GENIUS JOURNAL
general nursing science journal
e-ISSN: 2723-7729
Vol. 7 No. 1 PP. 156-164 E-ISSN 2723-7729

Factors Associated with Diabetic Ulcer Prevention Behavior in Patients with Type 2 Diabetes Mellitus

Yoan Permata Sari[1], Nova Nurwinda Sari[1], Anggie Stiexs[1]
[1]*Department of Nursing, Universitas Mitra Indonesia, Indonesia*

Correspondence author: Yoan Permata Sari
Email: yoanpermata67@gmail.com
Address: Kampung Jawa, Pesisir Tengah, Pesisir Barat, Lampung, Telp. 081274571402
DOI: https://doi.org/10.56359/gj.v7i1.783

Abstract

Introduction: Diabetes mellitus is a major non-communicable disease with a rapidly increasing prevalence and is associated with serious complications, including diabetic foot ulcers that contribute to disability and mortality. Preventive behaviors, particularly proper foot care, play a crucial role in reducing the risk of diabetic ulcers; however, these behaviors are influenced by various individual and contextual factors that require further investigation.
Objective: Type 2 diabetes mellitus often causes macrovascular and microvascular complications, Macrovascular complications are more caused by hyperglycemia, hypoglycemia, diabetic nephropathy, diabetic neuropathy, and diabetic ulcers. The appearance of diabetic foot wounds is characterized by the presence of open wounds on the surface of the skin so that it results in infection due to the entry of germs or bacteria to the surface of the wound if not treated immediately, the infection will expand to the lower skin tissue, tendons, muscles, and even bones. This study aims to determine the factors related to diabetic ulcer prevention behavior in type 2 diabetes mellitus patients at the Kedaton Health Center Bandar Lampung.
Method: The type of quantitative research with a cross sectional, sampling technique purposive research design with population 109 a sample of 86 respondents. The data analysis used was univariate and bivariate analysis using the chi square test.
Result: The results of this study found that there was a relationship between knowledge and ulcer prevention behavior with a p-value of 0.000 (p-value < 0.05); there was a relationship between attitude and diabetic ulcer prevention behavior with a p-value of 0.000 (p-value < 0.05); and there was a long-standing relationship between suffering from DM and diabetic ulcer prevention behavior with a p-value of 0.022 (p-value < 0.05) at the Kedaton Health Center Bandar Lampung.
Conclusion: People with diabetes mellitus should know and practice diabetic ulcer such as good and proper foot care prevention behaviors in order to prevent complications, especially diabetic wounds.

Keywords: attitudes, diabetic ulcers, knowledge

Introduction

Non-communicable diseases (NCDs) are a type of disease whose symptoms and symptoms are difficult to detect, yet their mortality rates remain high (Suryati et al., 2019). The World Health Organization (WHO) states that diabetes mellitus is one of the four priority NCDs that require prioritization in prevention and control (Widyastuti et al., 2023).

Diabetes mellitus (DM) is a chronic metabolic condition characterized by a continuous increase in blood glucose levels caused by impaired insulin secretion, persistence of insulin function, or both. (Jia eìt al, 2022). Chronic hyperglycemia due to metabolic disorders in DM patients can not only damage various organ systems but also cause disabilities and potentially life-threatening complications (Jia et al, 2022).

According to data from the International Diabetes Federation in 2022, it was reported that 537 million adults (20-79 years old) were living with diabetes worldwide. This number is expected to increase to 643 million (1 in 9 adults) in 2030 and 784 million (1 in 8 adults) in 2045. Diabetes mellitus caused 6.7 million deaths in 2021, an estimated 44% of adults living with diabetes (240 million people) were undiagnosed. 541 million adults worldwide, or 1 in 10, have impaired glucose tolerance, putting them at high risk of developing type 2 diabetes.

Among these people with diabetes mellitus are 48 million in North America and the Caribbean, 59 million in Europe, 32 million in South and Central America, 19 million in Africa, 162 million in the Western Pacific, and 55 million in the Middle East and North Africa. This number is expected to increase by 94% by 2045. especially in low- to middle-income countries (IDF, 2021).

The Ministry of Health of the Republic of Indonesia 2022 reported that the number of people with diabetes mellitus in 2021 was 19.47 million, with the prevalence of DM based on doctor diagnosis among the population of all ages in Indonesia being approximately 1.7% (SKI, 2023).

