EVALUATION OF PREDICTORS FOR THE DEVELOPMENT AND PROGRESSION OF DIABETIC RETINOPATHY AMONG DIABETES MELLITUS TYPE 2 PATIENTS

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Introduction

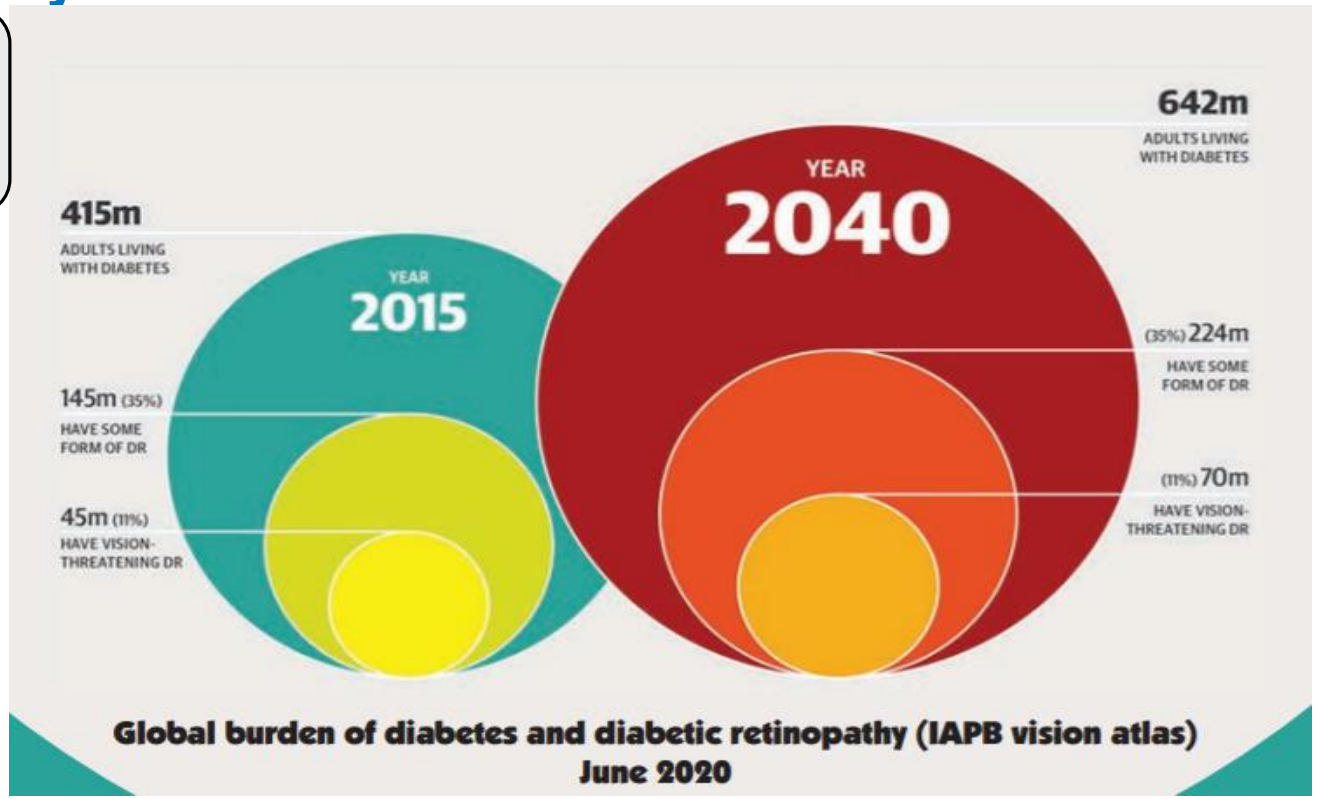
Diabetic Retinopathy

Diabetic retinopathy is highly specific microvascular complications caused by diabetes.

Prevalence of diabetic retinopathy worldwide arise from 6.8% to 44.4% in 2019.

Predict in year 2040 will be increased 224 million diabetes patients will diagnosed diabetic retinopathy, 70 million have vision threatening diabetic retinopathy worldwide

Prevalence of diabetic retinopathy in Malaysia has reported increase from 44.1% to 48.6%

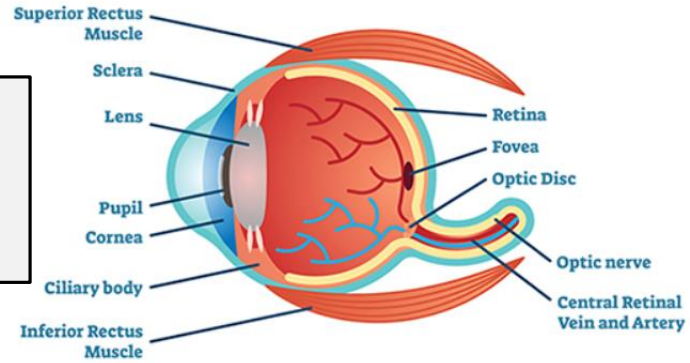


Early detection of diabetic retinopathy could reduce 90% of severe vision loss.

