovered in their earliest stage, some cases of diabetes and nephritis would be found early enough to prevent their ever entering the blind group, and many cases of vascular disease would be found and referred to their physician. The discovery of these and other conditions by using this method of examination in 100% of cases in this age group would, I believe, make a considerable contribution to the prevention of blindness program.

Medical Arts Bldg.

RÉSUMÉ

12,652 aveugles à des degrés divers ont été étudiés dans tout le Canada et ils ont été classés. Les diverses tables qui figurent dans le texte indiquent les points de vue envisagés dans cette classification-statistique.

Il résulte de cet exposé que la prophylaxie demeure la grande mesure à envisager dans l'état actuel de notre ignorance sur certaines étiologies encore très obscures. Cette prophylaxie de la cécité et de l'amblyopie s'exercera tout particulièrement chez les individus qui ont dépassé la quarantaine. JEAN SAUCIER

The idea that malnutrition is a condition which is identifiable by means of some overall index or a few signs is no longer tenable. The manifestations of malnutrition are as numerous as the substances needed to support growth, maintain the life processes, and sustain the normal functioning of the organism.—D. G. Wiehl, *American Journal of Public Health*, **35**: 1168, 1945.