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THE PREVALENCE OF BLOOD GLUCOSE AND BODY MASS INDEX IN ELDERLY PEOPLE AT PANTI WERDHA TRESNA IN GIANYAR BALI. (PRELIMINARY STUDY)

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ABSTRACT

Blood glucose also known as blood sugar is the amount of glucose that can be found in the blood. Carbohydrate foods are the main source of energy for the human body. The rise of blood glucose is usually at peak when the individual's age reach around 50's as the body function decreases which effects the glucose metabolism and also the elderly body weight. The purpose of this study is to know the prevalence of blood glucose and body mass index in elderly individual. The design of the study is descriptive cross-sectional study. This study was carried out at Panti Werdha Tresna which is located at Jln. Gumitir, Denpasar,Bali. The number of elderly individuals in that old folks house was around 40 which consist of both females and males. The age range was 53-80 years old. A day before the research was carried out the elderly individuals was given informed consent and was asked to fast for at least 8 hours before the blood sample was taken. The amount of blood withdrawn was about 2cc. The results showed that 1 person (4.8%) of male and 3 person (14.3%) of females are overweight while 2 person (9.5 %) females are obese. Total 6 elderly individual with BMI above normal range. For blood glucose more than 100 mg/dL, there are 3 person (60%) males and 12 person (75%) females. The prevalence of high blood glucose is higher in female (75%) compared with male (60%). Based on the results, it can be concluded that the number of samples that has high blood glucose and high BMI is only 2 person (13.3%) of the total samples. It is suggested that the government could create a program that can reduce morbidity and mortality due to complications of high blood sugar in the elderly individuals.

Keywords: blood glucose, body mass index, elderly.

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INTRODUCTION

Blood sugar concentration is also known as blood glucose level (BGL). Amount of sugar that is present in a human body is known as blood glucose level. The blood glucose levels are normally regulated by human body by a process called metabolic homeostasis.[1,8] Human body regulates their blood glucose with insulin and glucagon. Beta cells of pancreas secretes insulin which helps in the glucose transportation to the body cells.[2,3] For instance, if the glucose level inside the cells is high, it will be converted into insoluble glycogen by the cells. Hence, this process prevents the soluble glucose to interfere the cellular metabolism.[6,7] This will then lower the blood glucose level which will prevent hyperglycemia. Diabetes may happen if there is any insulin deficiency or the body cells becomes resistant towards insulin. Glucagon is secreted by the alpha cells of pancreas which helps the cells to break down stored glycogen. Via gluconeogenesis it also helps to convert non-carbohydrate carbon sources. Hence hypoglycemia can be prevented.[4,10]

Glucose sensing neurons are located in the forebrain, hypothalamus and hindbrain.

Glucose levels are usually the lowest in the morning and increases after meal for about two hours around few millimolars (mmol/L).[4,5,13] The mean normal level of blood glucose in human is 100 mg/dL or 5.5 mmol/L. For those without diabetes and not fasting the blood sugar level should be below 125 mg/dL. The blood glucose level usually fluctuates throughout the day.[10,12] The molecular formula of glucose is $C_6H_{12}O_6$ while the empirical formula is CH_2O. [1,3,15]

When there is abnormality in the blood glucose reading it indicates that there is certain medical condition. Hyperglycemia is a condition of persistent high level of blood glucose while hypoglycemia is a condition where the blood glucose is below the normal range. Persistent and untreated hyperglycemia can cause diabetes mellitus.[4,10] In this era of globalization, many people from all around the world are suffering from diabetes due to unhealthy dietary intake and also lack of physical activities. The incidence and prevalence of diabetic cases rises every year.[11,14,15] Based on a prevalence study done in 2012, 29.1 million Americans, which is 9.3% of the population, suffers from diabetes compared to the year of 2010 there was 25.8 million Americans which is 8.3% of the total population. The percentage of Americans age 65 and older suffering from diabetes remains high, at 25.9% of population, or 11.8 million seniors (diagnosed and undiagnosed diabetes).[7,9] For the statistics based on race/ethnic American Indians/Alaskan Natives has the highest rate which is about 15.9% of the total population while the least ethnic suffering from diabetes is non-Hispanic whites which is around 7.6% of total population. Based on the statistics done in 2012 it states that there is rapid rise of diabetes cases in the population which has many complications that are fatal. [1,2,11]

In this globalization era, in the developed countries older or elderly individuals are defined for the age above 65 years. The body mass index (BMI) is a measure of human body weight and height.[3,7,9] The universal value for this BMI is kg/m². This BMI can be calculated using the formula below: BMI = mass (kg)/height(m²). Based on BMI range, an individual is considered overweight if their BMI is 25 to 29.9. This increases the risk of diseases especially cardiovascular diseases. However, the BMI range for elderly individuals are different.[5,9]

Hence, this study therefore designed to know is there any correlation between age and blood glucose level in elderly individual. If there is correlation what are the actions that can be taken to reduce high amount of blood glucose among elderly individuals.

METODE

The design of this study is descriptive cross-sectional study. This study was carried out at Panti Werdha Tresna which is situated at Jln. Gumitir, Denpasar,Bali. The number of elderly individuals in that old folks house was around 40 which consist of both females and males. The age range was 53-80 years old. Before the research was carried out the patient was given informed consent and was asked to fast for at least 8 hours before the blood sample was taken. This study is done to determine the prevalence of blood glucose and body mass index in elderly individuals.