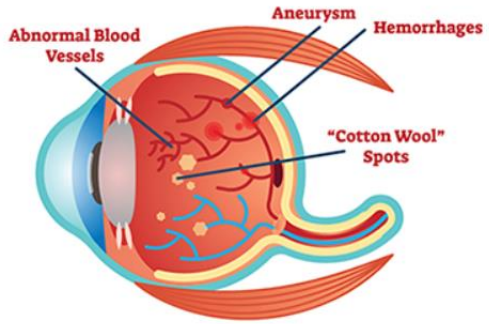
INTRODUCTION

STAGES OF DIABETIC RETINOPATHY

Diabetic retinopathy causes progressive damage to the retina, i.e. the light-sensitive lining at the back of eye



Healthy Eye



Diabetic Eye

No Diabetic Retinopathy	Mild non-Proliferative Diabetic Retinopathy (NPDR)	Moderate NPDR	Severe NPDR	Proliferative Diabetic Retinopathy (PDR)	Avdanced Diabetic Eye Disease (ADED)
	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5

Source : International Clinical Diabetic Retinopathy

INTRODUCTION

IMPORTANCE OF INVESTIGATING THE PROGRESSION AMONG PATIENTS OF DIABETIC RETINOPATHY

Treatment costs increased as the stages of diabetic retinopathy increased.

May help clinicians to identify individual who will increase the progression of diabetic retinopathy.

Increase risk of serious complications which lead to permanent loss vision. Early detection of diabetic retinopathy could reduce 90% of severe vision loss.

Patients can experience a decline in best-corrected visual acuity, which can have a profound impact on health-related quality of life.

INTRODUCTION

This study involved three groups of diabetes patients :

GROUP 1	GROUP 2	GROUP 3
Diabetes patients who were diagnosed with diabetes without obvious clinical findings of diabetic retinopathy (show development)	Diabetes patients who were diagnosed with diabetic retinopathy and remain in the same stage for a certain period of time until the current follow-up	Diabetes patients who were diagnosed with diabetic retinopathy at certain stage for a period of time but progressively worsen over time during the current follow-up (show progression)

Objectives

To evaluate the predictors and risk factors associated to the development or progression of diabetic retinopathy among Group 1 and Group 3.

LITERATURE REVIEW

(Kim et al., 2014; Liu et al., 2017; Ali et al., 2016; Rudnisky et al., 2017; Yau et al., 2012)

Common Predictors and Risk Factors

Duration of diabetes, age, gender, HbA1c and hypertension

(Ranjini et al., 2017, Rudnisky et al., 2017, Hao et al., 2019)

Demographics Predictors and Risk Factors

Age, gender, occupation, socioeconomic status, place of residence, body mass index

