Prediction of cardiovascular events in primary Health care: a cross sectional study (Monastir-Tunisia).

Prédiction des événements cardiovasculaires dans les centres de santé primaires: une étude transversale (Monastir-Tunisie)

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RÉSUMÉ

Introduction: Notre objectif était de déterminer la prédiction du risque des événements cardiovasculaires chez les patients hypertendus et/ou diabétiques, à l'aide du score de Framingham à 10 ans.

Méthodes: Nous avons mené une étude transversale dans deux centres de santé primaires à Monastir. Nous avons inclus des patients avec au moins un facteur de risque cardiovasculaire conventionnel. La prédiction de l'événement cardiovasculaire a été exprimée par la médiane et l'intervalle interquartile.

Résultats: Nous avons inclus 409 patients. L'âge moyen était de 64 ans (ET=12,3), le sex-ratio était de 0,44. Le diabète de type 2 (DT2) était présent chez 278 patients (68%) et 295 avaient une Hypertension Artérielle (HTA) (72,1%).

La prédiction globale du risque pour les maladies cardiovasculaires à 10 ans était de 26,3%. Elle était de 36,6% (26,4-46,8) pour les fumeurs, 29,7% (18,2-42,5) pour l'HTA et 29,1% (18,8-43,3) pour le DT2. Elle était significativement corrélée avec le nombre de facteurs de risques cardiovasculaire. Elle était significativement plus élevées chez les hommes que chez les femmes (p <0,01) et chez les patients non contrôlés que chez les patients contrôlés (p = 0,001). La prédiction du risque de mortalité cardiovasculaire était de 3,6% (1,3-8,6).

Conclusion: Trente pour cent des patients présentant une hypertension ou un diabète pourraient développer une maladie cardiovasculaire à 10 ans. Des actions de prévention ciblées doivent être renforcées pour faire face à ce fléau.

Mots clès: Maladies cardiovasculaires, Facteurs de risque, Diabète, Hypertension artérielle, Tunisie

SUMMARY

Introduction: We aimed to determine the prediction of cardiovascular events in patients with hypertension and diabetes using the 10-year Framingham score. Methods: We conducted a cross sectional study in two primary health care centers in Monastir. We included patients with at least one conventional cardiovascular factors. Prediction of cardiovascular event were expressed by median and inter quartile range.

Results: We included 409 patients. Age mean was 64 years (SD: 12.3), the sex ratio was 0.44. Patients with type 2 Diabetes were 278 (68%) and 295 had hypertension (72.1%). The global risk prediction at 10 years for cardiovascular diseases was 26.3%, It was 36.6% (26.4-46.8) for tobacco users, 29.7% (18.2-42.5) for patients with hypertension and 29.1 % (18.8-43.3) for those with diabetes. It increased significantly with the number of cardiovascular risk factors. The risk prediction for cardiovascular events, were significantly higher in men than in women (p < 0.01) and in non-controlled patients than in controlled patients (p <0.001). The risk prediction for cardiovascular diseases death was 3.6% (1.3-8.6).

Conclusion: Thirty percent of patients with hypertension or diabetes will develop cardiovascular diseases in 10 years. We suggest renforcing preventive actions to balance cardiovascular risk factors, including hypertension and diabetes.

Key words: Cardiovascular Diseases, Risk factors, Diabetes mellitus, Hypertension, Tunisia

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INTRODUCTION

Cardiovascular diseases are a major public health problem (1, 2). The burden of these diseases is supported by the increasing prevalence of conventional Cardio Vascular Risk Factors (CVRFs) essentially represented by Type 2 Diabetes (T2D) and High Blood Pressure (HBP). The World Health Organization estimates that annual mortality due to cardiovascular diseases will approach 25 million by 2030 worldwide, of which about 80% will occur in low- and middle-income countries (3, 4).

Tunisia has undergone a crucial demographic and epidemiological transition (5). A National chronic disease program focusing on the detection and management of conventional CVRFs (6) is especially based on Primary Health Care (PHC). The development of equations for calculating and predicting the risk of cardiovascular events from the CVRFs collection (7) is a useful tool from an epidemiological and individual standpoint. They can be used to assess the benefits of primary prevention. Studies on prediction of cardiovascular events in Tunisia are rare. We aimed to determine the prediction of cardiovascular events in patients with hypertension and diabetes using the 10-year Framingham score.

METHODS

Design: We conducted a cross sectional study during 2017 in Primary Health Care PHC centers.