The prevalence of DM in Lampung Province based on doctor's diagnosis in the population of all ages according to the Indonesian Health Survey (SKI 2023) is around 1.2% of cases with a weighted total of 29,331. Doctor's diagnosis in the population aged ≥ 15 is around 1.6%, at the age of 25-34 is around 0.2%, at the age of 35-44 is around 1.0%, at the age of 45-54 is around 3.5%, at the age of 55-64 is around 6.6%, at the age of 65-74 is around 6.7% and at the age of ≥ 75 is around 4.8% of cases of diabetes mellitus. According to data from the Bandar Lampung City Health Office in 2022, diabetes mellitus (DM) ranked first in Bandar Lampung, with an incidence of 18,644 people (Bandar Lampung City Government, Health Office, 2022). In 2022, the incidence of type 2 diabetes mellitus at the Keidaton Community Health Center was ranked as the highest category 4 in Bandar Lampung, with 934 cases, and the rate fluctuates annually (Bandar Lampung City Government, Health Office, 2022).

Keidaton Community Health Center is one of the inpatient health centers in Bandar Lampung. Diabetes mellitus is one of the 10 most common diseases at Keidaton Community Health Center in Bandar Lampung City, with fluctuating numbers. The number of Diabetes mellitus cases in men was 523 cases and in women 720 cases, with a total of 1,243 cases in 2021. In 2022, the number of DM cases in men was 1,090 cases and in women 1,293 cases, the total reached 2,383 cases. In 2023, the number of DM cases in men was 1,227 cases and in women 1,205 cases, the total reached 2,432 cases, while in 2024, from January to September 2024, the total number of DM cases reached 1,478 cases, with the number of cases in men being 709 cases and in women being 769 cases (Puskesmas Profile) Kedaton, 2024).

In Indonesia, the prevalence of diabetic ulcers in patients with diabetes is 15%, the amputation rate is 30%, the mortality rate is 32%, and the hospitalization rate is approximately 15-25%. Diabetic ulcers affect 80% of patients and 5 to 7.5% of neuropathy patients, with an incidence of more than 2% per year (Nursalam et al., 2020).

One primary preventive measure that can be taken to prevent diabetic foot ulcers is proper foot care. Diabetic foot wounds can be prevented by taking care of and managing blood sugar control through diet adherence, preventing wounds and taking regular and correct foot care (Oktorina eìt al., 2019). Foot care that can be done for DM sufferers includes always using footwear when walking, including when walking on sand, always checking footwear before use, checking the shape and color of the feet every day, always keeping the feet clean, dry and moist, cutting toenails regularly, always drying the area between the toes after bathing, using comfortable shoes (not too big and not too small), and avoiding using pillows or bottles filled with hot water, healing stones that aim to reduce swelling. Warming the feet (Peìrkeìni, 2021).

According to the theory of Angeline Pieìteìr (2021), several factors can influence foot care behavior, including internal factors such as age, gender, income, skill level, knowledge, and duration of diabetes, as well as external aspects such as family and environmental support. This study suggests that low knowledge and attitudes about foot care also contribute to poor foot care practices. Foot wounds are not solely determined by the patient's adherence to foot care; several other factors can contribute to foot wounds, such as poor blood sugar control, poor diet management, smoking, and prior wound occurrence.

According to research conducted by (Husnul Khotimah, 2020) entitled "The Relationship Between Knowledge and Attitudes Regarding Foot Care and Wound Prevention Efforts in Diabetic Patients in Indonesia, Madiun City Branch" the result was p = 0.017 because the probability was smaller than 0.05 (0.017 < 0.05) so there is a relationship between knowledge about foot care and wound prevention efforts in diabetic patients, the result was p = 0.003 because the probability If the value is smaller than 0.01 (0.003 <0.01), there is a relationship between attitudes about foot care and efforts to prevent diabetic foot ulcers.

Based on pre-survey data at the Keidaton Community Health Center in Bandar Lampung City, the number of DM cases has changed over the past three months. Data on type 2 diabetes mellitus cases in July 2024 was 129 cases, increased to 131 cases in August, and decreased to 109 cases in September. The results of interviews with health center officers revealed that the majority of DM patients at Keidaton Health Center were > 40 years old, and the majority of DM patients were women. The health center's efforts in handling DM were by conducting early detection at the integrated health post (posbindu) which included checking blood sugar levels, providing education about DM in prolanis activities, providing treatment, referrals, and home visits for DM patients with complications. However, these efforts have not yet achieved maximum results due to the fluctuating number of diabetes mellitus sufferers.