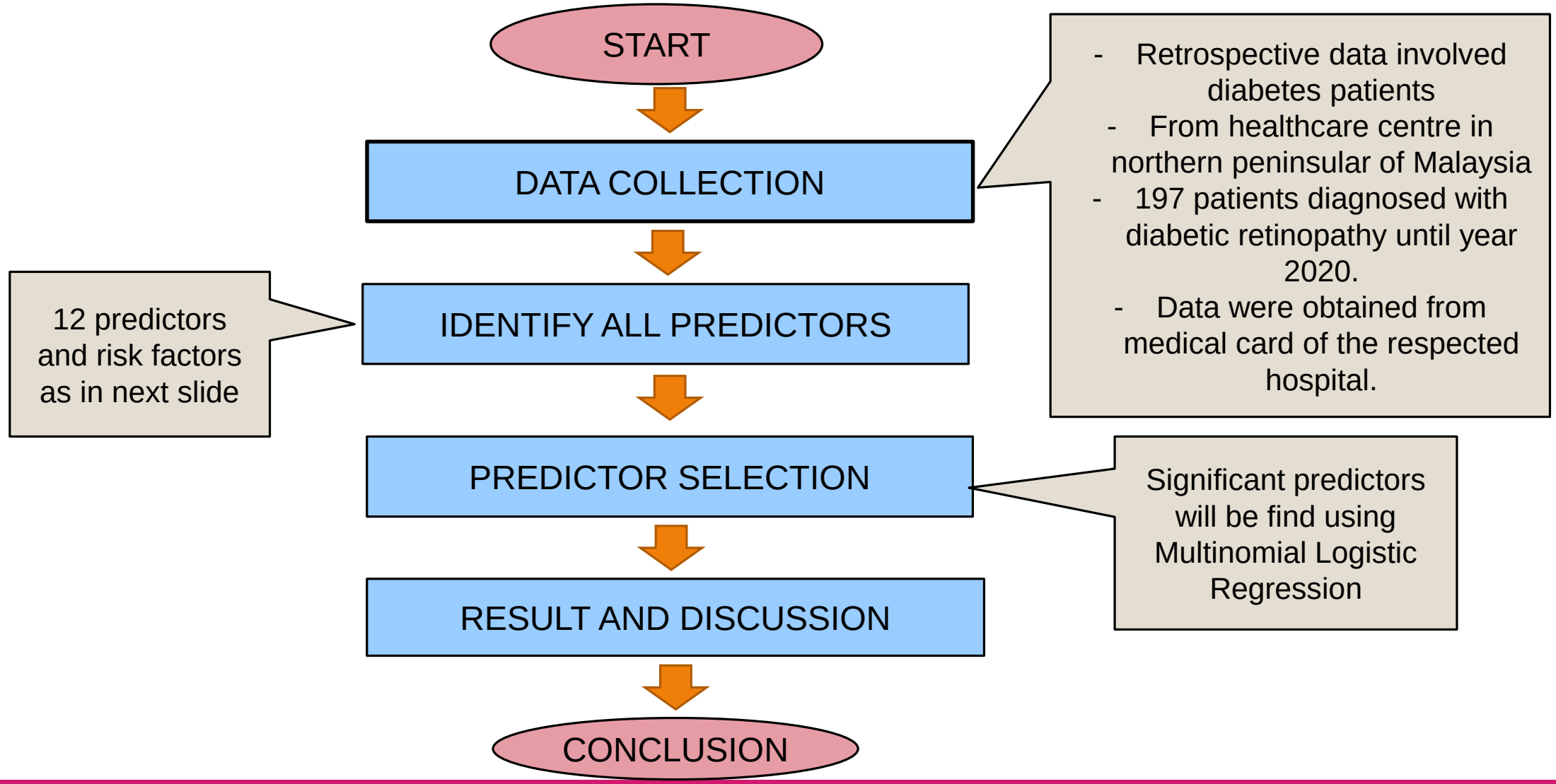
(Fong et al., 2004, Lee et al. 2014, Kotlarsky et al. 2015 and Tsao et al. 2018)

Clinical Predictors and Risk Factors

Glycosylated haemoglobin trends (HbA1c), systolic and diastolic blood pressure, serum creatinine, urea and insulin treatment