Setting**:** Monastir is located in the central east of Tunisia. Monastir city included 8 PHC centers. The two centers randomly selected in Monastir ("Stah Jabeur" and "Khnis") serve a population of 20000 inhabitants. The National chronic disease program has been adopted in 1998. It objective to ensure standardized management of hypertension and diabetes in PHC centers. It aimed to prevent cardiovascular events by screening and management of HBP and T2D (6).

Patients**:** We included adult patients monitored for conventional CVRFs in PHC centers during 2017.

Variables: The data included socio-demographic variables (age and sex), medical characteristics (T2D, HBP, obesity, sedentary lifestyle, and smoking), biological parameters (glycated hemoglobin (HbA1C), total cholesterol, Triglycerid (TG), low density lipoproteins (LDL cholesterol), and high density lipoproteins (HDL cholesterol), drugs (Metformin, Hypoglycemic sulfonylurea, insulin, converting enzyme inhibitors, Calcium channel blockers, diuretics and statins) and cardiovascular events (Peripheral artery disease, diabetic neuropathy, retinopathy, stroke, myocardial infarction and coronary heart diseases.

Data sources and measurement: according to 2017 recommendations, we defined HBP as unbalanced BP, with systolic BP ≥ 140 mmHg and / or diastolic BP ≥ 90mmHg. For high-risk cardiovascular diseases subjects, we recommended BP <130/80 mmHg (7). Body mass index (BMI) was calculated using the following formula: BMI = Weight (Kg) / Height^2 (m^2). Obesity has been defined as a BMI ≥ 30 Kg / m^2 for both sexes (7). Glycemic control: Based on T2D recommendations, patients with T2D were considered sufficiently controlled if HbA1C was <7% (7). Sedentary lifestyle: We define the sedentary lifestyle as anyone who has not done at least 30 minutes of moderate intensity physical activity, at least three times a week. Smoking was defined as the state of smoking reported in the past year; this consumption has been quantified as a year package. Age- sex according to World Health Organization recommendations, age is considered a risk factor if it is greater than 65 years for women and 55 years for men. Cardiovascular events included cardiovascular diseases, and associated deaths. Cardiovascular diseases included **c**oronary heart diseases, peripheral artery disease and Stroke**.**

Peripheral artery disease was defined by the presence of intermittent claudication, the abolition of one or more of the pulse or trophic disorders. Coronary heart disease has been defined in patients with a history of myocardial infarction, symptoms of angina pectoris or signs of electrocardiographic ischemia.

Biological parameters: Hypercholesterolemia has been defined as total cholesterol > 5.2 mmol/l; hypertriglyceridemia was defined as TG>1.7mmol/l and HDL cholesterol was considered as pathological if < 1mmol /l for men and < 1.20mmol/l for women (7, 8).We defined dyslipidemia disorders as patients having TG disorders and/or HDL CH, Cholesterol disorders. We used the 10-year Framingham score to calculate the RP of cardiovascular diseases (7) (figure 1).

Formula for coronary heart diseases

100*(1-EXP(-EXP((LN(A)-(15,5305+(28,4441*(1-C))+(-1,4792*LN(B))+(0*LN(B)*LN(B))+(-14,4588*LN(B)*(1-C)) + (1,8515*LN(B)*LN(B)*(1-C))+(-0,9119*LN(J))+(-0,2767*E)+(-0,7181*LN(K/L))+(-0,1759*G)+(-0,1999*G*(1-C)) + (-0,5865*H) +(0*H*C)))/(EXP(0,9145)*EXP(-0,2784*(15,5305+(28,4441*(1-C))+(-1,4792*LN(B))+(0*LN(B)*LN(B)) + (-14,4588*LN(B)* (1-C))+ (1,8515*LN(B)*LN(B)*(1-C))+(-0,9119*LN(J))+(-0,2767*E)+(-0,7181*LN(K/L))+(-0,1759*G)+ (-0,1999*G*(1-C)) + (-0,5865*H)+(0*H*C)))))))

Formula for Stroke

100*(1-EXP(-EXP((LN(A)-(26,5116+(0,2019*(1-C))+(-2,3741*LN(B))+(0*LN(B)*LN(B))+(0*LN(B)*(1-C))+(0*LN(B)*LN(B)*(1-C))+(-2,4643*LN(J))+(-0,3914*E)+(-0,0229*LN(K/L))+(-0,3087*G)+(-0,2627*G*(1-C))+(-0,2355*H)+(0*H*C)))/(EXP(-0,4312)*EXP(0*(26,5116+(0,2019*(1-C))+(-2,3741*LN(B))+(0*LN(B)*LN(B))+(0*LN(B)*(1-C))+(0*LN(B)*LN(B)*(1-C))+(-2,4643*LN(J))+(-0,3914*E)+(-0,0229*LN(K/L))+(-0,3087*G)+(-0,2627*G*(1-C))+(-0,2355*H)+(0*H*C)))))))

