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The Trend of Physical Disabilities Resulting from Type 2 Diabetes Mellitus in the Kenyan Society from 2010 to 2020: A Systematic Review

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Abstract

Type 2 diabetes is one of the world's most prevalent non-communicable diseases. It has progressively increased around the world caused largely by a lack of physical activity and the consumption of an unhealthy diet. This disease affects Kenya greatly due to the lack of awareness of the condition and inefficient screening methods. The majority of cases are only discovered after the onset of the symptoms, which can take years to manifest. Physical disabilities such as retinopathy, nephropathy, hypertension, and neuropathy are all extremely common in Kenya. The continual increase in cases of the disease has led to these complications being more prevalent as there are many cases that go unnoticed until it is too late. This article aims to assess the trend of physical disabilities resulting from type 2 diabetes mellitus in the Kenyan society from 2010-2020. The article used systematic review research method to investigate the major physical disabilities caused by type 2 diabetes in the Kenyan society for the past ten years. Results indicate that the four major diabetes complications, retinopathy, nephropathy, neuropathy, and cardiovascular complications were all observed in the Kenyan society. Some complications lead to hypertension, poor quality of sleep, and diabetic foot ulcers, among others. It was concluded that the prevalence of the disease is likely to increase over the coming years and there needs to be a shift in public health, medical, and lifestyle practices as well as awareness that will enable us to flatten the curve of complications arising from type 2 diabetes mellitus.

eyords: Type 2 diabetes mellitus; Diabetes physical disabilities; Systematic review; Kenyan society

Introduction

Diabetes Mellitus (DM) is a non-communicable disease that has been increasing in its prevalence on a global scale. In 2016, the WHO recognized it as one of the top 10 causes of death in all countries, other than low-income nations [1]. There are an estimated 463 million people with diabetes around the world, with 19 million of those in Africa, these numbers are expected to rise to 642 million globally by 2040 and 47 million in the African region by 2045 [2]. According to the International Diabetes Federation (IDF), type 2 diabetes is the most common diabetic disease with 90% of all cases being of this kind. It is characterized by the body's resistance to insulin which is caused primarily by poor dietary habits and physical inactivity [3]. Other risk factors include abdominal obesity and excessive alcohol consumption. Many undiagnosed cases of diabetes remain a concern of the Public Health sector as Type 2 diabetes is less marked than its counterpart and thus is usually discovered a few years after its onset, at which point it may be too late. Unfortunately, the proportion of undiagnosed diabetes in Africa stands at 69% which is nearly doubles that in higher-income countries at 37% [4]. As such the morbidity and mortality rates in Africa are much higher than the rest of the world. Type 2 diabetes has been increasingly prevalent in Sub-Saharan Africa (SSA), it was measured at approximately 6% in 2017, with the median number of adults living with it found to be 15.5 million [5]. All these current measurements are expected to increase in the next 20 years. Measured costs of treatment in SSA totaled to 3.3 billion US dollars which is expected to increase to 6 billion in the same time span. One of the most affected countries is Kenya. This is a rapidly developing nation in East-Africa, known for its premium economic, transport and financial status in the region; it is quickly urbanizing and improving in ways far beyond its neighbors. However, with this urbanization and globalization occurring, the Kenya National Strategy for the Prevention and Control of NCDs 2015-2020, noted that there has been a rise in diabetes prevalence within the nation [5]. This rise can be attributed to these demographic changes as well as the common diabetes risk factors of unhealthy diets and physical inactivity, which have all risen as well. Type 2 diabetes unfortunately is a disease that cannot be cured, once diagnosed, it is only manageable. This management requires changes to the daily lifestyle promoting a diabetes-healthy lifestyle. Although it can go into slight remission, there still has to be keen attention paid to the risk factors of diabetes on an individual's health? It is much better to ensure that the disease is never contracted and several measures need to be put in place on a nation- and worldwide level to try and curb this rising prevalence of cases. Public health officials, medical personnel and policy makers should all increase the work being done to spread awareness of the seriousness of this disease. Implementing projects that will improve attention to diet, as well as community and personal exercise programs. The study aimed to assess the trend of physical disabilities that emanate from type 2 diabetes in Kenya.

