Prevalence and Causes of Blindness among Sudanese adults attending outreached ophthalmic services in Sudan- 2019

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Abstract

Introduction: Blindness is a visual acuity of <3/60, or a corresponding visual field loss to less than 10 degrees in the better eye. It's a serious public health problem that contributes to severe physical limitation, affects the productivity and has psychological and social impacts. The objectives of this research were to estimate the prevalence and to identify the major causes of blindness.

Materials & Methods: This was an outreached based cross- sectional study conducted among 858 participants on four different cities in Sudan in 2019. Cluster sampling was used to draw the sample proportionate to size and systematic random sampling was used to select participants. Each study participant was investigated and examined clinically then data were collected using a pre-coded, pretested and administered closed ended questionnaire. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0.0. Prevalence was estimated, Univariate analysis for all determinants, bivariate analysis by cross tabulation of causes were performed. The study was estimated at 95% confidence level.

Results: The prevalence of blindness among the study population was 14%; the uppermost affected region was in Nyala (35%). The majority of blinds were females (59%) and the highest age group affected was of 60 years and above (80%). Glaucoma was the leading cause of blindness (42%) followed by Cataract (32%) and Diabetic Retinopathy (8%).

Conclusion: The prevalence of blindness among the study population is high. The majority of affected candidates were females of older age groups. Glaucoma was the leading cause of blindness followed by Cataract and Diabetic Retinopathy

Keywords: Blindness in Sudan; Prevalence; Causes of blindness; Ophthalmic Outreached services; Vision in Sudan

Introduction:

Blindness is a visual acuity of <3/60, or a corresponding visual field loss to less than 10 degrees in the better eye, not correctable by standard glasses, contact lenses, medicine, or surgery. It interferes with a person's ability to perform everyday activities [1] and significantly reduces the quality of the persons' life.

There are 285 million people estimated to be visually impaired worldwide; 39 million of them are blind and 246 have low vision. About 90% of the world visually impaired lives in low-income settings and 82% of people living with blindness are aged 50 and above [2].

The largest number of blind people resided in south Asia (11·7 million, 80% UI 4·1–21·7), followed by East Asia (6·2 million, 2·1–11·5) and Southeast Asia (3·5 million, 1·3–6·3). The crude prevalence of blindness ranged from 0·24% (80% UI 0·10–0·42) in Australasia to 0·70% (0·24–1·29) in south Asia [3].

The leading causes of chronic blindness include cataracts, glaucoma, age-related macular degeneration (AMD), corneal opacities, refractive errors, diabetic retinopathy (DR), trachoma, and eye conditions in children (e.g. caused by vitamin A deficiency). Age-related blindness is increasing throughout the world, as is blindness due to uncontrolled diabetes. [4]

It is estimated that half of all blindness can be prevented. Because most of the major blinding eye diseases do not significantly affect the vision at earlier stages, thus interventions are most useful before the disease begins to develop or in early stages of development. Screening and early treatment for most of the major blinding eye diseases are available and some are also cost-effective [5].

The economic impact of vision loss is extensive. It was found that direct medical expenses, other direct expenses, loss of productivity, and other indirect costs for visual disorders across all age groups were approximately 139 billion dollars in 2013, with direct costs for the under-40 population reaching 14.5dollars billion dollars. These costs impinge on the national health care expenditures and even extend to influence other related expenses and resources of individuals and their families [6].

Objectives:

1. To estimate the prevalence of blindness in four cities in Sudan.
2. To identify the leading causes of blindness in Sudan

Materials & Methods:

This was an outreached based cross- sectional study reviewed and approved by Albasar Institutional Review Board- Sudan. It was conducted among 858 participants on four different cities in Sudan; Khartoum, Kassala, Nyala and Aldamazin in 2019. The study aimed to estimate

the prevalence and to identify the leading causes of blindness to reveal information for prevention and control.

Sample size was estimated statistically considering the design effect and response rate. The sample was drawn proportionate to size at each outreached service area and participants were selected using systematic random technique. Informed written consent was obtained from each participant prior to study then each participant was investigated and examined clinically by consultant ophthalmologist and data were collected using a pre-coded, pre-tested, and administered closed ended questionnaire composed of 43 questions on socio-demographic data and causes of blindness.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0.0. The number of clinically blind participants was identified to estimate the prevalence in each city. Univariate analysis for all determinants and bivariate analysis by cross tabulation of causes were performed. The results were displayed as tables and charts.