The results of interviews with 10 DM sufferers at the Kedaton Public Health Center revealed that 7 out of 10 DM sufferers said they had had DM for <5 years and did not know the exact definition of Diabetes Mellitus and Diabetic ulcer prevention behaviors include proper foot care, using correct footwear and checking the feet regularly to detect wounds or swelling on the feet, so far DM sufferers only know that efforts to prevent injury is by taking medication and controlling blood sugar, and 3 out of 10 other sufferers said they had had DM for > 10 years and did not know the type of DM they were suffering from. In an effort to manage DM and ulcer prevention behavior, 7 (70%) patients said they routinely checked

themselves and took medication from the community health center, 1 (10%) carried out good foot care such as washing their feet properly, using appropriate footwear and checking their feet every day to find out if there were any wounds or swelling, and 2 (20%) others managed diabetes mellitus by changing their lifestyle habits to be healthy such as limiting sugar consumption.

Objective

This study aims to determine the factors related to diabetic ulcer prevention behavior in type 2 diabetes mellitus patients at the Kedaton Health Center Bandar Lampung.

Method

This study employed a quantitative research design with a cross-sectional approach to identify factors related to diabetic ulcer prevention behavior among patients with type 2 diabetes mellitus. The study was conducted at the Kedaton Inpatient Community Health Center, Bandar Lampung, in 2024. The population of this study consisted of 109 patients with type 2 diabetes mellitus who were registered and received treatment at the Kedaton Community Health Center. The sample size was 86 respondents, determined using a purposive sampling technique based on predefined inclusion criteria.

The inclusion criteria were patients diagnosed with type 2 diabetes mellitus, aged ≥18 years, able to communicate effectively, willing to participate in the study, and present at the health center during the data collection period. Patients with severe cognitive impairment or critical conditions were excluded from the study. Data were collected using a structured questionnaire, which consisted of sections assessing respondents' knowledge, attitudes, duration of diabetes mellitus, and diabetic ulcer prevention behavior. The questionnaires were administered directly to respondents after obtaining informed consent. Prior to data collection, the instruments had been reviewed to ensure clarity and suitability for the study population.

Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) software. Univariate analysis was used to describe respondents' characteristics and the distribution of each variable. Bivariate analysis was performed using the Chi-square test to examine the relationship between independent variables (knowledge, attitudes, and duration of diabetes mellitus) and the dependent variable (diabetic ulcer prevention behavior). Statistical significance was determined at a p-value ≤ 0.05. The study was conducted in accordance with ethical research principles, including voluntary participation, anonymity, confidentiality, and informed consent from all respondents.

Result

Table 1. Awareness and Behavioral Assessment of Diabetes Prevention

Knowledge	Behavioral Prevention						Total		*P value*
	Good		Sufficient		Poor				
	N	%	N	%	N	%	N	%	
Good	30	62.5	16	33.3	2	4.2	48	100	0.000
Sufficient	6	16.2	27	73.0	4	10.8	37	100	
Poor	0	0.0	0	0.0	1	100.0	1	100	

Based on Table above it was found that of the 48 respondents with a good level of knowledge, 30 respondents (62.5%) had good diabetes prevention behavior; Of the 37 respondents whose level of knowledge was sufficient, 27 respondents (73.0%) had adequate diabetes prevention behavior; while of the 1 respondent whose level of knowledge was poor, 1 respondent (100%) had poor diabetes prevention behavior. Based on the results of the chi-square statistical test, a p-value of 0.000 or a p-value of ≤ 0.05 was obtained, so it can be concluded that there is a significant relationship between knowledge and the behavior of diabetes mellitus prevention in type 2 diabetes mellitus patients at Puskeismas Keidaton, Bandar Lampung City in 2024.

