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Increasing Awareness of Diabetes Mellitus in The Elderly in Lamongan Regency Through Community Service

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ABSTRACT

Purpose – *The Indonesian government had a chronic disease management program, PROLANIS, targeted for diabetes and hypertension since 2010 to prevent chronic disease patients from severe complications through monitoring and control measures. The purpose of this community service was to improve the health status of diabetic patients who participate in PROLANIS in Sukodadi and Sukolilo Villages, Lamongan Regency, through analysis of blood glucose levels.*

Design/methodology/approach – *To overcome the problems previously mentioned, community service has been proposed. This service includes educating participants about metabolic syndrome and health checks. The main aim of this educational program is to increase public awareness about diabetes mellitus. The blood examination aims to determine the prevalence of diabetes mellitus in these villages. This educational program involves direct mentoring and outreach methods, such as the creation of booklets, educational videos, and PPTs.*

Findings and Discussions – *In Sukodadi and Sukolilo Villages, community service was organized as a response to the high prevalence of diabetes mellitus. The program included blood tests and educational sessions for participants enrolled in the PROLANIS initiative. Analysis of the data revealed that the average blood sugar level of the participants was 143.1 mg/dl, slightly above the normal blood sugar level tolerance limit of 140 mg/dl. Nevertheless, the results indicate that the blood sugar levels of*

the participants can be effectively managed and kept below the diabetes tolerance threshold of <200 mg/dl.

Originality/value – Our community services in Sukodadi and Sukolilo Village, Lamongan Regency, showed that most elderly women with diabetes mellitus are retired. As people age, their risk of high blood glucose levels increases. Despite the average glucose level of PROLANIS participants being higher than normal, it can still be controlled. Our findings can guide the government to organize diabetes management programs and help service providers carry out prevention measures.

KEYWORDS: Age; Blood Glucose Levels; Gender; Occupation.

ABSTRACT

Tujuan – Pemerintah Indonesia telah memulai program PROLANIS, untuk diabetes dan hipertensi sejak tahun 2010 melalui tindakan pemantauan dan pengontrolan. Di Desa Sukodadi dan Desa Sukolilo, Kabupaten Lamongan, terdapat kasus Diabetes Melitus yang tinggi, sejumlah 570 kasus. Hal inilah yang mendasari dilakukan pengabdian masyarakat di lokasi tersebut. Tujuan dari pengabdian masyarakat ini untuk meningkatkan derajat kesehatan masyarakat melalui analisis kadar glukosa darah peserta PROLANIS di Desa Sukodadi dan Sukolilo Kabupaten Lamongan.

Desain/metodelogi/pendekatan – Untuk mengatasi permasalahan yang telah ditemukan maka diusulkan pengabdian kepada masyarakat. Layanan ini mencakup edukasi kepada peserta tentang sindrom metabolik dan pemeriksaan kesehatan. Tujuan utama dari program edukasi ini adalah untuk meningkatkan kesadaran masyarakat tentang penyakit diabetes melitus. Pemeriksaan darah tersebut bertujuan untuk mengetahui prevalensi diabetes mellitus di desa-desa tersebut. Program pendidikan ini melibatkan metode pendampingan dan sosialisasi langsung, seperti pembuatan booklet, video pendidikan, dan PPT.

Hasil dan Pembahasan – Pengabdian masyarakat dilakukan dikarenakan masalah berupa tingginya angka diabetes melitus di Desa Sukodadi dan Desa Sukolilo. Oleh karena itu, dilakukan pengabdian masyarakat berupa mengadakan pemeriksaan darah dan memberikan edukasi kepada sasaran yang mengikuti PROLANIS. Kadar gula darah peserta program PROLANIS di Desa Sukodadi dan Sukolilo rata-rata 143,1 mg/dl cenderung sedikit lebih tinggi dari kadar gula darah normal batas toleransi sebesar 140 mg/dl. Dari data yang didapatkan kadar gula darah peserta PROLANIS secara umum dapat dikendalikan dengan nilai dibawah ambang batas toleransi diabetes yaitu<200 mg/dl.

Originalitas – Pengabdian masyarakat kami di Desa Sukodadi dan Sukolilo Kabupaten Lamongan menunjukkan bahwa sebagian besar lansia perempuan penderita diabetes melitus sudah pensiun. Seiring bertambahnya usia, risiko kadar glukosa darah tinggi meningkat. Meski

rata-rata kadar glukosa peserta PROLANIS lebih tinggi dari normal, namun tetap dapat dikontrol. Temuan kami dapat memandu pemerintah untuk mengatur program pengelolaan diabetes dan membantu penyedia layanan melakukan tindakan pencegahan.

