Factors associated with the attitude of herbs utilization among diabetes mellitus patients

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Abstract. The use of herbs for chronic diseases, including diabetes mellitus (DM), has increased. Many factors are associated with the positive attitude of DM patients to the use of herbs, including demographic factors, knowledge of herbs, family support and characteristics of DM disease. The research used a cross sectional study, conducted in Tawangmangu Karanganyar Central Java Indonesia from March to May 2020. Subjects were 170 diabetes mellitus patients, aged 15-60 years who were examined at the Hortus Medicus Clinic or Community Health Center Tawangmangu Karanganyar Central Java Indonesia. The sample used purposive sampling. Data collection using questionnaires distributed to respondents. Data were analyzed univariate, bivariate, and multivariate using SPSS 25. Attitudes towards the use of herbs were associated with high knowledge of herbs (OR = 3.78; 95% CI = 1.6 - 8.87; p = 0.002), duration of DM disease ≥ 5 years (OR = 3.41; 95% CI = 1.70 - 8.99; p = 0.001), high education (OR = 1.26; 95% CI = 0.51 - 3.10; p = 0.617) and employment status (OR = 0.54; 95% CI = 0.21 - 1.38; p = 0.200). Knowledge of herbs and duration of DM disease were significantly related to the attitudes towards herbalism.

1. Introduction
Diabetes Mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia due to impaired insulin secretion, insulin action, or both. Diabetic patients experience insulin resistance, which makes the body cells difficult to convert glucose into energy[1]. Typical symptoms that often occur in people with DM are polydipsia, polyuria, polyphagia, blurred vision, and drastic weight loss [2,3]. Blood sugar examination is necessary to establish the diagnosis of DM. Random Blood sugar levels ≥ 200 mg/dl and fasting blood sugar levels ≥126 mg/dl) with an HbA1c level of 6.5% indicates that a person has diabetes[4].

In 2017, the number of people with DM in the world aged 20-79 years was 425 million. By 2045, it is estimated to increase to 629 million [5]. The results of the Basic Health Research (Riskesdas) in 2018 showed an increase in the prevalence of DM, which was 6.9% in 2015 to 8.5% in 2018 [6].

Treatment of DM with conventional drugs sometimes causes adverse effects, such as weight gain, edema, hypoglycemia, lactic acidosis, liver injury, digestive system disorders, and insulin resistance [7]. At this time, herbs are widely used by the community for the treatment of chronic diseases, including DM [8]. Based on data from Basic Health Research in 2010 showed that the Indonesian population who had consumed herbs was 59.12%, and as many as 95.6% felt the benefits of consuming herbs [9].
Many DM patients take advantage of their treatment with herbs because they have a positive attitude towards herbal medicine. Attitude is a learned predisposition to respond consistently to an object, both in the form of positive responses and negative responses. The concept of attitude is closely related to the concept of belief and behavior [10]. One of the constructs in the Health Belief Model (HBM) is perceived benefits [11]. People tend to adopt a treatment behavior when they believe/be positive that the new behavior is beneficial for healing the disease [12].

There are several factors that influence the attitude of DM patients toward herbs, including demographic factors, knowledge of herbs, and the characteristics of DM as a chronic disease. This study aims to identify the factors that influence the attitude of DM patients towards herbs in Tawangmangu.

2. Material and Methods
2.1. Design and site of the study
This study is an observational analytic study with a cross-sectional design. All data in this study were obtained from questionnaires containing closed questions. The study was conducted at the Community Health Center and Hortus Medicus (HM) Clinic, Center for Research and Development of medicinal plants and traditional medicine.

2.2. Population and sample
This study population was DM patients at the community health center and HM Clinic B2P2TO2T Tawangmangu. A total of 170 subjects were selected by fixed disease sampling. Subjects who participated in this study consisted of 85 subjects from the Hortus Medicus Clinic Tawangmangu and 85 subjects from the Community Health Center Tawangmangu.

Subjects were declared eligible if they met the inclusion criteria: outpatients at the HM Clinic / Community Health Centers Tawangmangu, in the treatment of DM, having fasting blood glucose ≥ 120 mg/dl or random blood glucose ≥ 200 mg/dl or 2 hours postprandial glucose ≥ 200 mg/dl, age ≥ 15 years, able to answer the questionnaire well, willing to be a research subject. Subject was excluded if unable to be interviewed.

2.3. Variables of the study
The dependent variable is the attitude towards herbs. The independent variables are age, gender, education, occupation, marital status, income, family support, herbal knowledge and duration of DM.

