



Socialization of the Importance of Early Diabetes Mellitus Prevention using Poster Media for Young Tenants of Boarding House in Tembalang Sub-District, Semarang

Aulia Meirizka Saputra¹, Fanda Indriyani², Dian Purwo Jatinging Putri², Ainutajriani², Stalis Norma Ethica³

^{1,2,3} Universitas Muhammadiyah Semarang, Indonesia

ABSTRACT

Diabetes mellitus (DM) is among non-communicable diseases causing high number of morbidity and mortality in developing countries including Indonesia. Clinically, DM is a condition when blood sugar (glucose) levels exceed 126 mg/dl in a fasting state and exceed 200 mg/dl in a non-fasting state. Public understanding is still relatively low about possibility of early DM in young people. Teens could be susceptible to DM, especially when they have poor diet and sedentary lifestyle. Efforts to prevent early DM among teenagers have been done through Community Health Development Program (Program Pembangunan Kesehatan Masyarakat, PPKM) using poster as socialization media to the young tenants of boarding house at Sambiroto Residence, Tembalang Sub-District, Semarang, Central Java, Indonesia. The aim was to increase the teenagers' awareness of knowing the risks and clinical symptoms of diabetes mellitus. It is also to add insight on how to prevent DM disease at a young age. Participatory approaches and counseling have been carried out in the community service activities through the poster media, as well as the delivery of questionnaires prior- and post- counseling. The results of the questionnaire analysis showed that the counseling program using poster as media could improve awareness about DM among boarding house young tenants in Sambiroto Residence, Tembalang, Semarang City.

Keywords: Community Service, Diabetes Mellitus, Disease Awareness, Sambiroto Housing, Young Tenants.

Received:	Revised:	Accepted:	Available online, p.
19.01.2021	20.04.2021	17.06.2021	06.08.2021

Suggested citation

Saputra, A. M., Indriyani, F., Putri, D. P. J., Ainutajriani, & Ethica, S. N. (2021). Socialization of the importance of early diabetes mellitus prevention using poster media for young tenants of boarding house in Tembalang Sub-District, Semarang. *Jurnal Pengabdian Pada Masyarakat*, 6(3), 959-970. <https://doi.org/10.30653/002.202063.760>

Open Access | URL: <http://ppm.ejournal.id/index.php/pengabdian/article/view/760>

³ Corresponding Author: Medical Laboratory Technology, Diploma Study Program, Faculty of Nursing and Health Sciences, Universitas Muhammadiyah Semarang, Jl. Kedungmundu Raya No. 18 Semarang, 50273, Indonesia; Email: norma@unimus.ac.id

INTRODUCTION

Diabetes mellitus (DM) is among non-communicable diseases causing high number of morbidity and mortality in developing countries including Indonesia. Clinically, DM is a condition when blood sugar (glucose) levels exceed 126 mg/ dl in a fasting state and exceed 200 mg/ dl in a non-fasting state. DM is often reported as The Great Imitator, because the symptoms of the ailment imitate those of other diseases. In fact, DM could affect all organs of the body (Kemenkes RI, 2018; Dhoruri et al., 2017). Current research has even showed that DM is closely associated with the death and severity of Covid-19 (Corona Virus Diseases 2019), as well as disease progression in patients with Covid-19 (Huang et al., 2020).

Cases of DM worldwide continues to increase. It is predicted that by 2030 diabetes mellitus sufferers will reach 550 million people, which is equivalent to about 3 new cases every 10 seconds, or nearly 10 million per year. The increase rate will be more dominant in developing countries. The prevalence of diabetes mellitus in each country varies. In 2035, China is the highest country with the prevalence of diabetes mellitus reaching 142.7 million, followed by India with a prevalence of 109 million, and the United States 29.7 million. Indonesia ranks ninth with the prevalence of DM reaching 11.8 million (Fan et al., 2017; Cho et al., 2018; Whiting et al., 2011).

The occurrence of DM is thought to be due to multifactorial causes including heredity, a virus that causes pancreatic beta cell damage, diet, obesity, activity patterns, environment and insufficient sleep habits (Alipour et al., 2017; Sisti et al., 2018). Various risk factors triggering DM namely genetic, lifestyle to physiological factors. Lifestyle factors prompting DM are smoking, alcohol consumption, consumption of unhealthy foods, lack of physical activity, excess body weight, and obesity. This lifestyle can cause physiological changes in the body such as high blood pressure, high blood sugar, and high blood fat which have the potential to cause DM (Riley et al, 2016).