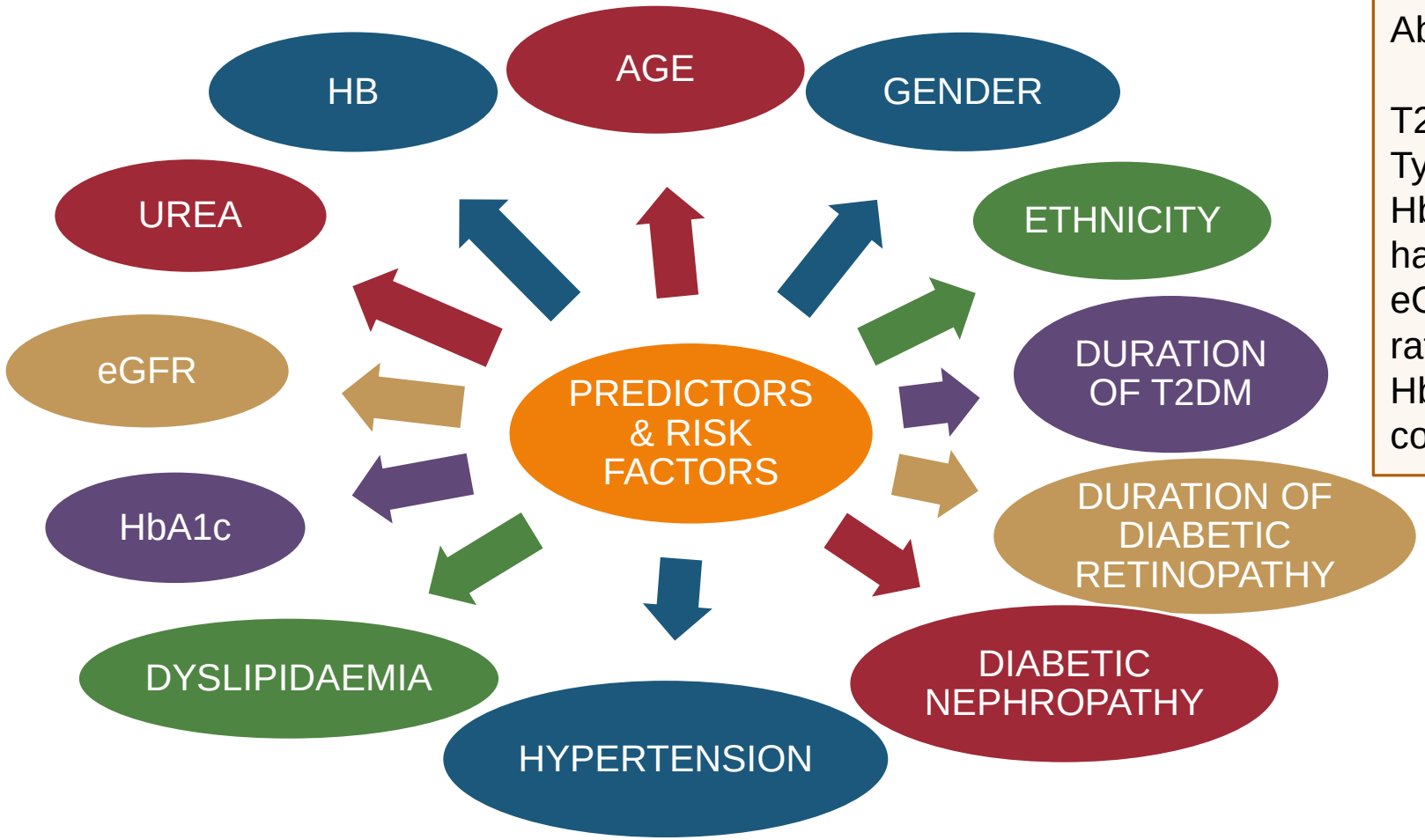
METHODOLOGY

Flowchart Of Methodology



METHODOLOGY

List of Predictors and Risk Factors



Abbreviations:

T2DM - Diabetes Mellitus Type 2
HbA1c - glycosylated haemoglobin
eGFR- glomerular filtration rate
Hb - haemoglobin concentration

METHODOLOGY

Statistical Analysis

MULTINOMIAL LOGISTIC REGRESSION:

$$\text{logit}\left(Y_{DR}\right) = \ln\left[\frac{P\left(Y_{DR} = j \mid X\right)}{P\left(Y_{DR} = J \mid X\right)}\right] = \beta_{j0} + \beta_{j1}X_1 + \beta_{j2}X_2 + \ldots + \beta_{jk}X_k$$

Where $j = 1,2, \ldots, j-1$, is a logit equation and j represents the categories of the reference outcome.

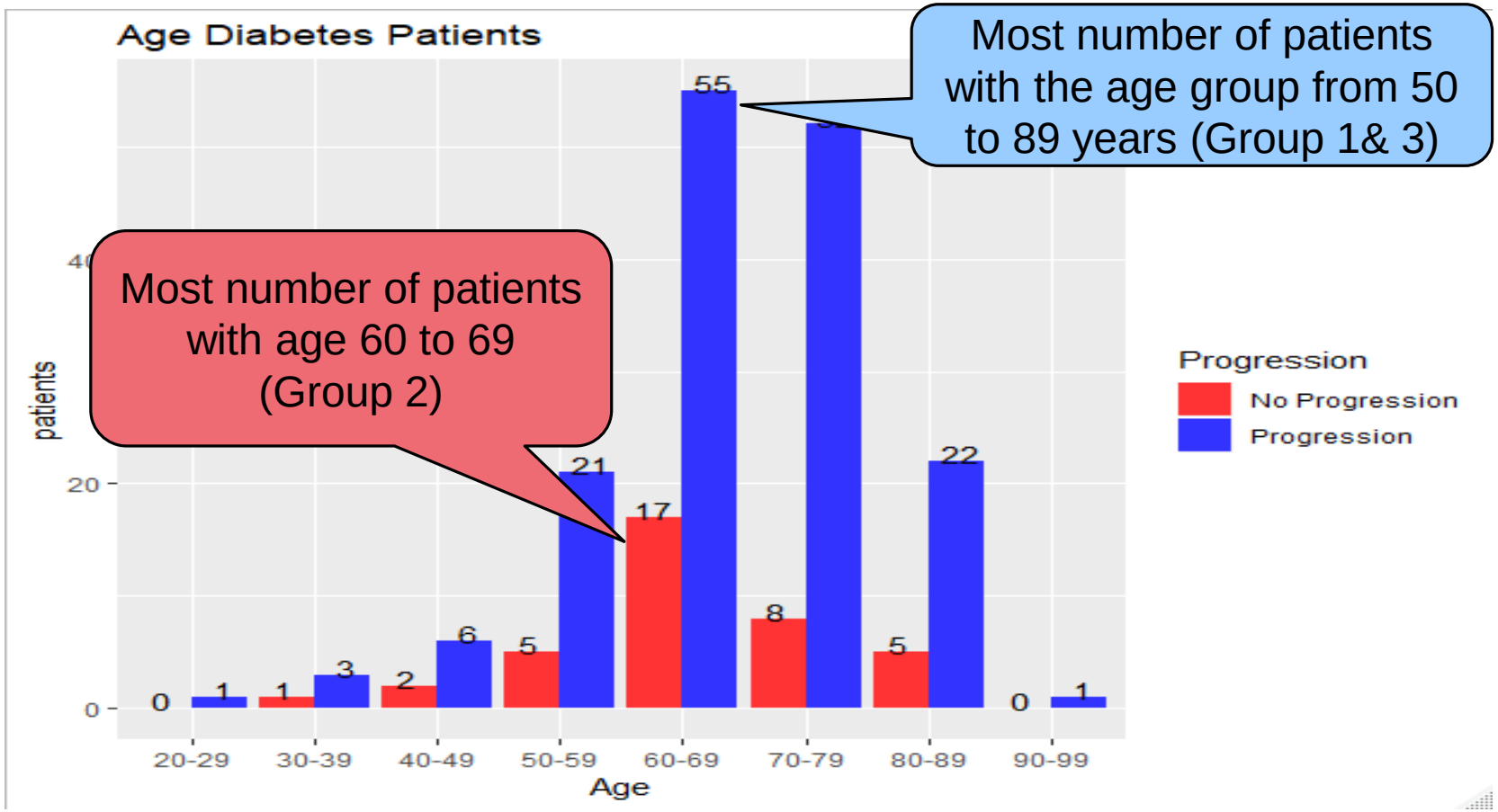
$Y_{DR} = 0,1,2,3,4,5$ (stages of diabetic retinopathy)