Table 2. Analysis of the Relationship Between Attitudes and Ulcer Prevention Behavior

Attitudes	Attitudes and Ulcer Prevention Behavior						Total		*P value*
	Good		Sufficient		Poor				
	N	%	N	%	N	%	N	%	
Positive	36	46.8	41	53.2	0	0,0	77	100.0	0.000
Negative	0	0.0	2	22.2	7	77.8	9	100.0	

Based on Table above it was found that of the 77 respondents who had positive attitudes, 41 (53.2%) had adequate diabetes prevention behavior; while of the 9 respondents who had negative attitudes, 7 (77.8%) had inadequate diabetes prevention behavior. Based on the results of the chi-square statistical test, a p-value of 0.000 or p-value ≤ 0.05 was obtained, which means there is a relationship between attitudes and diabetes prevention behavior in type 2 diabetes mellitus patients at Puskeismas Keidaton Bandar Lampung in 2024.

Table 3. Long-standing Relationships are a DM Concerning Type 2 Diabetic

Long suffering from DM	Ulcer prevention behavior						Total		P value
	Good		Sufficient		Poor				
	N	%	N	%	N	%	N	%	
< 5 years	19	59.4	9	28.1	4	12.5	32	100	0,007
≥ 5 years	17	31.5	34	63.0	3	5.6	54	100	

Based on Table 4.8, it is known that of the total 32 respondents who had suffered from DM for <5 years, 19 respondents (59.4%) had good diabetes prevention behavior; Meanwhile, of the total 54 respondents who had suffered from DM for ≥ 5 years, 34 respondents (63.0%) had adequate diabetes prevention behavior. Based on the results of the chi square statistical test, it was found that there was a p-value of 0.007 or a p-value of ≤ 0.05, so it can be concluded that there is a relationship between the length of suffering from DM and the prevention behavior of the patient. diabetes mellitus type 2 diabetes mellitus patients at Puìskeìsmas Kedaton Bandar Lampung Tahun 2024.

Discussion

Knowledge is something that a person knows from his personal experience. Knowledge has various kinds and characteristics. There is knowledge that is direct and there is also knowledge that is indirect. There is knowledge that is not fixed in nature and experiences subjective, specific and specific changes, and there is also knowledge that is specific in nature, objective and concrete (Darsini, 2019).

Meinuiruit Muilya & beìtty (2014) in the journal (Sigit, 2019) that a person with good knowledge will have motivation to make prevention efforts so that the occurrence of complications of diabetes mellitus, especially diabetic foot ulcers, can be minimized.

Based on the assumption of the researcher, the good knowledge of most of the respondents was caused by the majority of respondents routinely taking medication once a month or having a blood sugar check or blood sugar check and consulting with a doctor. Although some respondents had elementary school backgrounds, which can be categorized as low education, this does not rule out the possibility that respondents will have insufficient knowledge. This could occur because the provision of information about type 2 diabetes and its complications can be obtained by respondents from health officers, both doctors and nurses as educators. This information can also be provided by respondents from mass media, print media, electronic media and social media. In addition, respondent's age, occupation, length of DM, routine of taking medication and support from family are factors that influence respondent's knowledge of preventing diabetic foot ulcers, while respondents who have good knowledge but poor diabetic foot ulcer prevention behavior are due to low level of compliance. Few respondents know the importance of foot care but do not make it a habit for reasons such as laziness, forgetfulness, or feeling it is a hassle.

Based on the results of the analysis of the questionnaire answers in the category of knowledge, the majority did not choose number 7, because of diabetes mellitus. Most of the respondents with diabetes mellitus are not actually inherited or inherited, but because of a person's habits towards lifestyle, such as eating too many sweet foods, rarely exercising, and obesity.

Based on the assumption of the researcher, the positive attitude of the respondents comes from the majority of respondents having good knowledge. Good knowledge possessed by type 2 DM patients will make them know and understand how to prevent type 2 DM complications. This will affect the response to all matters regarding complications that can occur in type 2 DM patients, one of which is diabetic foot disease. The more positive the picture of a person's attitude, the more negative the situation can lead to good preventative actions, and vice versa, if the attitude picture is negative, the occurrence can cause adequate preventative action. want less.

Based on the analysis of the questionnaire answers in the attitude category, the results showed that the majority did not choose number 2, because if the occurrence of sores, respondents do not immediately go to the doctor and treat the sores themselves, the cost of medical examination and treatment can be a burden, with treating the sores themselves being considered cheaper than consultation, and respondents' habits of using traditional or alternative medicine. Some respondents prefer Believers in traditional medicines such as herbs, potions, or medicinal methods rather than medical treatments.