Young people or adolescents are currently very susceptible to diabetes mellitus, which originates from improper lifestyle and patterns, such as eating too much sugar, consuming less fruits and vegetables, staying up late and not doing enough exercise. (Temneanu et al, 2016). Therefore, early education about the dangerous risk of DM targeting young people is necessary to prevent occurrence of early symptoms of DM. Young tenants at Sambiroto Baru Residence 3 Housing Tembalang District, Semarang in this case are among susceptible group of early DM. The risk will be increased if they are not educated to practice balanced diet and healthy lifestyle. For that reason, efforts to prevent early DM among teenagers need to be conducted through Community Health Development Program (Program Pembangunan Kesehatan Masyarakat, PPKM) to the boarding school children at Sambiroto Residence Housing, Tembalang Sub-District, Semarang, Central Java, Indonesia.

PPKM is a program sponsored by The Medical Laboratory Science and Technology Study Program of Universitas Muhammadiyah Semarang (Unimus) as a higher education institution in Indonesian aiming to generate skillful health analyst experts (Adhestigita et al., 2019; Kurniawati et al., 2019; Indriatiningsih et al., 2019). The aim of the PPKM activity was to increase the children's awareness of knowing the danger and clinical symptoms of diabetes mellitus. It is also to add insight on how to prevent DM

disease at a young age. The method to be carried out includes the provision of education poster with graphical pictures to attract and engage young people as targeted audience.

Literature or Conceptual Review

Diabetes Mellitus (DM) is a metabolic disorder identified by the presence of chronic hyperglycemia combined in greater or lesser extent by changes to metabolisms of carbohydrate, protein, and lipid (Mauri-Obradors et al., 2017). Two types of DM, the type 1 (DM1) and type 2 (DM2) present many possible long-term complications. Various epidemiological have reported that generally the severity of diabetic complications is proportional to both level and duration of hyperglycemia (Tandon et al., 2012).

The occurrence of Type 1 DM continues to increase (Ryninks et al., 2015). In particular, DM type 1 is an autoimmune condition, which is also the commonest type of diabetes seen in children. The condition could lead to absolute insulin deficiency, which results in hyperglycaemia as well as its related manifestations characterized by the 4Ts (toilet, thinner, thirsty, tired) (Hamiltin et al., 2017). Another study reported that Maturity-onset diabetes of the young (MODY) is a form of monogenetic diabetes, due to a single gene alteration. The condition accounts for 1–2% of the entire cases of DM and occurs at a younger age, usually before the age of 25 years (Bonfig et al., 2011). Meanwhile, In Asia, gestational diabetes mellitus (GDM) is a of the main public health issues in Asia. Asian women associated with common risk factors particularly among those having a history of previous GDM, should get more attention from physician due to high-risk cases for GDM in pregnancy (Lee et al., 2018). Considering all of these facts, female youth should receive priority in the socialization of DM risks and promotion of healthy ways to prevent early symptoms of DM.

Several studies had reported the importance of Prevention Counseling Program prevent early DM occurrence in young people. For example, the Feel4Diabetes-study is a school-and community-based intervention program targeting vulnerable families across Europe aiming to endorse healthy lifestyle and thus, preventing type-2 DM. For the success of a prevention counseling program, Bean et al., (2020) recommended 3 points including: (a) Creating peer support networks, (b) establishing platforms to provide information related to prediabetes, and (c) facilitating ongoing trainer support.

METHOD

Prior to the core event of socialization program on DM prevention at young age using poster media, early survey on the location was conducted. Young tenants of, Sambiroto Baru 3 boarding house in Tembalang Sub-District, Semarang was targeted because in the location there were a large group of young female tenants who are mainly care less about healthy lifestyle. Several steps were then carried out as part of the implementation of PPKM program including:

- 1) Identifying the goals of boarding school children, namely approaching and conducting interviews first so that we find the problem is a lack of awareness, namely about health, for example rarely exercising, eating foods that contain high sugar levels, lack of rest time, so that without realizing it this habit can trigger DM at a young age.