X refer to the predictors and risk factors associated with diabetic retinopathy,
$X = X_1, X_2, \ldots, X_k$ can be either continuous or categorical predictors.

k denotes the number of predictors and risk factors for diabetic retinopathy.

RESULT AND DISCUSSION

Composition Of Diabetes Patients According to Age Group

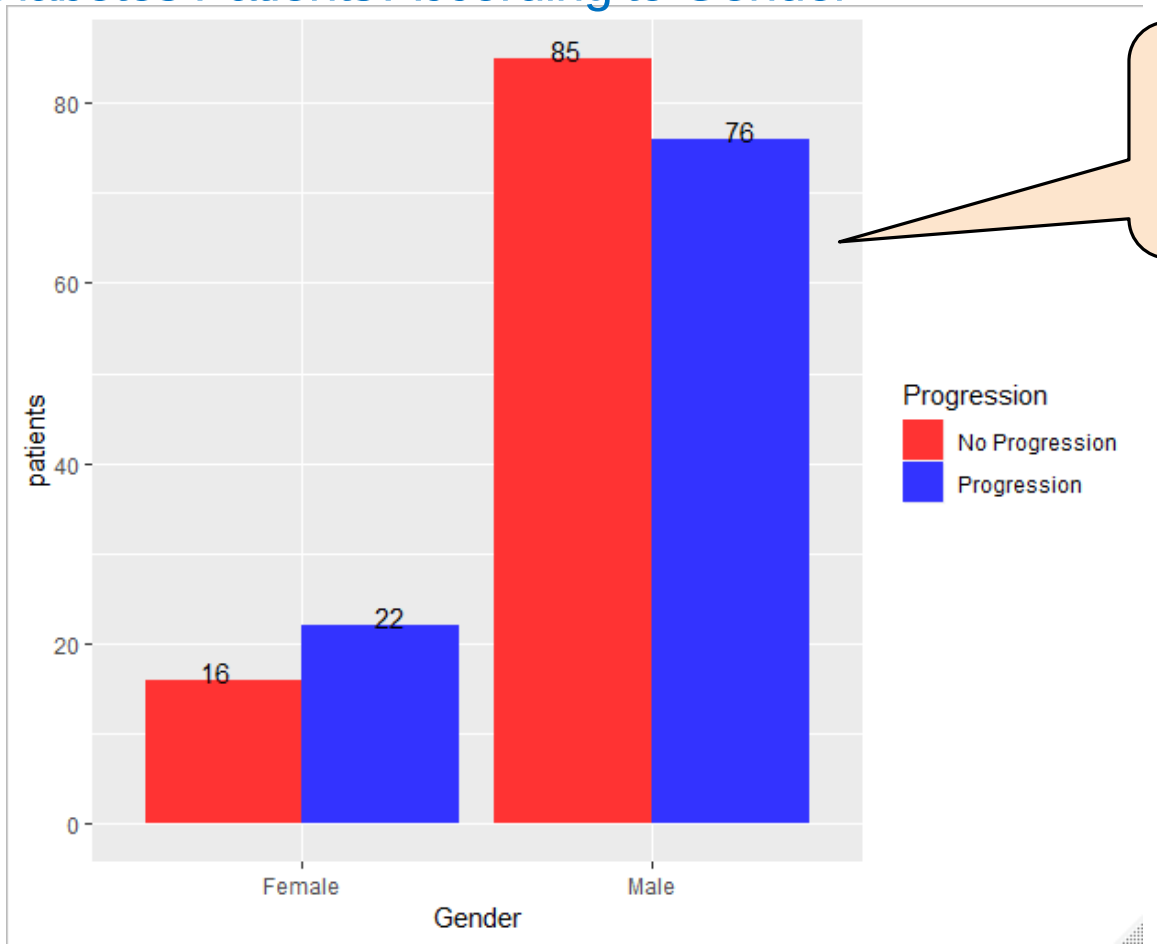


Blue bars refer to Group 1 and 3, red bars refer to Group 2

Figure 1: Comparison between diabetes patients with no progression and with progression status according to patients' age group.

