



**DEVELOPMENT OF EARLY DETECTION ASSESSMENT QUESTIONNAIRE
FOR TYPE 2 DIABETES MELLITUS FOR HEALTH CADRES**

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ABSTRACT

In 2021 Diabetes Mellitus (DM) type 2 contributes to more than 90% of the total diabetes cases globally, which means more than 482.94 million individuals suffer from this disease. This figure is believed to be higher because there are still many residents who have not been detected. In Indonesia, early detection of type 2 DM is integrated with the Posbindu program, but it is still not running optimally because there is no instrument that can identify high-risk community groups. Objective: This study aims to design an early detection assessment questionnaire for type 2 DM that can be used by health cadres. Method: This study used research and development method. According of the 10 steps of the research and development method, researchers only used 9 steps due to environmental conditions, limited time and research costs. The product that will be produced in this research is an early detection assessment instrument in the form of a questionnaire consisting of questions related to signs and symptoms as well as risk factors for type 2 DM. The population consists of people in the working area of the Puskesmas Simpang Timbangan. The data analysis technique used during product testing is validity testing using Pearson product moment and reliability testing using Cronbach's alpha with validity value r count $>$ r table (0.3008) and reliability value 0.746 ($>$ 0.60). Results: From the development of the questionnaire, 15 closed questions were obtained that were valid and reliable for use. Conclusions: This early detection assessment questionnaire can be used by health cadres in early detection of risk factors for DM Type 2 in the community.

Keywords: cadres; DM type 2; early detection assessment; questionnaire

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INTRODUCTION

Diabetes Mellitus Type 2 (DM type 2) is recognized as a serious public health problem with a major impact on human life and health costs (Khan et al., 2020). In 2021 DM type 2 contributes to more than 90% of the total diabetes cases globally, which means more than 482.94 million individuals suffer from this disease (International Diabetes Federation, 2021). In Indonesia, based on National Health Insurance (JKN) Statistics in 2019, there were around 738,480 type 2 DM sufferers accessing JKN services, with total number of 1.9 million visits. The global prevalence of type 2 DM will increase by more than 60% by 2050 (Ong et al., 2023). The prevalence of type 2 DM tends to increase in the age group 40 years and over (Palange et al., 2020). If DM type 2 is not treated, it can cause acute complications such as hypoglycemia and hyperglycemia, as well as chronic complications such as retinopathy, nephropathy, neuropathy, diabetic ulcers, as well as cardiovascular diseases such as coronary heart disease, congestive heart failure and hypertension (Farmaki et al., 2020). Therefore, Prevention of this disease is important.

Primary prevention of DM type 2 is aimed at individuals or groups who have not yet been affected by the disease, with a focus on reducing the risk or avoiding the onset of the disease. Primary prevention can be done by identifying high risk groups, changing lifestyle, adjusting

diet and increasing physical activity. Identification of high risk groups for DM type 2 is the first step in early detection of the disease. Early detection program for integrated DM at the Integrated Development Post (Posbindu) for Non-Communicable Diseases (PTM). In 2017, Indonesia had 33,679 Posbindu or 24.9% spread throughout Indonesia (Kemenkes RI, 2017). The implementation of Posbindu in almost all regions of Indonesia faced various problems including: the absence of health instructors, lack of knowledge and skills of cadres, lack of family support, and low visits (Suparto et al., 2015).

Puskesmas Simpang Timbangan is one of the Community Health Centers in Ogan Ilir Regency whose working area consists of 1 sub-district and 3 villages, each of which has a Posbindu. Puskesmas Simpang Timbangan also has a DM care cadre which researchers have formed in 2023. Based on the results of interviews with officers holding the Non-Communicable Diseases (NCDs) program, it is known that the majority of residents in their working area have not yet identified risk groups for DM type 2 because there are no measuring tools or assessment formats that can be used by cadres in early detection of DM type 2. From the above background, researchers are interested in developing an early detection assessment for DM type 2 which can be used by health cadres to identify groups at risk of developing DM type 2. It is hoped that this early detection assessment can be an effective and efficient screening instrument in helping prevent the occurrence of DM type 2.

