Prevalence of Mental Health Disorders among Elderly Diabetics and Associated Risk Factors in Indonesia

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Abstract

This cross-sectional study aimed to explore the prevalence of mental health disorders (MHD) among elderly diabetics in Indonesia and their associated risk factors. Data were extracted from the 2018 national basic health survey, Indonesia (abbreviated as the acronym of RISKESDAS). The survey involved households randomly selected from 34 provinces, 416 districts, and 98 cities in Indonesia, with 1,017,290 respondents. The number of subjects selected in this study was 2,818 elderly diabetic subjects. MHD was determined by self-reporting assessment. Secondary data acquired from the RISKESDAS 2018 data involved age, sex, urban-rural residence status, marital status, educational level, employment status, obesity, hypertension, heart disease, stroke, family history of MHD, and duration of DM. Binary logistic regression was used to analyze the risk factors related to MHD among elderly diabetics. Prevalence of MHD among elderly diabetics in Indonesia was 19.3%. Factors associated with MHD among elderly diabetics were obesity (prevalence odds ratio [POR]=4.57; 95% CI: 3.312-6.297), family history of MHD (POR=2.43; 95% CI: 1.707-3.471), lower education (POR=1.93; 95% CI: 1.464-2.533), stroke (POR=1.76; 95% CI: 1.292-2.384), hypertension (POR=1.74; 95% CI: 1.416-2.145), heart diseases (POR=1.49; 95% CI: 1.123-1.973), female (POR=1.43; 95% CI: 1.122-1.813), and urban residence (POR=0.75; 95% CI: 0.607-1.183). The prevalence of MHD among elderly diabetics in Indonesia was 19.3%, suggesting that screening for psychological problems and educating elderly diabetic patients is essential. Obesity, family history of MHD, lower education, stroke, hypertension, heart disease, female, and rural residence altogether more likely to experience MHD in elderly diabetics.

Introduction

In 2019, it was reported that 463 million individuals globally suffered from diabetes mellitus (DM). It was increased from 382 million in 2013[1]. The United States, China, India,
and Indonesia are countries with a high prevalence of DM[2]. The prevalence of DM in Indonesia was 5.7% in 2007 and increased by 10.9% in 2018 [3, 4] caused a number of 157,500 or 6% of total deaths[5]. DM was a catastrophic and financial burden disease that expensed USD 381.25 million for all DM related hospital treatment in 2019 based on national health insurance (Jaminan Kesehatan Nasional=JKN)[6].

Mental health disorder (MHD) is the most frequent comorbid for DM with a prevalence of 28% globally; females tend to be higher than males, i.e., 34% and 23%, respectively[7–10]. Previous mental disorder conditions such as generalized anxiety disorder (GAD), major depressive disorder (MDD), bipolar disorder, and eating disorders are the underlying comorbid for DM patients with MHD[11–14] MHD in diabetics may decrease quality of life[15], poor self-care management[16], increase disability[17], cardiovascular mortality risk[18] and all-cause mortality risk[19]. On the other side, diabetes is a risk factor for MHD[20].

Younger diabetics are more likely to get MHD[8] while another study reported that elderly diabetics more likely to get MHD, with the increased risk of other factors present[11]. The previous study also concluded that MHD is more likely to occur in females, no formal education, current alcohol abusers, type I DM, longer duration of DM, chronic complication of DM, and other comorbidities among elderly diabetics patients[21]. However, there is a lack of information regarding MHD risk factors among elderly diabetics in Indonesia. The five-annual national basic health survey (abbreviated as an acronym of RISKESDAS: riset kesehatan dasar) 2018[3] was the latest national survey conducted by the Ministry of Health, Republic of Indonesia. The present study aimed to determine the prevalence and risk factors of MHD among elderly diabetics in Indonesia.

