Narrative Review

Glaucoma in Saudi Arabia: A Challenging Public Health Concern – A Narrative Review

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ABSTRACT

The aim of this narrative review is to investigate and summarize studies conducted for prevalence of glaucoma in Saudi Arabia. Search criteria were; published studies after the year of 2000 and included Saudi population. Any study that focused on subtypes of glaucoma and their relations with other ocular conditions were excluded. There were three studies that estimated the prevalence of glaucoma in Saudi Arabia. The prevalence reported in these studies ranged from 5.4% to 5.8%. However, these studies were conducted in specific regions and did not represent the national prevalence of glaucoma in Saudi Arabia. It was concluded that there is a high demand for accurate estimate for the national prevalence of glaucoma in Saudi Arabia. Accurate estimate of prevalence and epidemiology of glaucoma leads to constrain the challenges of glaucoma as a public health concern in Saudi Arabia.

Key Words: Glaucoma, Prevalence, Public health, Saudi Arabia.

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INTRODUCTION

Glaucoma is the second leading cause of visual impairment and blindness worldwide. In fact, glaucoma is the major cause of irreversible visual impairment and blindness.[1] In 2014, the number of glaucoma cases was 64.5 million worldwide, this number is expected to increase to 112 million in 2040.[1] The global prevalence was estimated to be 3.54%.[1] In Saudi Arabia, glaucoma represented 5.7% of the total causes of visual impairment and was reported as one of three major causes of the visual impairment.[2,3] However a national prevalence of glaucoma in Saudi Arabia is yet to be estimated.

Glaucoma is defined as a group of chronic, progressive and potentially blinding optic neuropathies characterized by changes to the optic nerve head and retinal nerve fiber layer associated with visual field defect.[4]To provide the best practice of diagnosing and managing glaucoma, pattern and distribution of the disease as well as the mechanism of glaucoma should be investigated and understood.

Glaucoma has become a public health concern because of several reasons. First, the diagnosis and management of the disease is extremely challenging. This is because of the asymptomatic nature of some of its types. This means that patients will not have symptoms of vision loss until damage has occurred to a large number of optic nerve fibers and visual fields. Another aspect of challenges occurs in the angle closure glaucoma, in which the progression of damage towards blindness is fast and is difficult to slow down and control. Secondly, glaucoma affects a wide range of daily activities such as driving, reading and walking. The functional defects lead to challenges of quality of life for individuals with glaucoma.[5-8] Thirdly, cost is high for treatment of individuals with advanced stages of glaucoma. The cost will even be higher for those who are classified as low vision patients due to glaucomatous insult.

Because of these reasons, estimating and understanding the prevalence and the pattern of the

disease distribution will largely help provide ultimate management plan of the disease and present potential preventative approaches to reduce the adverse effects of glaucoma. In this review, we present a few studies that attempted to estimate the prevalence of glaucoma in Saudi Arabia. We shall also demonstrate limitations and the gaps that need to be dealt with. The objective of this review was to elaborate the potential demand of conducting national investigation on glaucoma epidemiology, which enhances the current knowledge of clinical management and diagnosis of glaucoma in Saudi Arabia.

METHODS

In this study, we reviewed published articles on glaucoma, in which the sample included Saudi population across the country and collected in individual provinces of Saudi Arabia. This review also included studies that focused on causes of visual impairments and reports prepared by international and official agencies such as World Health Organization. Studies which included other ocular diseases in addition to glaucoma were also included. On the other hand, studies that were conducted to investigate subtypes of glaucoma or their relationship with specific ocular or systemic diseases were excluded. Studies conducted before 2000 were excluded, because of the demographical changes that had occurred especially the increase in the mean age and the increase in the number of individuals older than 40 years.

Any study that matched the exclusion and inclusion criteria was selected. Following keywords were used: glaucoma, prevalence, Saudi Arabia and population based; no filters were used. The search included following search engines: PubMed, Google Scholars and Web of Science. The review process was performed by one reviewer, the author (MA).