KATA KUNCI: Gender; Kadar Gula Darah; Pekerjaan; Usia

PRELIMINARY

Diabetes mellitus is a group of metabolic syndrome disorders in the body that is characterized by high blood glucose levels and may be followed by other health problems, such as hypertension, obesity, low HDL levels, and high triglyceride levels (Najmi & Yohana, 2022). Indonesia is one of the 10 countries with the highest number of diabetics in 2019. Based on 2019 International Diabetes Federation (IDF) data, Indonesia is ranked 7th after Mexico, where Indonesia has a prevalence value of 10,7 million. Based on the 2018 Riskesdas (Riset Kesehatan Dasar), data on blood glucose levels in Indonesian patients with diabetes mellitus increased from 2013 to 2018, namely by 1.6%. In 2013 the prevalence of diabetes mellitus in Indonesia was 6.9% and increased to 8.5% in 2018. East Java is one of the provinces that experienced an increase in the prevalence of diabetes mellitus from 2013 to 2018. Lamongan Regency is one of the Regency/City located in East Java Province. The number of cases of diabetes mellitus in Lamongan Regency based on health service data in 2020 was 21.992 patients, while patients who had received services were around 21.633 or 98.4%. The high cases maycause the emergence of several complications caused by diabetes mellitus. According to (Price & Wilson, 2006; Widyasari, 2017), the main complications will arise due to diabetes mellitus, both type 1 and type 2, such as heart attacks, kidney failure, stroke, and gangrene.

Diabetes mellitus cases are also influenced by individual characteristics. Individual characteristics are one of the risk factors that need to be considered in their contribution to a disease. Risk factors for diabetes mellitus itself can be divided into 2, namely risk factors that can be modified and risk factors that cannot be modified. Modifiable risk factors are such as blood glucose levels, body weight, and things that can be influenced by daily lifestyle. Meanwhile, risk factors that cannot be modified include gender, age, family history of diabetes, and so on. The prevalence of diabetes by sex, based on the 2013-2018 Riskesdas shows that women have a higher prevalence rate than men. In 2013, women had a prevalence rate of 1,7% while men only had 1,4%. In 2018, women had a prevalence rate of 1.78% while men only had 1.21%. Based on these data, it is also known that the prevalence rate of diabetes mellitus in males decreases compared to females. The prevalence of diabetes mellitus by age group is known that the older a person is, the higher the risk of developing diabetes mellitus. Based on Riskesdas data in 2013 and 2018, the highest point in the age group with the risk of developing diabetes is the age group of 22 to 64 years old.

Individual characteristics of diabetes mellitus do not necessarily cause the disease to occur and cannot be prevented. Prevention of diabetes mellitus can still be done with lifestyle changes. Based on the official website of Harvard Edu, shows that lifestyle changes can

prevent 9 out of 10 cases of diabetes mellitus in the United States (Harvard Edu). These lifestyle changes are more focused on regulating diet to ensure ideal body weight and increasing physical activity can help prevent diabetes mellitus (Khokhar & Dkk., 2017). As well as consumption of drugs or insulin injections according to doctor's recommendations can be done on diabetics diagnosed. In other studies, it was stated that activity modification as a prevention and control intervention in diabetes mellitus was proven to be able to minimize the occurrence of complications of diabetes mellitus (Terathongkum & Dkk., 2018; Sampson & Dkk., 2021). In other literature, it is also stated that activity interventions are very significant in preventing diabetes mellitus (Fitriani, 2021). Interventions are usually carried out focusing on the process of losing weight, BMI, waist circumference, body fat percentage, and fat mass (Fayh & Dkk., 2013; Fitriani, 2021). Various efforts to prevent and control diabetes mellitus are very important to avoid possible serious complications and maintain overall health.