2.4. Operational definition of the variables
Attitude towards herbs is the subject's attitude regarding the benefits, efficacy and safety of herbs. The measurement scale of the data collected is continuous and then converted into a dichotomous form for analysis purposes, with 0=negative attitude, if the subject's attitude is < mean, 1=positive attitude, if the subject's attitude is > mean.

Age is the age of the subject at the time of the interview. The data scale at measurement time was continuous and was changed to dichotomous, 0 if the age is < 35 years and 1 if the age is ≥ 35 years.

Gender is the gender of the subject. The data scale at the time of measurement is dichotomous data, 0 for male and 1 for female.

Education is defined as the last level of education that has been achieved by an individual based on the last diploma held from the elementary, junior high, high school or college level [13]. The data scale used is categorical data, 0 if < senior high school and 1 if ≥ senior high school.

Employment is a permanent/main job as the main source of income for subjects. The data scale is categorical data converted into dichotomous data, 0 for not working and 1 for working.

Marital status is the status of the subject consisting of 3 possibilities, namely unmarried, married and widowed/widow. The dichotomous data scale is 0 if unmarried or widowed/widow and 1 if married.

Income is the amount of family income, both permanent and additional jobs in a month, measured in rupiah. The UMR for Karanganyar Regency is Rp. 1,833,000,-. The data scale is continuous, converted into dichotomous, 0=low if < Rp 1,833,000 and 1=high if ≥ Rp 1,833,000.
Family support is family support in the form of material and non-material when subjects seek types of herbal treatment. The measuring instrument used is a questionnaire. The data scale is continuous data converted into dichotomous data, 0=weak for values < 5.73 and 1=strong for values ≥ 5.73.

Herbal knowledge is the subject’s understanding of the benefits, efficacy and safety of herbs. The measuring instrument used is a questionnaire. The data scale is continuous data converted into dichotomous data, 0 = low if values< 5.31 and 1 = values ≥ 5.31.

The duration of suffering from DM is the length of time the subject has suffered from DM, since being diagnosed for the first time until the time of the interview. The data scale was continuous and changed to a dichotomous, 0 for < 5 years and 1 for ≥ 5 years.

2.5 Data analysis
Data were analyzed using univariate, bivariate and multivariate methods. Univariate analysis was used to describe the dependent and independent variables. Bivariate analysis was used to determine the relationship between age, sex, education, occupation, marital status, income, family support, herbs knowledge, and duration DM illness with attitudes towards herbs, measured by the chi-square test. Multivariate analysis was performed by logistic regression with SPSS 25 to explain the effect of multiple independent variables toward dependent variables.

3. Results and discussion
There were 170 subjects who participated in this study, consisting of 85 subjects from DM patients who were examined at the Hortus Medicus Tawangmangu Clinic and 85 subjects from DM patients who were examined at the Tawangmangu Community Health Center.

3.1. Subjects Characteristics
Demographic and clinical characteristics data includes all eligible subjects (n=170). Table 1 shows the average age of the subjects is 50.63 years, income is 2,472,452 rupiahs and duration of DM illness is 4.16 years. Table 2 shows that the majority of the research subjects were female (64%), age ≥ 35 years old (98%), married (83%), have low education (74%), employed (79%), have low knowledge of herbs (56%), have low knowledge of DM (64%), have strong family support (72%), duration of DM illness < 5 years (54%) and have low income (55%).

| Table 1. Subjects characteristics (continuous data). |
|---------------------------------------------------|
| No | Characteristic | N | Mean | SD | Min | Max |
|----|----------------|----|------|----|-----|-----|
| 1  | Age (year)     | 170| 50.63| 6.48| 20  | 60  |
| 2  | Income (rupiah)| 170| 1,472,452| 753,671| 0   | 12,000,000 |
| 3  | Duration of illness (year) | 170 | 4.16 | 0.96 | 0   | 29  |

| Table 2. Subjects characteristics (dichotomous data). |
|------------------------------------------------------|
| Independent variable | n | % |
| Gender            |    |   |
| Male              | 75 | 44 |
| Female            | 95 | 64 |
| Age               |    |   |
| < 35 years        | 3  | 2  |
| ≥ 35 years        | 167| 98 |
| Marital Status    |    |   |
| Unmarried         | 29 | 17 |
| Married           | 141| 83 |
3.2. Bivariate analysis

