

**WEIGHT PERCEPTION AND ITS ASSOCIATED
FACTORS AMONG TYPE 2 DIABETES MELLITUS
PATIENTS ATTENDING DIABETES CLINIC,
HOSPITAL UNIVERSITI SAINS MALAYSIA**

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**Dissertation Submitted in Partial Fulfillment of the
Requirement for the Degree of Master of Medicine
(FAMILY MEDICINE)**



UNIVERSITI SAINS MALAYSIA

2017

ACKNOWLEDGEMENT

It is a genuine pleasure to express deep sense of gratitude to my mentor and supervisor, Dr Azlina Ishak and Dr Imran Ahmad, lecturers in Family Medicine Department, HUSM, who has provided insight and expertise that greatly, assisted the research. I sincerely thank Dr. Wan Nor Arifin, Unit of Biostatistics and Research Methodology, Universiti Sains Malaysia, for sharing his pearls of wisdom during the course of this research. I am extremely thankful to all the staffs in medical out-patient department, Hospital Universiti Sains Malaysia for their kind assistance and co-operation throughout my data collection period. Any errors are on my own and should not tarnish the reputations of these esteemed persons.

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**PERSEPSI BERAT BADAN DAN FAKTOR-FAKTOR YANG BERKAITAN
DENGANNYA DALAM KALANGAN PESAKIT YANG MENGHIDAPI
KENCING MANIS JENIS 2 (TYPE 2 DIABETES MELLITUS) DI KLINIK
DIABETES, HOSPITAL UNIVERSITI SAINS MALAYSIA**

Abstrak

Latar belakang: Kencing manis dikatakan berkadar langsung dengan kenaikan berat badan seseorang. Dengan penurunan berat badan yang sedikit, walaupun sebanyak lima hingga tujuh peratus dari berat asal, ia membawa banyak kebaikan, seperti gula dalam darah dapat dikawal dengan lebih baik, tekanan darah dapat diturunkan, penggunaan ubat dapat dikurangkan, dan dapat melewati komplikasi kencing manis. Pemahaman yang tepat tentang berat badan adalah sangat penting kerana ia dapat memberi motivasi yang positif untuk pesakit melakukan senaman dan cara pemakanan yang sihat.

Metodologi: Kajian keratan rentas telah dijalankan di klinik diabetes. Sebanyak 321 pesakit telah menyertai kajian ini melalui soal selidik. Antara data yang dikaji adalah ciri-ciri sosiodemografi, tempoh dan rawatan kencing manis, persepsi berat badan, tingkah laku pengurusan berat badan (fizikal aktiviti dalam METS dan pengambilan sayur-sayuran dan serat), dan pengukuran berat dan tinggi pesakit.

Keputusan: Sebanyak 67.9% (n=218) pesakit memandang rendah terhadap status berat badan. Antara factor-faktor ketara yang berkaitan dengan pandangan rendah status berat badan adalah pesakit yang berkahwin (AOR=0.09 [95%CI: 0.011-0.763], P=0.23), pesakit yang mempunyai pendidikan yang lebih rendah (AOR=0.427, 95%CI=0.199-0.915, P=0.028), pesakit yang mempunyai berat badan yang berlebihan (AOR=10.152, 95%CI=4.205-24.514, P<0.001) dan pesakit yang gemuk (AOR=5.851, 95%CI=14.728-147.887, P<0.001) adalah ketara dalam pandangan rendah status berat badan. Dalam tingkah laku pengurusan berat badan, pesakit yang menjalankan aktiviti ringan adalah lebih ketara dalam pandangan rendah status berat

badan berbanding dengan pesakit yang mengamalkan aktiviti harian secara sederhana.

(AOR=46.671, 95%CI=2.574-13.300, P<0.001)

Kesimpulan: Kajian ini mendapati ketidak sepadan antara persepsi status berat badan dengan pengukuran berat badan sebenar. Kebanyakan pesakit memandang rendah terhadap status berat badan diri sendiri. Kakitangan penjagaan kesihatan perlu meluangkan lebih masa dan usaha untuk membetulkan persepsi penjagaan berat badan yang salah ini agar menguruskan rawatan kencing manis yang lebih berkesan.