Length of suffering from DM is a period of time for someone who has experienced DM since they were first diagnosed (ADA, 2023). DM patients who have had it for more than 10 years, if their blood glucose content cannot be controlled, because this can cause complications that are closely related to the vasculature and cause suffering.

macroangiopathy-microangiopathy then it causes vasculopathy and neuropathy so that the blood circulation is disrupted and there are wounds or torn feet of the sufferer which they are often not aware of. Meìnuìruìt Hariani (2020) The duration of suffering from diabetes mellitus for a long time comes with being somewhat obedient and willing to control one's blood glucose even if one experiences complications, this will making the sufferers maintain their quality of life. Referring to the results of previous research, the research results suggest that DM patients who have been sick for a long time have a better chance of survival in deterrent behavior The prevalence of diabetes compared to DM patients < 5 years old, however, various factors such as insufficiency in disease management, lack of continuing education, and economic factors can cause their behavior is just good enough not optimal.

Conclusion

There is a relationship between knowledge and diabetes prevention behavior in type 2 diabetes patients at Puskeismas Keidaton Bandar Lampung in 2024 with a p-value of 0.000 or a p-value of ≤ 0.05. There is a correlation between attitudes and diabetes prevention behavior in type 2 diabetes mellitus patients at Puskeismas Keidaton Bandar Lampung in 2024 with a p-value of 0.000 or a p-value of ≤ 0.05.

There is a correlation between the length of time suffering from diabetes and diabetes prevention behavior in type 2 diabetes mellitus patients at Puskeismas Keidaton Bandar Lampung. Lampung in 2024 with p-value 0.007 or p-value ≤ 0.05. For further researchers, it would be better to conduct research with a larger sample or conduct an experiment to improve the behavior of preventing diabetic foot ulcers in diabetic patients.

Acknowledgment

The researchers would like to express their gratitude to all participants who were willing to participate as respondents in this study, as well as to the educational institution and hospital for granting permission and full support throughout the research process.

Authors' Contribution

All authors contributed equally to every stage of the research, from proposal preparation, data collection, and analysis, to the writing of the article. All authors have read and approved the final manuscript and are responsible for the content and originality of this work.

Conflict of Interest

The researchers declare that there is no conflict of interest regarding the implementation or publication of this research. The entire research process was carried out independently, without any influence from any party. Respondent participation was voluntary, with informed consent obtained, and their confidentiality and privacy were protected in accordance with ethical research standards. The researchers hope that the results of this study can serve as a valid reference for the development of nursing education and mental health support.

Ethical Considerations

This research received ethical approval from the nursing education institution and the hospital where the clinical practice was conducted. All respondents were informed about the purpose and benefits of the study and signed an informed consent form. The research was

conducted with a strong commitment to ethical principles, including data confidentiality and the right to voluntary participation.

Funding

This research did not receive funding from any party and was conducted purely for academic purposes and the advancement of scientific knowledge.

