

## Hypertension and Micro-Vascular Complications Among Type 2 Dm Adult Patients in Mukalla, Yemen

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### Abstract

**The Background and Purpose:** to assess the prevalence of hypertension and micro-vascular complications among type 2 diabetic patients registered in primary health care center in Mukalla city at eastern Yemen.

**Methods:** A Cross-sectional study was conducted in a randomly selected eligible patients from the diabetic registry of the AL Noor Charity Center (ACC), Mukalla city in Yemen.

**Results:** Prevalence of hypertension in the T2DM patients were 46.7% (56/120). Retinopathy is the most micro-vascular complications among the adults having T2DM (73/120, 60.8%) while nephropathy is the least prevalence (13/120, 10.8%), prevalence of neuropathy was 49.2% (59/120), a high prevalence of retinopathy in males (66%) than females (55.7%) and a high prevalence of neuropathy in male adults (52.2%) than females (46%).No statistical significant difference were exit related to gender for any studied complications. Similar findings were observed regarding age related variations.

**Conclusion:** A high prevalence of hypertension, retinopathy and neuropathy were reported among T2DM patients in Mukalla. Adopting effective and safe treatment strategies are highly recommended to prevent premature death and complications due to DM.

**Key words:** Hypertension; micro vascular complications; DM

### Introduction

Diabetes mellitus (DM) is a syndrome consisting of metabolic, vascular and neuropathic components that are interrelated. It is defined as group of metabolic disorder that is characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both, which leads to alteration in carbohydrate, fat and protein metabolism.[1]

Type 2 diabetes is estimated to affect over 150 million people worldwide.2 This prevalence is increasing rapidly, partly through changes in case ascertainment and diagnostic criteria, but mainly through lifestyle changes in countries which know a fast development.2 Type 2 diabetes is also associated with an increased risk of premature death due to cardiovascular disease (CVD), stroke, and renal disease.3 Hypertension is a major risk factor for cardiovascular disease, stroke and ischemic heart disease. Therefore, this factor represents one of the most preventable causes of morbidity and premature mortality in developed as well as developing countries.4 Hypertension and diabetes frequently coexist. The frequency of hypertension in diabetic population is almost twice as compared to non-diabetic general population.5 There is a considerable evidence for an increased prevalence of hypertension in diabetic persons6 The prevalence rate of hypertension among type 2 diabetics is higher than that of age and sex-matched patients without diabetes, ranging between 32% and 82%.7-12 The coexistence of hypertension and type 2 diabetes is a major contributor to the development and progression of macro-

vascular and micro-vascular complications in people with diabetes compared to the general population.4, 13-15 As an example of this problem in developing countries; The prevalence of hypertension, the frequencies of undiagnosed hypertension and uncontrolled hypertension among Moroccan patients with type 2 diabetes were very high.16

Micro-vascular complications from type 2 diabetes are common and include retinopathy leading to various degrees of visual impairment including blindness and has become a major cause of blindness throughout the world;17,18 neuropathy, leading to pain and numbness, chronic and recurrent infected ulcers in the extremities which can lead to amputation; and nephropathy characterized by proteinuria ultimately leading to end stage renal disease. It constitutes the major work load of dialysis centers.3,7 Micro-vascular complications are the major outcome of type 2 Diabetes Mellitus progression, and increase diabetic mortality.19

Information on prevalence of type 2 diabetes mellitus related complications is important for the updating of policies and practices in diabetic care management to gain better control of type 2 diabetes mellitus. In Yemen the epidemiology of diabetes mellitus remains poor, and there is little information available on this issue in the international literature.20

The aims of this study were to assess the prevalence of hypertension and micro-vascular complications among type 2 diabetic patients registered in primary health care center in Mukalla city at eastern Yemen.

**Patients and methods:**

All adults (both males and females) at age of > 40 years, who receiving care in Al-Noor charity center (ACC) during the period from May-July 2017 constituted the study population for purpose of this work. A sample size of 120 eligible patients was statistically calculated based on an expected proportion of 34.29%21.

**The Inclusion criteria** were determined as all medically diagnosed T2DM patients above 40 years of age of both sex (male and female) who registered on diabetic treatment schedule and visited ACC at regular intervals) while patients who already taking lipid-lowering drugs and pregnant women were excluded.

ACC is a primary health care center and it is a community based services center of NGO in Mukalla city at eastern Yemen. It is the only center in Mukalla establishing diabetic registry and clinic ten years ago.