Formula for cardiovascular diseases

100*(1-EXP(-EXP((LN(A)-(18,8144+(-1,2146*(1-C))+(-1,8443*LN(B))+(0*LN(B)*LN(B))+(0,3668*LN(B)* (1-C)) +(0*LN(B)*LN(B)*(1-C))+(-1,4032*LN(J))+(-0,3899*E)+(-0,539*LN(K/L))+(-0,3036*G)+(-0,1697*G*(1-C)) +(-0,3362*H) +(0*H*C)))/(EXP(0,6536)*EXP(-0,2402*(18,8144+(-1,2146*(1-C))+(-1,8443*LN(B))+(0*LN(B)*LN(B))+(0,3668*LN(B)*(1-C)) +(0*LN(B)*LN(B)*(1-C))+(-1,4032*LN(J))+(-0,3899*E)+(-0,539*LN(K/L))+(-0,3036*G)+(-0,1697*G*(1-C))+(-0,3362*H) +(0*H*C)))))))

Formula for cardiovascular diseases death

100*(1-EXP(-EXP((LN(A)-(-5,0385+(0,2243*(1-C))+(8,237*LN(B))+(-1,2109*LN(B)*LN(B))+(0*LN(B)*(1-C)) +(0*LN(B)*LN(B)*(1-C))+(-0,8383*LN(J))+(-0,1618*E)+(-0,3493*LN(K/L))+(-0,0833*G)+(-0,2067*G*(1-C))+(-0,2946*H) +(0*H*C)))/(EXP(0,8207)*EXP(-0,4346*(-5,0385+(0,2243*(1-C))+(8,237*LN(B))+(-1,2109*LN(B)*LN(B))+(0*LN(B)*(1-C)) +(0*LN(B)*LN(B)*(1-C))+(-0,8383*LN(J))+(-0,1618*E)+(-0,3493*LN(K/L))+(-0,0833*G)+(-0,2067*G*(1-C))+(-0,2946*H) +(0*H*C)))))))

Formula for coronary heart diseases death

100*(1-EXP(-EXP((LN(A)-(11,2889+(0,2332*(1-C))+(-0,944*LN(B))+(0*LN(B)*LN(B))+(0*LN(B)*(1-C))+(0*LN(B)*LN(B)*(1-C)) +(-0,588*LN(J))+(-0,1367*E)+(-0,3448*LN(K/L))+(-0,0474*G)+(-0,2233*G*(1-C))+(-0,1237*H)+(0*H*C)))/(EXP(2,9851)* EXP(-0,9142*(11,2889+(0,2332*(1-C))+(-0,944*LN(B))+(0*LN(B)*LN(B))+(0*LN(B)*(1-C))+(0*LN(B)*LN(B)*(1-C))+(-0,588*LN(J))+ (-0,1367*E)+(-0,3448*LN(K/L))+(-0,0474*G)+(-0,2233*G*(1-C))+(-0,1237*H)+(0*H*C)))))))

Parameters used for risk calculation

A	Time period	Time in years over which risk is calculated. Usually set to 10, appropriate range is 4 to 12 years. Does not affect ASSIGN calculation (which is always 10 years).
B	age	Patient age in years (try to limit to 35 to 75 years).
C	male	Patient sex: male=1, female=0
D	cigarettes	Number of cigarettes smoked per day. Affects ASSIGN score only.
E	smoker	Smoking status: smoker=1, non-smoker=0. Does not affect ASSIGN score.
F	Family hx	Family history of premature cardiovascular disease: yes=1, no=0. Affects ASSIGN score only.
G	diabetes	Presence of diabetes: yes=1, no=0
H	lvh	Presence of left ventricular hypertrophy on ECG: yes=1, no=0. Does not affect ASSIGN score.
I	simd	Scottish index of multiple deprivation. Usual range is 0.53 to 87.7. 20 is a reasonable default when unknown. Affects ASSIGN score only.
J	systolic_bp	Systolic blood pressure in mmHg
K	total_chol	Total cholesterol in mmol/L
L	HDL_chol	HDL cholesterol in mmol/L

Note: In our study we haven't used the lvh and the simd to calculate risk prediction