References

1. American Diabetes Association. (2020). Glycemic targets: Standards of medical care in diabetes (2020). https://doi.org/10.2337/dc20-S006
2. Adi, S. (2019). Pengelolaan dan pencegahan diabetes melitus tipe 2 dewasa di Indonesia. PB Perkeni.
3. Aisyah, R., & Bestari, R. S. (2023). Peningkatan pengetahuan masyarakat tentang prevalensi dan faktor risiko diabetes melitus serta upaya pencegahannya melalui edukasi. Jurnal Pengabdian Masyarakat Medika, 35–40. https://doi.org/10.23917/jpmmedika.v3i1.1587
4. Al Khusaini, N. W., & Sodik, M. A. (2020). Keterkaitan pola makan pada penderita diabetes melitus. Jurnal Ilmiah Kesehatan, 1(1), 1–7.
5. Arnila, R. (2021). Pengembangan e-modul berbasis STEM (Science, Technology, Engineering, and Mathematics) pada materi fluida statis dan fluida dinamis di SMA Negeri 6 Kota Jambi. Universitas Jambi.
6. Farah, S., Wahyudi, M., Wiyono, W. I., & Jayanti, M. (2023). Analisis faktor risiko diabetes melitus tipe 2 di Puskesmas Aertembaga Kota Bitung. Jurnal Kesehatan Tambusai, 4(2), 946–953.
7. Fatmawati, B. R., Suprayitna, M., & Istianah, I. (2021). Self-efficacy dan perilaku sehat dalam modifikasi gaya hidup penderita hipertensi. Jurnal Ilmiah STIKES Yarsi Mataram, 11(1), 1–7. https://doi.org/10.57267/jisym.v11i1.73
8. Fatmawati, B. R., Suprayitna, M., & Prihatin, K. (2020). Pengaruh pendidikan kesehatan terhadap sikap dan tindakan pencegahan ulkus diabetik pada pasien diabetes melitus tipe 2. Jurnal Kesehatan Qamarul Huda, 8(1), 34–41.
9. International Diabetes Federation. (2022). IDF diabetes atlas 2022. https://diabetesatlas.org
10. Hannufa, S. (2022). Hubungan antara perilaku dengan kondisi ulkus kaki diabetik pada pasien diabetes melitus tipe II di Rumah Sakit Anwar Medika Sidoarjo. Universitas Anwar Medika.
11. Helsapeira, J. (2023). Analisis asuhan keperawatan pada pasien diabetes melitus tipe 2 dengan evidence-based practice relaksasi otot progresif. STIKes Mercubaktijaya Padang.
12. Kementerian Kesehatan Republik Indonesia. (2023). Survei Kesehatan Indonesia (SKI) dalam angka. Jakarta: Badan Kebijakan Pembangunan Kesehatan.
13. Kementerian Kesehatan Republik Indonesia. (2021). Pola hidup sehat dan deteksi dini bantu kontrol gula darah pada penderita diabetes. https://www.kemkes.go.id
14. Khotimah, H. (2024). Hubungan pengetahuan dan sikap tentang perawatan kaki dengan upaya pencegahan luka pada penderita diabetes melitus. Universitas Airlangga.
15. Latifah, N. F. Q. (2023). Sikap dan tindakan pencegahan ulkus diabetikum. Institut Teknologi dan Sains Kesehatan Insan Cendekia Medika Jombang.
16. Lestari, M. (2022). Hubungan perilaku pencegahan luka kaki dengan skor sensasi kaki. Universitas Islam Sultan Agung Semarang.

17. Lestari, Z., Zulkarnain, S., Sijid, & Aisyah, S. (2021). Diabetes melitus: Review etiologi, patofisiologi, gejala, penyebab, pemeriksaan, pengobatan, dan pencegahan. Jurnal Kesehatan, 1(2), 237–241.
18. Lubis, S. P. S. (2019). Analisis pengaruh perawatan kaki dan penggunaan alas kaki terhadap ulkus kaki diabetik. Dalam Prosiding Seminar Nasional Teknologi Informasi, Komputer dan Sains (SINTAKS) (Vol. 1, hlm. 870–876).
19. Maharani, A., & Sholih, M. G. (2024). Literature review: Faktor risiko penyebab diabetes melitus tipe II pada remaja. Jurnal Sehat Mandiri, 19(1), 185–197.
20. Nasruddin, J. (2019). Metodologi penelitian pendidikan. Pantera Publishing.
21. Nasution, F., Andilala, A., & Siregar, A. A. (2021). Faktor risiko kejadian diabetes melitus. Jurnal Ilmu Kesehatan, 9(2), 94–102.
22. Nisak, R. (2021). Evaluasi kejadian dan klasifikasi ulkus diabetikum menurut Wagner. Jurnal Ilmiah Keperawatan, 7(2). https://doi.org/10.33023/jikep.v7i2.729
23. Notoatmodjo. (2018). Metodologi penelitian kesehatan. Rineka Cipta.
24. Widyastuti, W. O. S. A., & Ernasari. (2023). Tingkat pengetahuan pasien diabetes melitus pada pencegahan luka kaki diabetes. Window of Nursing Journal, 4(1), 1–8. https://doi.org/10.33096/won.v4i1.187
25. Yusnanda, F., Rochadi, R. K., & Maas, L. T. (2019). Pengaruh riwayat keturunan terhadap kejadian diabetes melitus pada pralansia. Journal of Healthcare Technology and Medicine, 4(1), 18. https://doi.org/10.33143/jhtm.v4i1.163