Bivariate analysis was performed with chi-square test. Table 3 shows that high herbs knowledge (OR = 4.47; 95% CI = 1.99 to 10.06; \( p = 0.000 \)), duration of DM illness \( > 5 \) years (OR = 4.31; 95% CI = 2.31 to 11.17; \( p = 0.000 \)) strong support of the family (OR = 1.84; 95% CI = 0.89 to 3.80; \( p = 0.143 \)), high income (OR = 1.52; 95% CI = 0.76 to 3.05; \( p = 0.314 \)), education \( \geq \) senior high school (OR = 1.11; CI 95% = 0.50 to 0.953; \( p = 0.953 \)) and age \( \geq 35 \) years (OR = 1.37; 95% CI = 1.25 to 1.50; \( p = 0.698 \)) increased positive attitudes towards herbal utilization. Meanwhile, female gender (OR = 0.79; 95% CI = 1.99 to 10.06; \( p = 0.636 \)), married (OR = 0.86; 95% CI = 2.31 to 11.17; \( p = 0.935 \)) and employment status (OR = 0.91; 95% CI = 0.89 to 3.80; \( p = 0.990 \)) decreased positive attitudes towards herbs (table 3).

Table 3. The results of the chi-square test analysis of factors related to attitudes towards herbs.

| Independent variable | Check-up Place | OR | \( p \) |
|----------------------|----------------|-----|-------|
|                      | Hortus Medicus Clinic | Community Health Center |       |       |
| Gender               | n | %  | n  | %  |       |       |
| Male                 | 57 | 76 | 18 | 24 | 0.79 | 0.636 |
| Female               | 68 | 71.6 | 27 | 28.4 |       |       |
| Age                  | n | %  | n  | %  |       |       |
| < 35 years           | 1 | 33.3 | 2 | 66.7 | 1.37 | 0.698 |
| \( \geq 35 \) years  | 122 | 73.1 | 45 | 26.9 |       |       |
| Marital Status       | n | %  | n  | %  |       |       |
| Unmarried            | 22 | 75.9 | 7 | 24.1 | 0.86 | 0.935 |
| Married              | 103 | 73 | 38 | 27 |       |       |
| Education            | n | %  | n  | %  |       |       |
| < Senior high school | 92 | 73 | 34 | 27 | 1.11 | 0.953 |
3.3. Multivariate analysis

Multivariate analysis using logistic regression. Logistic regression is an approach to making a predictive model of the relationship between the dependent variable and the independent variable, where the dependent variable is a dichotomous categorical variable. Table 4 shows the results of the logistic regression analysis. High knowledge of herbs (OR = 3.78; 95% CI = 1.60 to 8.87; \(p = 0.002\)), duration of DM illness ≥ 5 years (OR = 3.41; 95% CI = 1.70 to 8.99; \(p = 0.001\)) and education ≥ senior high school (OR = 1.26; 95% CI = 0.51 to 3.10; \(p = 0.617\)) increased positive attitudes towards herbs. Meanwhile, working status (OR = 0.51; 95% CI = 0.21 to 1.38; \(p = 0.200\)) decreased positive attitudes towards herbs.

Table 4. Logistic regression analysis results factors related to positive attitude towards herbs.

| Variable Independent                  | OR    | CI 95%         | \(p\)  |
|--------------------------------------|-------|---------------|-------|
|                                      | Top   | Bottom        |       |
|                                      | Range | Range         |       |
| Education (≥ senior high school)     | 1.26  | 0.51 - 3.1     | 0.617 |
| Employment status (Employed)         | 0.54  | 0.21 - 1.38    | 0.200'|
| Herbs knowledge (high)               | 3.78  | 1.6 - 8.87     | 0.002 |
| Duration of DM illness (≥ 5 year)    | 3.41  | 1.7 - 8.99     | 0.001 |

There is a statistically significant relationship between knowledge of herbs and positive attitudes towards herbs. High herb knowledge increased positive attitudes towards herbs 3.78 times compared to low herb knowledge (OR = 3.78; 95% CI = 1.60 - 8.87; \(p = 0.002\)). Subjects who understood the efficacy, safety and quality of herbs were more likely to have a positive attitude towards herbs [14]. Subjects who understand the history of herbal use by our ancestors and Indonesia's rich natural biodiversity may also have a more positive attitude towards herbs. [15].
There is a statistically significant relationship between duration of DM illness with positive attitudes towards herbs. DM duration of illness $\geq$ 5 years increased positive attitudes towards herbs 3.41 times compared to duration of DM illness < 5 years (OR = 3.41; 95% CI = 1.70 - 8.99; $p = 0.001$). Subjects who have had DM for longer are more likely to experience complications of DM. DM treatment with long-term chemical drugs sometimes causes side effects, including weight gain, edema, hypoglycemia, lactic acidosis, liver toxicity, digestive system disorders and insulin resistance [7]. The experience of the emergence of the above side effects due to long-term use of chemical drugs encourages the subject to take advantage of alternative complementary medicine and have a positive attitude towards herbs [16].