Figure 1. Formula used to calculate the 10-year Framingham risk score of cardiovascular events

Statistical analysis:

Data was collected and analyzed using SPSS 19.0. Qualitative variables were described by number and percentage, quantitative variables by median and interquartile range (IQR). The risk prediction (RP) for cardiovascular events was determined by the 10-year Framingham risk score. It was expressed in median risk, and calculated using Microsoft Excel 2013**.** To compare the risk score according to qualitative variable, we used Kruskal Wallis test for multinomial variables while man Whitney test was used for binary variable. Standardized coefficient (R^2) was calculated for age and cardiovascular events and cardiovascular deaths. A $p < 0.05$ was taken as statistically significant.

Ethics approval and consent to participate: The study was approved by the Scientific Ethical Committee of Faculty of medicine (Monastir). For consent to participate, data include only outpatient code.

RESULTS

We included 409 patients. The sex ratio (M/W) was 0.44 and age mean was 64 years (SD: 12.3). Patients with hypertension were 295 (72.1%). Forty two percent of patients cumulated 4 CVRFs. Patients with T2D, HBP were adequately controlled respectively in 35.2% and 36.3% of cases. Cardiovascular diseases were noted in 17.8% of subjects (Table 1).

Table 1. Demographic and clinical characteristics of hypertensive and diabetic population during 2017 in Monastir (Tunisia)

Characteristics	n	%
Sex		
Male	127	**31.1**
Female	282	**68.9**
Age group (years)		
25-39	6	**1.5**
40-65	317	**77.5**
	86	**21.0**
Type		
Age-ajusted to sex		**57.9**
Personel history of CVD	73	**18.0**
Family history of CVD	105	**26.0**
Diabetes	278	**68.0**
Controlled diabetes	98	**35.2**
Hypertension	295	**72.1**
Controlled HBP	107	**36.3**
Dyslipidemia	192	**46.9**
Controlled dylipidemia	39	**20.3**
Tobacco use	73	**17.8**
Obesity	219	**53.5**
Sedentary lifestyle	52	**18.1**
History of CV Disease	**73**	**17.8**
CHD	18	**4.4**
Stroke	17	**4.2**
Peripheral artery disease	50	**12.2**
Number of CVRFs		
1	9	**2.2**
2	97	**23.7**
3	131	**32.0**
³ 4	172	**42.1**

CVD: Cardio Vascular Diseases. CVRFs: Cardio Vascular Risk Factors. HBP: High Blood Pressure. CHDs: Coronary Heart Diseases.

Risk prediction of cardiovascular events at 10 years: The global RP for cardiovascular diseases was 26.3% (IQR: 16.4 - 40.4). It was 15.9% (IQR: 9.2-25.4) for coronary heart diseases and 5.3% (IQR: 2.7- 11.0) for stroke ($p<0.0001$). Risks presented are median values.

The RP for cardiovascular events was significantly higher in men than in women ($p<0.01$) and in non-controlled patients than in controlled patients ($p<0.01$). The global RP for coronary heart diseases was 24.0% (IQR: 13.6-31.4) for Tobacco users. Patients with hypertension had an equivalent RP of coronary heart diseases events than those with diabetes ($p=0.639$). The RP of cardiovascular diseases increased significantly with the number of CVRFs ($p<0.001$). Patients with hypertension had a significantly higher risk than those with diabetes for developing stroke events ($p=0.007$). Age was significantly correlated to cardiovascular diseases events ($R^2=0.55$; $p<0.001$).

Risk prediction of cardiovascular deaths at 10 years: The global RP for cardiovascular diseases death was 7.0% (IQR: 2.4-17.0). It was 3.6% (IQR 1.3-8.6) for coronary heart diseases death. Patients with hypertension had a significantly higher risk to cardiovascular death in 10 years than those with diabetes ($p<0.0001$). The RP of cardiovascular diseases death increased significantly with the number of CVRFs ($p<0.001$) (Table 2).

Age was significantly correlated to coronary heart diseases death ($R2=0.68$; $p<0.001$).

DISCUSSION

This study was conducted to address the scarcity of recent Tunisian studies on the description of CVRFs in PHC centers and their association with cardiovascular events.

We included 409 patients. The sex ratio was 0.44. Patients with type 2 Diabetes were 278 (68%) and 295 had hypertension (72.1%). The global RP at 10 years for cardiovascular diseases was 26.3%, It increased significantly with the number of CVRFs, it was the highest for tobacco users. The RP for cardiovascular events, were significantly higher in men than in women ($p < 0.01$) and in non-controlled patients than in controlled patients ($p <0.001$). The RP for cardiovascular diseases death was 3.6% (1.3-8.6).