Results:

The prevalence of blindness among the study population was 14%; the uppermost affected region was in Nyala; 35% (Figure I). The majority of blinds were females; 59% (Table 3), and the highest

age group affected was of 60 years and above; 80% (Table 2). Glaucoma was the leading cause of blindness; 42% followed by Cataract; 32% and Diabetic Retinopathy; 8% (Table 4).

Table 1: Background characteristics

Background characteristic		Frequency	Percentage
Age in years	18-29	189	22
	30-39	87	10
	40-49	159	19
	50-59	153	18
	60-69	135	16
	70-79	87	10
	80 & above	48	6
	Total	**858**	**100**
Gender	Male	463	54
	Female	395	46
	Total	**858**	**100**
Marital Status	Single	192	22
	Married	553	64
	Divorced	48	6
	Separated	36	4
	Widowed	29	3
	Total	**858**	**100**
Educational level	Illiterate	288	34
	Basic	169	20
	Secondary	159	19
	University& higher	242	28
	Total	**858**	**100**

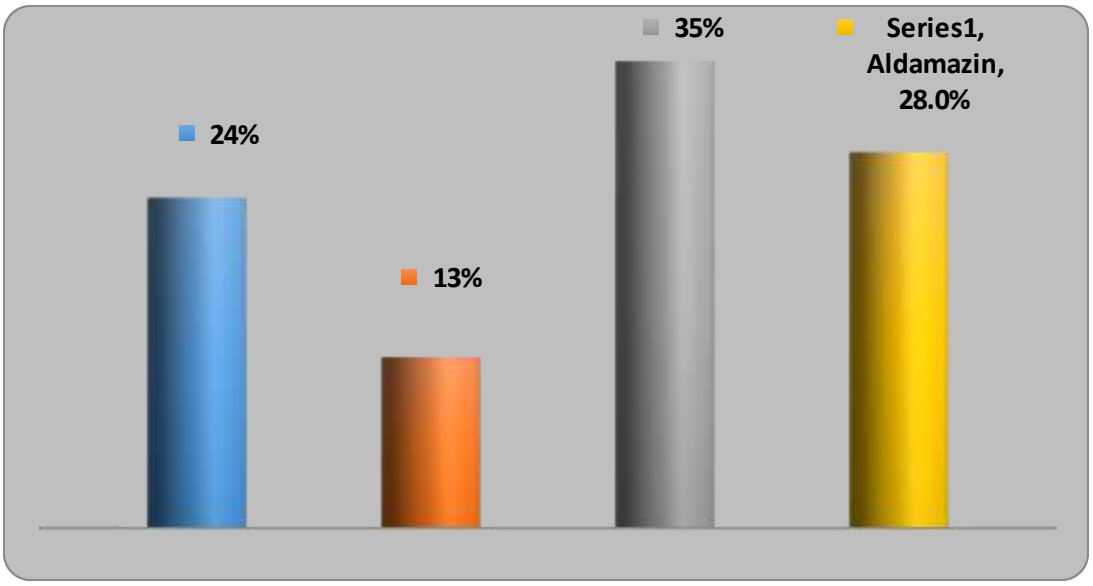

Figure I: Prevalence of Blindness according to country region

Table 2: Blindness versus age groups

		Current status of blindness		Total
		Blind	Not blind	
Age in years	18-29	0	189	189
	30-39	3	84	87
	40-49	7	152	159
	50-59	14	139	153
	60-69	31	104	135
	70-79	37	50	87
	80 and above	26	22	48
Total		118	740	858

Table 3: Gender versus blindness

		Current status of blindness		Total
		Blind	Not blind	
Gender	Male	48	415	463
	Female	70	325	395
	Total	118	740	858

Table 4: Causes of blindness among participants

		Current status of blindness		Total
		Blind	Not blind	
Current diagnosis	Normal	0	98	98
	Cataract	38	169	207
	Glaucoma	50	53	103
	Diabetic retinopathy	9	21	30
	Others	21	399	420
	Total	118	740	858

Discussion:

The study set out to answer the questions of prevalence and the leading causes of blindness in four cities in Sudan.

Among 858 candidates selected proportionate to size of each outreached camp, the majority were males exceeding females by about 8%. The highest age group attended to seek eye care was the youngest age group (18-29 years old) and the least age group was of 80 years and above. It was expected that the majority of attendee would be of older ages as they are usually more prone to develop health problems. This is either due to small percentage of these age groups in these regions of Sudan or may be due to difficulty in access to services. Colm Mc Alinden and et al revealed in their study the mean age of majority of patients accessing eye care was 56.11 (±20.42) [7], unlike the results of this study where the majority were young adults.