The Indonesian government through BPJS Kesehatan (Badan Penyelenggara Jaminan Sosial Kesehatan/Social Security Agency on Health)has started a chronic disease management program, PROLANIS (*Chronic Disease Management Program*) targeted for diabetes and hypertension since 2010 to prevent chronic disease patients from falling into severe complications. One of the goals of PROLANIS is to monitor and control blood glucose levels in diabetic patients so that patients take medication and consult regularly to achieve stable blood glucose levels. The indicator for PROLANIS itself is that 75% of PROLANIS registered participants who carry out examinations at their regional First Health Level Facilities (Fasilitas Kesehatan Tingkat Pertama/FKTP) have "good" results on specific examinations for Diabetes Mellitus Type 2 and Hypertension (BPJS Kesehatan). PROLANIS is carried out through a health promotion approach and includes medical activities, education, consultations, visits, to monitoring. PROLANIS involves the community to increase their awareness to maintain stable blood glucose levels and blood pressure through activity interventions. As mentioned in PROLANIS counseling related to diabetes the behavior of maintaining a diet, taking medication regularly, and exercising regularly can help prevent the occurrence of diabetes mellitus (Islami & Dkk., 2017), of course increasing public awareness for healthy living behavior is the basis of achieving PROLANIS goals and indicators in Indonesia. The PROLANIS is also organized by involving local doctors and health workers, which is expected to increase public awareness about diabetes mellitus and hypertension and help prevent serious complications due to these conditions. Our community service purpose was to describean analysis of individual characteristics (age, gender, and occupation) on blood glucose levels in PROLANIS participants in the Lamongan Regency. Due to a high prevalence rate of Diabetes Mellitus (DM) in Lamongan, estimated to be around 2.6% among individuals aged 15 years and above, the location was chosen for conducting activities. The health services that cater to DM patients in 33 health centers across Lamongan Regency have been able to reach out to 22,580 cases, which is a remarkable 97.2% of the estimated total number of DM patients. Sukodadi District has recorded the highest number of diabetes patients, with a total of 570 sufferers. This highlights the need for community service activities such as blood sugar checkups, especially in Sukodadi and Sukolilo villages in the district, where the number of DM cases remains high.

METHOD

Sukodadi Village and Sukolilo Village, situated in Lamongan Regency, exhibit a relatively high prevalence of diabetes mellitus cases. To address this issue, community service has been proposed as a viable solution. The service aims to educate participants on metabolic syndrome and conduct blood tests for metabolic syndrome indicators. The primary objective of the educational program is to increase public awareness about diabetes mellitus. The blood tests aim to ascertain the prevalence of diabetes mellitus in these villages. The education program involves direct mentoring and outreach methods, such as creating pocketbooks, educational videos, and PPTs.

Diabetes mellitus is characterized by elevated blood glucose levels. To mitigate the risk of diseases related to high blood glucose levels, such as diabetes mellitus, regular monitoring of blood glucose levels is recommended. In response to the high incidence of diabetes mellitus in Sukodadi and Sukolilo Villages, Lamongan, East Java, community service activities have been conducted. The primary aim of these activities is to obtain first-hand information regarding the prevalence of diabetes mellitus in rural areas. The collected data will then be used to develop health programs in the area. The activities include educating the community about metabolic syndrome and conducting health checks for all participants. The health checks involve measuring blood glucose levels and collecting personal information, such as gender, age, marital status, and occupation.

To serve the community, health assessments were conducted on all PROLANIS members in Sukodadi and Sukolilo Villages, Lamongan Regency. A total of 65 individuals underwent examination, which included registration, collecting personal information, and a comprehensive health evaluation. The objective of this initiative is to leverage the examination results to develop health programs that can enhance the welfare and health of village residents.

RESULT AND DISCUSSION

Results

Table 1. Table of problems and solutions in Sukodadi Village and Sukolilo Village

Problem	Solution
The high incidence of Diabetes Mellitus in Sukodadi Village and Sukolilo Village.	Conduct blood tests related to indicators of metabolic syndrome in the form of taking venous blood from participants, serum extraction, examination of metabolic syndrome indicators, and analysis to find out a direct picture of the condition of Diabetes Mellitus in Sukodadi Village and Sukolilo Village.
	Holding education about metabolic syndrome in the form of providing pocket books, educational videos about metabolic syndrome, and PPTs related to diabetes mellitus to increase public understanding in

Sukodadi Village and Sukolilo Village regarding Diabetes Mellitus.

From the education that has been provided along with the health checks carried out, the results obtained are the problems faced by partners, including the fairly high prevalence of diabetes mellitus cases. For this reason, an analysis of partner problems and solutions is carried out, including in table above.