A Cross-sectional study was conducted in a randomly selected eligible patients from the diabetic registry of the AL Noor Charity Center (ACC), Mukalla city in Yemen during the period from May-July 2017

A well structured questionnaire was the tool for data collection from patients. The questionnaire include personal data, family history, history

of the illness. Samples of blood were collected from patients by well trained 4th medical laboratory students in Hadramout University. .

All the obtained data are fed on computer using the statistical package of social sciences version (SPSS version 23 ). Statistical methods used for univariate analysis are mean, median, standard deviation, range and interquartile range, for bivariate analysis, independent t- test for difference between two sample means, chi square test for association between categorical variables. A cut-off point of 0.05 was determined for significance level

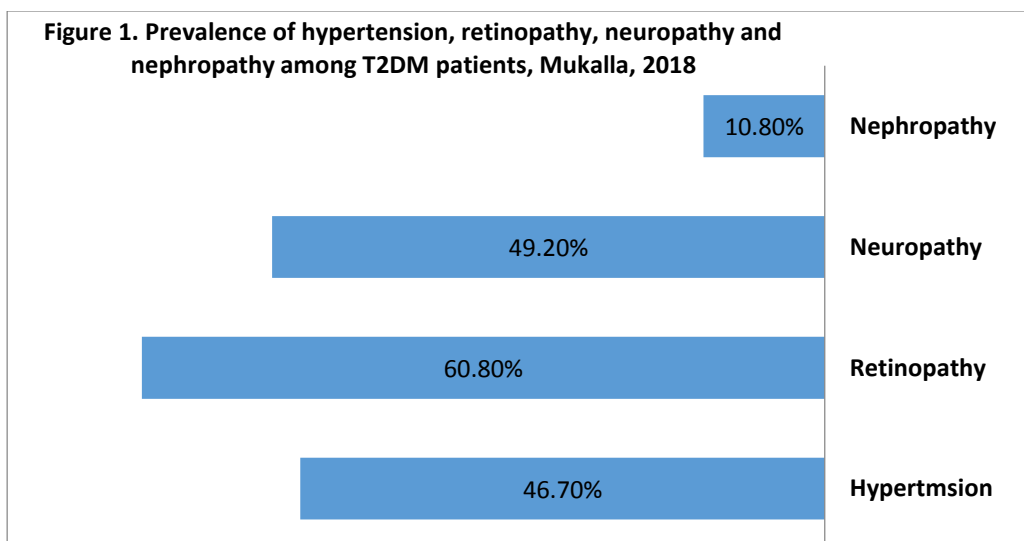
**Results:**

The mean age of participants was 54.8[1]years ( ± 9.33). Out of 120 diabetic patients enrolled in the study, 6[1]were females (50.8%), 52.4 % were unemployed, 30% were illiterates, 35.8% were overweight and 25% were obese. (Table 1).

Prevalence of hypertension in the T2DM patients were 46.7% (56/120). Retinopathy is the most micro-vascular complications among the adults having T2DM (73/120, 60.8%) while nephropathy is the least prevalence (13/120, 10.8%), prevalence of neuropathy was 49.2% (59/120). (Figure 1)

Characteristics		Frequency	Percentage %
Age	41-50 years	47	39.2
	51-60 years	43	35.8
	> 60 years	30	25
Gender	Male	59	49.2
	Female	61	50.8
Occupation	Government	29	24.2
	Private work	28	23.4
	unemployed	63	52.4
Education status	Illiterate	36	30.0
	Read and write	26	21.7
	Primary	33	27.5
	Secondary	14	11.7
	University+	11	9.1

**Table 1:** Demographic characteristics the studied Type 2 diabetic patients attending AL Noor Charity Clinic (ACC), Mukalla city, 2017 .



Prevalence of hypertension in male T2DM adults was 45.5% in males while in females was 47.5%. a high prevalence of retinopathy in males (66%) than females (55.7%) and a high prevalence of neuropathy in male adults (52.2%) than females (46%), low prevalence of nephropathy

were observed in both males (13.5% ( and females (8%). No statistical significant difference were exit related to gender for any studied complications of T2DM among adults.