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ABSTRACT

Background: Weight perception is one of the determining factors of receptivity to weight management intervention especially in diabetes mellitus patients. Weight management is the cornerstone of diabetic management as 5 to 7 percent of weight reduction can reduce oral anti-diabetic agent use and even prevent and delay onset of diabetes.

Objective: To determine the weight perception and its associated factors among type 2 diabetes mellitus patients attending diabetic clinic, HUSM

Methodology: This was a cross-sectional study conducted among 321 diabetic patients attending diabetic clinic from June 2015 to June 2016. Data on sociodemographic characteristics, diabetic duration and treatment, weight perception, weight management behaviours, measurement of weight and height, physical activities in METS and fibre/vegetables intake were collected using structured questionnaire.

Results: A total of 67.9% (n=218) of the participants had underestimated their weight status. Factors associated with under-estimation of weight were being married (AOR=0.09 [95%CI: 0.01-0.76], P=0.23), lower education level (AOR=0.43 [95%CI=0.20-0.92], P=0.028), overweight (AOR=10.15, 95%CI=4.21-24.51, P<0.001) and obese (AOR=5.85, 95%CI=14.73-147.89, P<0.001), and being physically less active (AOR=46.67, 95%CI=2.57-13.30, P<0.001). BMI of the subjects were closely related to estimation, as being overweight is 10 times more likely than normal subjects in

underestimation of their weight status, and obese individuals too, significantly underestimated their weight.

Conclusions: We found a mismatch between BMI measured and self-perceived body weight. Health care personnel need to spend more time and effort in patients' weight perception in order to improve diabetic management and its health relevance.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

We are being plagued with the growing occurrence of type 2 diabetes; the disease which is highly connected to over consumption of calories and lack of physical activities. The Third Malaysian National Health Morbidity Survey (NHMS) in 2015 reported that the prevalence of glucose intolerance among age >18 years old was almost 4.7% and overall prevalence diabetes mellitus (DM) was 17.5%, compare to 11.6% in year 2006.¹² This also means there were two million Malaysian adults diagnosed with the disease and there is an added 6.9% in the prevalence of diabetes over the last 10 years with both genders were equally affected.^{1,2} The grave concern about this is nearly 52.6% of the diabetic population are undiagnosed.² These data were similar to a study by Centres for Disease Control (CDC) in 2014.^{3,4} Coronary heart disease is the major cause of premature death in patients with type II DM and hypertension is a major contributing risk to the development of coronary artery disease and renal impairment in these patients. This explained why diabetes patients are my focus group of study population.

What is the relationship between diabetes and overweight or obesity? A study done by Obesity Action Coalition, DM II can be prevented or delayed its onset if there is slightest weight loss, 5 to 7 percent from baseline.^{5,6} In pre-diabetic or patient with impaired glucose tolerance, weight loss has been proven to reduce insulin resistance, better usage of glucose in the body, and additional calorie restriction can even be inverting the progression of type 2 diabetes. For individual who can sustain weight reduction, there are advantages of better insulin action and decrease fasting glucose to the extent of

reducing the need for oral hypoglycaemic agents. Diabetes also accelerates atherosclerosis and posing the risk of getting hypertension and coronary heart disease, which again are the major cause of DM mortality.⁵ The risk of getting DM is 3 to 7 times higher among obese compare to normal weight individuals.^{7,8}

Prevalence of obesity in Malaysia has risen tremendously, based on the Malaysian National Health and Morbidity Survey (NHMS), the number of overweight adult males has increased from 20.1% in 1996 to 29.7% in 2006. The more worrying fact that the obese male adults have even dramatically increase 2.5 times, from 4% in 1996 to 10% in 2006. The similar exponentially increase was found with obese female, prevalence was found to be 7.6% in 1996 increasing to 17.4% in 2006.¹ The prevalence of overweight and obesity Malaysian adult was found to be 33.6% in 2011.⁹