RESULTS

According to the defined inclusion and exclusion criteria, there were three studies (2001 to 2022), that estimated prevalence of glaucoma in Saudi Arabia.[9-11] All these studies were about estimating prevalence and percentage of causes of visual impairment in individual provinces of Saudi Arabia. None of these studies applied a national prevalence study that defines the spread of glaucoma across the country. Table 1 shows the studies that were found with the prevalence and a region for each study. It can be observed that the three studies showed a prevalence that ranged from 5.3% to 5.8%. These studies were within the 8 years period from 2011 to 2019.

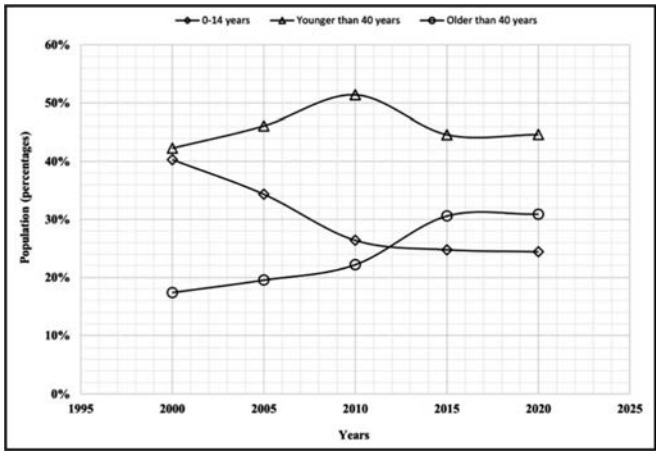

Figure 1: The percentages of Saudi Arabian population older than 40 years (circles), younger than 40 years (triangles) and individuals with age from 0 to 14 years (diamonds) from 2005 to 2019. It can be observed that the percentage of the people older than 40 (circled symbols) years had been increased since 2005, while the other two groups had been declined at the same period of time.

There were also some studies that were not included in this review because they were conducted before year 2000.

DISCUSSION

Glaucoma is known as one of the leading causes of irreversible blindness worldwide. Global efforts have been made to estimate prevalence of glaucoma.[1,2,12,13] This estimate helps clinicians and researchers to find optimized methods leading to early detection of the disease and to reduce the progression of disease. Therefore, the remaining vision is preserved. The goal of this review was to provide knowledge regarding prevalence of glaucoma to the clinicians and researchers. Hence, actions can be taken to address the national prevalence of glaucoma. To the best of our knowledge, no study was available that estimated prevalence of glaucoma across the country of Saudi Arabia.

Two studies estimated prevalence of glaucoma types where the open-angle glaucoma was reported to have the highest prevalence.[14,15] Although these studies presented valuable knowledge regarding glaucoma types; they were only conducted among

Table 1: *Studies conducted to investigate prevalence/proportions of glaucoma as a cause of the visual impairment in individual regions of Saudi Arabia.*

Author	Sample Size	Prevalence/Proportion of the Causes for the Visual Impairment	Region	Year of Publication
L – Shaalan et al.[9]	617	5.8%	Northern region	2011
Hajar et al.[10]	3800	5.3%	Southern region	2015
Khandekar et al.[11]	940	5.6%	Central region (Except the capital)	2019

glaucoma populations. This means that prevalence of glaucoma among the general population was not estimated. Finding only three studies that investigated the glaucoma epidemiology in Saudi population demonstrates a substantial lack of knowledge related to glaucoma epidemiology in Saudi Arabia. Clinicians would have unclear knowledge about the cases that are being seen in their clinics. The researchers have no clear framework of conducting glaucoma research that is needed to reduce damage caused by this disease. Moreover, there would also be difficulties in the clinical practice regarding protocols that should be followed for clinical examinations of glaucoma because the distribution of glaucoma types and spread is unknown.