METHOD

This type of research is research and development (R & D) to produce an early detection assessment instrument for type 2 DM disease, and test the effectiveness of the instrument. The research implementation used by researchers refers to the research and development steps by Sugiyono. Referring to the ten development steps proposed by Sugiyono, researchers will only use 9 steps that are adapted to characteristics, limited time, energy and costs, namely potential and problems, data collection, product design, design validation, design revision, product trial, revision product, usage test, product revision (Sugiyono, 2008). Of the 9 steps, they can be grouped into 3 stages, namely the preliminary study stage which consists of 2 activities, namely identification of potential and problems and data collection. Then the development stage consists of product design, design validation and product revision. The population consists of people in the working area of the Puskesmas Simpang Timbangan. The data analysis technique used during product testing is validity testing using Pearson product moment and reliability testing using Cronbach's alpha.

RESULT

Identify Potential and Problems

Research begins with a potential or problem. The problem that occurs is the increasing incidence of type 2 DM in Ogan Ilir. Most people have not identified risk groups for type 2 DM because there are no measuring tools or assessment formats that can be used by cadres for early detection of type 2 DM. So far, early detection of type 2 DM has been carried out using invasive measures in the form of blood sugar checks. using a glucometer.

Gathering Information

After the potential and problems are identified, various information and literature studies are then collected which can be used as material for planning instruments that are expected to overcome these problems.

Product Design

The product resulting from research and development is a questionnaire instrument for early detection of type 2 DM risk factors.

Table 1.

Questionnaire grid for early detection of risk factors for Type 2 DM

Number	Variable
1	Riwayat genetik
2	Obesitas
3	Hipertensi
4	Riwayat penyakit kardiovaskular
5	Merokok
6	Banyaknya rokok yang dihabiskan dalam 1 hari
7	Konsumsi alcohol
8	Aktivitas fisik (olahraga)
9	Intensitas olahraga
10	Kenyamanan dengan lingkungan sekitar
11	Tingkat stress
12	Sering haus
13	Sering buang air kecil
14	Sering lapar
15	Penurunan berat badan
16	Kesemutan pada kaki
17	Kaku pada kaki atau leher
18	Rasa gatal pada kaki
19	Memiliki luka sukar sembuh
20	Penglihatan kabur
21	Sering lelah/letih
22	Mengalami lemah otot
23	Mengalami napas cepat dan dalam
24	Sering mual dan muntah
25	Kulit dan bibir terasa kering

Design Validation

Design validation is an activity process to assess whether the questionnaire design in this case is effective or not. Validation of the questionnaire is carried out by inviting several experts or experienced experts to assess the newly designed questionnaire. The 3 experts involved are lecturers in the Nursing Department who are experts in their fields, including; Dr. Arie Kusumaningrum, S.Kep., Ns., M.Kep., Sp.An., Sukmah Fitriani, S.Kep., Ns., M.Kep., Sp.Kep.Kom, and Karolin Adhisty, S.Kep., Ns., M.Kep. Each expert was asked to assess the questionnaire design using the instrument feasibility test sheet, so that the weaknesses and strengths could then be identified.

Design Revision

After the questionnaire design is validated through discussion with experts, its weaknesses will be known. These weaknesses were then tried to be reduced by improving the design. Those in charge of improving the design are researchers who want to produce the product. The following are the results of the revised questionnaire.

Table 2.
Questionnaire Design Revision 1

No	Question	Answer	
		Yes	No
1	Apakah anda mempunyai Riwayat keluarga yang menderita penyakit Diabetes Melitus?		
2	Apakah hasil IMT anda ≥ 25 ? *(Diukur oleh peneliti)		
3	Apakah anda mempunyai riwayat penyakit hipertensi (darah tinggi)?		
4	Apakah anda mempunyai riwayat penyakit jantung?		
5	Apakah anda merokok?		
6	Apakah anda menghabiskan lebih dari 10 batang rokok dalam 1 hari?		
7	Apakah anda mengkonsumsi alkohol?		
8	Apakah anda melakukan aktivitas fisik (olahraga) selama 30 menit setiap hari?		
9	Apakah anda saat ini sedang merasa stress?		
10	Dalam 1 bulan terakhir, apakah ada sering merasa haus?		
11	Dalam 1 bulan terakhir, apakah ada sering buang air kecil terutama pada malam hari (lebih dari 10 kali sehari)?		
12	Dalam 1 bulan terakhir, apakah ada sering merasa lapar?		
13	Apakah anda mengalami penurunan berat badan yang signifikan dalam 6 bulan terakhir?		
14	Dalam 1 bulan terakhir, apakah ada mengalami kesemutan di kaki?		
15	Apakah anda memiliki riwayat melahirkan anak dengan berat badan lebih dari 4 kg?		
16	Apakah saat ini anda memiliki luka yang sukar sembuh?		
17	Apakah anda mengkonsumsi makanan yang tinggi gula setiap hari?		
18	Apakah saat ini penglihatan anda kabur?		
19	Apakah anda sering mudah merasa lelah/letih?		
20	Apakah saat ini kulit dan bibir anda terasa kering?		

