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# HEALTH LITERACY AND DIABETES RISK FACTORS SCORE

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**ABSTRACT**

***Introduction:*** *Health literacy is an ability of people to get, process and understand the health information and services to make a health decision. Diabetes Mellitus (DM) is known as one of major health problem around the world. Decreasing the new cases of DM can be done by applying healthy lifestyle. Health literacy affects to people's life style. This study aims to examine health literacy level of civil administration servant in Central Kalimantan with Diabetes risk factors score.*
***Methods:*** *Totally 42 respondents were recruited in this study. HLS-EU-Q16 was used to measure health literacy level and Finnish Diabetes Risk Score (FINDRISC) questionnaire was used to measure diabetes risk factors score. The data was analyzed in univariate and bivariate analysis used Chi-square.*
***Results:*** *Majority of respondents had aged under 45 years old (85.7%) and male (54.8%). The health literacy level of respondents was high (59.5%) and most of them had low risk of diabetes (69.0%). By using Chi-square, health literacy level was statistically significant with diabetes risk factors score (p=0.028). The risk factors for diabetes that mostly found were overweight, low physical activity, family history of diabetes and not consumed fruit and vegetables every day.*
***Conclusion:*** *Health literacy level was statistically significant with diabetes risk factors score. The government should promote healthy lifestyle to decrease the risk of getting non-communicable disease such as Diabetes Mellitus not only for civil servant but also general population.*

***Keywords*** *Health literacy, Diabetes risk factors, Civil servant, Central Kalimantan*

## INTRODUCTION

Diabetes Mellitus (DM) is now recognized as one of the major health problem throughout the world. Currently, the prevalence of diabetes is quite high where the latest estimate of the International Diabetes Federation (IDF) states that there are 425 million people living with diabetes in the world in 2017. In addition, there are 352 million people who are at risk of developing type 2 diabetes [1]

Indonesia itself has a prevalence of diabetes which tends to increase, from 6.9% (2013) to 8.5% (2018). In the job category, DM patients are more dominated by government employees, one of which is civil servants with a prevalence of 4.2%. It was stated that civil servants tended to suffer from obesity and central obesity compared to other occupational groups. In addition, these workers also showed high consumption of sweet foods and sweet drinks [2].

The prevalence of DM needs to be suppressed so that the increase in its value does not occur by means of health literacy skills. Health literacy is linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course [3]. Without adequate health literacy, a person may not have the capacity to manage his health and prevent the development of chronic

diseases through modification of lifestyle risk factors [4]. Modified lifestyles can actually reduce the risk factors for DM that produces an 80% preventable incidence [5]. This needs to be emphasized because higher risk of diabetes is found in people with low literacy rates, the most common being preventable or modified risk factors, one of which is obesity [6].

This study used state civil administration servant (civil servant and contract workers) in Finance and Asset Regional Agency of Central Kalimantan Office as study population because finding in author's preliminary study shown that workers in the office tend to have diabetes risk factors such as obesity, and lack of exercise and healthy food consumptions. The purpose of this study is to determine the relationship between health literacy and diabetes risk factors score. We hypothesize that there is a relationship between health literacy and diabetes risk factors score among the state civil administration servant.

## METHODS

Participants were recruited from Finance and Asset Regional Agency of Central Kalimantan office. The sample size (n=42) in this study was calculated based on a different hypothesis with the significance level 90% and strength of 90% using WHO Sample Size Determination in Health Studies version 2.0 software. The population proportions for the calculation were obtained from average estimate in previous study in White's [7]. All workers either civil servants or contract workers were randomly selected as potential participants. Simple random sampling was used to recruit participants using Microsoft Excel 2010 software to generate random number, the numbers were matched with the workers name list. Eligible participants were men and women that in place at the time of survey, never been diagnosed with diabetes mellitus and non-pregnant respondents. Individuals who were sick during survey were excluded. All surveys were conducted in Indonesian language and participation was voluntary. Written consent was obtained from participants before beginning the survey and after they were provided with additional information about the study.

After provided with the information, health literacy was assessed using HLS-EU-Q16, a short version from the European health literacy survey tool [8]. The questionnaire was translated in Indonesian language and the translated version has demonstrated excellent reliability [9]. It contains 16 questions that made up of three subscales: health care, disease prevention and health promotion assessment with 4-point Likert-type item scale. Based on the answer, the final score of health literacy can range from 0 to 16. A score $\leq$ 12 identified as inadequate health literacy and a score of 13-16 as adequate health literacy.