This study divulged that the prevalence of blindness among the study population is 14%, thus the estimated number of blind people in Sudan represents almost about 7% of the global number of blind people; where the anticipated number of 18 years of age and above population in Sudan is about 19,600,000[8], and according to the WHO; the estimated number of blind people all over the world in 2018 is about 36 million. This prevalence is high if compared with the prevalence estimated by Marcelino Correia and et al in Timor-Lest which was only 2.8% [9] and with the prevalence of blindness in Sokoto State – Nigeria which was estimated to be as low as 1.9% [10]. Although the study was conducted in outreached service and all the attendee were already having eye problem, thus the prevalence estimated cannot be generalized to the overall country population but still it is alarming. Blindness is either due to reversible or irreversible diseases, and in most of the cases it is preventable and or treatable, thus such high percentage of blindness reflects poor measures towards prevention and treatment of diseases leading to blindness such as knowledge regarding eye diseases and their early symptoms, when to seek medical advice or due to barriers that limit the access to eye care services weather physical or financial. The healthcare services is recommended be distributed and available in a manner that matches the community needs and the cost must be feasible without any burden and a sufficient level of knowledge must be assured to secure the community members against such disabling disorders.

The majority of blinds were females (59%). There is no scientific justification yet relates a higher prevalence of blindness to females except for the hypothesis that relates females at higher

risk for developing age related eye diseases due to longer life expectancy. In countries similar to Sudan where this study was conducted, it may be related to social and or traditional barriers that limit the access of females to healthcare services. In addition, this could be related to the theory of age related eye disorders since the uppermost blind age group was of 70-79 years old (31%) followed 60-69 years old (26%) and females are more prone to live longer; thus they would be at higher risk for blinding diseases. This matched the results of the study conducted Doyal L & et al [11].

This is cluttering that the older age groups of 60 years and above females were the premier with the supreme prevalence of blindness (80%). A highly significant associations were revealed regarding relation between blindness with gender and with age (P-value= 0.002) and (P-value= 0.000) respectively.

Throughout the four regions of this study, the highest prevalence of blindness was in Nyala city; the capital of South Darfur in the South-West of Sudan and the least number of blind candidates was in Khartoum state; the Capital of Sudan. Khartoum is the most modern state and it is the capital of the country with the highest standard of healthcare services if compared to other regions. A good number of healthcare institutes and professionals are available in Khartoum, in addition to easier access to services; all are advantages that makes the state of community health is better than other regions including eye care services. The high prevalence of blindness in Nyala could be related to the limited number of healthcare institutes and professionals cadres, and Nyala is a rural city as well and this was proved by H Hashemi and et al in their study that estimated a higher prevalence of blindness in rural areas [12].

The study yielded that the major cause of blindness was due to Glaucoma; on top of all types of blindness (42%) and that contradicted both of the studies by Rohit Varma who found that the major cause of blindness among Chinese Americans was Myopic Retinopathy [13] and Marzieh Katibeh [14] who revealed DR as a major cause of blindness. Glaucoma leads to irreversible blindness that can't be treated but the effects of it on vision can be prevented and controlled if early detected and diagnosed, and being a major cause of blindness in Sudan in this study is an indicator of either late or no presentation to medical care whether due to lack of knowledge, education or difficulty in accessing to healthcare service for any reason it was; financial or physical. Another reason could be related to the health service itself since Glaucoma diagnosis

and treatment require a good standard of institutional setup and well trained professionals that should be proportionate to the population number require that services noted that the treatment in most of the cases is for the rest of life and is relatively expensive. There was strongly between the causes and the state blindness (P-value=0.000).

Cataract was the second leading cause of blindness (32%). This disease could be easily managed with a simple surgical procedure. Although globally cataract is a leading cause of blindness and the prevalence of it caused by cataract is even higher if compared with this study as stated in the results achieved by Moncef Khairallah and et al; 33.4% of blindness was due to Cataract [15], but still such percentage reflects services that not matching the needs. In Sudan the reason could be due to lack of infrastructures and trained cadres considering as well the financial cost that would significantly contribute to the increase in this disorder.