Figure 1. The Community Service Activity "Peningkatan Kewaspadaan terhadap Sindrom Metabolik pada Lansia di Kabupaten Lamongan"

This community service activity entitled "Peningkatan Kewaspadaan Sindrom Metabolik pada Lansia di Kabupaten Lamongan" was initiated by the Faculty of Public Health, Airlangga University in Sukodadi Village and Sukolilo Village, Lamongan Regency, East Java Province. The implementation of community service was carried out offline in the form of a community health examination on 17-18 October 2022. This activity was attended by 65 PROLANIS participants from Sukodadi Village and Sukolilo Village, Lamongan Regency. The implementation of this community service activity includes registering participants by filling in personal data, namely name, gender, age, marital status and occupation. Furthermore, the participants in community service activities took part in health checks by midwives and lecturers from the Faculty of Public Health, Airlangga University in the form of checks for glucose, cholesterol, uric acid, body weight, height, abdominal circumference and blood pressure. This health examination is the main agenda of this community service activity as a preventive effort to guide the description of cases of diabetes mellitus that occur in PROLANIS participants in Sukodadi Village and Sukolilo Village, Lamongan Regency. The individual characteristics of the participants which include age, gender, and occupation are described in Table 2.

Table 2. Distribution of Participants' Characteristics in Measuring Blood Glucose

Characteristics	Frequency	Percentage (%)
Gender		
Man	19	29,2
Woman	46	70,8
Total	**65**	**100,0**
Age		
Late Adult (36-45 years)	2	3,1
Early Elderly (46-55 years)	14	21,5
Late Elderly (56-65 years)	36	55,4
Elderly (> 65 years)	13	20,0
Total	**65**	**100,0**
Work		
Housewife	16	24,6
PNS/TNI/POLRI	10	15,4
Entrepreneur / Trader	22	33,8
Private employees	3	4,6
Farmers / Gardeners	12	18,5
Pension	2	3,1
Total	**65**	**100,0**

Table 2 shows that the diabetic patients who participating PROLANIS in Lamongan Regency have individual characteristics including, the least age of participants is late adulthood with a range of 36-45 years old, namely 2 participants (3,1%), and most are in the late elderly with a range of 56-65 years which is 36 participants (55,4%). Of the total participants based on gender, 19 participants (29,2%) were male and 46 participants (70,8%) were female. Most of the participants'jobs were entrepreneurs/traders, namely 22 participants (33,8%), and a few retirees, namely 2 participants (3,1%). Then proceed with univariate analysis of blood glucose levels based on age, gender, and occupation.

Table 3. Blood Glucose Analysis Based on Individual Characteristics

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Characteristics	Frequency	Average (mg/dl)
Gender		
Man	19	137,6
Woman	46	145,3
Total	**65**	**143,1**
Age		
Late Adult (36-45 years old)	2	141
Early Elderly (46-55 years old)	14	129,3
Late Elderly (56-65 years old)	36	130,3
Elderly (> 65 years old)	13	148,1
Total	**65**	**143,1**
Work		
Housewife	16	148,6
PNS/TNI/POLRI	10	141,1
Entrepreneur / Trader	22	144,9
Private employees	3	126,7
Farmers / Gardeners	12	132,4
Pension	2	171,75
Total	**65**	**143,1**

Table 3 shows that the analysis of blood glucose levels based on the characteristics of the diabetic patients who participating PROLANIS in Lamongan Regency. The lowest average respondent's blood glucose level was in the early elderly (46-55 years old) which was 129,3 mg/dl, and the highest average blood glucose level was in the elderly (>65 years old) was 148,1 mg/dl on blood glucose measurements. This table also shows the lowest average blood glucose level in the male group, which was 137,6 mg/dl, and the highest average blood glucose level in the female group, which was 145,3 mg/dl. on blood glucose measurements, where the changes tend to go up. The lowest average respondent's blood glucose level is the type of work of a private employee with an average blood glucose level of 126,7 mg/dl, and the highest average respondent's blood glucose level is the type of work retired with an average respondent's blood glucose level of 171,75 mg/dl, where the changes tend to increase.

Discussion

Figure 2. The Health Check Process in the Community Service Activities

This community service was conducted on PROLANIS participants with comorbid diabetes with the assumption that fasting blood glucose levels were measured. Under normal circumstances, a fasting blood glucose level <100 mg/dl, and detected glucose <140 mg/dl within 2 hours of eating. Our findings show that the average blood glucose level of PROLANIS participants was 143,1 ml/dl, demonstrating that it was a bit higher than the tolerance limit of 140 mg/dl. Thus, the PROLANIS campaign in Sukodadi and Sukolilo villages managed to keep the blood glucose levels of diabetic participants below 200 mg/dl on average.