RESULT AND DISCUSSION

Composition Of Diabetes Patients According to Gender



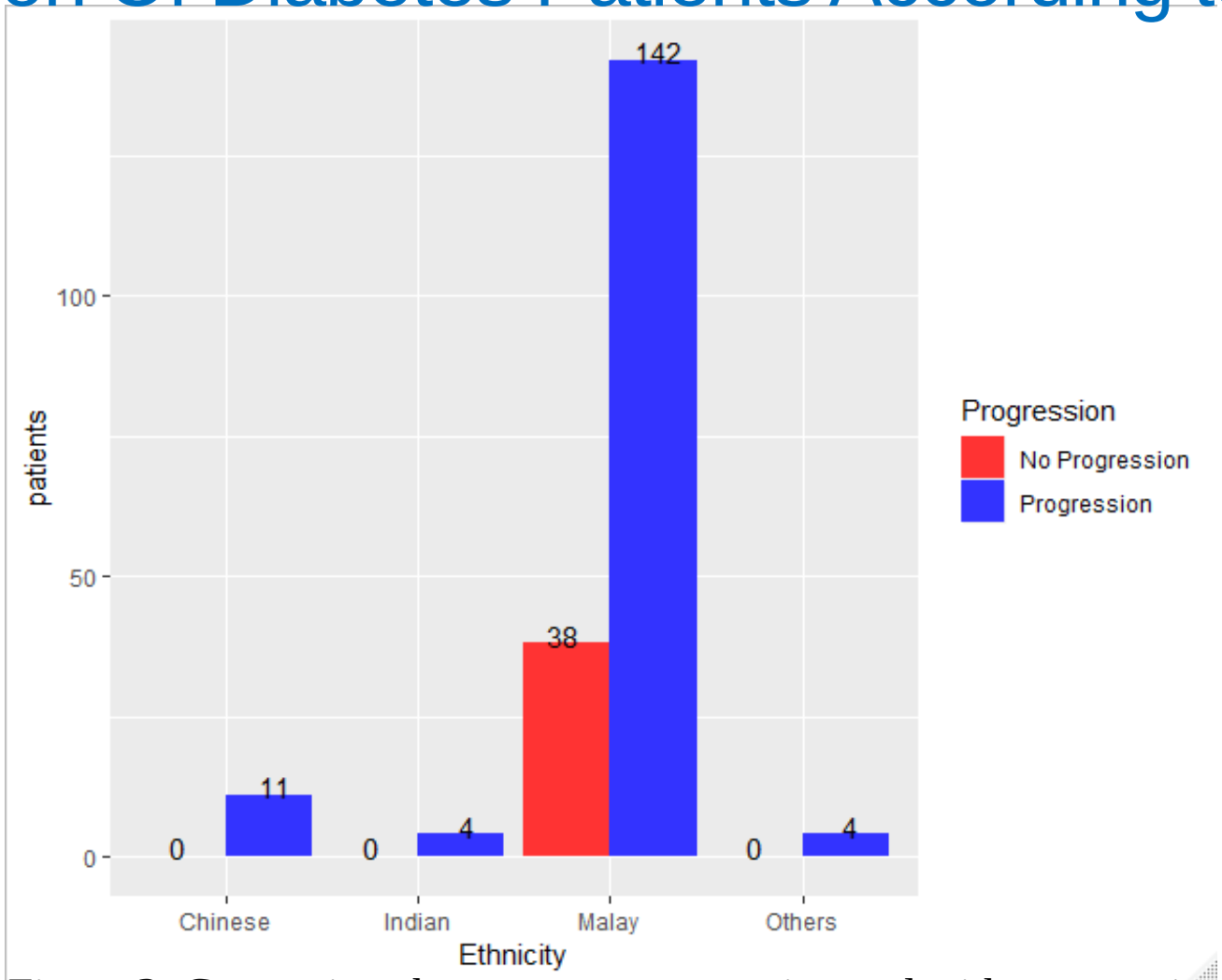
Male shows the highest number of diabetes patients for both.

Figure 2: Comparison between no progression and with progression status according to gender.