Table 2. Prediction of Cardiovascular events at 10 years according cardiovascular risk factors in hypertensive and diabetic population during 2017 in Monastir (Tunisia)

	Morbidity						Deaths			
	CVD		CHD		Stroke		CVD		CHD	
	%	IQR	%	IQR	%	IQR	%	IQR	%	IQR
Global	26.3	16.4-40.4	15.9	9.2-25.4	5.3	2.7-11.0	7.0	2.4-17.0	3.6	1.3-8.6
Sex										
Men	35.9	23.5-46.7	23.1	14.4-31.1	6.0	3.3-10.8	9.4	3.2-17.1	7.0	2.4-10.2
Women	23.6	14.3-33.5	13.5	7.9-20.7	5.1	2.5-11.0	6.0	1.9-17.0	3.0	1.1-7.0
CVRFs control										
Controlled	28.3	18.8-43.4	17.3	9.7-27.0	5.9	2.7-14.3	6.7	2.3-18.2	4.8	1.6-9.6
Not controlled	46.2	32.1-56.0	29.7	21-40.7	14.5	9.4-20.0	23.3	8.6-33.5	10.5	6.1-14.0
CVRFs type										
T2D	29.1	18.8-43.3	17.0	10.5-27.3	5.8	2.9-13.2	6.9	2.6-19.5	4.8	1.8-9.8
Hypertension	29.7	18.2-42.5	17.9	9.6-27.3	6.4	3.4-13.2	9.5	3.3-21.8	4.7	1.7-9.7
Dyslipidemia	32.0	21.3-44.5	18.1	12.5-28.9	6.5	4.0-14.3	9.8	4.2-22.6	5.6	2.5-10.1
Sedentary lifestyle	17.6	10.2-27.0	13.1	5.8-19	2.1	1.3-3.7	1.8	0.8-4.0	1.5	0.5-3.5
Obesity	24.0	14.2-35.6	13.9	8.0-23.1	4.6	2.3-9.7	4.7	1.7-13.3	2.6	1.0-7.1
Tobacco use	36.6	26.4-46.8	24.0	13.6-31.4	5.7	3.4-9.5	9.0	3.1-14.0	6.8	2.3-10.2
Age adjusted to sex	34.9	25.6-45.4	20.4	12.7-28.6	8.5	5.3-14.7	13.8	7.2-24.0	7.1	3.4-10.7
History of CVD	31.8	19.3-47.0	18.7	11.5-28.7	7.9	3.3,13.7	9.9	3.3-23.2	5.4	1.9-10.9
Number of CVRFs										
1	17.5	12.4-18.6	10.3	7.5-13.0	2.5	2.1-3.3	2.5	1.2-3.2	1.7	0.9-2.4
2	17.6	11.1-25.5	9.7	6.5-18.0	3.1	1.8-5.4	2.7	1.0-7.0	1.5	0.5-3.6
3	21.9	14.0-29.1	13.3	8.1-18.0	4.0	1.9-7.0	4.1	1.4-11.0	2.2	0.8-4.9
4	37.4	27.0-46.8	23.2	15.1-30.9	9.3	5.1-15.5	13.1	6.5-24.2	7.6	3.8-11.1

CVD: Cardio Vascular Diseases. CHD: Coronary Heart diseases. CVRFs: Cardio Vascular Risk Factors.T2D:Type2 Diabetes. IQR: Interquartile Range

The study population consulting in PHC centers for chronic health disease was characterized by a female predominance with a sex ratio of 0.44; our results were similar to those reported in Cameroon, Senegal and sub-Saharan Africa (2, 3, 9). However, a male predominance was reported in an Irean study (10), an equivalence according to sex was found in Lebanese population consulting rural villages and urban cities (11). This should be associated to the high accessibility of women's care services in the study region. On the other hand, the feminization of public health doctors forces men to choose same-sex doctors in the private sector. The data regain an average age of 64 years, rate consistent with study of Torlasco et al. in Italy (12), and older than that described by Joshi et al in Kenya in a mass screening study (13), and by Boatenget al in Sub-Saharan Africa (3).These results can be explained by a lack of community screening in the study area. The age adjusted to sex risk was detected in 57.9% of patients having CVRFs, rate equivalent to those defined par Paquissi FC et al in Angola (14), and Baccouche H et al in Monastir (15). T2D remains a public health problem. It represents 68% of patients consulting PHC for chronic disease. This rate was higher than that noted by Bahandeka S et al in Uganda (16), Boateng D et al in Sub sahara africa (3), Baccouche H et al inpatients consulting for chest pain in Monastir (15), and by Fatema K et al in Bangladesh (17). HBP was the most recovered CVRF (70%) of patients consulting PHC for chronic disease, consistent with literature data (18,19).