Product trial

The revised instrument design was then tested to 43 participants. Testing is carried out using validity and reliability tests. The validity test used Pearson Product Moment test with r table = 0.3008. Here are the results:

Table 3.
Questionnaire Validity Test Results

Question Number	Pearson Correlation	Validity
1	0,360	Valid
2	-0,171	Not valid
3	0,518	Valid
4	0,174	Not valid
5	0,471	Valid
6	0,318	Valid
7	0	Not valid
8	0,120	Not valid
9	0,293	Not valid
10	0,576	Valid
11	0,439	Valid
12	0,660	Valid
13	0,682	Valid
14	0,483	Valid
15	0,081	Not Valid
16	0,352	Valid
17	0,239	Not valid
18	0,462	Valid
19	0,524	Valid
20	0,348	Valid

Table 4.
Questionnaire Reliability test results

Cronbach's Alpha	N of items
0,746	13

Product Revision

From validity and reliability testing, it was found that of the 20 instruments, there were 13 valid and reliable question items. Furthermore, invalid question items were discarded, but two question items that were considered important were retained but the narrative was revised. The following are the results of the revised questionnaire:

Table 5.
Questionnaire Design Revision 2

No	Question	Answer	
		Yes	No
1	Apakah anda mempunyai Riwayat keluarga yang menderita penyakit Diabetes Melitus?		
2	Apakah hasil IMT anda lebih dari atau sama dengan 25? *(Diukur oleh kader)		
3	Apakah anda mempunyai riwayat penyakit hipertensi (darah tinggi)?		
4	Apakah anda merokok?		
5	Apakah anda menghabiskan lebih dari 10 batang rokok dalam 1 hari?		
6	Apakah anda tidak melakukan aktivitas fisik (olahraga) selama 30 menit setiap hari?		
7	Dalam 1 bulan terakhir, apakah ada sering merasa haus?		
8	Dalam 1 bulan terakhir, apakah ada sering buang air kecil terutama pada malam hari (lebih dari 10 kali sehari)?		
9	Dalam 1 bulan terakhir, apakah ada sering merasa lapar?		
10	Apakah anda mengalami penurunan berat badan yang signifikan dalam 6 bulan terakhir?		
11	Dalam 1 bulan terakhir, apakah ada mengalami kesemutan di kaki?		
12	Apakah saat ini anda memiliki luka yang sukar sembuh?		
13	Apakah saat ini penglihatan anda kabur?		
14	Apakah anda sering mudah merasa lelah/letih?		
15	Apakah saat ini kulit dan bibir anda terasa kering?		

Usage Trial

After testing the instrument, the instrument was then tested for use by 10 health cadres using the cadre response sheet.

Product Revision

The revision of the questionnaire was carried out again after trial use by cadres by considering input and suggestions from cadres as targets who would use this questionnaire. The following are the results of the revised questionnaire:

Table 6.
Questionnaire Design Revision 3

No	Question	Answer	
		Yes	No
1	Apakah anda mempunyai Riwayat keluarga yang menderita penyakit Diabetes Melitus?		
2	Apakah hasil IMT anda lebih dari atau sama dengan 25? *(Diukur oleh kader)		
3	Apakah anda mempunyai riwayat penyakit hipertensi (darah tinggi)?		
4	Apakah anda merokok?		
5	Apakah anda menghabiskan lebih dari 10 batang rokok dalam 1 hari?		

No	Question	Answer	
		Yes	No
6	Apakah anda tidak melakukan aktivitas fisik (olahraga) selama 30 menit setiap hari?		
7	Dalam 1 bulan terakhir, apakah ada sering merasa haus?		
8	Dalam 1 bulan terakhir, apakah ada sering buang air kecil terutama pada malam hari (lebih dari 10 kali sehari)?		
9	Dalam 1 bulan terakhir, apakah ada sering merasa lapar?		
10	Apakah anda mengalami penurunan berat badan yang signifikan dalam 6 bulan terakhir?		
11	Dalam 1 bulan terakhir, apakah ada mengalami kesemutan di kaki?		
12	Apakah saat ini anda memiliki luka yang sukar sembuh?		
13	Apakah saat ini penglihatan anda kabur?		
14	Apakah anda sering mudah merasa lelah/letih?		
15	Apakah saat ini kulit dan bibir anda terasa kering?		