Complications	Male (n= 59)		Female (n=61)		P-value
	No	Prevalence%	No	Prevalence%	
Hypertension	27	(45.7%)	29	(47.5%)	0.496
Retinopathy	39	(66%)	34	(55.7%)	0.165
Neuropathy	3[1]	(52.5%)	28	(46%)	0.293
Nephropathy	8	(13.5%)	5	(8%)	0.258

**Table 2.** Gender specific prevalence rates of hypertension and micro-vascular complication of T2DM among diabetic adults, Mukalla, 2018

The median age is used for classification of age groups into two groups (≤58 years and >58 years). Prevalence of hypertension, retinopathy and neuropathy were more among age groups 49 to 58 years than age group

above 58 years while nephropathy was common in age group of 30 -58 years, but the difference is not statistically significant. (Table. 3)

Complications	≤58 years (n= 77)		>58 years (n=43)		P-value
	No	Prevalence%	No	Prevalence%	
Hypertension	37	(48%)	19	(44%)	0.415
Retinopathy	49	(63.6%)	24	(55.8%)	0.258
Neuropathy	4[1]	(53.2%)	18	(41.8%)	0.157
Nephropathy	6	(7.8%)	7	(14.5%)	0.130

**Table 3.** Gender specific prevalence rates of hypertension and micro-vascular complication of T2DM among diabetic adults, Mukalla, 2018

### Discussion

This study highlight on the magnitude of hypertension and micro-vascular complications among T2DM in Yemen. A high prevalence of hypertension, retinopathy and neuropathy were reported and low prevalence of nephropathy, there was no significance difference exist regarding age and gender. Patients with diabetes mellitus (DM) are at risk of adverse cardiovascular (CV) outcomes, including micro-vascular and atherosclerotic complications.<sup>22</sup>

Type 2 diabetes mellitus (T2DM) is a global pandemic and its prevalence is rapidly increasing in developing countries, including Yemen. The most common co-morbidity associated with T2DM is hypertension. In Thailand; the most common co-morbidity of T2DM is hypertension.<sup>23</sup> T2DM with a hypertension co-morbidity is likely to exacerbate the development of, or more severe micro-vascular complications.

The prevalence of hypertension among T2DM patients varies across countries and is reported to range from 20.6% to 78.4% in the Southeast Asian region, and 9.7% to 70.4% in the African region<sup>2[1]</sup>The problem is not limited to the developing countries only, Type 2 diabetes mellitus (T2DM) and hypertension (HT) are major non-communicable health problems in both developing and developed countries.<sup>24</sup>

Micro-vascular complications among T2DM patients are a consequence of prolonged hyperglycemia, <sup>23</sup> and these complications include diabetic neuropathy, diabetic nephropathy and diabetic retinopathy. The prevalence of micro-vascular complications among T2DM patients is high, but has been shown to vary widely across populations.<sup>26-28</sup> In this study a high prevalence of retinopathy and neuropathy were reported in comparing with other studies in China, Australia and India. A study in China reported prevalence of neuropathy, nephropathy, ocular lesions, and foot disease among T2DM patients to be 17.8%, 10.7%, 14.8%, and 0.8%, respectively.<sup>30</sup> Another study in Australia reported the prevalence of diabetic retinopathy among T2DM patients is 21.9%.<sup>3[1]</sup> Prevalence of any micro-vascular in newly diagnosed T2DM in India is 30.2%.<sup>27</sup>

It was reported elsewhere about the importance of controlling BP among T2DM to prevent further micro and macro-vascular complications. Hurst

C et al in 2015 indicate in their study in Thailand that hypertension was highly associated with micro-vascular complications, and blood pressure control is highly important in terms of preventing micro-vascular complication among patients with T2DM.<sup>23</sup> Moreover and based on available evidence, patients with DM and persistent BP readings >140/90 mmHg should be started on antihypertensive drug therapy.<sup>32,33</sup> These data are clear that drug therapy in hypertensive DM patients is effective in reducing mortality; preventing adverse CV events, such as myocardial infarction, stroke, and heart failure; and slowing the progression of existing kidney disease.<sup>34,35</sup> It is important to keep in mind that the degree of BP reduction is the major determinant of reduction in CV risk, superseding the choice of antihypertensive drug; a dictum that is valid in patients with DM.<sup>36</sup>

### Conclusion:

A high prevalence of hypertension, retinopathy and neuropathy were reported among T2DM patients in Mukalla. Adopting effective and safe treatment strategies are highly recommended to prevent premature death and complications due to DM.

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