In year 2006, one in every seven Malaysian are obese, and this has become even more shocking with one in every three Malaysians are now obese. This clearly indicates that there is an alarming growth rate of obesity among Malaysian adults.⁹ The cause of this issue is none other than the diverse culture in Malaysia and our love for food, calorie-intensive food, and sedentary lifestyle and living. This is a global worrying problem and in year 2013, Malaysia is granted with the notorious title as the region's fattest nation as well as ranking number sixth most obese country in Asia. Overweight and obesity are the root cause of all common non-communicable chronic diseases. According to the latest NHMS, 9.1 million Malaysians suffer from hypertension, 14.3 million have hyperlipidaemia and 5.3 million are diabetes.^{1,2} These conditions are risk factor for developing coronary heart disease, heart failure and leading cause of death amongst men and women in Malaysia. People in Asia tend to develop diabetes at a lower body mass

index, at younger ages, suffer longer with diabetes complications, and shorter life expectancy compare to diabetes patients in another region. ⁵

The fact that 80 to 90 percent of diabetes patients are overweight and obese provides an interesting clue to the connection between diabetes and obesity. Being overweight causes our body to become resistant to insulin, and being diabetic and overweight, the body needs higher level of insulin to control the glucose level. For type 2 diabetic, it develops when our body has prolonged effects of insulin resistance. Vice versa, weight gain is common among insulin user, this is because of the more insulin you needed to maintain your blood glucose level, the more glucose is absorbed into your cells, and this extra glucose is absorbed and stored as fat. Therefore, obesity leads to insulin resistance and development of diabetes mellitus and subsequent treatment of diabetes with insulin leads to building up of body fat. ⁹

In view of obesity and diabetes mellitus are closely related, prevention is better than cure. Maintaining a healthy weight is crucial to reduce the chances of you having diabetes mellitus. However, if you missed the chance and have been diagnosed with diabetes and you are overweight or obese, a small weight loss (5 to 10 percent) provides you with great reward by delaying the chance of getting macro and micro-vascular complications and for those on oral anti-diabetic agents, it reduces the amount of medication you need. ^{5,6} Treating overweight and obese diabetes patients, we are having great difficulties to achieve targeted HbA1C, blood pressure and cholesterol level. Low density lipoprotein cholesterol control also increased as BMI increased. The emphasis of weight loss in diabetes is important as a comprehensive diabetic care. However, one of the predisposing factors that may affect the patient's readiness to lose weight and getting information on weight related care is accurate perception of their own weight as the

objective of this study. A study done where subjects are randomly allocated to intensive lifestyle intervention program, the findings of 5 to 7 percent weight lost with physical activity of 30 minutes a day, had the advantage of reducing risk of having type 2 diabetes by 58 percent. This further emphasizes the importance of weight management in diabetes care.^{5,6}

Weight perception is a stronger determinant factor compare to actual body mass index reported in multiple studies relating to active weight control. Personal evaluation of one's body image is a major force in precipitating weight reduction behaviours and activities. The health belief system, the weight exaggeration, the perceived severity of health consequences of being overweight and obese is a protective mechanism in improving health by engaging in healthy lifestyle and behavioural change. The three most common adopting habits to lose weight were reducing fat intake, increase physical activities and increase fruits and vegetable intake.

Body weight perceptions may dictate patient's adherence to healthy dietary habit, readiness to engage in moderate physical activity and adopting a healthy lifestyle. Regardless of how advance the disease, multiple studies had shown that patients' empowerment in the care of diabetes management is the key to achieve better diabetic control and general positive outcome.¹⁵ It is well understood that there are barriers to be able to sustain healthy lifestyles changes. Treating health care professionals are facing the similar obstacles of providing continuous advice and support for the lifestyle changes if patient remained poorly involved in the diabetic management.¹⁶ Assessment of patient's understanding is essential to provide appropriate and personalise advice and guidance. Misconception needs to be addressed to actively involve patient in the diabetic management including necessary lifestyle changes; physical activity, balanced diet and

nutrition. With good insight into the disease and its management, doctor and patient achieve equal participation that ensures the success of the diabetic control.¹⁶ Therefore, in this study, we are to evaluate the perception of diabetic patients pertaining to their own body weight and factors related to correct perceived or underestimate of own body weight in view of patients' perception and empowerment of the disease are essential parts of a diabetic control.