DISCUSSION

Based on the results of the validity test of the questionnaire assessing early detection of type 2 DM risk factors, there were 13 valid questions and 7 invalid questions. Valid questions are questions about genetics, history of hypertension, smoking, number of cigarettes consumed in 1 day, frequent thirst, frequent urination, frequent hunger, weight loss, tingling in the feet, having wounds on the feet that are difficult to heal, blurred vision, fatigue, lips and skin feel dry. Validity test is a test used to determine and test accuracy and the determination of a measuring instrument to be used to measure something as it should be measured (Rosita et al., 2021). Validity testing is carried out statistically using Pearson Product Moment. Validity test with Pearson product moment (r) compare every variable dependent on analysis 2D motion capture (identified as reference standard). Higher correlation demonstrated strong concurrent validity (Amalia et al., 2022).

According to Darmono, 2018 in Fitriyani (2012) DM symptoms can be classified into acute symptoms and chronic symptoms. The acute symptoms of DM vary from one sufferer to another, and they may not show any symptoms until a certain time. At the beginning the symptoms are: eating a lot (polyphagia), drinking a lot (polydipsia), urinating a lot (polyuria). If this condition is not treated immediately, symptoms will arise: drinking a lot, urinating a lot, appetite starts to decrease/weight loss quickly (down 5 - 10 kg in 2 - 4 weeks), fatigue easily, if not treated quickly, will nausea occurs, and the sufferer will even fall into a coma, which is called diabetic coma. Chronic symptoms of DM are tingling, the skin feels hot, or like being pricked by needles, a thick feeling on the skin, cramps, fatigue, easy drowsiness, blurred eyes, usually changing glasses frequently, itching around the genitals, especially women, teeth that become loose and fall out easily. decreased sexual ability and even impotence, pregnant women often experience miscarriage or fetal death in the womb, or with babies with a birth weight of more than 4 kg (Fitriyani, 2012). There are 7 invalid questions, namely questions about obesity, cardiovascular disease, alcohol consumption, physical activity, stress level, history of giving birth > 4 kg, and diet. The number of respondents used to test the validity and reliability of the self-medication knowledge and behavior questionnaire will influence the results (Amalia et al., 2022).

Reliability testing on a research instrument is a test used to find out whether the questionnaire used in collecting research data has been completed said to be reliable or not in the reliability test of this research carried out using Cronbach's Alpha (Rosita et al., 2021). In this research, the reliability value or Cronbach's Alpha is 0.746 (> 0.60), so the questionnaire can be said to be reliable. Type 2 diabetes is a chronic metabolic disease characterized by hyperglycemia.

Long-term high blood glucose can damage multiple organs, increasing the risk of cardiovascular disease, kidney disease, retinopathy and other complications (Ali et al., 2022). Delayed diagnosis of diabetes may increase many health risks. When blood glucose levels remain above normal for an extended period, multiple organ systems can be harmed, raising the risk of cardiovascular, renal, neurological and ocular complications (Zhang et al., 2023). With this questionnaire, the author hopes that early detection of risk factors for type 2 DM can be done easily by community health center cadres and community nurses. Screening for preclinical diabetes is critical given the complications and morbidities already present at the time of the clinical diagnosis of diabetes (Duan et al., 2021). Furthermore, the author also hopes that preventing the incidence of type 2 DM can be done as early as possible with health education. Education is the cornerstone of effective diabetes management and prevention. It is very important to provide knowledge about the course of diabetes, factors risks, and lifestyle modifications needed to prevent diabetes mellitus (Singh et al., 2024).

CONCLUSION

From the development of the questionnaire, 15 closed questions were obtained that were valid and reliable for use with validity value r count $>$ r table (0.3008) and reliability value 0.746 ($>$ 0.60). This early detection assessment questionnaire can be used by health cadres in early detection of risk factors for DM Type 2 in the community.