RESULT AND DISCUSSION

Composition Of Diabetes Patients According to Ethnicity

72.08% of diabetes patients who visit for appointment are Malay patients. (Group 1&3)



All patients from Group 2 are Malay patients and from total all patients, about 19.28% patients from group 2

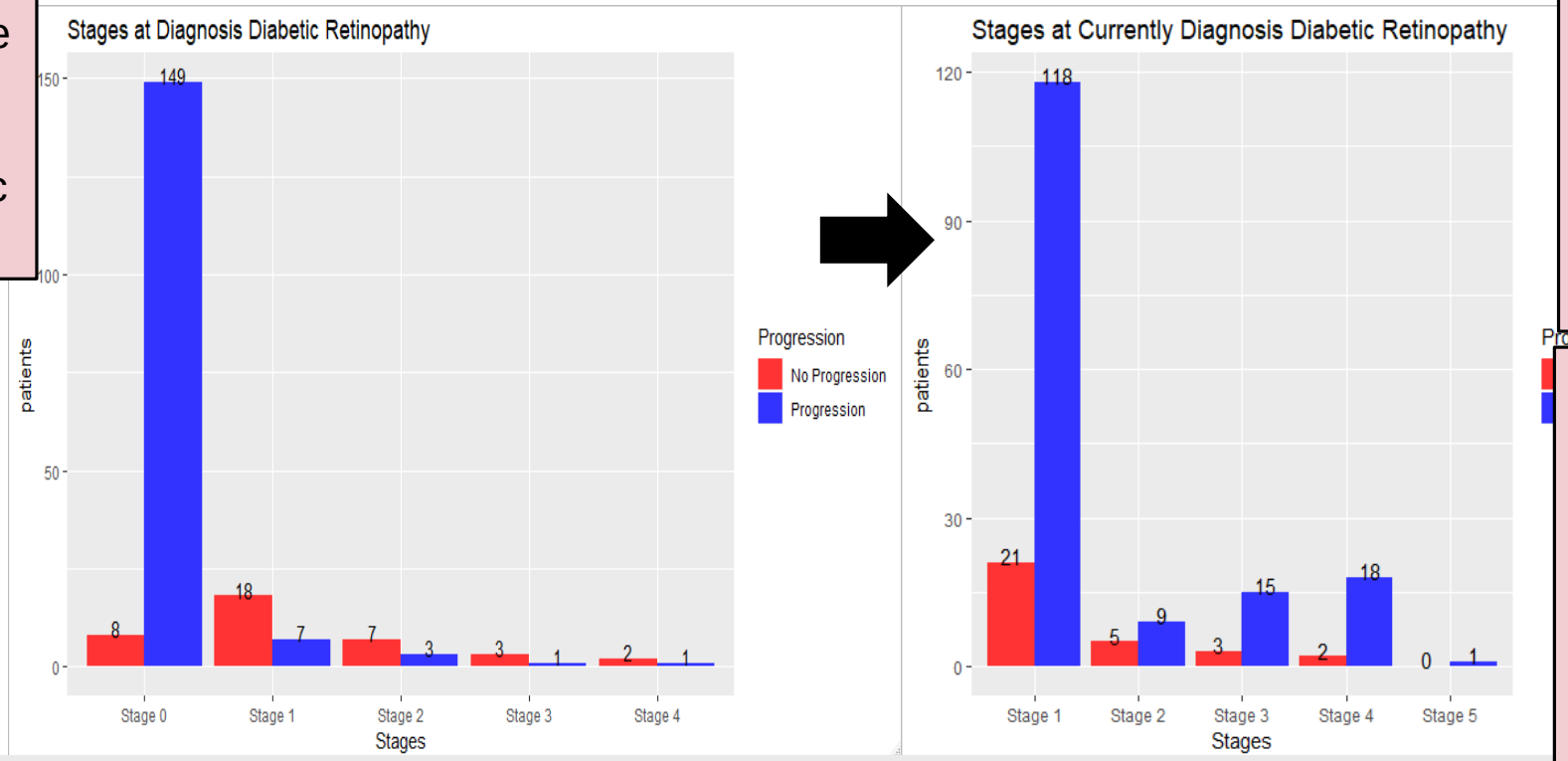
Figure 3: Comparison between no progression and with progression status according to ethnicity

RESULT AND DISCUSSION

Composition Of Diabetes Patients According to Stages Of Diabetic Retinopathy

Figure 4(a) refers to the stages for diabetes patients when first diagnosed with diabetic retinopathy.

Stage 4 to 5 also shown progression



(a) **(b)**

Figure 4(b) refers to the same diabetes patients when diagnosed with diabetic retinopathy during the current follow up.

118 diabetes patients who were first diagnosed with stage 0 have shown progression to stage 1, 9 patients have developed to stage 2, 11 patients developed to stage 3, and 15 patients developed to stage 4.

Figure 4: Comparison between the (a) developed stages at diagnosis of diabetic retinopathy and (b) stages diabetic retinopathy at current follow up.