- 2) Extension materials were made in the form of a brochure with the theme of "Prevention of Diabetes Mellitus at a Young Age".
- 3) The PPKM core socialization event was on Wednesday, December 23, 2020 targeting young female tenants of boarding house at Sambiroto Baru Residence 3, Tembalang District, Semarang City, Central Java (Figure 1).
- 4) Delivery of poster materials, list of attendance document, printed questionnaires, etc. (Ethica et al., 2020). The material contains information about the high risk, manifestation and complications of DM in young people. It also contains information about ways to prevent the occurrence of DM at early age including sufficient rest, regular exercise, and balanced diet every day.

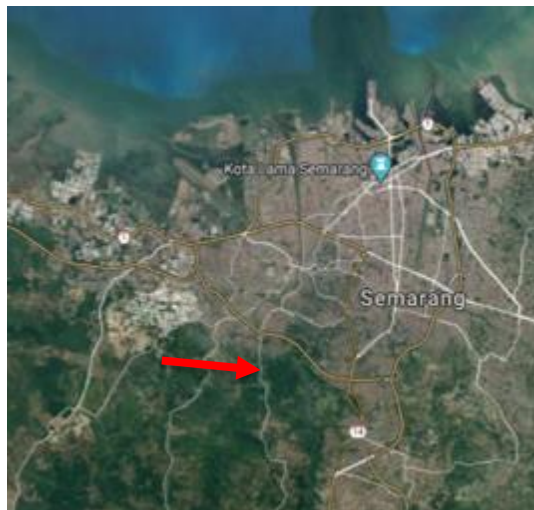


Figure 1. *Sambiroto Residence 3 (pointed by red arrow) at Tembalang Sub-District. Semarang City, where the counseling program had been conducted*

Source: Wikimapia

The participatory and counseling approach had been carried out in this community. Documentation as evidence of the PPKM program implementation was also conducted in the form of photos and videos. Implementation method that had been done includes questionnaire analysis and evaluation. The workflow of all activities was as shown in Figure 2.

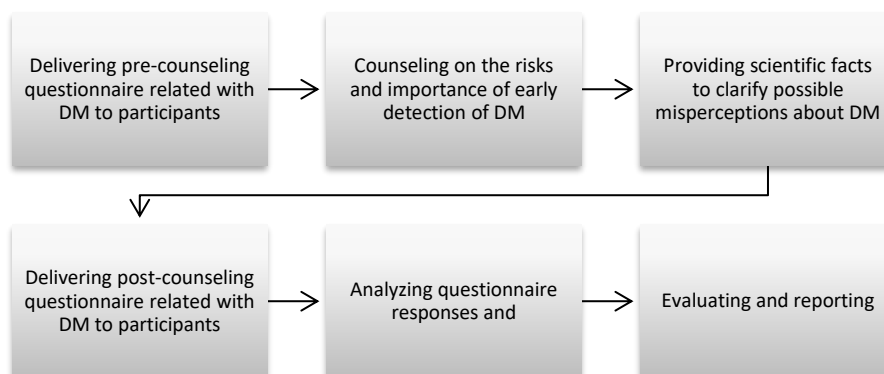


Figure 2. *Workflow of counseling activity to prevent early DM (modified from Ethica et al., 2019)*

Every participant was provided with a piece of paper containing separated questionnaire, intended to be filled pre- and post-counseling by respondents (Dewi et al., 2019). The questions and answers in both pre- and post-questionnaire were designed similar, so at the end of the session responds to both could be compared indicating the effectiveness of the counseling. Both questionnaires are shown in **Figure 3**. Later, data obtained from pre- and post-questionnaire were compared and displayed in a simple bar chart using MS Excel.

KUESIONER:	
Iptek Bagi Masyarakat: Penyuluhan Pentingnya Cegah Diabetes di Usia Muda	
Sebelum Penyuluhan (Pre-Counseling)	
1.	Diabetes melitus (DM) bisa disebut juga ...
	a. Penyakit lambung
	b. Kencing manis
	c. Penyakit ginjal
2.	Penyakit Diabetes melitus banyak menyerang kelompok pada usia mana? Pilih jawaban yang tepat
	a. Anak-anak, remaja, orang tua
	b. Dewasa
	c. Orang tua
3.	Apa penyakit Diabetes melitus bersifat menular?
	a. Tidak
	b. Ya
4.	Berikut ini faktor Diabetes melitus tipe II adalah /
	a. Usia, obesitas, riwayat keluarga, ras
	b. Jenis kelamin, usia, riwayat keluarga
	c. Obesitas, kebiasaan, usia, ras
<hr/>	
Setelah Penyuluhan (Post-Counseling)	
1.	Diabetes melitus (DM) bisa disebut juga ...
	a. Penyakit lambung
	b. Kencing manis
	c. Penyakit ginjal
2.	Penyakit Diabetes melitus banyak menyerang kelompok pada usia mana? Pilih jawaban yang tepat
	a. Anak-anak, remaja, orang tua
	b. Dewasa
	c. Orang tua
3.	Apa penyakit Diabetes melitus bersifat menular?
	a. Tidak
	b. Ya
4.	Berikut ini faktor Diabetes melitus tipe II adalah /
	a. Usia, obesitas, riwayat keluarga, ras
	b. Jenis kelamin, usia, riwayat keluarga
	c. Obesitas, kebiasaan, usia, ras