Materials and Methods

Design and study population

This cross-sectional study employed secondary data acquired from RISKESDAS 2018, which is the latest round of study. The survey involved households randomly selected from 34 provinces, 416 districts, and 98 cities in Indonesia, with 1,017,290 respondents[3]. The study population involved elderly diabetics in the survey aged older than 60 years old. Diabetics status was determined based on the questionnaire as well as age of the respondents. Diabetics status was defined as answering 'Yes' to the question delivered, whether subjects
had diagnosed DM by the doctor. Subjects with incomplete data were excluded from the
study. More details regarding data collection, ethical issues, and other related steps published
in the RISKESDAS 2018 report[3].

Data collection

This study was approved by the Ethics Committee, the National Institute of Health
Research and Development (NIHRD), the Ministry of Health, Republic, Indonesia. MHD
status was determined by the WHO self-reporting questionnaire-20 (SRQ-20),[22] as
acquired from RISKESDAS 2018 data. Secondary data were also acquired from
RISKESDAS 2018 that involved age, sex, urban-rural residence status, marital status,
educational level, employment status, obesity, hypertension, heart disease, stroke, family
history of MHD, and duration of DM.

Statistical analysis

Subject’s characteristics were presented as frequency and proportions. The
relationships of the determinants and MHD status were analyzed by the Chi-square test. The
p-values <0.05 were considered statistically significant. Parameters that had p-value <0.25
then involved in the multivariate analysis using binary logistic regression. All statistical
analyses were performed using the Statistical Package for the Social Sciences (SPSS)
software (version 23.0 for Windows, IBM SPSS Inc., Chicago, IL).

Results

Data extracted from RISKESDAS 2018 contained 2,818 elderly diabetics subjects.
Table 1 showed that the sex proportion of elderly diabetics in the study population was higher
in females, while the age category was almost comparable. Most of the elderly diabetics had
lower education, live in the urban area, unemployed, and married. A few amounts of the
study population, i.e., around 6%, were obese as well as with a family history of MHD.
Hypertension and duration of DM were almost comparable, while heart disease and stroke
had a lower proportion in the total population. The overall prevalence of MHD among elderly
diabetics was 19.3% of the study population.

Table 1. Subject's characteristics
| Characteristics          | Frequency (n) | Percentage (%) |
|-------------------------|---------------|----------------|
| Sex                     |               |                |
| Male                    | 1163          | 41.3%          |
| Female                  | 1655          | 58.7%          |
| Age                     |               |                |
| 60-69 years             | 1489          | 52.8%          |
| >69 years               | 1329          | 47.2%          |
| Education level         |               |                |
| JHS or lower            | 2049          | 72.7%          |
| SHS or higher           | 769           | 27.3%          |
| Residence               |               |                |
| Urban                   | 1799          | 63.8%          |
| Rural                   | 1099          | 36.2%          |
| Employment status       |               |                |
| Unemployed              | 1723          | 61.1%          |
| Employed                | 1095          | 38.9%          |
| Marital status          |               |                |
| Not married             | 1182          | 41.9%          |
| Married                 | 1636          | 48.1%          |
| Obesity                 |               |                |
| Yes                     | 189           | 6.7%           |
| No                      | 2629          | 93.3%          |
| Family history of MHD   |               |                |
| Yes                     | 171           | 6.1%           |
| No                      | 2647          | 93.9%          |
| Duration of DM          |               |                |
| ≤ 5 years               | 1555          | 55.2%          |
| ≥ 5 years               | 1263          | 44.8%          |
| Hypertension            |               |                |
| Yes                     | 1441          | 51.1%          |
| No                      | 1377          | 48.9%          |
| Heart diseases          |               |                |
| Yes                     | 347           | 12.3%          |
| No                      | 2471          | 87.7%          |
| Stroke                  |               |                |
| Yes                     | 258           | 9.2%           |
| No                      | 2560          | 91.8%          |
| MHD                     |               |                |
| Yes                     | 545           | 19.3%          |
| No                      | 2273          | 80.7%          |