Methods

All data included in this article comes from studies that were published not earlier than 2009 to get the most accurate information for our specified range of years. Databases used include Cochrane e-Library, Ebscohost, BMC Public Health, Hinari, Joster, and Research for Life. Grey literature was obtained from google scholar, as the World Health Organization (WHO), Center for Disease Control (CDC), and International Diabetes Federation (IDF) websites. A combination of keywords that included "Type 2 diabetes and disabilities in Kenya' as well as 'type 2 diabetes complications in Kenya' was used in the search for all articles containing information on physical disabilities associated with type 2 diabetes in Kenya between 2010-2020. All data obtained contained research involving community screening (including home-based door-to-door), clinic-based and general cross-sectional studies, pragmatic cluster randomized clinical trials, secondary analysis of reviewed datasets and official Kenya Ministry of

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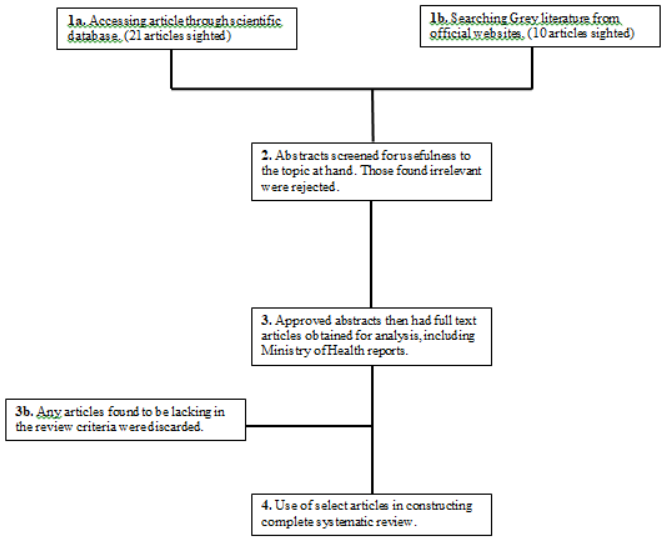
Health reports. All studies that were used in this article had to satisfy certain criteria before being left in consideration for inclusion in the systematic review (Figure 1 and Table 1).

Figure 1: Flowchart of systematic review process undertaken



Inclusion criteria

The inclusion criteria were as follows

1. The study must contain information obtained through community screening, cross-sectional study, clinical study, and official government records, all within Kenya.
2. Report on the prevalent disabilities involved with type 2 diabetes in Kenya.
3. Must be peer-reviewed and fully published articles.
4. Must contain information obtained not earlier than 2010.
5. The primary reviewer went through and removed all articles that do not have any meaningful information to add to the review.

Exclusion criteria

1. Reviews, reports, proceedings, letters, editorials, commentaries, case studies.
2. Studies that were published before 2010.
3. Studies published outside Kenya.

Complication-observed	Study-type	Number	*Source*	*Results*
Cardiovascular complications	Community and home-based screening	236 (home based screening) 346 (community-based screening)	[6]	6% (home based) and 10% (community based) participants had SBP ≥ 160 mmHg. 23% (home-based) and 8% (community-based) had a random glucose level ≥ 7 mmol/L.
Cardiovascular complications	Population-based household survey (cluster sampling)	2,061	[7]	
Nephropathy	Cross-sectional	385	[8]	Prevalence of DM leads to an increase in hypertension that was three-fold. (Cardiovascular risk factors were high)
Nephropathy	Cross-sectional	245	[9]	UKD occurred in over 30% of study cases.
Neuropathy	Cross-sectional	84	[10]	All subjects had T2DM, 53% had poor QOS (compared to 29.5% in comparison group), 44% (compared to 8% in comparison group)were at high risk for OSA.
Overall complications	National STEPS survey	4,069	[4]	Mortality was 11% in people with DFU
Retinopathy	Cross-sectional	4,414	[11]	There is a high level of pre-diabetes prevalence and undiagnosed diabetes which can progress to complications.
Retinopathy	Cross-sectional	270	[12]	Incidence of 224.7 per 1000 among participants with known diabetes mellitus.

Table 1: Systematic review results.

Results

Type 2 diabetes has the highest predicted percentage growth in Sub-Saharan Africa. This puts at risk several countries in the region, especially the rapidly urbanizing country of Kenya. Cases and complications of type 2 diabetes in Kenya have only increased over the past 10 years. Among adults below the age of 60, the adjusted national prevalence of type 2 diabetes has been estimated during the past decade to be 2.2%-5.3% while the non-adjusted prevalence is recorded at 4.2% [6-9]. Studies done in Kenya between 2010-2020 have also shown an increase in complications due to the lack of diabetes awareness, late interventions and low control [4]. These studies were done in a different part of Kenya including Nairobi, Webuye district, Nakuru, Nyeri and Kirinyaga [6,8,10-12]. Physical disabilities that were observed include retinopathy, nephropathy, cardiovascular complications, and neuropathy. These complications will only likely increase with a majority of them going undiagnosed.