Figure 3. Four questions related with DM awareness in each questionnaire delivered to participants prior- and post counselling session

RESULT AND DISCUSSION

According to early survey conducted by interviews, most teenagers in the boarding house of Sambiroto Baru Residence 3 on a daily basis do not pay attention to eating patterns and healthy living, this is the cause of diabetes mellitus at young age. Tenants of the boarding houses in Sambiroto Baru housing also admit they often eat foods that contain high sugar levels. so that they pay less attention to the content of the food consumed every day. Based on the survey, boarding school teenagers pay less attention to their diet every day. However, such habits including careless diet bring high risks to diabetes mellitus at a young age. The purpose of this PPKM is to increase the knowledge of boarding children in the Sambiroto Baru Residence 3 housing complex, Tembalang Sub-District, Semarang about prevention. Diabetes mellitus at a young age.

Community service activity through PPKM Program delivering counseling theme "*Prevention of Diabetes Mellitus at Young Age*" has been conducted by Unimus team at Sambiroto Residence, Tembalang Sub-District, Semarang City. The aim was to deliver counseling to boarding school teenagers to be more aware of the importance of maintaining health, the benefit of healthy daily diet to prevent DM at early age. DM disease could bring lifetime sickness carrying risks of complications that cause damage to human organs.

Planning of community service activity at Sambiroto Residence, Tembalang Sub-District, Semarang City took up to 3 weeks ranging from poster creation, permit correspondence, questionnaire preparation and other technical briefing to core events. Location survey was also carried out prior to the activity.

The activity reported in this paper had been carried out on Wednesday, December 23, 2020. From 15 targeted teenagers invited, 13 of participants of the counseling program were all females. Total participants of the even including committees were 16 persons. All of them had never been receiving any counseling related with the awareness of DM nor other non-communicable diseases.

From the data analysis of PPKM counseling carried out on Wednesday, December 23, 2020, from what we surveyed it can be concluded that boarding school children are still lacking in implementing a healthy diet and lifestyle. Therefore, this PPKM socialization activity can make boarding school children aware. Based on our hopes, even though the boarding school students' enthusiasm is still lacking, we hope that this activity can reduce diabetes mellitus sufferers at a young age.

- 1) Unimus Lecturer and Student as a team led by a health counselor, Dr. Stalis Norma Ethica, M.Si. from the Unimus Medical Laboratory Science/ Technology Study Program were the proposer and implementer responsible for coordinating the implementation of core events and extension materials.
- 2) The community, namely the boarding school housing tenant group Sambiroto Baru 3 Residence of Tembalang Sub-District, Semarang City, Central Java provided location and accommodation for counseling activities with the permit of Mr. Ermanto as the landlord.
- 3) The participants of this community service event mainly came from teenagers as tenant living in Sambiroto Baru, Tembalang Sub-District, Semarang students of Diploma Study Program of Medical Laboratory Science, Unimus working as committee members.

- 4) Unimus students were directly involved in all activities and given responsibility for preparing poster, questionnaire and documentation of activities.
- 5) Dr. Stalis Norma Ethica was asked to be the consultant as well as a resource person for counseling activities themed " *Prevention of Diabetes Mellitus at Young Age* ".

The overall steps of socialization activities conducted were following the plan according to the chart as guidelines shown Figure 2. Primary counseling event had been carried out at the set location on Wednesday, December 23, 2020. Briefing of the event was conducted by Dr. Stalis Norma Ethica, lecturer of Magister Study program of Clinical Laboratory Science at Unimus. Next, distribution of questionnaires prior- and post- counseling was done to find out basic knowledge of participants before and after delivering of poster material about the definition of DM and the importance of early DM prevention (Figure 4 and 5).