JHS: junior high school, SHS: senior high school

Table 2 identified variables that related to the MHD. Sex, residence type, educational level, employment status, obesity, hypertension, heart disease, stroke, and family history of MHD were significantly different between the MHD groups based on the Chi-square test; however, age, marital status, and duration of DM were comparable between the groups. The proportions of several parameters were significantly higher in the MHD group, i.e., female,
rural residence, lower educational level, unemployed, obesity, hypertension, heart disease, family history of MHD, and stroke. These variables, as well as variables that were \( p \leq 0.25 \), i.e., age category and marital status, then involved in the Binary logistic regression, and the final model of regression showed in Table 3.

| Variables                        | MHD                     | p-value* | POR   | % CI          |
|----------------------------------|-------------------------|----------|-------|---------------|
|                                  | Yes (n=545)             | No(n=2273)|       |               |
| Age category                     | n                       | n        |       |               |
| 60-69 years                      | 271 18.2                | 1218 81.8| 0.11  | 1.17 0.968-1.407 |
| >69 years                        | 274 20.6                | 1055 79.4|       |               |
| Sex                              | n                       | n        |       |               |
| Female                           | 366 22.1                | 1289 77.9| 0.001 | 1.56 1.282-1.901 |
| Male                             | 179 15.4                | 984 84.6 |       |               |
| Residence                        | n                       | n        |       |               |
| Urban                            | 296 16.5                | 1503 83.5| 0.001 | 0.61 0.504-0.736 |
| Rural                            | 249 24.4                | 770 75.6 |       |               |
| Marital status                   | n                       | n        |       |               |
| Not married                      | 247 20.9                | 935 79.1 | 0.08  | 1.19 0.983-1.432 |
| Married                          | 298 18.2                | 1338 81.8|       |               |
| Educational level                | n                       | n        |       |               |
| JHS or lower                     | 464 22.6                | 1585 77.4| 0.001 | 2.49 1.932-3.200 |
| SHS or higher                    | 81 10.5                 | 688 89.5 |       |               |
| Employment status                | n                       | n        |       |               |
| Unemployed                       | 364 21.1                | 1359 78.9| 0.003 | 1.35 1.111-1.647 |
| Employed                         | 181 16.5                | 914 83.5 |       |               |
| Obesity                          | n                       | n        |       |               |
| Yes                              | 100 52.9                | 89 47.1  | 0.001 | 5.51 4.072-7.468 |
| No                               | 445 16.9                | 2184 83.1|       |               |
| Hypertension                     | n                       | n        |       |               |
| Yes                              | 351 24.3                | 1090 75.6| 0.001 | 1.96 1.618-2.383 |
| No                               | 194 14.0                | 1183 85.0|       |               |
| Heart diseases                   | n                       | n        |       |               |
| Yes                              | 83 23.9                 | 264 76.1 | 0.02  | 1.37 1.047-1.785 |
| No                               | 462 18.7                | 2009 81.3|       |               |
| Stroke                           | n                       | n        |       |               |
| Yes                              | 86 33.3                 | 172 66.4 | 0.001 | 2.29 1.733-3.022 |
| No                               | 495 19.0                | 2101 81.0|       |               |
| Family history of MHD            | n                       | n        |       |               |
| Yes                              | 63 36.8                 | 108 63.2 | 0.001 | 2.62 1.891-3.630 |
| No                               | 482 18.2                | 2165 81.8|       |               |
| Duration of DM                   | n                       | n        |       |               |
| ≤ 5 years                        | 245 19.4                | 1018 80.6| 0.94  | 0.99 0.823-1.199 |
| ≥ 5 years                        | 300 19.3                | 1255 80.7|       |               |