1.2 Statement problem and rational of the study

The disagreement between the weight understanding of the health authorities and the general population is a hindrance for obesity intervention efforts and programme. A savvy individual might attempt to improve his diet and increase physical activity to lose weight after receiving health information and risks of being overweight or obese. However, obesity intervention might fail to impel this type of positive attitude if obese individuals do not perceive themselves as the targeted intervention group. These population will assume that the information is proposed for somebody else and not relevant for them. The effort of health authority might be in vain in view of this incongruence of weight status. A completely different strategy would be needed to implement desired diet and lifestyle changes among this group of individuals.¹⁶

Weight management is the cornerstone of diabetes prevention and diabetic management. Almost all patients diagnosed with diabetes mellitus would go for counselling for therapeutic lifestyle changes. Comparing to general population, they should have better understanding about their body weight. There are multiple studies considering prevalence of overweight and obese among Malaysian but not from the

perspective of the patients, there is lack of knowledge about how patients perceive about their own body weight and whether they satisfy with their weight and to assess health related behaviour. Therefore, in this study, we are to evaluate the perception of diabetic patients pertaining to their own body weight and to consider what are the factors related to accurate perceived or underestimation of own body weight.

1.3 Literature review

Weight perception has close relationship with health risks behaviour and daily living. Obesity and being overweight as the risk factor of insulin resistance and development of diabetes mellitus is well established. Multiple studies done looking into prevalence of overweight and obesity among diabetic patient, in Singapore, 58% of diabetic patients were overweight A study by University Malaya Medical Centre, Malaysia, 66.8% of diabetic patients were overweight (BMI ≥ 25 kg/m²) with 15.8% obese (BMI ≥ 30 kg/m²).¹⁰ A local study in Kelantan, 38.4% of diabetics were either obese or overweight. By focusing to diabetic patients in this study, we want to know the prevalence of overweight and obese among this group of subject in Diabetes clinic, HUSM.¹¹

A study done by in Ghana assessing weight perception among diabetics, 58.0% (n=116) of the participants has misinterpreted their weight status, with 77.6% (n=90) underestimated their body weight. The underestimation increased significantly with an increase in BMI. The associated factors associated with underestimation were being overweight and obese, not married and never tried to lose weight. Age and hyperglycaemia were not significantly associated with weight underestimation.¹⁷

Bola F. Ekezue did a study on effect of underestimation of weight status on weight management behaviour among overweight and obese diabetic subjects. The underassessment was 26% with higher among black and Hispanics and those who underestimate their weight status were significantly less likely to engage in weight management behaviours. Advice given to patients significantly improved weight management behaviours.¹⁸

Kylie Van Minnen et.al. did a study to assess body weight self-perception among type 2 diabetes in Australia and its associated factors and implications. There were 52.8% of overweight, and 83.7% of obese patients, had correctly estimated their weight status. Better diabetic knowledge and higher educational individuals have more accurate estimation. However, correct self-perception of weight did not have impact on weight loss.¹⁹

A study by Kuk et. al. observed that only 2% of obese men and one obese woman reported being satisfied with their weight. The higher the weight satisfaction, the lower the motivation and intention to change or to adopt a healthier lifestyle.²⁰ Another study by Andrea L. Herman finding the association between weight misperception with diabetic intervention program concluded that the higher the misperception from the ideal weight, under-reported participants are more likely to aware and taking into action to lose weight. Therefore, weight misperception should be addressed when screening diabetic risk participants as the awareness of ideal weight status may have an impact on the intervention program.²¹

A study done to assess weight perception and its associated physical activities found out that underestimation of weight were associated with 13% less moderate to vigorous physical activity (MVPA) and even more significantly reduced for individuals

age > 60 who underestimate their weight status with 23% less MVPA and again this emphasized that weight perception has significant impact on weight management intervention behaviour.²²

CHAPTER 2

OBJECTIVES

2.1 General and specific objectives

The general objective of this study was to determine the weight perception and its associated factors among type 2 Diabetes mellitus patients attending to Diabetes clinic, Hospital Universiti Sains Malaysia (HUSM). The specific objectives were as followed:

1. To determine proportion of underestimation of weight status among type 2 Diabetes mellitus patients attending Diabetes clinic, HUSM
2. To identify the factors related to underestimate of weight status among type 2 Diabetes mellitus patients attending Diabetes clinic, HUSM

2.2 Practical Definition

Sociodemographic data

Education level was divided to lower and higher education level. Lower education level included never attended school, primary and secondary school per Malaysia educational system. Any further studies until diploma, degree, master or PHD would be categorized as higher education level. For household income, per department of statistic Malaysia, the average household income for state of Kelantan in year 2014 was RM 2716.²²

Therefore; income was categorized to lower and higher income with the cut of point of

RM3000 or less as lower and any household income of more than RM3000 as higher household income.