There is a statistically insignificant relationship between education and positive attitudes towards herbs. High education increased positive attitudes towards herbs 1.26 times compared to low education (OR = 3.41; 95% CI = 1.70 - 8.99; $p = 0.001$). Subjects with high school education are likely to more easily receive and understand information about the efficacy, safety and quality of herbs from various mass media. This makes it more likely that high school education has a positive attitude towards herbs. This is supported by research by Wawan et al. 2010 which states that education affects a person's attitude, someone who has good knowledge will behave well too [17].

4. Conclusion
High knowledge of herbs, duration of DM illness $\geq$ 5 years, and high education increased positive attitudes towards herbs. High herbal knowledge increased positive attitudes towards herbs 3.78 times compared to low herbs knowledge. DM duration of illness $\geq$ 5 years increased positive attitudes towards herbs 3.41 times compared to duration of DM illness < 5 years. High education increased positive attitudes towards herbs 1.26 times compared to low education.

Acknowledgments
The researcher would like to thank the Head of the Tawangmangu Community Health Center and the Head of the Center for Research and Development of Traditional Medicinal and Medicinal Plants who have given permission to conduct the research. Researchers also thank DM patients who have been willing to be subjects.

References
[1]. Kharroubi AT and Darwish HM. 2015. Diabetes melitus: The epidemic of the century. World J Diabetes, 6 (6), 850. https://dx.doi.org/10.4239%2Fwjd.-v6.i6.850
[2]. American Diabetes Association (2016). Standards of medical care in diabetes—2016: summary of revisions. Diabetes care. 39(1): S4-S5. https://doi.org/10.2337/dc16-S003
[3]. Lanywati. 2011. Diabetes melitus penyakit kencing manis. Yogyakarta: Kanisius.
[4]. American Diabetes Association (2017). Classification and diagnosis of diabetes. Diabetes care. 40(1): S11-S24. https://doi.org/10.2337/dc17-S005
[5]. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE (2014). Global estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes Res Clin Pract. 103(2): 137-149. https://doi.org/10.1016/j.diabres.2013.11.002
[6]. Kementerian Kesehatan (2018). Riset kesehatan dasar tahun 2018. Jakarta: Kemenkes RI. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-risksdas/
[7]. Zhang C, Rawal S, Chong YS. 2016. Risk fators for gestational diabetes: is prevention possible?. Diabetologia. 59(7): 1385-1390. https://doi.org/ 10.1007/s00125-016-397
[8]. Dewoto HR (2007). Pengembangan obat tradisional Indonesia menjadi fitofarmaka. MKI. 57(7): 205-211
[9]. Kementerian Kesehatan (2010). Riset kesehatan dasar tahun 2010. Jakarta: Kemenkes RI. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-risksdas/
[10]. Kristianto dan Lilik P. 2011. Psikologi Pemasaran : Integrasi Ilmu Psikologi dalam Kegiatan Pemasaran. Jakarta : CAPS
[11]. Murti B (2018). Prinsip dan metode riset epidemiologi. Program Studi Ilmu Kesehatan Masyarakat. Program Pasca Sarjana UNS. Surakarta
[12]. Burke E. 2013. The Health Belief Model: : Current Nursing Theory.
[13]. Cahyaningtyas NA, Sudiyanto A, Soemanto RB (2018). Socioeconomic determinants of healthy ageing and the contextual effect of peer group: A multilevel evidence from Blora, Central Java. J Epidemiol Public Health. 4(1): 30-36. https://doi.org/10.26911/jepublichealth. 2019.04.01.04
[14]. Hamzah DF (2019). Analisis penggunaan obat herbal pasien diabetes mellitus tipe 2 di kota langsa. Jumantik. 4(2): 168-177. http://dx.doi.org/10.30829-jumantik.v4i2.5057.
[15]. Hasanuddin dan Kusyanti. 2016. Jenis tumbuhan obat penyakit diabetes melitus pada masyarakat Kota Subussalam: 95-100, Prosiding Seminar Nasional Biotik, ISBN: 978-602-18962-7
[16]. Hori S, Mihaylov I, Vasconcelos JC, Mc Coubric M. 2008. Patterns of complementary and alternative medicine use amongst outpatients in Tokyo, Japan. BMC Complement Altern Med., 8:14. https://doi.org/10.1186/1472-6882-8-14
[17]. Wawan A dan Dewi M. 2010. Teori dan Pengukuran : Pengetahuan, Sikap dan Perilaku Manusia. Yogyakarta : Nuha Medika