JHS: junior high school, SHS: senior high school, POR: prevalence odds ratio
*Chi-square test
Table 3. Binary logistics regression of risk factors for MHD

| Risk factors                | p-value | POR   | 95%CI           |
|-----------------------------|---------|-------|-----------------|
| Family history of MHD       | 0.001   | 2.43  | 1.707-3.471     |
| Female                      | 0.004   | 1.43  | 1.122-1.813     |
| Urban residence             | 0.006   | 0.75  | 0.607-1.183     |
| Lower education             | 0.001   | 1.93  | 1.464-2.533     |
| Obesity                     | 0.001   | 4.57  | 3.312-6.297     |
| Hipertension                | 0.001   | 1.74  | 1.416-2.145     |
| Heart diseases              | 0.006   | 1.49  | 1.123-1.973     |
| Stroke                      | 0.001   | 1.76  | 1.292-2.384     |

Nagelkerke R: 0.375; POR: prevalence odds ratio

Of the 11 variables involved in the Binary logistic regression model, eight parameters had statistically significance. Obesity (prevalence odds ratio [POR]=4.57; 95% CI: 3.312-6.297), family history of MHD (POR=2.43; 95% CI: 1.707-3.471), lower education (POR=1.93; 95% CI: 1.464-2.533), stroke (POR=1.76; 95% CI: 1.292-2.384), hypertension (POR=1.74; 95% CI: 1.416-2.145), heart disease (POR=1.49; 95% CI: 1.123-1.973), female (POR=1.43; 95% CI: 1.122-1.813), and urban residence (POR=0.75; 95% CI: 0.607-1.183) altogether were associated with MHD among elderly diabetics.

Discussion

This cross-sectional study involved 2,818 elderly diabetics in Indonesia. Of them, 545 experienced MHD indicated that the prevalence of MHD among elderly diabetics in this population study was 19.3%. The current study updated the prevalence of MHD among elderly diabetics aged older than 60 years old, especially in Indonesia. A systematic review involved 248 studies and concluded a prevalence of 28% in people with type 2 diabetes experienced depression globally and 32% in Asia[8]. Diabetics aged older than 65 years old had a prevalence ratio of 21%[8], indicated similarly with the current study, while in the younger age (<65 years old) had a more prevalence ratio, i.e., 31%[8]. The female group had more prevalence than the male group, i.e., 34% and 24%, respectively[8]. Depression determination methods also influence the prevalence ratio; self-reported methods tend to had a higher prevalence (30%) than clinical diagnosis assessment (22%)[8]. The current study utilized self-reported methods using WHO-SRQ-20[22]; however, it found a lower number of prevalent compared to the previous review[8]. A previous systematic review of 26 studies involved all measurement assessments conducted in 2011 concluded that the prevalence of
major depressive disorder in type 2 DM was 14.5% indicated lower number of prevalence ratio[23]. Another study observed diabetic patients in primary care aged more than 55 years, found the MHD prevalence of 19.1%[24].

Present study also found that the family history of MHD, sex, type of residence, educational level, obesity, hypertension, heart disease, and stroke altogether associated with MHD among elderly diabetics with the pseudo R (Nagelkerke) was 0.375. This finding explained that 37.5% of MHD determinants in this population study of elderly diabetics influenced by the mentioned factors, and the rest 62.5% explained by other factors that did not observe in the study. Present study involved many determinants; however, only those provided in RISKESDAS 2018 data. This study did not observe other pivotal determinants for MHD in diabetics. The determinants involved physical capability, insulin, and drug usage, ethnicity, detailed civil status (married, single, divorced, widowed), residence status (living alone, nuclear family, joint/extended living), family size, family income, pensioner status, smoking, alcohol, religion, glycaemic control, other sociodemographic and clinical health factors[8, 9, 11, 25–27]. The involved determinants in the study will potentially explain other parameters that influence MHD among elderly diabetics.

Interestingly, the current study found that obesity was associated with MHD in elderly diabetics with the highest POR, i.e., 4.57. A review study[28] concluded that obesity raises a 70% risk of MHD, while MHD increases the 40% risk of obesity. However, since this study did not observe longitudinally, so it cannot be determined whether obese occurred prior to MHD or vice versa. Another possibility in MHD prior to obesity, related to the use of its medication that one of the side effects is weight gain[29]. Future studies should be done to elucidate the relationship between obesity and MHD in diabetics, especially among the elderly involved, personality, cardiometabolic traits[30], and cognitive impairments[31].