The total amount of samples was 40 but only 21 samples were taken into account durin the research. This is due to some exclusion criteria. Bed ridden, suffers from cardiovascular and vascular diseases and respiratory diseases were excluded from the study, Hence, only 21 samples were used for this study.

Data is collected from elderly subjects whose age range between 50-80 years with their inform consent .The subjects was chosen randomly and their height, weight and blood pressure was measured. Blood around 2 cc was also withdrawn from the subjects. Before the blood was withdrawed, the subjects were asked to fast for about 8 hours.

RESULTS

This research was carried out at Panti Tresna Werdha. Out of 21 samples 5 person (23.8%) were males while the remaining 16 person (76.2%) were females. Table 1 shows descriptive statistics of age, blood glucose and BMI.The age range of the sample were 53-80 years old. The mean age is 68.09 ± 7.67 (years). The mean of blood glucose level is 128.86 ± 57.56 (mg/dL). Based on the blood glucose level tabulated in table 2, it shows that 1 person (4.8%) female has blood glucose level less than 80 mg/dL. 2 person (9.5 %) males and 3 person (14.3 %) females has a

normal blood glucose level (80-100 mg/dL). For blood glucose more than 100 mg/dL, there are 3 person (14.3%) males and 12 person (57.1%) females. The mean BMI is 22.53 ± 5.00 (kg/m^2). Based on the table 3 the BMI group range is divided into 4 groups which is underweight (<18.5kg/m^2), normal range (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2) while obesity (>30.0 kg/m^2). For the underweight group there are 2 person (9.5%) males and 3 person (14.3%). For the normal range there are 2 person (9.5%) males and 8 person (38.1%) females. 1 person (4.8%) of male and 3 person (14.3%) of females are overweight while 2 person (9.5 %) females are obese. The number of samples that has high blood glucose and high BMI is only 2 person (13.3%) of the total sample.

Table 1. Descriptive statistics of age, blood glucose and BMI

Variables	
Age (years)	68.09 ± 7.67
Blood Glucose (mg/dL)	128.86 ± 57.56
BMI (kg/m^2)	22.53 ± 5.00

Tabel 2.Percentage distribution of blood glucose level for male and female

Blood Glucose (mg/dL)	Male n= 5	Female n= 16
< 80	0% (0)	4.8% (1)
80-100	9.5% (2)	14.3% (3)
> 100	14.3% (3)	57.1% (12)

Tabel 3. Percentage distribution of BMI for male and female

BMI (kg/m^2)	Male n= 5	Female n= 16
< 18.5	9.5% (2)	14.3% (3)
18.5- 24.9	9.5% (2)	38.1% (8)
25.0-29.9	4.8% (1)	14.3% (3)
> 30.0	0% (0)	9.5% (2)

DISCUSSION

Based on the results above, high blood glucose is not influenced by BMI. This is because based on the study, 2 of 21 samples has high blood glucose and high BMI which is only 13.3%. There are many other factors that can affect the rise in blood glucose level such as obesity. Based on the latest study of *Kumar et al.*[7]it states that obesity and overweight will increase the blood glucose. This research was done in a big scale which consist of 240 male individuals. Based on the results it states that 132 (55%) male individuals has blood glucose around 120-150 mg/dL while the individuals who were overweight was 130 (55%). This research shows that increase in BMI will also have rise in BGL. Based on this journal one of the most important modifying factors of diabetes is obesity.

Based on other journals of *Innocent et al.*[5]it also shows that there is association between BMI and blood glucose level. This research was conducted in a large scale which is 253 individuals which will reduce the risk of errors and increase the prevalence. Older female individuals has higher BMI which is related to problems in the homeostasis process in the body. Based on the journal around 63.06% females and 49% males has high BMI level. This study shows that there is increase in BGL in both male and female but it is higher in females. Females that has high BGL is around 45% while males is and 24.6% in males. Another research done in Sweden among men states that, when an individual is in a normal glucose condition without any diseases and follow-up was done for several years was done to observe is there any cases of type 2 diabetes mellitus. It is found that an individual with high BMI has the highest risk to suffer from type 2 diabetes mellitus. Another study that was done towards Caucasian women states that there are also other factors that effects the blood glucose level and BMI such as biological and racial factors. Based on the study there were no any association between BGL and BMI.

Another research done by *Patil et al.*[14]states that indian population has the highest risk to suffer from diabetes mellitus and many other cardiovascular diseases due to unhealthy dietary intake and decrease in physical activities. Based on the research it is found that from total 204 individuals it is found that 165 (81%) individuals are

overweight and obese from the study. Based on WHO, it is stated there is different association between percentage of body fats and also body mass indexes between Asian and European population. This also differs for the risk of suffering from Type 2 diabetes.

CONCLUSION

There are many risk factors that contribute in increasing the blood glucose level such as age, blood pressure and body mass index. The research was only done with 21 samples from total needed sample which is 36 due to some exclusion criteria like respiratory diseases, cardiovascular diseases and bed ridden. Based on the research done, the prevalence of high blood glucose is higher in female (75%) compared with male (60%).

RECOMMENDATION

The study that was carried out was just limited in a location. Hence, in future it can be carried out in a bigger population so that the reading can be generalized in the population. There is also increased risk of errors as the study was done in smaller sample group. There are Indonesian population in the rural areas who are still not aware of the risk factors and complication of high blood glucose level. If left untreated it can lead to diabetes. Hence, the government should increase awareness programmes to increase the knowledge on diabetes which will later avoid uncontrolled diabetes level. This will later reduce the rate of morbidity and mortality.

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