Weight perception

Weight perception was assessed by asking single question by face to face interview, “what do you think about your weight?”, whether it is normal, underweight, overweight or obese. This question was adopted from study by Victor Mogre in Ghana whereby the self-administered questionnaire was well validated.¹⁷ Body weight perception was assessed by comparing the participants' self-perceived weight to their measured BMI. Disagreement of self-perceived body weight was identified when the self-perceived body weight category (about the right weight, underweight, overweight or obese) mismatch to the measured BMI weight category (underweight, normal weight, overweight or obese). Underestimation of body weight was recognized when the self-perceived weight category was found to be below the measured BMI category. Accurate estimation was identified when both perceived and measured BMI were the same. Overestimation was recognised when self-perceived BMI category was above the measured BMI. The dependent outcome of this study would be underestimate, accurate estimation and overestimation of body weight.

Body mass index

Normal BMI is between 18.5 to 22.9, BMI >23 being overweight and BMI at 27.5 or above being obese based on Asian adjusted BMI.²⁵

Physical activities

Physical activities were determined using The International Physical Activity Questionnaires (IPAQ) with 4 generic items; short versions were used with face to face

interviewed. This questionnaire has extensive reliability and validity testing done. Mets were generated, with Mets<600 being mild activity, 600 to 3000 Mets considered moderate activity and Mets> 3000 is intense activity. ²⁶

Mets were calculated using formula as below:

MET-min per week=MET level x minutes of activity/day x days per week

Example of calculation of METs (Appendix B)

Dietary fibre/vegetables

This questionnaire was adopted from WHO stepwise instrument, ²¹ dietary intake advices with 5 or more than 5 servings of fibre and vegetables daily being good dietary habit. There are many domains in WHO stepwise instrument for risk factor surveillance of noncommunicable disease, including unhealthy diet, high salt and sodium intake, tobacco use, alcohol consumption, raised blood pressure and glucose and abnormal lipid. Considering health related behaviours related to diabetes mellitus would be physical activities and vegetables and fibre intake. Sodium or salt intake would be very difficult to quantify. Besides, diabetes patients are advised to reduce carbohydrate intake and increase vegetables and fibre intake even per clinical practice guideline Malaysia. ²⁷

CHAPTER 3

MANUSCRIPT

3.1 Title page

**WEIGHT PERCEPTION AND ITS ASSOCIATED FACTORS AMONG TYPE 2
DIABETES MELLITUS PATIENTS ATTENDING DIABETES CLINIC,
HOSPITAL UNIVERSITI SAINS MALAYSIA**

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Running title: Weight perception among diabetic patients

3.2 Abstract

Background: Weight perception is one of the determinant factors of receptivity to weight management intervention especially in Diabetes mellitus patients. Weight management is the cornerstone of diabetic management as 5 to 7 percent of weight reduction can reduce oral anti-diabetic agent and improve insulin sensitivity.

Objective: To determine the weight perception and its associated factors among type 2 Diabetes mellitus patients attending Diabetes clinic, HUSM

Methodology: This was a cross-sectional study conducted among 321 diabetic patients attending Diabetes clinic from June 2015 to June 2016. Data on sociodemographic characteristics, diabetic duration and treatment, weight perception, weight management behaviours, measurement of weight and height, physical activities in METS and fibre/vegetables intake were collected using structured questionnaire.

Results: A total of 67.9% (n=218) of the participants had underestimated their weight status. Factors associated with under-estimation of weight were being married (AOR=0.09 [95%CI: 0.01-0.76], P=0.23), lower education level (AOR=0.43 [95%CI=0.20-0.92], P=0.028), overweight (AOR=10.15, 95%CI=4.21-24.51, P<0.001) and obese (AOR=5.85, 95%CI=14.73-147.89, P<0.001), and being physically less active (AOR=46.67, 95%CI=2.57-13.30, P<0.001). BMI of the subjects were closely related to estimation, as being overweight is 10 times more likely than normal subjects in underestimation of their weight status, and obese individuals too, significantly underestimated their weight.