Poster material presented in the counselling events (Figure 6) was also distributed to all participants as printed materials. Printed materials were used because in the location is not possible to utilize advanced multimedia facilities. During counseling, the speakers invited participants to take part in the discussion. Because the situation was amidst Covid-19 (Corona Virus Disease 2019) pandemic, strict health protocol was applied such as physical distancing, mask wearing, body temperature checking and hand sanitizer application.



Figure 4. *Delivery of posters activity before counseling presentation*



Figure 5. *Delivery of post-questionnaire after counseling presentation*

During counseling session, participants were free to address questions and to present their opinions. The activity was also followed up with evaluation of DM case reports involving participants, ended with the distribution of questionnaires on the same day. The series of activities conducted were then followed by evaluation on responded questionnaire presented in the final report of the activity.

Based on evaluation, it was found that the activities held were a fascinating moment for the community of the young female tenants of Boarding House of Sambiroto Baru 3 residence, because they could gather and get knowledge as well as motivation to convey the true facts about DM (Figure 7). Based on the results of the evaluation activities, information was obtained that participants hoped that similar extension activities could continue to be provided with other extension materials, and even other events in the future.



Figure 6. Poster designed and used as socialization media



Figure 6. Awarding to the most active participant in closing ceremony

After conducting counseling and distributing posters, the response from the boarding house tenants were recorded and analyzed. The evaluation was not only conducted to determine the quality of community service activities, but also to find out

whether there was an increase in participants' understanding of DM according to the counseling materials provided. Analysis of the results of the questionnaire analysis was conducted at the beginning of January 2021.

The PPKM program through counseling with the theme of "Prevention of DM at Young Age" was intended to improve understanding of young females in Semarang city about DM disease. The understanding was measured through analysis of questionnaire answers provided before and after counseling activities. The questionnaire mainly focused on basic causes of DM and its relation with young people, which are among susceptible groups to the disease. Ways to prevent early onset of DM were also conveyed underlining importance of balanced diet and non-sedentary lifestyle. The improvement measured by questionnaire analysis before and after counseling had given. The results of the analysis of the questionnaire responses received from participants before and after counseling are shown in **Figure 8**. There were 13 participants responding to counseling activity and all of them could manage to return questionnaire responses.

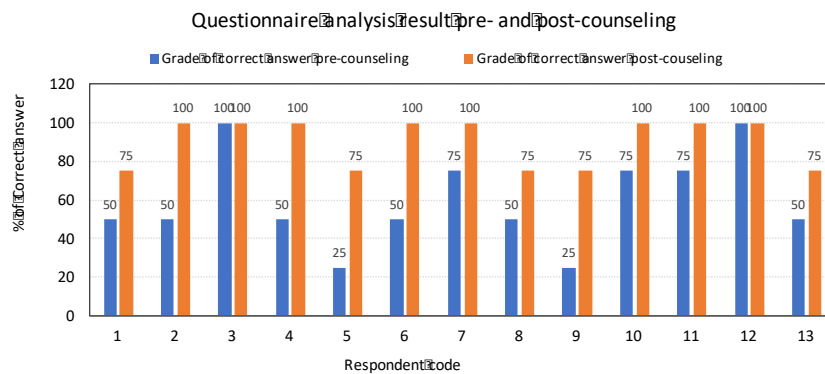


Figure 7. Questionnaire analysis result showing higher percentage of correct answers after counseling

Figure 8 shows comparison between the pre- and post-questionnaire answers coming from 13 participants. Prior to counseling, only 2 participants could answer all tested questions correctly, yet after counselling 8 could answer all questions provided correctly. Overall, after counseling, there were 10 out of 13 participants (77%) that could get benefit by improving their answers. From this community service, it can be seen that the boarding houses of Sambiroto Baru Residence 3, Tembalang sub-district initially care less about poor diet and sedentary lifestyle, which bring risks of early DM onset. After counselling, however, their understanding about ways to prevent occurrence of early DM was improved. Our results show that the use of poster media is beneficial in improving understanding of our young respondents, young tenants of a boarding house in Semarang City, Central Java, about ways to prevent DM at early age.

CONCLUSION

Counseling activity of "Prevention of Diabetes Mellitus at Young Age" as part of Unimus PPKM program for young female tenants of boarding house in Tembalang Sub-

District, Semarang City, Central Java Province had been successfully carried out. Our results show that the use of poster media is beneficial in improving understanding of targeted young respondents in Semarang City.