The insufficient epidemiological knowledge in clinical practice and in research has led to unclear insight about glaucoma in the health officials and agencies. The result was that glaucoma was not given interest and attention by specialists who were enrolled in residency programs.[16]This resulted in inadequate number of glaucoma specialists across the country. The number of glaucoma specialists was least as compared to other sub-specialties in Ophthalmology across the country. This consequently caused cumulative number of glaucoma patients who needed to visit glaucoma clinic. Although it may not be the only reason but it has definitely contributed towards decreased awareness about glaucoma in the health sector.

This resulted in fewer glaucoma specialists and absence of primary eye care role in primary health centers to deal with glaucoma. There is a long waiting list of glaucoma patients reported in different hospitals and glaucoma clinics. Therefore, urgent cases that required clinical intervention would not have their appointment at the best time. Consequently, severe glaucoma cases were reported where more optic nerve tissues and visual field damage had occurred, leading to substantial reduction in the quality of life.[17] In addition, there is lack of opticians who are well skilled in taking images and performing optimum visual field testing or other functional tests that are necessary for glaucoma diagnosis and management. Needless to say that imaging acquisition and accurate visual field testing are critical components for clinical interpretations in patients with glaucoma.

The improvement of glaucoma epidemiology knowledge will be beneficial to build an effective connection between the research that investigate glaucoma and its spread on one hand and the clinical diagnosis and management of the disease on the other hand. This leads to reduce a wide range of challenges about clinical work up of glaucoma patients. It will also develop protocols that optimize the clinical care of glaucoma patients.

Glaucoma epidemiology is a critical public health concern because, if not well managed, it affects the quality of life of an individual and thence of society. Several reports concluded that patients with glaucoma would have lower performance in several daily life activities such as driving, reading and occupational roles as compared to control participants.[5-8]If this concern is well tackled, there would be more potential approaches to provide ultimate clinical settings and research strategies to early detect the disease and reduce progression. Therefore, methods of fighting the disease would be more efficient to reduce the effect of glaucoma on different aspects of individuals and the society.

Another concern regarding the lack of glaucoma knowledge in Saudi Arabia is the economic impact. In Saudi Arabia, the diagnosis and management are mostly covered by the government for the citizens. The management includes topical drops that reduce the intraocular pressure. The glaucoma medications are expensive; the equipment that is used for visual field testing and for imaging acquisitions is expensive as well. Lee et a,[18] demonstrated that the average total cost for a glaucoma patient per year (including diagnostic tools, therapeutic and medications) at early stages was about 50% less than the cost in advanced stages. This proves that there is a dire need to build a framework that provides effective diagnosis and

management methods in order to improve detection of disease and monitor its progression. Thus complications and challenges of glaucoma should be dealt with.

Heijlet al,[19] demonstrated that intervention for glaucoma patients reduced the progression of the disease by about 17%. This raised the importance of accurate and early diagnosis of disease. This can be accomplished by activating screening programs for individuals who are at risk of glaucoma. It was suggested by Burr and collogues, that glaucoma detection would be improved by screening programs and by improving the current methodologies of diagnosing and managing glaucoma.[20] The risk factors for glaucoma include age above 40 years, complications of diabetic retinopathy and high blood pressure.

It is a known fact age of above 40 years is an important risk factor for glaucoma. In Saudi Arabia, the average age has recently been increased.[21] According to General Authority for Statistics in Saudi Arabia, the percentage of people older than 40 years to the general population increased from 18% in 2005 to about 27% in 2019 (Figure 1). They also demonstrated that diabetes mellitus and high blood pressure were the most common chronic diseases among 65 years older people in the Saudi population. Alrubeaan et al, found that 19.7% of diabetic patients had diabetic retinopathy, which is considered one of the risk factors for glaucoma.[21] Hence, estimating the prevalence of glaucoma will be the first step toward efforts of preventing complications of glaucoma and towards providing a better management than the current practice.

Conflict of Interest: Authors declared no conflict of interest.

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Authors' Designation and Contribution

Muhammed S. Alluwimi; Assistant Professor: *Concepts, Design, Literature Search, Data Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*