RESULT AND DISCUSSION

Characteristics of diabetes patients according to with and without development/progression of diabetic retinopathy

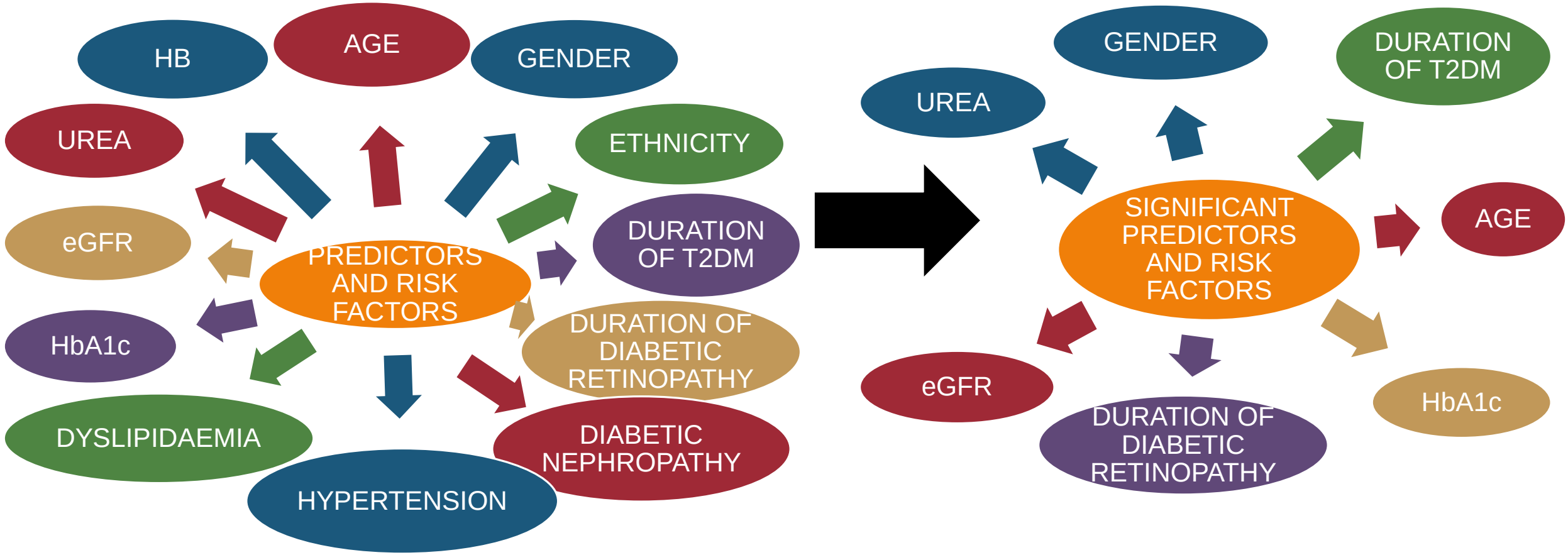
Characteristics	All Patients (n=197)	Group 1 & 3 Patients with Development/Progression of Diabetic Retinopathy (n=161)	Group 2 Patients without Development/Progression of Diabetic Retinopathy (n=36)	P-value
Age	67.33 (10.99)	67.68 (11.02)	67.78 (11.02)	<0.001
Gender				<0.001
Male	0.52	0.53	0.42	
Female	0.48	0.47	0.58	
Ethnicity				0.9636
Malay	0.89	0.88	1.00	
Chinese	0.05	0.07		
India	0.03	0.01		
Others	0.02	0.01		
Duration of T2DM	12.66 (5.03)	13.31 (5.00)	12.52 (5.05))	<0.001
Duration Diabetic Retinopathy	6.02 (3.45)	6.79 (3.99)	5.96 (3.38)	<0.001

RESULT AND DISCUSSION

Characteristics	All Patients (n=197)	Group 1 & 3 Patients with Development/Progression of Diabetic Retinopathy (n=161)	Group 2 Patients without Development/Progression of Diabetic Retinopathy (n=36)	P-value
Diabetic Nephropathy	1.00	0.82	0.18	0.4392
Hypertension	0.99	0.82	0.18	0.576
Dyslipidaemia	0.89	0.91	0.20	0.6231
HbA1c	8.64 (2.47)	9.41 (2.50)	8.54 (2.47)	<0.001
eGFR	59.45 (25.34)	59.78 (25.37)	54.54 (23.47)	<0.001
Urea	7.04 (3.77)	7.82 (3.93)	7.44 (3.94)	<0.001
Hb	11.46 (2.01)	11.34 (2.00)	11.89 (1.97)	0.8069

RESULT AND DISCUSSION

Predictor Selection



CONCLUSION

Age, gender, duration of T2DM, duration of diabetic retinopathy, HbA1c, eGFR and urea are significant to the progression of diabetic retinopathy.

Support the importance of giving attention to these significant predictors to the development and progression of diabetic retinopathy.

Avoid rapid progression of stages

Significant predictors could be given attention to prevent serious microvascular complications.

This study should be taken as the basis for further action be taken in healthcare management especially in diabetes disease management.

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THANK YOU

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