Acknowledgement

Kami ucapkan terima kasih kepada Universitas Megarezky selaku institusi yang menanungi prodi pendidikan profesi ners, pihak SMA Negeri 14 Maros yang telah bersedia menjadi lokasi pengabdian masyarakat, para peserta PPGD yang selalu kami banggakan dan nantinya kelak akan menjadi penolong-penolong hebat masa depan, serta Tim Dosen Program Studi Pendidikan Profesi Ners Universitas Megarezky.

REFERENCES

- Adhestigita, A., Pratama, R. G., Afifah, N., Febiana, T., Rahayu, S., Sulistyningtyas, A. R., ... & Ethica, S. N. (2019). Kegiatan pengabdian masyarakat sebagai upaya mendapatkan gambaran penderita penyakit tuberculosis melalui program praktik pembangunan kesehatan masyarakat (PPKM) di Puskesmas Lamper Tengah Semarang tahun 2018-2019. In *Prosiding Seminar Nasional Mahasiswa Unimus*, Vol. 2 (pp. 319-324).
- Alipour, F. G., Ashoori, M. R., Pilehvar-Soltanahmadi, Y., & Zarghami, N. (2017). An overview on biological functions and emerging therapeutic roles of apelin in diabetes mellitus. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 11, S919-S923.
- Bean, C., Dineen, T., & Jung, M. (2020). Lessons learned in supporting women with prediabetes through maintaining diet and exercise behavior changes beyond a diabetes-prevention counseling program. *Case Studies in Sport and Exercise Psychology*, 4(1), 21-31.
- Bonfig, W., Hermanns, S., Warncke, K., Eder, G., Engelsberger, I., Burdach, S., ... & Lohse, P. (2011). GCK-MODY (MODY 2) caused by a Novel p. Phe330Ser mutation. *International Scholarly Research Notices*, 2011, 1-6.
- Cho, N., Shaw, J. E., Karuranga, S., Huang, Y. D., da Rocha Fernandes, J. D., Ohlrogge, A. W., & Malanda, B. (2018). IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Research and Clinical Practice*, 138, 271-281.
- Dewi, S. S., Ethica, S. N., & Hersoelistyorini, W. (2019). Socialization of the benefits of fermenting cattle milk into yogurt as a probiotic food product for housewife community of Sruni Village, Musuk, Boyolali. *Jurnal Pengabdian Pada Masyarakat*, 4(4), 581-588.
- Dhoruri, A., Lestari, D., & Ratnasari, E. (2017). Sensitivity analysis of goal programming model for dietary menu of diabetes mellitus patients. *International Journal of Modeling and Optimization*, 7(1), 7.
- Ethica, S. N., Iriyanto, S., Sukowiyono, S., Khuriyati, S. F., Sulistyningtyas, A. R., Hidayati, N., & Hersoelistyorini, W. (2020, December). Prospecting postharvest processing of agricultural and social forest products at Gerlang Village, Central Java. In *IOP Conference Series: Earth and Environmental Science* (Vol. 594, No. 1, p. 012003). IOP Publishing.
- Ethica, S. N., Sulistyningtyas, A. R., Ernanto, A. R., Afriansyah, M. A., & Mukaromah, A. H. (2020). Socialization of lupus disease awareness for housewife group of Genting Village, Ambarawa, Central Java. *Jurnal Pengabdian Pada Masyarakat*, 5(4), 906-916.