Conclusions: We found an enormous mismatched between BMI measured and self-perceived body weight. Health care personals need to spend more time and effort in

weight status understanding of patient to improve diabetic management and its health relevance.

Keywords: weight perception, diabetes, BMI, physical activity, underestimation

3.3 Introduction

We are being strike with the growing occurrence of type 2 Diabetes mellitus (DM); the disease which is highly connected to over consumption of calories intake and lack of physical activities. The Third Malaysian National Health Morbidity Survey (NHMS) in 2006 reported that the prevalence of DM was 14.9% and further increased to 17.5% in year 2015. The fact that 80 to 90 percent of diabetes patients are overweight and obese provides an interesting clue to the connection between diabetes and obesity. In year 2006, one in every seven Malaysian are obese, and this has become even more shocking with one in every three Malaysians are now obese. This is a global worrying problem and in year 2013, Malaysia is granted with the notorious title as the region's fattest nation as well as ranking number sixth most obese country in Asia. People in Asia tend to develop diabetes at a lower body mass index, at younger ages, suffer longer with diabetes complications, and shorter life expectancy compare to diabetic patients in another region.

1-4

Maintaining a healthy weight is crucial to reduce the chances of you having DM. However, if you missed the chance and have been diagnosed with diabetes and you are overweight or obese, a small weight loss (5 to 10 percent) provides you with great reward by delaying the chance of getting macro and micro-vascular complications and for those on oral anti-diabetic agents, it reduces the amount of medication you need.^{5,6} The risk of

getting DM is 3 to 7 times higher among obese compare to normal weight individuals.⁷ There are studies done in Malaysia diabetic patients, overweight and obese ranging from 38 to 80 percents.^{8,9}

Weight perception is a stronger determinant factor compare to actual body mass index reported in multiple studies relating to active weight control.^{13, 14} Personal evaluation of one's body image is a major force in precipitating weight reduction behaviours and activities. The health belief system, the weight exaggeration, the perceived severity of health consequences of being overweight and obese is a protective mechanism in improving health by engaging in healthy lifestyle and behavioural change. The three most common adopting habits to lose weight were reducing fat intake, increase physical activities and increase fruits and vegetable intake.¹³

Body weight perceptions may dictate patient's adherence to healthy dietary habit, readiness to engage in moderate physical activity and adopting a healthy lifestyle. Regardless of how advance the disease, multiple studies had shown that patients' empowerment in the care of diabetes management is the key to achieve better diabetic control and general positive outcome.¹⁵ It is well understood that there are barriers to be able to sustain healthy lifestyles changes. Treating health care professionals are facing the similar obstacles of providing continuous advice and support for the lifestyle changes as long as patient remained poorly involved in the diabetic management.¹¹ Assessment of patient's understanding is essential in order to provide appropriate and personalise advice and guidance. Misconception needs to be addressed in order to actively involve patient in the diabetic management including necessary lifestyle changes; physical activity, balanced diet and nutrition. With good insight into the disease and its management,

doctor and patient achieve equal participation that ensures the success of the diabetic control.¹⁶

There were studies considering the weight perception among diabetic patient in countries like Ghana, United States and Australia.¹⁷⁻¹⁹ Study among diabetes patients, in Ghana, 77.6% underestimate their weight status and factors associated with underestimation were being obese, overweight, not married and never tried to lose weight.¹⁷ Study by Bola F. Ekezie among individual with diabetes, 26% underestimate their weight status and negatively effect on weight management behaviours.¹⁸ In Australia, 31.4% diabetes individual unaware of their weight and weight perception was influenced by household income, educational level and whether they were informed by their health care personnel.¹⁹ Glycaemic control, blood pressure and age have no association to weight perception among diabetes patients.¹⁷

Studies have repeatedly reported that accurate weight perception and understanding as the driving force for healthy eating habit and engagement in physical activities.²⁰⁻²² There are multiple studies looking into prevalence of overweight and obese among Malaysian but not from the perspective from the patients, there is lack of knowledge about how patients perceive about their own body weight and whether they satisfy with their weight and to assess health related behaviour. Therefore, in this study, we are to evaluate the perception of diabetic patients pertaining to their own body weight and to consider what are the factors related to correct perceived or underestimate of own body weight.