REFERENCES

- Ali, M. K., Pearson-Stuttard, J., Selvin, E., & Gregg, E. W. (2022). Interpreting global trends in type 2 diabetes complications and mortality. *Diabetologia*, 65, 3–13. <https://doi.org/10.1007/s00125-021-05585-2/Published>
- Amalia, R. N., Dianingati, R. S., & Annisaa, E. (2022). Pengaruh Jumlah Responden Terhadap Hasil Uji Validitas Dan Reliabilitas Kuesioner Pengetahuan Dan Perilaku Swamedikasi. *Generics : Journal of Research in Pharmacy Accepted*: 4 Mei, 2(1). <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://ejournal2.undip.ac.id/index.php/generics/article/view/12271&ved=2ahUKEwjfndvrocYJAxUz1TgGHQ73NhAQFnoECAoQAQ&usg=AOvVaw2TOOKx9WdsZTL-Lrk2HBkb>
- Duan, D., Kengne, A. P., & Echouffo-Tcheugui, J. B. (2021). Screening for Diabetes and Prediabetes. In *Endocrinology and Metabolism Clinics of North America* (Vol. 50, Issue 3, pp. 369–385). W.B. Saunders. <https://doi.org/10.1016/j.ecl.2021.05.002>
- Farmaki, P., Damaskos, C., Garmois, N., Garmpi, A., Savvanis, S., & Diamantis, E. (2020). Complications of the Type 2 Diabetes Mellitus. *Current Cardiology Reviews*, 16(4), 249–251. <https://doi.org/10.7326/0003-4819-152-5-201003020-01003>
- Fitriyani, F. (2012). UNIVERSITAS INDONESIA [Universitas Indonesia]. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://lib.u.i.ac.id/file%3Ffile%3Ddigital/2016-12/20440387-S-PDF-Fitriyani.pdf&ved=2ahUKEwio39yokcyJAxVR_6ACHcsFBRYQFnoECBQQAQ&usg=AOvVaw1mzT30n6_zLRN92U4m_QtG
- International Diabetes Federation. (2021). *IDF Diabetes Atlas 10th edition*. www.diabetesatlas.org
- Kemenkes RI. (2017). *Peta Jumlah Posbindu PTM (Detail Informasi Peta Posbindu Indonesia)*.

- Khan, M. A. B., Hashim, M. J., King, J. K., Govender, R. D., Mustafa, H., & Kaabi, J. Al. (2020). Epidemiology of Type 2 diabetes - Global burden of disease and forecasted trends. *Journal of Epidemiology and Global Health*, 10(1), 107–111. <https://doi.org/10.2991/JEGH.K.191028.001>
- Ong, K. L., Stafford, L. K., McLaughlin, S. A., Boyko, E. J., Vollset, S. E., Smith, A. E., Dalton, B. E., Duprey, J., Cruz, J. A., Hagins, H., Lindstedt, P. A., Aali, A., Abate, Y. H., Abate, M. D., Abbasian, M., Abbasi-Kangevari, Z., Abbasi-Kangevari, M., ElHafeez, S. A., Abd-Rabu, R., ... Vos, T. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, 402(10397), 203–234. [https://doi.org/10.1016/S0140-6736\(23\)01301-6](https://doi.org/10.1016/S0140-6736(23)01301-6)
- Palange, N. J., Cinquenta, A. F., Presse, I. J., Jamal, A. M., & Suli, R. F. (2020). Alcohol consumption as a risk factor for the development of type 2 diabetes mellitus in patients at hospital central de nampula, northern mozambique. *Romanian Journal of Diabetes, Nutrition and Metabolic Diseases*, 27(2), 120–127. <https://doi.org/10.46389/rjd-2020-1020>
- Rosita, E., Hidayat, W., & Yuliani, W. (2021). Uji Validitas Dan Reliabilitas Kuesioner Perilaku Prosocial. *Fokus (Kajian Bimbingan & Konseling Dalam Pendidikan)*, 4(4), 279. <https://doi.org/10.22460/fokus.v4i4.7413>
- Singh, A., Destra, E., Kurniawan, J., Suros, A. S., Febriastuti, A., & Sitorus, R. A. H. (2024). Kegiatan Deteksi Dini Penyakit Diabetes Mellitus Tipe 2 melalui Pemeriksaan Gula Darah Sewaktu pada Kelompok Usia Produktif. *Jurnal Pengabdian Masyarakat*, 3(1), 207–213. <https://doi.org/10.30640/abdimas45.v3i1.2986>
- Sugiyono. (2008). *Metode Penelitian Pendidikan: pendekatan kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Suparto, T. A., Sunjaya, D. K., & Susanti, R. D. (2015). Masalah-Masalah Program Posbindu Di Desa Dayeuhkolot Kabupaten Bandung Jawa Barat. *Jurnal Pendidikan Keperawatan Indonesia*, 1(1). <https://doi.org/https://doi.org/10.17509/jpki.v1i1.1185>
- Zhang, J., Zhang, Z., Zhang, K., Ge, X., Sun, R., & Zhai, X. (2023). Early detection of type 2 diabetes risk: limitations of current diagnostic criteria. *Frontiers in Endocrinology*, 14. <https://doi.org/10.3389/fendo.2023.1260623>