Family history of MHD was found in this study as a risk factor with high POR, i.e., 2.43 means elderly diabetic with a family history of MHD had a risk 2.43 times compared to elderly diabetic without any family history. Indeed, in general, population, MHD is mostly influenced by the genetic and family factor[32]. Previous studies involved stress and epigenetics as a predictor of MHD in the general population[33]. Candidate genes were also studied and revealed that APOE, BDNF, SLC6A4 polymorphisms related to MHD in the general population[34]. Other studies revealed the contribution of inflammatory markers, such as interleukin (IL)-1β, IL-6, IL-10, monocyte chemoattractant protein-1, tumor necrosis factor-alpha, C-reactive protein, and phospholipase A2 contributed to the depression[35], that is also associated with type 2 diabetes[36].
Lower education level was another significantly associated factor with MHD in this study. Many other studies have reported a similar association of lower educational status with MHD in the diabetes population as well as in the general population[37–40]. Lower education level diabetics have limitations in coping[41] to deal with diabetes complications and other comorbidities as well as their general psychosocial problems. This study showed that elderly diabetics had almost two times the risk of experiencing MHD compared to higher education level. Present study determined lower education levels for elderly diabetics passed for junior high school (secondary education) or lower. Previous studies categorized level education in more detail, i.e., no schooling, primary education, secondary education, and tertiary education.[25].

This study also concluded that female elderly diabetics had a 43% higher risk of getting MHD compared to males. Either in the general population, diabetics, or chronic disease patients, females more likely to get MHD.[8, 42] Current study also found that elderly diabetics who lived in an urban area are less likely to experience MHD (POR=0.75) compared to diabetics live in a rural area. Most of the elderly diabetics in this study population were living in an urban area (63.8%); however, the proportion of MHD among elderly diabetics more likely occur in rural areas. Previous studies showed different conclusions regarding the higher prevalence of MHD in rural or urban areas[25, 40, 43], while other studies reported separately[11, 38, 44]. In developed countries, MHD tends to be higher in urban residents[45]. The current study also concluded a significant relationship between stroke, hypertension, and heart disease to MHD. The risk of stroke, hypertension, and heart disease is 76%, 74%, and 49% higher, respectively, compared to the absence of these conditions. Studies concluded that the presence of comorbidity more likely to experience MHD[11]. The more the number of comorbidities and additional illnesses, the higher the risk of getting MHD[11]. This condition also related to the physical limitations and capabilities, as well as the complicated clinical and health conditions involved drug usages[26].

Conclusions

The prevalence of MHD among elderly diabetics in Indonesia was 19.3%. The risk factors for MHD among elderly diabetic subjects were family history of MHD, female, rural residence, low education, obesity, hypertension, heart disease, and stroke. The high
prevalence of MHD among elderly diabetics, suggesting screening for psychological
problems and educating elderly diabetic patients should be considered as routine components
of diabetes care. Further studies should be conducted using clinical diagnosis assessment in a
large population study, involved genetic factors, inflammatory markers, cardiometabolic
traits, and other potential factors to elucidate the relationship between risk factors and the
occurrence of MHD among elderly diabetic subjects as well as its mechanisms.

Data Availability

The data used to support the findings of this study are available from the corresponding
author Mahalul Azam upon request through the email address
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Conflicts of Interest

The authors have declared that there is no conflict of interest exists.

Funding Statement

Research Grant of Faculty of Sports Science, Universitas Negeri Semarang.

Acknowledgments

We thank the Faculty of Sports Science, Universitas Negeri Semarang, for the Research
Grant under the ID number 36.4.5/UN37/PPK.4.6/2020. We also thank the National Institute
of Health Research and Development, Ministry of Health, the Republic of Indonesia, for
providing RISKESDAS 2018 data.

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