- Fan, W. (2017). Epidemiology in diabetes mellitus and cardiovascular disease. *Cardiovascular Endocrinology*, 6(1), 8-16.
- Hamilton, H., Knudsen, G., Vaina, C. L., Smith, M., & Paul, S. P. (2017). Children and young people with diabetes: recognition and management. *British Journal of Nursing*, 26(6), 340-347.
- Huang, I., Lim, M. A., & Pranata, R. (2020). Diabetes mellitus is associated with increased mortality and severity of disease in covid-19 pneumonia—a systematic review, meta-analysis, and meta-regression. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(4), 395-403.
- Indriatiningsih, W., Nugraha, W. A., Putri, S. M., Sa'adah, A., Sulistyanyngtyas, A. R., & Ethica, S. N. (2019). Praktik pembangunan kesehatan masyarakat (PPKM) dalam upaya pencegahan penyakit kardiovaskuler di Desa Ngablak Kidul, Pedurungan, Semarang. In *Prosiding Seminar Nasional Mahasiswa Unimus*, Vol. 2 (pp. 8-16).
- Jones, K. E., Yan, Y., Colditz, G. A., & Herrick, C. J. (2018). Prenatal counseling on type 2 diabetes risk, exercise, and nutrition affects the likelihood of postpartum diabetes screening after gestational diabetes. *Journal of Perinatology*, 38(4), 315-323.
- Kemendes RI. (2018). *Hasil utama riskedas tentang prevalensi diabetes mellitus di Indonesia 2018*. Jakarta: Kementerian Kesehatan RI.
- Krist, A. H., Davidson, K. W., Mangione, C. M., Barry, M. J., Cabana, M., Caughey, A. B., ... & US Preventive Services Task Force. (2020). Behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention in adults with cardiovascular risk factors: US Preventive Services Task Force recommendation statement. *JAMA*, 324(20), 2069-2075.
- Kurniawati, D. N., Dewi, T. M. K., Febiana, T., Sulistyowati, S., Sulistyanyngtyas, A. R., Darmawati, S., & Ethica, S. N. (2019). Pelaksanaan pengabdian masyarakat dalam upaya monitoring penyakit tuberculosis melalui praktik pembangunan kesehatan masyarakat (PPKM) di Puskesmas Lamper Tengah Semarang tahun 2019. In *Prosiding Seminar Nasional Mahasiswa Unimus*, Vol. 2 (pp. 63-70).
- Lee, K. W., Ching, S. M., Ramachandran, V., Yee, A., Hoo, F. K., Chia, Y. C., ... & Veettil, S. K. (2018). Prevalence and risk factors of gestational diabetes mellitus in Asia: a systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, 18(1), 1-20.
- Manios, Y., Androutsos, O., Lambrinou, C. P., Cardon, G., Lindstrom, J., Annemans, L., ... & Makrilakis, K. (2018). A school-and community-based intervention to promote healthy lifestyle and prevent type 2 diabetes in vulnerable families across Europe: design and implementation of the Feel4Diabetes-study. *Public Health Nutrition*, 21(17), 3281-3290.
- Mauri-Obradors, E., Estrugo-Devesa, A., Jané-Salas, E., Viñas, M., & López-López, J. (2017). Oral manifestations of Diabetes Mellitus. A systematic review. *Medicina Oral, Patología Oral y Cirugía Bucal*, 22(5), e586.
- Riley, A. R., Duke, D. C., Freeman, K. A., Hood, K. K., & Harris, M. A. (2015). Depressive symptoms in a trial behavioral family systems therapy for diabetes: A post hoc analysis of change. *Diabetes Care*, 38(8), 1435-1440.
- Ryninks, K., Sutton, E., Thomas, E., Jago, R., Shield, J. P., & Burren, C. P. (2015). Attitudes to exercise and diabetes in young people with type 1 diabetes mellitus: a qualitative analysis. *PloS One*, 10(10), e0137562.

- Sisti, L. G., Dajko, M., Campanella, P., Shkurti, E., Ricciardi, W., & De Waure, C. (2018). The effect of multifactorial lifestyle interventions on cardiovascular risk factors: a systematic review and meta-analysis of trials conducted in the general population and high risk groups. *Preventive Medicine, 109*, 82-97.
- Tandon, N., Ali, M. K., & Narayan, K. V. (2012). Pharmacologic prevention of microvascular and macrovascular complications in diabetes mellitus. *American Journal of Cardiovascular Drugs, 12*(1), 7-22.
- Temneanu, O. R., Trandafir, L. M., & Purcarea, M. R. (2016). Type 2 diabetes mellitus in children and adolescents: a relatively new clinical problem within pediatric practice. *Journal of Medicine and Life, 9*(3), 235.
- Whiting, D. R., Guariguata, L., Weil, C., & Shaw, J. (2011). IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Research and Clinical Practice, 94*(3), 311-321.

Copyright & License



This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, & reproduction in any medium, provided the original work is properly cited.

© 2021 Aulia Meirizka Saputra, Fanda Indriyani, Dian Purwo Jatining Putri, Ainutajriani, Stalis Norma Ethica.

Published by LPPM of Universitas Mathla'ul Anwar Banten in collaboration with the Asosiasi Jurnal Pengabdian Kepada Masyarakat (AJPKM)