According to national recommendations (6) the glycemic control rate in diabetics consulting PHC was 35.3%. It was equivalent to literature data (20). In Spain, PerezB et al reported a rate of glycemic control of 83.9% following a program using a comprehensive management approach (21). HBP was controlled in 36.3% of cases, equivalent to literature (22). In France, Denolle T. et al. reported a rate of HBP control of 80% as part of a rehabilitation program (23).

In this study, cardiovascular diseases were noted in 17.8% of subjects. Our results were close to those published by Lin FJ et al (24). This rate was lower than that described by Fourati M et al, carried out with elderly subjects in Sfax (25). Stroke was found in 4.2% of patients. Studies in Asia (24) have described similar results. Higher levels were described by Yuan J et al (26) in hemodialysis subjects and by Diaz KM et al (27) in subjects with resistant HBP.

The RP for cardiovascular diseases was 26.3%, higher than that described by Boateng D et al in an African immigrants study in Norway (3) and by Nakhaie M et al and Faradonbeh NA et al (10,28).This differences can be attributed to the speed demographic and epidemiological transition in Tunisia.

Patients with hypertension had a significantly higher risk than those with diabetes for developing stroke events, that contrast with Alloubani A et al results (29).

The risk of occurrence cardiovascular events increased with the number of CVRFs; Baccouche H et al. also found a significant and high linear relation between the number of CVRFs and acute coronary syndrome (15). Risk of developing cardiovascular events was significantly higher in men than in women. Other studies showed similar results (10, 28), which can be explained by the protective effects of estrogen against cardiovascular diseases in women.

Nakhaie M et al (10) found that 10 years cardiovascular diseases risk was significantly higher in non-controlled patients treated for HBP than in controlled patients as described in this study. HBP is a well-established risk factor for coronary heart diseases and for stroke mortality (30). T2D is known to be associated with a marked increase in the risk of cardiovascular diseases (31). The excess risk of diabetic persons is in part explained by T2D related factors, such as type and duration of T2D, glycemic control, and presence of retinopathy or microalbuminuria or proteinuria (32). In our study, patients with hypertension had an equivalent RP of coronary heart diseases events than those with diabetes. When risk factors were considered individually, tabacco use had the highest risk to develop cardiovascular diseases at 10 years as reported by NakhaieM et al (10). It was known that smoking cessation can significantly reduce the inflammatory cytokines and acute and chronic risk of cardiovascular diseases (10).

The RP for cardiovascular events was significantly higher in non-controlled patients than in controlled patients. In Japanese patients, the risk of cardiovascular death increased by strict glycemic control in the secondary prevention of cardiovascular disease with recourse frequent to insulin. (33). Available data suggest that individuals with treatment-resistant hypertension are at high risk for adverse cardiovascular events and mortality, highlighting a need for efforts toward improving outcomes in some population (27). A higher risk for cardiovascular events and mortality was associated with a greater number of CVRFs, these results rejoined those of Diaz KM et al (27). These findings suggest that lifestyle interventions may be beneficial for reducing morbidity and mortality risk.

Our study was not free of limitations. Data were collected from the medical records of hypertensive and / or diabetic patients and some information was incomplete for variables such as diet and social support. In addition, the study population not included private family physicians or specialists.

We conducted a cross sectional study of diabetes and hypertension patients, we cannot comment about correlation of future cardiovascular diseases events and RP, we plan to continue tracking these patients to check their predictions. Other studies should be done on larger National population, and in different cities.

Among the limitations of the study, the use of the 10-year Framingham score is closely linked to the geographic origin of the subjects studied and seems more suited to the american context. Despite this restriction its use deserves to be widely disseminated.

This study showed high values of 10-year cardiovascular event RP in diabetics and hypertensive Tunisian population. These results demonstrated that in the upcoming years, the Tunisian population is going to be in great risk for cardiovascular events. This study may encourage health care policy makers to develop community-based health care promotion programs and to initiate a regular assessment by PHC doctors for predicting the risk of developing cardiovascular diseases among all patients, which make them aware of diseases control.

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