Based on the community service results showed that there was an increase in blood glucose levels with age. These results are in line with the results of the previous analysis, which showed an increase in blood glucose levels from the lowest age (late teens) with blood glucose levels of 96 mg/dl to old age with blood glucose levels of 170,5 mg/dl (Wirotomo, 2019). Blood glucose levels tended to be significantly higher in the older group. The community service results are also in line with another result from the reference, which showed that there was a relationship between age and the incidence of Type 2 DM (p=0,000) with an OR value of 7,6, showing that people aged ≥45 years have 8 times greater risk of developing Type 2 DM compared to people aged less than 45 years (Kekenusa & Dkk., 2013). Other sources stated that patients with diabetes mellitus who joined the PROLANIS at the Pulomerak Health Center had the highest proportion of diabetic patients in the age range of 45-59 years around 54% (Kurniawati, 2022). Increasing age itself causes changes in carbohydrate metabolism and changes in insulin release, which are influenced by glucose in the blood and, due to the influence of insulin, inhibit the release of glucose into cells. The basic mechanism that causes a high risk of type 2 diabetes mellitus in elderly individuals is an increase in the composition of body fat that accumulates in the abdomen, thus triggering central obesity. Furthermore, central obesity trigger insulin resistance which is the initial process of type 2 diabetes mellitus (Suastika & Dkk., 2011).

According to the results of the community service, the average blood glucose level of women is higher than that of men. The results showed that the blood glucose level for men was lower, namely 137,6 mg/dl, while the average blood glucose level for women was the highest at 145,3 mg/dl. Based on gender blood glucose levels in this community service were higher than normal blood fasting blood glucose levels (<100 mg/dl). However, this is

still possible as most of the participants in this community service were in the later age group (56-65 years old) so of course there has been a decrease in body metabolism.This discussion focuses on the greater increase in blood glucose levels in women compared to men. It can be concluded that women are more likely to suffer from hyperglycemia than men. This is in line with the one reference which states that women suffer from diabetes more easily than men (Rita, 2018). Other literature also states that the proportion of people with diabetes mellitus in the PROLANIS at the Pulomerak Health Center was more female than male with a percentage of 65% (Kurniawati, 2022). Central obesity, hypertension, and low HDL protein are hallmarks of diabetic metabolic syndrome, which is also significantly more prevalent in women (James & Dkk., 2020). It can be seen that one of the causes of diabetes may be related to gender. Women have a greater chance of suffering from diabetes mellitus than men because many women's lifestyles are unhealthy compared to men's. Physically, women are more likely to experience a greater increase in body mass index and experience monthly cycle syndrome *(premenstrual syndrome)*. In addition, postmenopause tends to make body fat distribution more prone to accumulation, putting women at risk for diabetes (Wahyuni & Dkk., 2014).

The results showed that people who worked retirement jobs were more likely to have hyperglycemia than those who worked in other types of jobs.The results showed that the blood glucose level of the participants who were pensioners was 171,75 mg/dl, which was a very significant increase compared to the normal situation. This is also in line with the findings based on age-based individual characteristics, and retirees, including the elderly and late-aged groups, also achieved the highest blood glucose levels. This can be connected with the other results which found that the proportion of people with diabetes mellitus was more in those who did not work at 63,8% (Kurniawati, 2022). Of course, these findings are in line with retirees who no longer have permanent jobs and tend to have no activities and obligations to fulfill. Also, people who worked in the private sector had the lowest risk of developing high blood glucose compared with other types of jobs. This was by a community service conducted by Khaeriyah Adri *et al.* which found that the work of housewives/pensioners is a risk factor for diabetes mellitus cases because it is significantly related and the OR value > 1 is the biggest indication of being influenced by the age factor (Adri & Dkk., 2020). The average age of retirees was>45 years, so that is by article conducted by Wicaksono, that age >45 years was a risk factor for type 2 diabetes mellitus with diabetic ulcers (Wicaksono, 2011).

CONCLUSION

Based on our community services on PROLANIS participants in Sukodadi and Sukolilo Village, Lamongan Regency, we have found that the majority of people with diabetes mellitus in these areas are elderly women who have retired from work. As people get older, their risk of high blood glucose levels also increases, especially for those aged above 65 years. Additionally, women and those who are retired are more likely to experience an increase in blood glucose levels.

Despite the average blood glucose level of PROLANIS participants being 143.1 mg/dl, which is higher than the normal fasting glucose level, it can still be controlled at levels below 200 mg/dl. This finding has significant implications for the communities of Sukodadi and Sukolilo Village in Lamongan Regency. By improving the community's health status and implementing programs that cater to their needs, we hope to increase awareness of their health conditions through regular health checks. Our conclusions can also serve as a guide for the government to organize special programs related to diabetes mellitus management in these areas and act as a reference for future service providers to carry out community service activities that focus on prevention measures such as socialization about the dangers of diabetes mellitus and learning a balanced diet for diabetes mellitus patients.

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