The participant who had completed the health literacy question later assessed with diabetes risk factors score that were measured by a brief survey contain 8 items from *Finnish Diabetes Risk Score* (FINDRISC) questionnaire with a score in each of the answer [10]. This instrument showed an optimal result in validity test [11]. Each participant was asked set of questions on diabetes risk related items such as age, Body Mass Index (BMI), waist circumference, physical activity (which indicate if they engage in physical activity more than 30 minutes every day), diet (fruit and vegetables consumptions frequency), high blood pressure and high blood glucose history, and also family history of diabetes. The score form each answer were accumulated, the final score can range from 0 to 26. A score of $\leq$11 was predictive of low risk and a score more than 12 identified as high risk.

In addition to the diabetes risk score, researcher helped the participant with several measurement if they can't pinpoint the answer of the items. Such as, BMI calculation, waist circumference and high blood glucose items. BMI was calculated by chart attached to the questionnaire using following formula: BMI = $kg/m^2$. Waist circumference was measured in centimeters (cm) by placing non-stretching measuring tape with accuracy of 0.1 cm in horizontal plane around participant's abdomen. Blood glucose was measured using a finger stick sample of peripheral blood and analyzed using an Accu-Chek blood glucose meter. Random blood glucose level were determined according to the result in mg/dl.

In this cross sectional study, all statistical analyses were completed using IBM SPSS Statistics version 20. Frequencies and descriptive statistics were used to analyze univariate variable such as respondents' health literacy score, diabetes risk factors score, and risk factors characteristics such as age, BMI, waist circumference, physical activity, diet, high blood pressure history, high blood glucose history, and family history of diabetes. Bivariate analysis was conducted with Chi Square test to determine the relationships between health literacy (independent variable) and diabetes risk factors score (dependent variable). The significance level was set at a $p$ value < 0,1. Odds ratio were analyze also to quantifies the strength of the association between both variable. The null hypothesis in this study is there is no correlation between health literacy and the diabetes mellitus risk factors score.

## RESULT

### *The characteristic of the participants*

A total of 42 participants (23 men, 19 women) were assessed to complete the health literacy and diabetes risk factors questionnaires. All participants stated that they had never diagnosed with diabetes. The majority of the participants were aged under 45 years old (85.7%). Characteristics of the sample are presented in Table 1.

Table 1 Overview of Participant Characteristics (n= 42)

| Variable | N | % |
|---|---|---|
| Sex | | |
| Male | 23 | 54.6 |
| Female | 19 | 45.2 |
| Age | | |
| Under 45 years | 36 | 85.7 |
| 45-54 years | 6 | 14.3 |
| BMI | | |
| Lower than 25 kg/m$^2$ | 15 | 35.7 |
| 25 – 30 kg/m$^2$ | 20 | 47.6 |
| Higher than 30 kg/m$^2$ | 7 | 16.7 |
| Waist circumference | | |
| Less than 94 cm (male) or 80 cm (female) | 23 | 54.8 |
| 94-102 cm (male) or 80-88cm (female) | 10 | 23.8 |
| More than 102 cm (male) or more than 88 cm (female) | 9 | 21.4 |
| Physical Activity | | |
| > 30 minutes everyday | 12 | 28.6 |
| < 30 minutes everyday | 30 | 71.4 |
| Diet (fruit and vegetables consumption) | | |
| Every day | 10 | 23.8 |
| Not Every day | 32 | 76.2 |
| High blood pressure history | | |
| Yes | 35 | 83.3 |
| No | 7 | 16.7 |
| High blood glucose history | | |
| Yes | 36 | 85.7 |
| No | 6 | 14.3 |
| Family history with diabetes | | |
| No | 18 | 42.9 |
| Yes (indirect family) | 17 | 40.5 |
| Yes (direct family) | 7 | 16.7 |
| Health literacy score | | |

| Variable | N | % |
|---|---|---|
| Inadequate health literacy | 17 | 40.5 |
| Adequate health literacy | 25 | 59.5 |
| Diabetes risk factors score | | |
| Low risk | 23 | 69.0 |
| High risk | 13 | 31.0 |

Diabetes risk factors measures confirmed that participants were mostly had low risk of having diabetes in overall (69.0%). According to the result, 54.8% exhibited normal waist circumference, defined as less than 94 cm for men and 80 cm for women, 83.3% never had a history of taken a medication for high blood pressure or had a history of high blood pressure, 85.7% never had history of high blood glucose level, and 42.9% of the participants reported no family history of diabetes. However, result shown high number in several characteristics that increase the risk of diabetes such as overweight (47.6) and obesity (16.7%), low physical activity (71.4%), didn't consume fruit and vegetables every day (76.2%).

Participants' health literacy was overall high with 59.5% of the participants or 25 people scored in adequate health literacy. Meanwhile 17 participants or 40.5% were categorized as inadequate health literacy.