Diabetic Retinopathy affected about 8% with blindness; this means a considerable prevalence of uncontrolled diabetes mellitus (DM) is there as well which a serious problem that directly indicates poor educational level that plays a major role in control of DM. Butting into account the rapid change in DM and DR epidemiology, Retinopathy is now a global problem that affects 34% of all diabetics [16] and the magnitude of blindness is expected to raise due to this problem unless actions directed to enhance the level of knowledge and to strengthen the role of primary care to control DM and prevent against retinopathy are taken.

In conclusion, the prevalence of blindness among the study population in Sudan is high. The majority of affected candidates were females of older age groups. Glaucoma was the leading cause of blindness followed by Cataract and Diabetic Retinopathy.

The magnitude of non-modifiable factors leading to blindness represents a great risk on the community in Sudan. It is highly recommended to take actions towards health education, prevention, early detection and control to protect the population and to reduce the prevalence of blindness.

Conclusion:

- The prevalence of blindness among the study population is high.
- The majority of affected candidates were females of older age groups.
- Glaucoma was the leading cause of blindness followed by Cataract and Diabetic

Retinopathy

References:

1. Center for Disease Control and Prevention: Blindness and Vision Impairment.

2017. Retrieved from: https://www.cdc.gov/healthcommunication/toolstemplates/entertainment ed/tips/Blindness.html. Accessed 17 April 2019.

2. WHO: Blindness.2019. Retrieved from: http://www.who.int/topics/blindness/en/. Accessed 10 April 2019.

3. Rupert R, Seth R, Braithwaite, Maria V, Aditi D, Jost B, et al . Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis.The Lancet Global Health. 2017; 05(09): 888-897.

4. WHO. Visual impairment and blindness; Fact Sheet N°282. 2018. Retrieved from: http://www.who.int/mediacentre/factsheets/fs282/en/. Accessed 10April 2019.

5. Centers for Disease Control and Prevention: Blindness and Vision Impairment.2017. Retrieved from: https://www.cdc.gov/healthcommunication/toolstemplates/entertaid/tips/Blindness.html. Accessed 09 April 2019.

6. National Academies of Sciences, Engineering, and Medicine. Making Eye Health a Population Health Imperative. Vision for Tomorrow.2016. doi: 10.17226/23471.

7. Colm M, Helen C, Nik S, Peter G. Demographics, referral patterns and management of patients accessing the Welsh Eye Care Service. Eye and Vision. 2016; 3: 14.

8. World Population Review: Sudan Population. 2019. Retrieved from: http://worldpopulationreview.com/countries/sudan-population/. Accessed 18 April 2019.

9. Marcelino C, Taraprasad D, Julia M, Bernadette M , Valerio A, Hans L, et al. Prevalence and causes of blindness, visual impairment, and cataract surgery in Timor-Leste. Clinical Opthalmology. 2017; 11: 2125–2131.

10. Nasiru M, Rabiu M, Adamu M, Elizabeth E, Sunday I. Prevalence and Causes of Blindness and Visual Impairment in Sokoto State, Nigeria: Baseline Data for Vision 2020: The Right to Sight Eye Care Programme. Middle East African Journal of Ophthalmology. 2011; 18(2):123–128.

11. Lesley D, Raja G. Sex, gender and blindness: a new framework for equity. BMJ Open Ophthalmology. 2018; 03 (01).

12. Hashemi H, Yekta A, Jafarzadehpur E, Doostdar A, Ostadimoghaddam H,

Khabazkhoob M. The prevalence of visual impairment and blindness in underserved rural areas: a crucial issue for future. Eye. 2017; 31: 1221-1228.

13. Rohit V, Jeniffer S, Bruce S. Prevalence and Causes of Visual Impairment and Blindness in Chinese American Adults. JAMA Ophthalmology. 2016; 134(7): 785-793.

14. Marzieh K, Mohammad P, Mehdi Y, Mojgan P, Reza S. Prevalence and Causes of Visual Impairment and Blindness in Central Iran; The Yazd Eye Study. Ophthalmic and Vision Researchs. 2015; 10(3): 279–285.

15. Moncef K, Rim K, Rupert B, Hans L, Seth R, Jost Band, et al. Number of People Blind or Visually Impaired by Cataract Worldwide and in World Regions, 1990 to 2010. Investigative Ophthalmology & Visual Science. 2015; 56(11): 6762-6769.

16. Yan L, Yifan S, Liyuan T, Weiqiang Q, Huibin L. Xiodan J, et al. Prevalence of diabetic retinopathy among 13473 patients with diabetes mellitus in China: a cross-sectional epidemiological survey in six provinces. British Medical Journals. 2016; 7(1).