Discussion

This major health problem in Kenya is not given the public and medical attention it needs. Costs are rising globally and locally in treating and managing the disease. The review shows that there are complications that come along with type 2 diabetes including neuropathy, retinopathy, cardiovascular complications and nephropathy. Cardiovascular complications have increased due to the prevalence of DM in the nation as hypertension is increased three-fold among cases with community and home-based screening showing a prevalence of high blood pressure of 6% and 10% respectively as well as high random glucose levels. Chronic Kidney Disease (CKD) was found to be prevalent in 30% of study cases with diabetes as well as an increased prevalence of poor quality of sleep and risk for obstructive sleep apnea. Due to the increased lack of initiation and maintenance of annual fundoscopy, it is difficult to measure the full scale of all retinopathy cases and prevalence; however, studies show an incidence of nearly 25% (2224.7 per 1000) among participants with diabetes mellitus. Complications of neuropathy were also prevalent in the nation, while looking at diabetic foot ulcers, which present a major complication of diabetes mellitus. The mortality rate was measured at 11%. Some of the data recorded and reported needs further research due to the lack of extensive and effective enough methods of screening as well as treatment. The disabilities are often exasperated due to type 2 diabetes and its tendency to remain asymptomatic for a long time, even years. This leads to a more serious progression of the complications before the diagnosis, by which time it may be too late.

Retinopathy

Diabetes retinopathy (DR) is a complication of diabetes mellitus that affects the retinal microvasculature. Although it isn't a leading cause of blindness in SSA, it can lead to serious effects on the eyes causing visual impairment such as cataract, uncorrected refractile error, and trachoma. Although there are very few studies looking at DR complication as a result of DM, [11] found in a study done in Kenya that patient's aged ≥ 50 who have DM also have an incidence of 22.5% to develop DR. This is a worrying incidence as there are approximately 34.6% of patients who have DM that develop DR and 10% develop sight-threatening DR [12]. Unfortunately, there is very minimal data that is comparable in all of SSA let alone Kenya.

Nephropathy

The leading cause of end-stage renal disease is diabetes nephropathy, also known as diabetes kidney disease (DKD). This occurs when high blood glucose levels, attributed to type 2 diabetes, that begin to damage the blood filtering parts of the kidney and leads to protein leakage. 40% of patients who have DM develop DKD which can then progress to chronic diabetes disease [8]. In a study done in Nairobi, Otieno et al discovered that members of the adult population ≥ 30 years and above who had type 2 diabetes had a prevalence of chronic kidney disease ranging between 32.7%-39.0%, all in different stages of the disease between 3-5 [8]. The asymptomatic nature of the disease makes it that patients are unlikely to see medical care with due diligence.

Hypertension

Hypertension is another complication of type 2 diabetes that can lead to several physical disabilities. Most individuals that are suffering from type 2 diabetes with the development of hypertension also end up developing nephropathy as the high blood pressure can also lead to more damage on the kidneys [6,8]. Due to these complications, it is of high importance to diagnose and identify patients with hypertension early on. In a home and community-based screening exercise for hypertension among diabetes patients, 6% of the population, home-screened, was found to have developed hypertension while 10% at the community level were found [13]. However, the results are to be looked at carefully as the methodology used was different from most as well as the rural setting of the study. Other studies are reported to have found up to 50% prevalence of hypertension in people suffering from type 2 diabetes within Kenya [6,8,14].

Neuropathy

Neuropathy involves the damage or dysfunction of nerves and these results in the affected area feeling symptoms of numbness, tingling, muscle weakness, and pain. According to Ajala, 59% of clinical visits with diabetes type 2 diagnosis present peripheral neuropathy [15-20]. These pains can cause individuals to be unable to move or handle objects freely as it mostly affects the hands and feet. Foot ulceration often occurs in 15%-25% of all individuals suffering from diabetes with 7% of those risking amputation in the next 10 years [21-25]. This can greatly reduce the quality of life as most diabetic individuals end up being unable to comfortably move around and need to pay very costly medical fees for treatment. These treatments are especially expensive in Kenya and make it difficult for those suffering complications to receive aid. They in turn must live with their conditions which can begin to cause other issues. In a study done at the Kenyatta hospital, Sokwalla et al noted the effect of peripheral neuropathy on type 2 diabetes patients, discovering that it causes "Poor Quality of Sleep (QOS)" in 53.4% of individuals suffering from peripheral neuropathy with 44.4% of those being at risk for obstructive sleep apnea (OSA) [26-30]. With the increase in the prevalence of type 2 diabetes itself, we can expect an increase in the cases of OSA being reported in further studies done as peripheral neuropathy increases in prevalence as well.

Conclusion

Type 2 diabetes is increasing in prevalence within Kenya. The number of patients has been growing and will keep on rising for the years to come. With the current levels of continual urbanization and change

in lifestyles among the Kenyan people, the number of undiagnosed cases will likely remain as high and possibly increase. Unfortunately, this will lead to a continual increase in the physical disabilities due to the disease. Furthermore, this increase in morbidity will lead to an increase in mortality as well. Spreading awareness and implementing new procedures to screen for type 2 diabetes before complications arise can have a positive impact on this negative trend and hopefully slow down the rise.

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