***Health literacy and diabetes risk factors score***

Chi- Square test was conducted using health literacy scores (adequate or inadequate) as independent variable and diabetes risk factors scores (low or high) as dependent variable to determine both associations. Through the chi-square analysis, significant relationships ($p < 0.05$) were found between two variable (**Table 2**). The odds of having high risk of diabetes was significantly higher in participants with inadequate health literacy, compared to those who had adequate health literacy (OR 5.906, 95% CI 1.411 to 24.727)

Table 2 Health Literacy and Diabetes Risk Factors Correlations

| | | Diabetes Risk Factors Score | | | | Total | | Chi Square p value |
|---|---|---|---|---|---|---|---|---|
| | | Low Risk | | High Risk | | | | |
| | | n | % | n | % | n | % | |
| Health Literacy | Inadequate Health Literacy | 8 | 47.1% | 9 | 52.9% | 17 | 100.0% | 0.028 |
| | Adequate Health Literacy | 21 | 84.0% | 4 | 16.0% | 25 | 100.0% | |
| Total | | 29 | 69.0% | 13 | 31.0% | 42 | 100.0% | |

## DISCUSSION

This study examined the level of health literacy and the extent to which it's associated with diabetes risk factors scores. The health literacy level was high or adequate among this civil servant and contract workers. The finding is consistent with previous research that stated the higher health literacy can be found in the population with higher education level [12, 13]. This is in line that government workers in Indonesia requires them to had a high school or higher education level, which explained why adequate health literacy were mostly found in this study population.

The risk factors in this study population showed that most of the workers or participants had low risk of developing diabetes. Compared to the previous research finding, public servant workers as the study population showed that there is a high prevalent of the risk factors for type 2 diabetes mellitus, revealing an inadequate life style for the prevention of this disease [14].

Interestingly, even though most of the participants were in a low risk, there are several risk factors of diabetes that showed high number of incident which can become the main cause of diabetes although they scored low in overall calculation. More than half of the participants are overweight or obese, these condition are the main factors of diabetes prevalence because studies had shown that changes in the composition of fatty acids in membrane phospholipids greatly influence insulin activity and can increase blood sugar levels [15]. Same condition with lack of physical activity and healthy diet specifically fruit and vegetables consumption that generally done by this study population, these condition can increase the occurrence of diabetes. People who have heavy daily physical activity had lower risk of diabetes compared to people who have mild daily physical activity [16]. This study also find that more than half of the participants had direct or indirect family history of diabetes. Based on the previous research people who have a family history of diabetes have a 10.9 times greater chance of developing diabetes than people who do not have a history of diabetes, especially from direct family (parents) [17]

In this study found significant relationship between health literacy and diabetes risk factors score, means inadequate or low health literacy most likely had higher risk of diabetes. This finding is consistent with previous study that stated there is a relationship between health literacy and diabetes in which lower health literacy is more prevalent among individuals with diabetes [18].This is likely a result of inadequate health literacy that causes decreased knowledge and lack of attitude toward about diabetes risk factors [19]. In contrast to this study, the previous research in older adults showed that there is no significant association between functional health literacy and having high risk of diabetes [12].

To the best of our knowledge, the present study is the first to cover health literacy and diabetes risk factors in state civil administration servant, a high at-risk group. But this study has a few limitations. First, it is a descriptive correlational study, thus causation cannot be inferred. Second, the researcher only used civil servant workers in one government office due to the limited time and energy, thus generalization to all civil servants may not be made beyond the target study population. Future studies should include wider range of study population for better representation. Third, this study used a health literacy measure that covers 12 health literacy dimensions in general. This measures are not disease or condition-specific and information obtained by this measures may not be appropriately translated for the specific use with targeted diabetes prevention. These limitation should be considered when interpreting the study result and when designing future research studies with this population.

## CONCLUSION

As the number of prevalence of diabetes grows every year, attention must be focused on strategies to assist these individuals in achieving desirable health outcomes and prevent diabetes, adding to the concern for this population known to have high prevalence of diabetes. The study showed that health literacy show significant relationship with diabetes risk factors score. This study also revealed that the odds of having high risk of diabetes was significantly higher in the person with inadequate health literacy, compared to those who had adequate health literacy.

This study population shown high number of overweight or obesity, lack of exercise, poor diet and family history of diabetes as the main risk factor in general. This further lead to the importance of health literacy skill to determine health behavior so that it will have an impact on managing prevention of diseases especially diabetes not only for the specific group who in the high risk like civil servant but also to the all people. Further studies toward this topics with appropriate tool is needed to understand and to gain more information about health literacy and diabetes specifically in Indonesia.

## CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest

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